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ANSWER KEY

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Chapter-1. Knowing Our Numbers Exercise 1.1

Question 1. Write the following numbers in words:

(i) 2127 – Two thousand one hundred twenty seven

(ii) 40024 – Forty thousand and twenty four

(iii) 32341 – Thirty two thousand three hundred forty one

(iv) 4748 – Four thousand seven hundred forty eight

(v) 83845 – Eighty three thousand eight hundred forty five

Question 2. Write the following numbers in numbers.

(i) Seven thousand seven hundred seventy eight – 7778

(ii) Two thousand four hundred twenty seven – 2427

(iii) Nine thousand two hundred eighteen – 9218

(iv) Six thousand four hundred two – 6402

(v) Seven thousand seven hundred sixty – 7766

Question 3. Fill in the blanks will < or > sign.

(i) 34412 $\geq$ 34313 (ii) 63550 $\geq$ 62545

(iii) 96790 $\leq$ 96895 (iv) 58835 $\leq$ 58940

(v) 8412 $\geq$ 7410

Question 4. Arrange the following numbers in ascending orders:

(i)	32586, 32570, 33465, 31210	31210, 32570, 32586, 33465
(ii)	90046, 90304, 90403, 90406	90046, 90304, 90403, 90406
(iii)	271116, 271218, 271210, 271316	271116, 271210, 271218, 271316

Question 5. Arrange the following numbers in descending order:

(i)	189910, 189019, 189901, 198109	198910, 189019, 189901, 198109
(ii)	3721, 4550, 3724, 4850	4850, 4550, 3724, 3721
(iii)	22180, 22260, 24230, 24380	24380, 24230, 22260, 22180

Question 6. Write the successor of:

(i) 187 – 188 (ii) 3215 – 3216

(iii) 11870 – 11871 (iv) 12315 – 12316

Question 7. Write the predecessor of:

(i) 70 – 69 (ii) 785 – 784

(iii) 2132 – 2131 (iv) 10199 – 10198

Exercise 1.2

Question 1. Tick the correct answer :

(i) 6000000 + 500000 + 4000 + 100 + 7 is

(a) 6504107 (b) 6504207 (c) 6504017 (d) 64050107

Ans. 6504107

(ii) The smallest 7 digits number using the digits 1, 2, 7, 4 is

(a) 1122274 (b) 1112247 (c) 1111274 (d) 1111247

Ans. 1111247

(iii) The greatest 8 digits number descending the digits 1, 0, 3, 5 is

(a) 55555555 (b) 55555310 (c) 30555551 (d) 55555301

Ans. 55555310

Question 2. Write the place value of 8 in each of the following numbers.

(i) 7859321 – 8 lac or 8,00,000

(ii) 3008004 – 8 thousand or 8000

(iii) 81397254 – 8 crore or 8,00,00,000

(iv) 2080413 – 80 thousand or 80,000

(v) 854231 – 8 lakhs or 8,00,000

Question 3. Write in a short form each of the following

(i) 400000 + 20000 + 300 + 70 + 7 – 420377

(ii) 7000000 + 300000 + 4000 + 50 + 2 – 7304052

(iii) 9000000 + 700000 + 2000 + 30 + 5 – 9702035

Question 4. Using the digits 4, 6, 5, 7, 0 make greatest 8 digit number.

Ans. 77776540

Question 5. Using the digits 3, 2, 4, 1, 0 make the smallest 8 digit numbers.

Ans. 11110234

Exercise 1.3

Question 1. Fill in the blanks :

(i) One hundred thousand 10 million.

(ii) 1 million 100 lakh.

(iii) 1 lakh 100 thousand.

(iv) 1 billion 10 million.

Question 2. Write the following numbers in international system:

(i) 2,386,012 – Two million, three hundred and eighty six thousand and twelve

(ii) 48,235,127 – Forty eight million, two hundred thirty five thousand, one hundred twenty seven

(iii) 7,300,100,400 – Seven billion, three hundred million, one hundred thousand and four hundred

(iv) 42,603,02,379 – Four billion, two hundred sixty million, three hundred and two thousand, three hundred seventy nine

Question 3. Insert commas suitable and write the names according to the International system of numeration.

(i) 345002 – 3,45,002

(ii) 68045765 – 68,045,765

(iii) 507012084 – 507,012,084

(iv) 5025054000 – 5,025,054,000

Question 4. The number 380042080 in international system.

(a) Three thousand eighty million forty two thousand eighty.

(b) Three hundred eighty million forty two thousand eighty.

(c) Three hundred eighty million four hundred two thousand eighty.

(d) Thirty eight million four hundred twenty thousand eighty.

Ans. (b) Three hundred eighty million forty two thousand eighty.

Question 5. Write the numbers whose expanded form are given below.

(i) $(1 \times 10000) + (5 \times 1000) + (6 \times 100) + (9 \times 10) + (6 \times 1)$

Ans. 15696

(ii) $(8 \times 10000) + (7 \times 1000) + (1 \times 100) + (2 \times 10) + (3 \times 1)$

Ans. 87123

(iii) $7,00,00,00 + 6 \times 100000 + 3 \times 100 + 2 \times 1$

Ans. 760302

(iv) $7 \times 100000000 + 5 \times 10000000 + 3 \times 1000000 + 1 \times 100000 + 7 \times 10000 + 8 \times 1000 + 5 \times 10 + 9 \times 1$

Ans. 75317859

Exercise 1.4

Question 1. A merchant had ₹ 9,07,640 with her. She placed an order for 48 refrigerators at ₹ 16000. How much money will remain with her after the

Merchant had ₹ 9,07,640

Placed order for 48 refrigerators at ₹ 16000

1 refrigerator cost = 16000

48 refrigerator cost = 48×16000 = 7,68,000

The amount which is merchant has = 9,07,640

The amount which is left = 9,07,640 – 7,68,000 = 1,39,640

Ans. 1,39,640

Question 2. The distance between Atul's office and his house is 21 km 375 m. Everyday he takes bus both ways. Find the total distance covered by him in six days.

The distanced between Atul's office and his house is 21 km 375 m.

The total distance covered by him in six days.

Distance = 21 km 375 m or 21375

Distance = in 1 day = $21375 \times 2 = 42,750$ m

Distance for 6 = $42750 \times 6 = 2,56,500 = 256.5$

Ans. 21 km $375 \times 6 = 256.5$

Question 3. In a particular year a company manufactured 8534680 air conditioners in the following year. The number of air conditioners manufactured was 1222333 more than there produced in the previous year.

(i) How many air conditioners were produced during second year.

(ii) How many air conditioners were produced during these two years.

In a particular a company years manufactured = 8534680

The number of air conditioners manufactured year = 1222333

(i) The air conditioner were produced during second year was = 8534680 + 1222333 = 9,757,013

(ii) The air conditioner were produced during these two years

= 9,757,013 + 8,534,680 = 18,291,693

Question 4. The total population of a city in 352964069. If the number of males is 18859695. Find the number of females in the city.

The total population of a city is 35296406

Number of males 1885965

The number of females are = 35296406 – 1885965 = 33,410,441

Question 5. A company sold goods worth ₹ 17380245 in the month of June 12. The sale proceeds for a first two weeks were ₹ 3756744 and ₹ 3863108. What were the sale proceeds for the last two weeks.

A company sold goods worth ₹ 17380245

Sale proceeds for two weeks were ₹ 3756744 and ₹ 3863108

The total sale of first two weeks is = 3756744 + 3863108 = 76,19,852

The sale proceeds for last two weeks are = 17380245 – 7619852 = 97,60,393

Question 6. An aeroplane covers 850 km in 1 hr. How much distance will it cover in 73 hrs.

An aeroplane covers 1 hr. = 850 km

In 73 hrs. = 73 × 850 = 62050 km

Ans. 62050 km

Question 7. The total mass of 32 packets each of same mass is 50 kg 400 gm. What is the mass of each such packet?

The total mass of 32 packet = 50 kg 400 gm

The mass of each packet = 50400 ÷ 32 = 1575

Ans. 1 kg 575 gm

Exercise 1.5

Question 1. Estimate each of the following using the general rule.

(i) 728 + 996 = 1724 → 1700

(ii) 42905 + 4885 = 47,790 → 48000

(iii) 795 – 312 = 500

Question 2. Round off the following numbers to the nearest hundred.

(i) 173 – 200 (ii) 380 – 400

(iii) 854 – 900 (iv) 445 – 400

(v) 593 – 600 (vi) 450 – 500

Question 3. Evaluate each sum to the nearest ten.

(i) 34 + 42 = 76 = 80 (ii) 32 + 91 = 123 = 120

(iii) 72 + 78 = 150 = 150 (iv) 19 + 87 = 106 = 110

(v) 332 + 725 = 1057 = 1060 (vi) 128 + 232 = 360 = 360

Question 4. Estimate the difference to the nearest ten.

(i) 52 – 18 = 34 = 30 (ii) 97 – 37 = 60 = 60

(iii) 308 – 157 = 151 = 150 (iv) 982 – 810 = 172 = 170

Question 5. Estimate the difference to the nearest hundred.

(i) 664 – 207 = 457 = 500 (ii) 7282 – 3784 = 3498 = 3500

(iii) 7687 – 532 = 7155 = 7200 (iv) 8075 – 7283 = 792 = 800

Exercise 1.6

Question 1. Estimate the product of each of the following by rounding if each number to the nearest ten.

(i) 47 × 74 = 3478 = 3480 (ii) 32 × 61 = 1952 = 1950

(iii) 44 × 72 = 3168 = 3170 (iv) 76 × 86 = 6536 = 6540

(v) 57 × 84 = 4788 = 4790 (vi) 65 × 55 = 3575 = 3580

Question 2. Estimate the product of each of the following by rounding off each number to the nearest hundred.

(i) 367 × 230 = 84,410 = 84,400 (ii) 657 × 355 = 2,33,235 = 2,33,200

(iii) 272 × 335 = 91,120 = 91,100 (iv) 393 × 139 = 54627 = 54600

(v) 608 × 275 = 1,67,200 = 1,67,200 (vi) 422 × 164 = 69,208 = 69,200

Question 3. Estimate the product of each of the following is rounding off each number to the nearest thousand.

(i) 27808 × 42424 = 28000 × 42000 = 1176000000

(ii) 47324 × 48325 = 47000 × 48000 = 2256000000

(iii) 24288 × 29287 = 24000 × 29000 = 696000000

(iv) 42506 × 47430 = 43000 × 47000 = 2021000000

Exercise 1.7

Question 1. Copy and complete.

(i) $4\overline{)331} \rightarrow 4\overline{)320}$ (20)

(ii) $46\overline{)487} \rightarrow 50\overline{)500}$ (10)

(iii) $12\overline{)375} \rightarrow 12\overline{)360}$ (30)

(iv) $26\overline{)928} \rightarrow 30\overline{)900}$ (30)

(v) $40\overline{)1571} \rightarrow \overset{\boxed{40}}{40\overline{)1600}}$ (iv) $65\overline{)2218} \rightarrow \overset{\boxed{30}}{70\overline{)2100}}$

Question 2. Estimate the quotient. Verify by actual calculation.

(i) $7\overline{)283}$ = 40

$$\begin{array}{r} 40.4 \\ 7\overline{)283} \\ 28 \\ \hline \times\ 30 \\ \hline 28 \\ \hline 02 \end{array}$$

(ii) $6\overline{)314}$ = 52

$$\begin{array}{r} 52.3 \\ 6\overline{)314} \\ 30 \\ \hline 14 \\ 12 \\ \hline 20 \\ 18 \\ \hline 02 \end{array}$$

(iii) $7\overline{)6217}$ = 888

$$\begin{array}{r} 888 \\ 7\overline{)6217} \\ 56 \\ \hline 61 \\ 56 \\ \hline 57 \\ 56 \\ \hline 01 \end{array}$$

(iv) $4\overline{)2657}$ = 641

$$\begin{array}{r} 641 \\ 4\overline{)2567} \\ 24 \\ \hline 16 \\ 16 \\ \hline \times\ 7 \\ \hline 4 \\ \hline 3 \end{array}$$

(v) $96\overline{)2758}$ = 28

$$\begin{array}{r} 28 \\ 96\overline{)2758} \\ 192 \\ \hline 838 \\ 768 \\ \hline 70 \end{array}$$

(vi) $21\overline{)4423}$ = 210

$$\begin{array}{r} 210.6 \\ 21\overline{)4423} \\ 42 \\ \hline 22 \\ 21 \\ \hline 130 \\ 126 \\ \hline 004 \end{array}$$

(vii) $96\overline{)2758}$ = 28

$$\begin{array}{r} 28 \\ 96\overline{)2758} \\ 192 \\ \hline 838 \\ 768 \\ \hline 70 \end{array}$$

(viii) $128\overline{)5294}$ = 41

$$\begin{array}{r} 41.3 \\ 128\overline{)5294} \\ 512 \\ \hline 174 \\ 128 \\ \hline 460 \\ 384 \\ \hline 076 \end{array}$$

Exercise 1.8

Question 1. Express each of the following as Roman numeral.

(a) 14 – XIV (b) 8 – VIII (c) 5 – V

(d) 12 – XII (e) 18 – XVIII (f) 20 – XX

(g) 25 – XXV (h) 30 – XXX (i) 32 – XXXII (j) 40 – XL

Question 2. Write each of the following as a Hindu Arabic numeral.

(a) XXVI – 26 (b) XXXV – 35 (c) XXXIV – 34

(d) LXXIII – 73 (e) XCIX – 99 (f) XCII – 92

Question 3. Insert <, > in the blank.

(i) XIV > XIII (ii) XXV < XII

(iii) XXXVI > XXXXVII (iv) CXIV < CXVII

Chapter-2 Whole Numbers Exercise 2.1

Question 1. Which is the smallest whole number?

Ans. 0 is the smallest whole number.

Question 2. Which is the smallest natural number?

Ans. 1 is the smallest natural number.

Question 3. How many whole numbers are there between 35 and 53?

Ans. There are 17 seventeen whole numbers between.

35 and 53

53 – 35 = 18 – 1 = 17

Question 4. Which whole number does not have predecessor.

(i) 0 (ii) 1 (iii)2 (iv) 3

Ans. (i) 0 (The whole number which does not have predecessor.)

Question 5. Write the successor of –

(i) 2550901 – 2550902 (ii) 102199 – 102200 (iii) 107819 – 107820

(iv) 2783481 – 2783482 (v) 2178328 – 2178329 (vi) 507328 – 507329

Question 6. Write the predecessor of –

(i) 1000 – 999 (ii) 40000 – 39999 (iii) 324832 – 329831

(iv) 3980000 – 3979999 (v) 5089000 – 5088999 (vi) 10000 – 9999

Exercise 2.2

Question 1. Add each of the following and checking reversing the order of addends:

(i) 5943 + 287 = 287 + 5943 = 6230

(ii) 12420 + 9243 = 9243 + 12420 = 21663

(iii) 4332 + 4879 = 4879 + 4332 = 9211

(iv) 4784 + 2443 = 2443 + 4784 = 7227

Question 2. Fill in the blanks to make each of the following a true statement.

(i) 4789 + 0 = 4789 (ii) 0 + 997 = 997

(iii) 5239 + 642 = 5881 (iv) 5484 + 278 = 5762

(v) 338 + (891 + 616) = 338 + 1507 = 1845 (vi) 445 + (839 + 431) 445 + 1270 = 1715

Question 3. Which whole number is called identity element under addition?

Ans. The zero is the only whole number that does not change the value of the number added to. The zero is called identity element under addition.

Question 4. If a is a whole number such that a + 0 = a then a = _____.

Ans. 0 (Zero)

Question 5. 16 + (62 + 7) = (16 + 62) + 7 is an example of –

(a) Closure Property (b) Commutative Property

(c) Property of Zero (d) Associative Property

Ans. (d) Associative Property

Exercise 2.3

Question 1. Perform the following subtractions :

(i) 8350 – 294 (ii) 41000 – 31035 (iii) 10000 – 999

(iv) 4040401 – 302010 (v) 17 – 5

(i)
8350	
– 294	
8056	

(ii)
41000	
–31035	
09965	

(iii)
10000	
– 999	
9001	

(iv)
4040401	
– 302010	
3738391	

(v)
17	
– 5	
12	

Question 2. Find the whole number a when –

(i) a + 7 = 20 = a = 20 – 7 = 13 (ii) a + 43 = 215 = a = 215 – 43 = 172

(iii) a – 12 = 20 = a = 20 + 12 = 32 (iv) a – 420 = 318 = a = 318 + 420 = 738

Question 3. A men open his account ₹ 50,0000 in bank. After one day he withdraw ₹ 25,000 from account. He purchased air conditioner for ₹ 45250 and a LED for ₹ 91,325. He deposited the balance money in bank. How much money does the he have in his account now.

A men open his account 5,00,000

Withdraw – 25,000 from accounts

Purchased air conditioner ₹ 45,250

Purchased LED ₹ 91,325

5,00,000 – 25,000 = 4,75,000

Purchased air conditioner + LED = 45,250 + 91,325 = 1,36,575

4,75,000 – 1,36,575 = 338425 **Ans.**

The amount left in the account.

Question 4. Find the difference between the smallest number of 5 digits and the largest number of 4 digits.

The smallest five digit number is 10000

Biggest four digit number 9999

10000
– 9999
00001

Ans. 1

Question 5. Find the difference between the smallest 7 digit and the largest number 4 digits

Ans. 990001

1000000
– 9999
990001

Exercise 2.4

Question 1. Determine each of the following products by suitable rearrangement.

(i) $4 \times 3995 \times 210 = (4 \times 210) \times 3995$

$= 840 \times 3995$

$= 3,35,58,000$

(ii) $37256 \times 25 \times 3 \times 40 = (37256 \times 3) \times (25 \times 40)$

$= (1,11,768 \times 1000)$

$= (11,17,68,000)$

Question 2. Find the value of each of the following using various properties.

(i) $640 \times 3 + 640 \times 4$

$= 1920 + 2560$

$= 4480$

(ii) $2416 \times 92 + 2416 \times 7$

$= 2,22,272 + 16,912$

$= 2,39,184$

(iii) $8435 \times 333 + 8435$

$= 28,08,855 + 8455$

$= 28,17,310$

(iv) $992 \times 10 \times 982 - 783 \times 2423$

$= 97,41,440 - 18,97,209$

$= 78,44,231$

Question 3. Using distributive property of multiplication over addition/subtraction in whole number.

(i) $584 + 102$

$584 + 102 = 686$ **Ans.**

(ii) 936×1005

$936 \times (1000 + 5)$

$(936 \times 1000) + (936 \times 5)$

$936000 + 4680 = 940680$ **Ans.**

(iii) 482×64

$482 \times (60 + 4)$

$(482 \times 60) + (482 \times 4)$

$28,920 + 1928$

30848 **Ans.**

(iv) 5098×999

$5098 \times (900 + 99)$

$(5098 \times 900) + (5098 + 99)$

$45,88,200 + 5,04,702$

50,92,902 **Ans.**

Question 4. The value of 400 × 3 × 0 × 10 is

(i) 1200 (ii) 12000 (iii) 120000 (iv) 0

Ans. 0

Question 5. In a school there are twelve classes. If each class 30 boys and 20 girls. Find the number of students enrolled in the school.

In a school twelve classes each class 30 boys

In a school twelve class each class 20 girls

The total number of boys and girls in each class 30 + 20 = 50

Twelve classes in a school 50 × 12 = 600

Exercise 2.5

Question 1. Find the value of following :

(i) **0 ÷ 49** = 0 **Ans.** **(ii)** **83482 ÷ 1** = 83,482 **Ans.**

(iii) **990 ÷ (640 ÷ 64)**

990 ÷ 10

99 **Ans.**

(iv) **734 + (230 ÷ 230)**

734 + 1

735 **Ans.**

Question 2. Find the greatest 5 digits number which is exactly divisible by 236.

Ans. The greatest 5-digit number is 99828 which is exactly divisible by 236.

Question 3. Divide the following :

(i) 53 × 64 ÷ 3

= 53 × 21.33

= 1130.49 **Ans.**

(ii) 54 + 62 ÷ 2

= 54 + 31

= 81 **Ans.**

(iii) 523 × 574 ÷ 4

= 523 × 143.5

= 75050.5 **Ans.**

(iv) 724 – 524 ÷ 3

= 724 – 174.6

= 549.4 **Ans.**

Question 4. Fill in the blanks to make correct statement.

(i) 570 × 2 – 274 ÷ 2

570 × 2 – 137

1140 – 137

= 1003 **Ans.**

(ii) 200 × 4 – 244 ÷ 4

200 × 4 – 61

800 – 61

= 739 **Ans.**

(iii) 140 × 5 + 945 ÷ 5

140 × 5 + 189

700 + 189

= 889 **Ans.**

(iv) 425 × 7 + 248 ÷ 6

425 × 7 + 41.33

2975 + 41.33

= 3016.33 **Ans.**

Question 5. During assembly in a school 120 students stand in each row. Find the minimum number of rows if there are 480 students in that school.

During assembly in a school 120 students 480 students in a school

The minimum number of rows 480 ÷ 120 = 4

4 rows minimum number of rows.

Exercise 2.6

Question 1. Observe the latter and fill in the blanks :

(i) (a) 1 × 1 = 1

(b) 11 × 11 = 21

(c) 111 × 111 = 12321

(d) 1111 × 1111 = 1234321

(ii) (a) 2 × 2 = 4

(b) 22 × 22 = 484

(c) 222 × 222 = 49,284

(d) 2222 × 2222 = 49,37,284

Question 2. Study the following pattern and write the next 2 steps :

(i) (a) 1 × 7 + 1 = 8

(b) 12 × 7 + 2 = 86

(c) 123 × 7 + 3 = 864

(d) 1234 × 7 + 4 = 8642

(e) 12345 × 7 + 5 = 86420

(f) 123456 × 7 + 6 = 864198

(ii) (a) 1 × 15 + 1 = 16

(b) 12 × 15 + 2 = 182

(c) 123 × 15 + 3 = 1848

(d) 1234 × 15 + 4 = 18514

(e) 12345 × 15 + 5 = 185180

(f) 123456 × 15 + 6 = 1851846

Chapter-3. Playing With Numbers Exercise 3.1

Question 1. Simplify the following :

(i) 100 + 7 × 6 ÷ 3 – 8 × 4 – 10

100 + 7 × 2 – 8 × 4 – 10

100 + 14 – 32 – 10

114 – 42 = 72 **Ans.**

(ii) 28 – 21 ÷ 7

28 – 3

25 **Ans.**

(iii) 55 ÷ 5 + 18 + 12 × 2 – 1

11 + 18 + 12 × 2 – 1

11 + 18 + 24 – 1

53 – 1 = 52 **Ans.**

(iv) 15 + 3 × 5 – 2

15 + 15 – 2

30 – 2

28 **Ans.**

(v) 31 – (12 + 18 – 15) ÷ 5 – 14 × 2

31 – 15 ÷ 5 – 14 × 2

31 – 3 – 14 × 2

31 – 3 – 28

31 – 31 = 0 **Ans.**

(vi) 12 – (17 – 12) + 7 ÷ 7

12 – (17 – 12) + 1

12 – 5 + 1

8 **Ans.**

(vii) $40 \times 5 + \{17 - (16 - 4)\} \times 3$

$40 \times 5 + 17 - 12 \times 3$

$40 \times 5 + 5 \times 3$

$200 + 15$

215 **Ans.**

(viii) $50 + [40 - \{30 - (18 - 12 - 2)\}]$

$50 + [40 - (30 - (18 - 14)]$

$50 + [40 - (30 - 4)]$

$50 + [40 - (26)]$

$50 + [40 - 26]$

$50 + 14 = 64$ **Ans.**

Exercise 3.2

Question 1. Write the all factors of –

(i) 32

1×32

2×16

4×8

Factors of 1, 2, 4, 8, 16, 32.

(ii) 84

1×84

2×42

3×28

4×21

6×14

7×12

Factors of 84 = 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84.

(iii) 72

1×72

2×36

3×24

4×18

6×12

8×9

Factors of 72 = 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72.

(iv) 19

Factors of 19 = 1, 19.

(v) 28

1×28

2×14

4×7

Factors of 28 = 1, 2, 4, 7, 14, 28.

Question 2. Write the four multiplies of –

(i) $5 = 5 \times 2 = 10$

$5 \times 3 = 15$

$5 \times 4 = 20$

$5 \times 5 = 25$

(ii) $70 = 70 \times 2 = 140$

$70 \times 3 = 210$

$70 \times 4 = 280$

$70 \times 5 = 350$

(iii) $11 = 11 \times 2 = 22$

$11 \times 3 = 33$

$11 \times 4 = 44$

$11 \times 5 = 55$

(iv) $14 = 14 \times 2 = 28$

$14 \times 3 = 42$

$14 \times 4 = 56$

$14 \times 5 = 70$

(v) $20 = 20 \times 2 = 40$

$20 \times 3 = 60$

$20 \times 4 = 80$

$20 \times 5 = 100$

(vi) $35 = 35 \times 2 = 70$

$35 \times 3 = 105$

$35 \times 4 = 140$

$35 \times 5 = 175$

(vii) 15 = $15 \times 2 = 30$

$15 \times 3 = 45$

$15 \times 4 = 60$

$15 \times 5 = 75$

Question 3. The product of 2 numbers is 36. Their sum is 20. What are the numbers?

$2 \times 18 = 36$

$2 + 18 = 20$

Question 4. Find 2 numbers whose difference is 13 and product is 48.

$3 \times 16 = 48$

$16 - 3 = 13$

Question 5. Without actual division show that 17 is a factor of 170017.

First 17 is divisible by 17. Then 0 and 0 is divisible by 17. Now comes the same 17 so it is also divisible by 17. So the answer is 10001.

Question 6. Which of the following numbers are even and odd.

(i)	25	=	O	(ii)	28	=	E	(iii)	29	=	O
(iv)	15	=	O	(v)	10	=	E	(vi)	34	=	E
(vii)	40	=	E	(viii)	47	=	O	(ix)	58	=	E
(x)	107	=	O								

Question 7. Write down separately the prime and composite number less than 25.

Prime numbers = 2, 3, 5, 7, 11, 13, 17, 19, 23.

Composite numbers = 4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21, 22, 24, 25.

Question 8. Express the following numbers as sum of twin primes.

(i)	12	= 7 + 5		(ii)	36	= 23 + 13
(iii)	60	= 47 + 13		(iv)	120	= 97 + 23

Exercise 3.3

Question 1. Fill in the blanks :

(i) A number is divisible by 4, if the number formed by the last 2 digits of the numbers is divisible by 4.

(ii) A number is divisible by 6, if it is divisible by both 2 and 3.

(iii) A number is divisible by 5 if its ones digit is 0 or 5.

(iv) A number is divisible by 9, if the sum of its digits is divisible by 9 .

(v) If a number is divisible by both 5 and 3, it is necessarily divisible by 15 .

Question 2. List the primes :

(i) Less than 30.

2, 3, 5, 7, 11, 17, 19, 23, 29.

(ii) Between 70 and 150.

71, 73, 79, 83, 89, 97, 101, 103, 107, 109, 113, 127, 131, 137, 139, 149.

Question 3. Write :

(i) All even prime numbers.

Ans. There are 25 even prime number 2, 3, 5, 11, 13, 17, 19, 23, 29, 31, 31, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89 and 97.

(ii) Prime numbers between 90 and 100.

Ans. 97

(iii) Smallest odd composite numbers.

Ans. 9

(iv) Pair of twin primes between 70 and 80.

Ans. 71 and 73

(v) Number that is neither prime nor composite.

Ans. 1

Exercise 3.4

Question 1. Using the divisibility test determine which of the following numbers are divisible by 2.

(i) 7932 (ii) 80587 (iii) 6890 (iv) 42985

Ans. (i) and (iii) are completely divisible by 2.

Question 2. Using the divisibility test determine which of the following numbers are divisible by 5

(i) 2950 (ii) 79321 (iii) 27675 (iv) 9999

Ans. (i) and (iii) are completely divisible by 5.

Question 3. Using the divisibility test determine which of the following numbers are divisible by 10

(i) 127880 (ii) 2985 (iii) 239510 (iv) 8955

Ans. (i) and (iii) are divisible by 10.

Question 4. Test by 3 the divisibility of the following numbers by 3

(i) 6732 (ii) 8345 (iii) 102357 (iv) 531109

Ans. (i) and (iii) are completely divisible by 3.

Question 5. Test the divisibility of the following number by 6

(i) 969510 (ii) 879422 (iii) 735108 (iv) 1000001

Ans. (i) and (iii) is completely divisible by 6.

Question 6. Test the divisibility of the following numbers by 9

(i) 89145 (ii) 678277 (iii) 8523 (iv) 873452

Ans. (i) and (iii) is completely divisible by 9.

Question 7. Test the divisibility of the following number by 4

(i) 687352 (ii) 5102389 (iii) 9713 (iv) 972144

Ans. (i) and (iii) is completely divisible by 9.

Question 8. Test the divisibility of the following number by 8

(i) 298704 (ii) 973252 (iii) 828184 (iv) 933253

Ans. (i) and (iii) are completely divisible by 8.

Question 9. Using divisibility test determine which of the following numbers are divisible by 11

(i) 96010837 (ii) 10000001 (iii) 936612 (iv) 78169003

Ans. (ii) and (iv) is completely divisible by 11.

Question 10. Using the divisibility test determine which of the following numbers are divisible by both 5 and 10.

(i) 2985 (ii) 67950 (iii) 853600 (iv) 900090

Ans. (ii), (iii) and (iv) are completely divisible by 5 and 10.

Question 11. Write the smallest digit and greatest digit in the blank space of each of the following number so that the numbers formed is divisible by 3.

(i) –4267 = 24267

(ii) 7452 – 6 = 745286

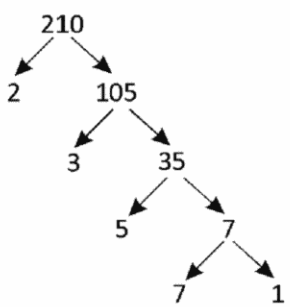
Question 12. Find out whether 365 is a prime or not.

Ans. No, 365 is not a prime number. The list of all positive divisors (i.e., the list of all integers that divide 365) is as follows : 1, 5, 73, 365. To be 365 a prime number, it would have been required that 365 has only two divisors i.e., itself and 1.

Exercise 3.5

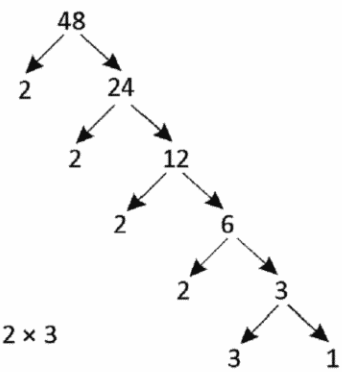
Question 1. Write the prime factorization of each of the following numbers.

(i) 210 =



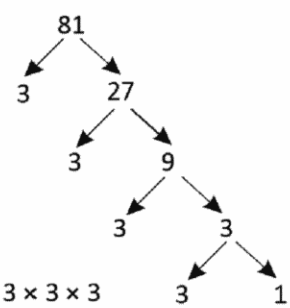
$210 = 2 \times 3 \times 5 \times 7$

(ii) 48 =



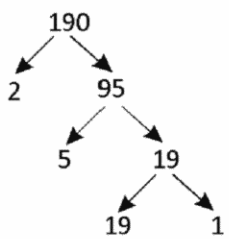
$48 = 2 \times 2 \times 2 \times 2 \times 3$

(iii) 81 =



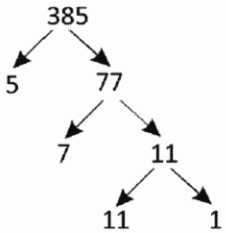
$81 = 3 \times 3 \times 3 \times 3 \times 3$

(iv) 190 =



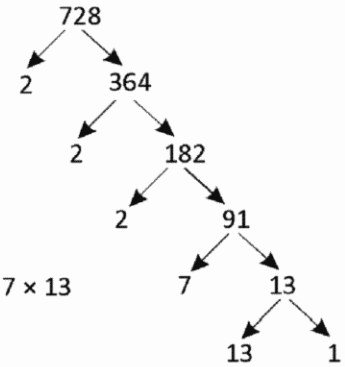
$190 = 2 \times 5 \times 19$

(v) 385 =



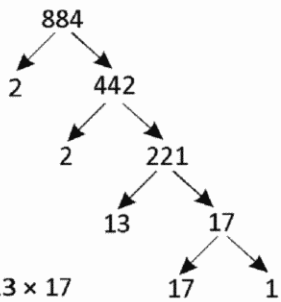
385 = 5 × 7 × 11

(vi) 728 =



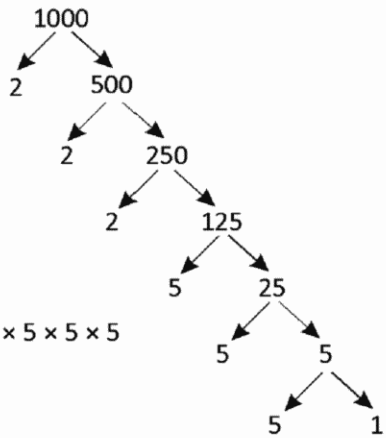
728 = 2 × 2 × 2 × 7 × 13

(vii) 81 =



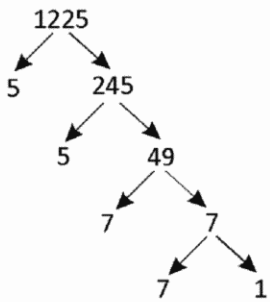
884 = 2 × 2× 13 × 17

(viii) 1000 =



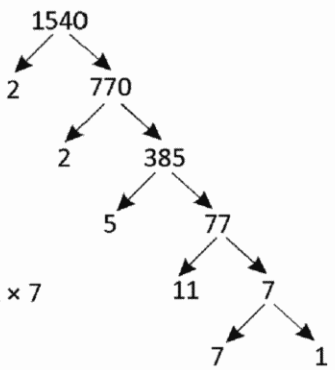
1000 = 2 × 2 × 2 × 5 × 5 × 5

(ix) 1225 =



1225 = 5 × 5 × 7 × 7

(x) 1540 =



1540 = 2 × 2 × 5 × 11 × 7

Question 2. Find the prime factors by division method :

(i) 8624

8634 = 2 × 2 × 2

2 × 7 × 7 × 11

2	8624
2	4312
2	2156
2	1078
7	539
7	77
11	11
	1

(ii) 5610

2	5610
3	2805
5	935
187	187
	1

5610 = 2 × 3 × 5 × 187

Exercise 3.6

Question 1. Find the HCF of 24 and 36.

Factors of 24 = 1, 2, 3, 4, 68, 12 and 24.

Factors of 36 = 1, 2, 3, 4, 6, 9, 12, 18 and 36.

There common factor of 24 and 36 = 1, 2, 3, 4, 6, 8, 12.

Highest common factors of 24 and 36 = 12.

Question 2. Find the HCF of 72, 108 and 180.

Factors of 72 = 1, 2, 3, 4, 6, 8, 12, 18, 24, 36, 72

Factors of 108 = 1, 2, 3, 4, 6, 9, 12, 18, 27, 36, 54, 108

Factors of 180 = 1, 2, 3, 4, 5, 6, 9, 10, 12, 15, 18, 20, 30, 36, 45, 60, 90 180

Common factors of 72, 108 and 180 are 1, 2, 3, 4, 6, 12, 18, 36.

Highest common factors is 36.

Question 3. Find the HCF of 658, 940, 1128 by division method.

Step-I

```
658) 940 (1
     658
     ---
282) 658 (2
     564
     ---
 94) 282 (3
     282
     ---
       0
```

Step-II

```
94) 1128 (12
    94
    --
    118
    118
    ---
      0
```

HCF of 658, 940 = 94

Therefore HCF of 658, 940 and 1128 = 94

Question 4. Find the greatest number that will divide 55, 75 and 113 leaving the remainders 7, 3 and 5 respectively.

Subtracting remainder

55 – 7 = 48

75 – 3 = 72

113 – 5 = 108

The new number are 48, 72, 108

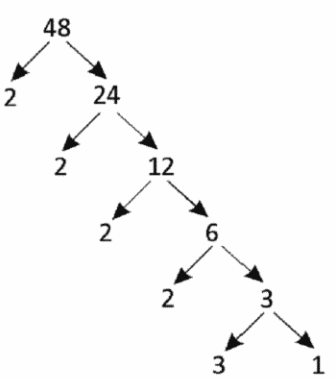
HCF by prime factorization method.

48

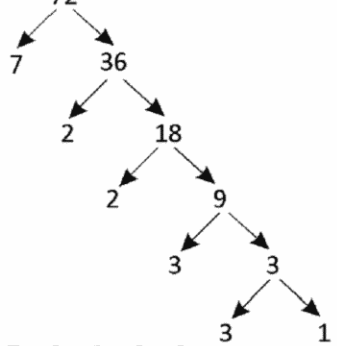
75

108

P.F. of 48 = 2 × 2 × 2 × 2 × 3

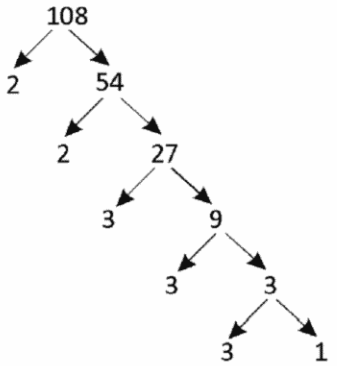


(ii) 72 = 72



P.F. of 72 = 7 × 2 × 2 × 3 × 3

(iii) 108 = 108



P.F. of 108 = 2 × 2 × 3 × 3 × 3

P.F. of 48 = 2 × 2 × 2 × 2 × 3

72 = 7 × 2 × 2 × 3 × 3

108 = 2 × 2 × 3 × 3 × 3

2 × 3 = 6

Question 5. Three tankers contain 403 liters, 434 liters and 465 liters of diesel respectively. Find the maximum capacity of 9 container that can measure. The diesel of the three containers exact number of times.

Ans. We need to find H.C.F. of 403, 434 and 465 to find the maximum capacity of a container that can measure the diesel of the three container exact number of limes.

Let's final the prime factors of 403, 434 and 465.

403 = 13 × 31

434 = 2 × 7 × 31

465 = 3 × 5 × 31

31 is the only common prime factor of 403, 434 and 465. Therefore 31 is the HCF of 403, 434 and 465.

Exercise 3.7

Question 1. Find the LCM of following numbers by listing their multiples.

(a) 4, 6

The multiples of 4 are 4, 8, 12, 16, 20, 24, 28, 32, 36, 40.

The multiples of 6 are 6, 12, 18, 24, 30, 36, 42, 48, 54, 60.

The common multiples of 4 and 6 are 12, 24, 36.

The lowest common multiple of 4 and 6.

Hence lowest common of 3 and 4 is 12.

(b) 12, 18

The multiple of 12 are 24, 36, 48, 60, 72, 96, 108.

The multiple of 18 are 36, 54, 72, 90, 108, 126, 144, 162.

The common multiples are 36, 72, 108.

The LCM of 12, 18 and 36.

(c) 4, 8, 12

The multiple of 4 = 8, 12, 16, 20, 24, 28, 32, 36.

The multiple of 8 = 16, 24, 32, 40, 48, 56, 64, 72.

The multiple of 12 = 24, 36, 48, 60, 72, 84, 96, 108.

The common multiple of 16, 24.

The LCM of 4, 8, 12 and 24.

(d) 6, 10, 18

The multiple of 6 = 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90.

The multiples of 10 = 20, 30, 40, 50, 60, 70, 80, 90.

The multiples of 18 = 36, 54, 72, 90, 108, 126, 144, 162.

The common multiple of 6, 10, 18 is 90.

Hence LCM is to 90.

(e) 16, 20

The multiple of 16 is 32, 48, 64, 80, 112, 128, 144.

The multiple of 20 is 40, 60, 80, 100, 120, 140, 160, 180.d

The common multiple of 16, 20 is 80 LCM is 80.

Question 2. Find the LCM of the following number by prime factorisation method:

(a) 16, 24

Prime factorization

2 | 16
2 | 8
2 | 4
2 | 2
| 1

2 | 24
2 | 12
2 | 6
3 | 3
| 1

16 = 2 × 2 × 2 × 2

24 = 2 × 2 × 2 × 3

2 × 2 × 2 × 2 × 3 = 48 **Ans.**

(b) 20, 45

Prime factorization

2 | 20
2 | 10
5 | 5
| 1

5 | 45
3 | 9
3 | 3
| 1

20 = 2 × 2 × 5

45 = 5 × 3 × 3

2 × 2 × 5 × 3 × 3 = 180 **Ans.**

(c) 16, 32, 42

Prime factorization

2 | 16
2 | 8
2 | 4
2 | 2
| 1

2 | 32
2 | 16
2 | 8
2 | 4
2 | 2
| 1

2 | 42
3 | 21
7 | 7
| 1

16 = 2 × 2 × 2 × 2

32 = 2 × 2 × 2 × 2 × 2

42 = 2 × 3 × 7

2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 3 × 7 = 5376 **Ans.**

(d) 20, 25, 30, 50

20 = 2 × 2 × 5

25 = 5 × 5

30 = 2 × 5 × 3

50 = 2 × 5 × 5

2	20
2	10
5	5
	1

5	25
5	5
	1

2	30
5	15
3	3
	1

2	50
5	25
5	5
	1

2 × 2 × 5 × 5 × 2 × 3 × 2 × 5 = 6000 **Ans.**

Question 3. Find the LCM of the following numbers by division method.

(a) 24, 27, 30, 60

2	24,	27,	30,	60
2	12,	27,	15,	15
2	6,	27,	15,	15
3	3,	27,	15,	15
3	1,	9,	5,	5
3	1,	3,	5,	5
5	1,	1,	5,	5
	1,	1,	1,	1

2 × 2 × 2 × 3 × 3 × 3 × 5 = 1080 **Ans.**

(b) 20, 25, 50

2	20,	25,	50
2	10,	25,	25
5	5,	25,	25
5	1,	5,	5
	1,	1,	1

2 × 2 × 5 × 5 = 100 Ans.

(c) 96, 128, 240

2	96,	128,	240
2	48,	64,	120
2	24,	32,	60
2	12,	16,	30
2	6,	8,	15
2	3,	4,	15
2	3,	2,	15
3	3,	1,	15
5	1,	1,	5
	1,	1,	1

2 × 2 × 2 × 2 × 2 × 2 × 2 × 3 × 5 = 1920 **Ans**

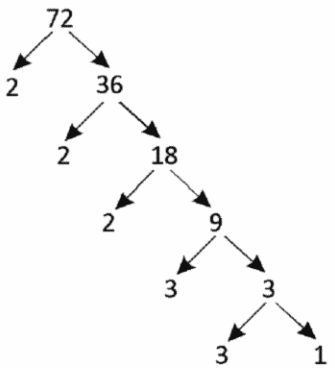
(d) 94, 64, 108, 75

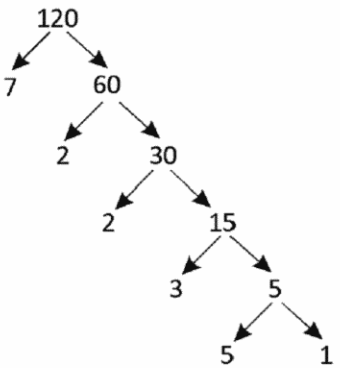
2	94,	64,	108,	72
2	47,	32,	54,	36
2	47,	16,	27,	18
2	47,	8,	27,	9
2	47,	4,	27,	9
2	47,	2,	27,	9
3	47,	1,	27,	9
3	47,	1,	9,	3
3	47,	1,	3,	1
47	47,	1,	1,	1
	1,	1,	1,	1

2 × 2 × 2 × 2 × 2 × 2 × 3 × 3 × 3 × 47 = 81,216 **Ans.**

Exercise 3.8

Question 1. Find the HCF and LCM of each of the following also verify the HCF × LCM = Product of the number 72, 120.





$2 \times 2 \times 2 \times 3 \times 3 = 72$ $2 \times 2 \times 2 \times 3 \times 5 = 120$

2	72, 120
2	36, 60
2	18, 30
3	9, 15
3	3, 5
5	1, 5
	1 1

HCF of 72 = $2 \times 2 \times 2 \times 3 \times 3$

HCF of 120 = $2 \times 2 \times 2 \times 3 \times 5$

= $2 \times 2 \times 2 \times 3 = 24$ **Ans.**

LCM = $2 \times 2 \times 2 \times 3 \times 3 \times 5 = 360$ **Ans.**

Followed by second question verification of HCF × LCM product of number

Question 2. HCF of two numbers is 13 and their LCM is 1989. If one of the numbers is 221. find the others.

Ans. HCF of two number is 13

LCM is 1989

If one no is 221

Other number is = ?

HCF × LCM = Product of numbers

HCF = 13

LCM = 1989

HCF × LCM = 25857

Unknown No. = x

Product of no's = 221x

221x = 25857

$x = \frac{25857}{221}$ $x = 117$

The another number is 117.

Question 3. Can two numbers have 2 as their HCF and 535 as LCM.

Ans. HCF of 20 means the two numbers have common prime factors of 2, 2 and 5. However the LCM of 535 means that both the numbers are odd. This cannot be the case if they have a prime factor of 2. Thus two numbers cannot have 20 as HCF and 535 as LCM.

Chapter-4. Negative Numbers And Integers Exercise 4.1

Question 1. Write the opposites of the following:

(a) Decrease in population = Increase in population

(b) Profit of ₹ 600 = Decrease (–) of ₹ 600

(c) 700 m below sea level = 700 m above (+) sea level

(d) 25 km north = 25 km (south)

(e) A withdrawal of ₹ 2500 = + 2500

Question 2. Represent the following numbers as integers with appropriate signs.

(a) A decrease of 19 = – 19

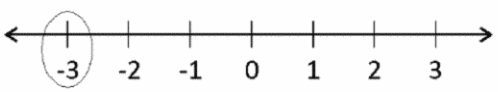
(b) A deposit of ₹ 975 = + 975

(c) A bird flying at height. = (+)

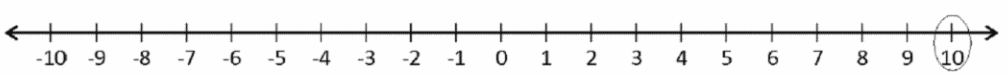
(d) A loss of ₹ 510 of 150 m above the ground = –510, + 150

Question 3. Represent the following numbers on a number line.

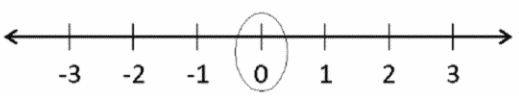
(a) –3



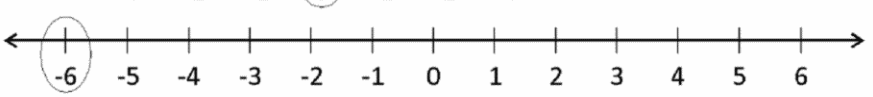
(b) 10



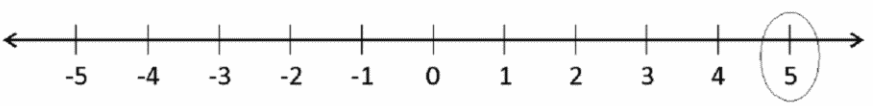
(c) 0



(d) –6



(e) 5



Question 4. Write all the integers between :

(a) –3 and 2 **Ans.** –3, –2, –1, 0, 1, 2

(b) –2 and 3 **Ans.** –2, –1, 0, 1, 2, 3

(c) –4 and 5 **Ans.** –4, –3, –2, –1, 0, 1, 2, 3, 4, 5

(d) –1 and 4 **Ans.** 0, 1, 2, 3, 4

Question 5. Write the following pairs of integers of greater.

(a) 5, –5 5 > –5

(b) 0, –4 0 > –4

(c) 0, 2 0 < –2

(d) –7, 10 –7 < 10

(e) 3, –9 3 > –9

(f) –30, –29 –30 > –29

Question 6. Arrange the following integers in increasing order.

(a) 2, –2, 3, –3, 4, –4 **Ans.** –4, –3, –2, 2, 3, 4

(b) 4, –9, –3, 0, –7, –5, 5 **Ans.** –9, –7, –5, –3, 0, 4, 5

(c) 5, –5, 4, –4, 3 –2 **Ans.** –5, –4, –2, 3, 4, 5

(d) 7, –7, –2, 1, –6, 8, –8 **Ans.** –8, –7, –6, –2, 1, 7, 8

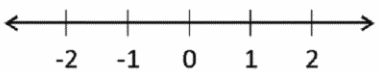
Question 7. Write the opposite of each of following :

(a)	–37	=	+37	(e)	–48	=	+48
(b)	0	=	0	(f)	–50	=	+50
(c)	44	=	–44	(g)	40	=	–40
(d)	47	=	–47	(h)	51	=	–51

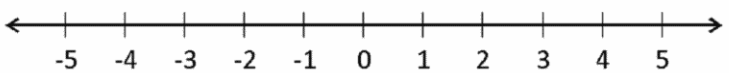
Exercise 4.2

Question 1. Using the number line, Put > < in the blanks:

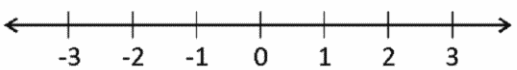
(a) –1 ____ 0 = –1 < 0



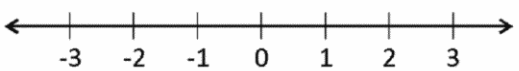
(b) –4 ____ –5 = –4 > –5



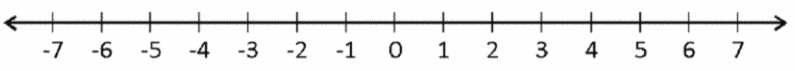
(c) 0 ____ 2 = 0 < 2



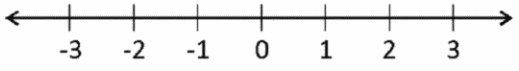
(d) 1 ____ –1 = 1 > –1



(e) –7 ____ –6 = –7 > –6



(f) 2 ____ –3 = 2 > –3



Question 2. Find the greater number in of the following each pair.

(a)	–4, 3	=	3 is greater number.	(b)	–4, –7	=	–4 is greater number.
(c)	–1, –10	=	–1 is greater number.	(d)	–2, 2	=	2 is greater number.
(e)	11 –30	=	11 is greater number.	(f)	–6, –2	=	–2 is greater number.

Question 3. Write the next 2 integers in each of the following:

(a) –3, –1, 1, 3 **Ans.** –3, –1, 1, 3, 5, 7

(b) 2, 0, –2, –4, **Ans.** 2, 0, –2, –4, –6, –8

(c) 10, 6, 2, **Ans.** 10, 6, 2, –2, –6

(d) –20, –15, –10 **Ans.** –20, –15, –10, –5, 0

Question 4. Write four integers greater than –18.

Ans. The four integers greater than –18 are –17, –16, –15, –14.

Question 5. Write four integers less than –12.

Ans. The four integers less than –12 are –13, –14, –15, –16.

Question 6. Arrange each of the following in increasing order

(a) 3, –7, 10, –2, 1, 0, –10 **Ans.** –10, –7, –2, 0, 1, 3

(b) 0, 2, –3, 5, –7, –1 **Ans.** –7, –3, –1, 0, 2, 5

Question 7. Arrange each of the following in decreasing order

(a) –1, 1, 4, –6, –2, 5 **Ans.** 5, 4, 1 –1, –2, –6

(b) –5, 2, –4, 37, –8 **Ans.** 37, 2, –4, –5, –8

Exercise 4.3

Question 1. Add the following integers:

(a) **–9, –5** = –a + (–b) = –9 + (–5) = –14 **Ans.**

(b) **–8, –10** = –8 + (–10) = –18 **Ans.**

(c) **–7, 12** = (–7) + 12 = 5 **Ans.**

(d) **8, –6** = 8 + (–6) = 2 **Ans.**

(e) **–7, –7** = –7 + (–7) = –14 **Ans.**

(f) **14, –4** = 14 + (–4) = 10 **Ans.**

Question 2. Add without using number line:

(a) 11 + (–7) (b) 13 + (+16) (c) 10 + (–2) (d) –10 + (–108) (e) –200 + (–201) (f) –25 + (–75)

+11	+13	+10	– 10	–200	–25
– 7	+16	– 2	–108	–201	–75
4	29	8	118	401	100

Question 3. Add :

(a)

– 795
– 128
– 923

(b)

– 2016
+ 1408
– 608

(c)

– 3600
+ 3141
– 459

(d)

– 2811
+ 2310
– 501

Question 4. Add :

(a) Add the sum of 60 and –10.

60 + (–10)

60 – 10 = 50 **Ans.**

(b) Add the sum of 80 and –20

80 + (–20)

80 – 20 = 60 **Ans.**

Question 5. Find the successor of –

(a) –60 = –61

(b) –2 = –3

(c) –30 = –31

(d) –25 = –26

Question 6. Add 18 and –29.

18 + (–29)

18 – 29 = –11 **Ans.**

Question 7. Add 89 and –77.

89 + (–77)

89 – 77 = 12 **Ans.**

Exercise 4.4

Question 1. Subtract the following :

(a) 9 from 5

5 + (–9)

5

– 9

– 4 **Ans.**

(b) –7 from 3

3 – (–7)

3 + 7

10 **Ans.**

(c) 3 from –7

–7 – (+3)

– 7 – 3

– 10 **Ans.**

(d) –8 from –4.

– 8 – (–4)

– 8 + 4

– 4 **Ans.**

Question 2. Subtract the following :

(a) 845 form –69

= – 69 – (+845)

= –69 – 845

= – 914 **Ans.**

(b) –386 from 121

= 121 + (–380)

= 121 + 386

= 507 **Ans.**

(c) –2150 from –899

= –899 – (–2150)

= –899 + 2150

= 2151 **Ans.**

(d) –2645 from 5189

= 5189 – (–2645)

= 5189 + 2645

= 7834 **Ans.**

(e) –256 from 0

= 0 – (–256)

= 0 + 256

= 256 **Ans.**

(f) 0 from –496

= –496 – (0)

= –496 – 0

= –496 **Ans.**

(g) –84 from 212

= 212 – (–84)

= 212 + 84

= 296 **Ans.**

(h) 139 from –315

= –315 – (+139)

= –315 – 139

= 454 **Ans.**

Question 3. Subtract the sum of 139 and 157 from the sum of –272 and 136.

139 + 157 = 296

–272 + 136 = –136

–136 – (+296)

–136 – 296

–432 **Ans.**

Question 4. The sum of 2 integers is –223. If one of them is 171, find the other.

Sum of two integer = –223

One integer = 171

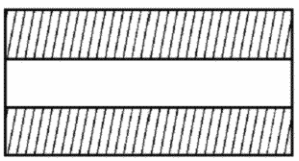
Other integer = –223 – 171 = –394 **Ans.**

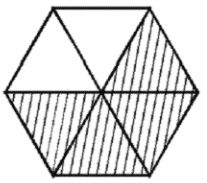
Question 5. Find the following:

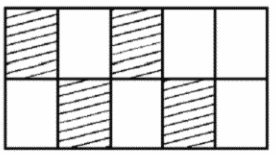
(a)	18 – (–9)	(b) –25 – (+8)	(c) –46 – (–64)	(d) – 42 –(–18)
	18 + 9	– 25 – 8	–46 + 64	–42 + 18
	27 **Ans.**	–33 **Ans.**	18 **Ans.**	–24 **Ans.**

Chapter-5. Fraction Exercise 5.1

Question 1. Write the fraction expressing the shaded fraction.

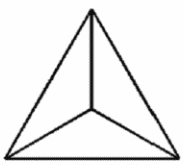




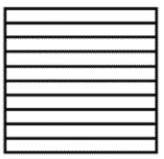


Ans. $\frac{2}{3}$ $\frac{4}{6}$ $\frac{4}{10}$

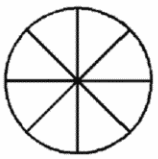
Question 2. Colour the fraction according to the given numbers.



$\frac{1}{3}$

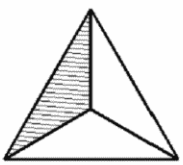


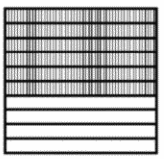
$\frac{6}{10}$

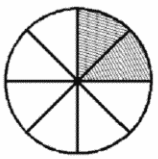


$\frac{2}{8}$

Ans.







Question 3. Ramesh solved 8 question from 16 question. What fraction of question did he solves.

Ans. $\frac{\cancel{8}}{\cancel{10}} = \frac{1}{2}$

Question 4. What fraction one day of 9 week.

Ans. $\frac{1}{9}$

Question 5. What fraction is 4 hrs 9 a day?

Ans. $\frac{4}{9}$

Question 6. What fraction of an hour 30 minutes?

Ans. 1 hour = 60 minutes $\frac{\cancel{30}}{\cancel{60}} = \frac{1}{2}$

Question 7. What fraction of 1 letre is 500 ml.

Ans. 1 litre = 1000 millilitres $\frac{\cancel{500}}{\cancel{1000}} = \frac{1}{2}$

Question 8. Richa stitches dresses. She had to stitch 50 dresses. She has so for stitched 30 dresses. What fraction of the dresses has she stitched.

Ans. She has so far stitched 30 dresses she had to stitch 50 dresses $= \frac{\cancel{30}}{\cancel{50}} = \frac{3}{5}$

Question 9. Write the natural number from 2 to 12. What fraction of their prime numbers.

Ans. Natural numbers from 2 to 12 are 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12. Prime number among there are 2, 3, 5, 7, 11. Therefore out of 11 numbers 5 are prime numbers. It represent a fraction (5/11).

Question 10. Write each of the following divisions as a fraction.

(a) $3 \div 6 = \frac{\cancel{3}}{\cancel{6}} = \frac{1}{2}$

(b) $7 \div 21 = \frac{\cancel{7}}{\cancel{21}} = \frac{1}{3}$

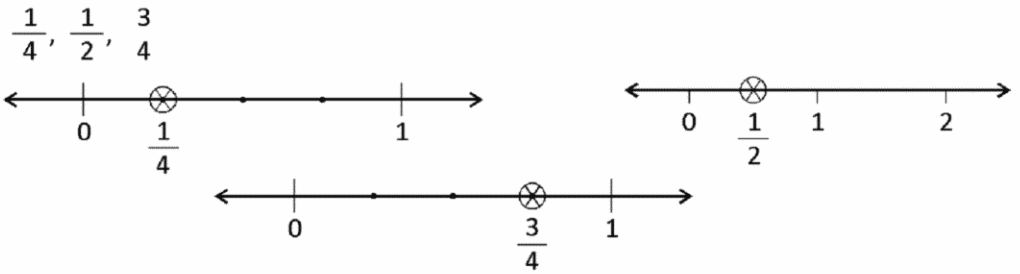
(c) $8 \div 24 = \frac{\cancel{8}}{\cancel{24}} = \frac{1}{3}$

(d) $9 \div 27 = \frac{\cancel{9}}{\cancel{27}} = \frac{1}{3}$

Exercise 5.2

Question 1. On the number line, locate the points represents the fractions.

$\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$



Question 2. Express each of the following fractions as improper fraction.

(i) $3\frac{1}{2} = 3 \times 2 = \frac{6+1}{2} = \frac{7}{2}$

(ii) $7\frac{3}{4} = 7 \times 4 = \frac{28+3}{4} = \frac{31}{4}$

(iii) $7\frac{3}{4} = 7 \times 4 = \frac{28+3}{4} = \frac{31}{4}$

(iv) $2\frac{4}{9} = 2 \times 9 = \frac{18+4}{9} = \frac{22}{9}$

(v) $10\frac{3}{5} = 10 \times 5 = \frac{50+3}{5} = \frac{53}{5}$

(vi) $8\frac{2}{8} = 8 \times 8 = \frac{64+2}{8} = \frac{66}{8}$

(vii) $6\frac{2}{11} = 6 \times 11 = \frac{66+2}{11} = \frac{68}{11}$

(viii) $9\frac{7}{3} = 9 \times 3 = \frac{27+7}{3} = \frac{34}{3}$

Question 3. Express each of the following improper fraction as mixed fraction.

(a) $\frac{19}{4} = 4\frac{3}{4}$

$$4\overline{)19}\ (4,\ 16,\ 03)$$

(b) $\frac{20}{3} = 6\frac{2}{3}$

$$3\overline{)20}\ (6,\ 18,\ 02)$$

(c) $\frac{17}{7} = 2\frac{3}{7}$

$$7\overline{)17}\ (2,\ 14,\ 03)$$

(a) $\frac{28}{5} = 5\frac{3}{5}$

$$5\overline{)28}\ (5,\ 25,\ 03)$$

(b) $\frac{35}{11} = 3\frac{2}{11}$

$$11\overline{)35}\ (3,\ 33,\ 02)$$

(c) $\frac{42}{9} = 4\frac{6}{9}$

$$9\overline{)42}\ (4,\ 36,\ 06)$$

Exercise 5.3

Question 1. Write the next three equivalent fraction of $\frac{2}{3}$.

Ans. Start multiplying the numerator and denominator by a number starting at 2 and ending at 20.

(1) $\frac{2 \times 2}{3 \times 2} = \frac{4}{6}$ (2) $\frac{2 \times 3}{3 \times 3} = \frac{6}{9}$ (3) $\frac{2 \times 4}{3 \times 4} = \frac{8}{12}$

Question 2. Reduce the fradction $\frac{15}{5}$ to its simplest from.

Ans. $\frac{\cancel{15}}{\cancel{5}} = 3$

Question 3. Fill in the blanks :

(i) $\frac{5}{11} = \frac{\boxed{15}}{33} = \frac{5 \times 3}{11 \times 3}$

(ii) $\frac{7}{8} = \frac{35}{\boxed{40}} = \frac{7 \times 5}{8 \times 5}$

(iii) $\frac{24}{36} = \frac{6}{\boxed{9}} = 36 \div 4 = 9$

(ii) $\frac{21}{77} = \frac{\boxed{3}}{11} = 21 \div 7 = 3$

Question 4. Which of the following are the equivalent fraction.

(i) $\frac{2}{3}$ and $\frac{8}{12}$

$\frac{2}{3} \times \frac{8}{12}$

$2 \times 12 = 3 \times 8$

$24 = 24$

(ii) $\frac{5}{11}$ and $\frac{10}{21}$

$\frac{5}{11} \times \frac{10}{21}$

$5 \times 21 = 11 \times 10$

$105 \neq 110$

(i) $\frac{7}{9}$ and $\frac{8}{12}$

$\frac{7}{9} \times \frac{35}{45}$

$7 \times 45 = 9 \times 35$

$315 = 315$

The (i) and (iii) are equivalent fractions.

Question 5. Express in its lowest form.

(i) $\frac{28}{98} = \frac{14}{49}$ **Ans.**

(ii) $\frac{169}{221} = \frac{169}{221}$ **Ans.**

Question 6. Express in its simplest form.

(i) $\frac{15}{25} = \frac{15 \div 5}{25 \div 5} = \frac{3}{5}$ **Ans.**

(ii) $\frac{25}{50} = \frac{25 \div 5}{50 \div 5} = \frac{\cancel{5}}{\cancel{10}} = \frac{1}{2}$

Exercise 5.4

Question 1. Put appropriate sign >, < between the fractions given below :

(i) $\frac{13}{9} \; (>) \; \frac{7}{9}$

(ii) $\frac{7}{11} \; (<) \; \frac{9}{11}$

(iii) $\frac{8}{13} \; (>) \; \frac{3}{13}$

(i) $\frac{13}{61} \; (<) \; \frac{14}{61}$

(ii) $\frac{8}{41} \; (<) \; \frac{11}{41}$

(iii) $\frac{17}{23} \; (>) \; \frac{11}{23}$

Question 2. Which fraction in each pair is larger and smaller.

(i) $\frac{8}{13}$ $\frac{8}{19}$ $= \frac{8}{13} > \frac{8}{19}$ (ii) $\frac{9}{17}$ $\frac{9}{11}$ $= \frac{9}{17} < \frac{9}{11}$

(iii) $\frac{3}{7}$ $\frac{3}{11}$ $= \frac{3}{7} > \frac{3}{11}$ (iv) $\frac{5}{14}$ $\frac{5}{16}$ $= \frac{5}{14} > \frac{5}{16}$

Question 3. Which of the following pairs of fractions is smaller.

(i) $\frac{3}{4}$ or $\frac{2}{7}$ $= \frac{2}{7}$ is smaller (iii) $\frac{7}{9}$ or $\frac{6}{7}$ $= \frac{6}{7}$ is smaller

(ii) $\frac{6}{7}$ or $\frac{4}{11}$ $= \frac{4}{11}$ is smaller (iv) $\frac{4}{7}$ or $\frac{2}{5}$ $= \frac{2}{5}$ is smaller

Question 4. Arrange of the following fraction in ascending and descending order :

$\frac{3}{5}, \frac{4}{5}, \frac{8}{5}, \frac{7}{5}$

$\frac{3}{5}, \frac{4}{5}, \frac{7}{5}, \frac{8}{5}$ (Ascending order) $\frac{8}{5}, \frac{7}{5}, \frac{4}{5}, \frac{3}{5}$

Question 5. In class III A of 40 students 30 students passed in first division and in class III B of 30 students, 21 students passed in first division. In which class was greater fraction of students getting first class.

Ans. Class III A 40 students 30 students passed in first division.

Class III B of 30 students, 21 students passed in first division.

The strength of class III A is more and 30 students passed by first division. Hence class III A is the Answer.

Question 6. Ruchi studies for $\frac{9}{4}$ hrs. where as Sita studies for $\frac{11}{5}$ hrs. Who studies more them.

Ans. $\frac{9}{4} = \frac{60}{1} = \frac{9}{4} \times \frac{60}{1} = \frac{540}{4} =$ 135 hrs. studies

$\frac{11}{5} \times \frac{60}{1} = \frac{660}{5} =$ 132 hrs. studies

Ruchi studies more.

Question 7. The following fractions represent just three different numbers. Separate them into 3 groups of equivalent fraction by changing each are to its simplest form.

(i) $\frac{2}{12} = \frac{1}{6}$ (ii) $\frac{8}{50} = \frac{4}{25}$ (iii) $\frac{8}{50} = \frac{4}{25}$ (iv) $\frac{16}{100} = \frac{8}{50} = \frac{4}{25}$

(v) $\frac{10}{60} = \frac{1}{6}$ (vi) $\frac{15}{75} = \frac{1}{5}$ (vii) $\frac{12}{60} = \frac{1}{5}$ (viii) $\frac{16}{96} = \frac{1}{6}$

(ix) $\frac{12}{75} = \frac{4}{25}$ (x) $\frac{12}{72} = \frac{6}{36} = \frac{1}{6}$ (xi) $\frac{3}{18} = \frac{1}{6}$ (xii) $\frac{4}{25} = \frac{4}{25}$

Exercise 5.5

Question 1. Solve the following :

(i) $\frac{13}{23} + \frac{5}{23} = \frac{13+5}{23} = \frac{18}{23}$

(ii) $\frac{9}{17} + \frac{15}{17} = \frac{9+15}{17} = \frac{24}{17} = 1\frac{7}{17}$

(iii) $\frac{4}{9} - \frac{2}{9} = \frac{4-2}{9} = \frac{2}{9}$

(iv) $\frac{13}{14} + \frac{(-5)}{14} = \frac{13-5}{14} = \frac{8}{14} = \frac{4}{7}$

(v) $\frac{11}{16} - \frac{3}{16} = \frac{11-3}{16} = \frac{8}{16} = \frac{1}{2}$

(vi) $\frac{7}{13} - \frac{5}{13} = \frac{7-5}{13} = \frac{2}{13}$

Question 2. Add :

(i) $\frac{5}{11} + \frac{4}{11} = \frac{5+4}{11} = \frac{9}{11}$

2	12, 18
2	6, 9
3	3, 9
3	1, 3
	1, 1

(ii) $\frac{7}{12} + \frac{5}{18}$

$\frac{7 \times 3 + 5 \times 2}{36} = \frac{21+10}{36} = \frac{31}{36}$

(iii) $\frac{3}{8} + \frac{1}{12}$

$\frac{3 \times 3 + 1 \times 2}{24}$

$\frac{9+2}{24} = \frac{11}{24}$

2	8, 12
2	4, 6
2	2, 3
3	1, 3
	1 1

(iv) $\frac{31}{25} + \frac{7}{30}$

$\frac{31 \times 6 + 7 \times 5}{150}$

$\frac{186+35}{150} = \frac{221}{150} = 1\frac{71}{150}$

5	25, 30
5	5, 6
3	1, 6
2	1, 2
	1, 1

$150\overline{)221}\ 1$, 150, 071

Question 3. Add :

(i) $1\frac{1}{2} + 2\frac{1}{2} = \frac{3}{2} + \frac{5}{4}$

$= \frac{3 \times 2 + 5 \times 1}{4}$

$= \frac{6+5}{4} = \frac{11}{4} = 2\frac{3}{4}$

$4\overline{)15}\ 3$, 12, 02

2	2, 4
2	1, 2
	1, 1

$4\overline{)11}\ 2$, 08, 03

(ii) $2\frac{3}{5} + 3\frac{3}{4} = \frac{13}{5} + \frac{15}{5}$

$= \frac{13 \times 4 + 15 \times 5}{20}$

$= \frac{52+75}{20} = \frac{127}{20} = 6\frac{7}{20}$

$20\overline{)127}\ 6$, 127, 007

(iii) $3\frac{5}{8} + 4\frac{1}{6} = \frac{29}{8} + \frac{25}{6}$

$= \frac{29 \times 3 + 25 \times 4}{24}$

$= \frac{87 + 100}{24} = \frac{187}{24} = 7\frac{19}{24}$

$24\overline{)187}$: 7, 168, 019

2	8, 6
2	4, 3
2	2, 3
3	1, 1
	1, 1

(iv) $4\frac{1}{6} + 2\frac{3}{5} = \frac{25}{6} + \frac{13}{5}$

$= \frac{25 \times 5 + 13 \times 6}{30}$

$= \frac{125 + 78}{30} = \frac{203}{30} = 6\frac{23}{30}$

$30\overline{)203}$: 6, 180, 023

2	6, 5
3	3, 5
5	1, 5
	1, 1

Question 4. Subtract :

(i) $\frac{10}{13} + \frac{5}{3}$

$\frac{10 \times 3 - 5 \times 13}{39}$

$\frac{30 - 65}{39} = \frac{-35}{39}$

13	13, 3
3	1, 3
	1, 1

(ii) $\frac{3}{8} - \frac{1}{4}$

$\frac{3 \times 1 - 1 \times 2}{8}$

$\frac{3 - 2}{8} = \frac{1}{8}$

2	8, 4
2	4, 2
2	2, 1
	1, 1

(iii) $\frac{8}{15} - \frac{3}{20}$

$\frac{8 \times 4 - 3 \times 3}{60}$

$\frac{32 - 9}{60} = \frac{23}{60}$

5	15, 20
3	3, 4
4	1, 2
	1, 1

(iv) $\frac{5}{11} - \frac{7}{22}$

$\frac{5 \times 2 - 7 \times 1}{22}$

$\frac{10 - 7}{22} = \frac{6}{22}$

11	11, 22
2	1, 2
	1, 1

(v) $\frac{9}{10} - \frac{3}{5}$

$\frac{9 \times 1 - 3 \times 2}{10}$

$\frac{9 - 6}{10} = \frac{3}{10}$

5	10, 5
2	2, 1
	1, 1

(vi) $\frac{5}{6} - \frac{2}{3}$

$\frac{5 \times 1 - 2 \times 2}{6}$

$\frac{5-4}{6} = \frac{1}{6}$

2	6, 3
3	3, 3
	1, 1

Question 5. Subtract :

(i) $1\frac{4}{5} - 1\frac{1}{10} = \frac{9}{5} - \frac{11}{10}$

$\frac{9 \times 2 - 11 \times 1}{10}$

$\frac{18-11}{10} = \frac{7}{10}$

5	5, 10
2	1, 2
	1, 1

(ii) $2\frac{7}{8} - 3\frac{1}{4} = \frac{2 \times 8 + 7}{8} - \frac{3 \times 4 + 1}{4}$

$\frac{23}{8} - \frac{13}{4} = \frac{23 \times 1 - 13 \times 2}{8}$

$\frac{23-26}{8} = \frac{-3}{8}$

2	8, 4
2	4, 2
2	2, 1
	1, 1

(iii) $3\frac{3}{4} - 2\frac{1}{5} = \frac{3 \times 4 + 3}{4} - \frac{2 \times 5 + 1}{5}$

$\frac{15}{4} - \frac{11}{5} = \frac{15 \times 5 - 11 \times 4}{20}$

$\frac{75-44}{20} = \frac{31}{20} = 1\frac{11}{20}$

2	4, 5
2	2, 5
5	1, 5
	1, 1

$20\overline{)31}$ quotient 1, 20, 11

(iv) $5\frac{1}{3} - 3\frac{3}{4} = \frac{5 \times 3 + 1}{3} - \frac{3 \times 4 + 3}{4}$

$\frac{16}{3} - \frac{15}{4} = \frac{16 \times 4 - 15 \times 3}{12}$

$\frac{64-45}{12} = \frac{20}{12} = 1\frac{7}{12}$

3	3, 4
2	1, 4
2	1, 2
	1, 1

$12\overline{)20}$ quotient 1, 12, 08

Question 6. Simplify :

(i) $5\frac{1}{3} + 3\frac{3}{4} + 1\frac{1}{5}$

$\frac{1 \times 4 + 3}{4} + \frac{2 \times 2 + 1}{2} + \frac{1 \times 5 + 1}{5}$

$\frac{7}{4} + \frac{5}{2} + \frac{6}{5}$

$\frac{7 \times 5 + 5 \times 10 + 6 \times 4}{20}$

$\frac{35 + 50 + 24}{20} = \frac{109}{20} = 5\frac{9}{20}$

2	4, 2, 5
2	2, 1, 5
5	1, 1, 5
	1, 1, 5

$20\overline{)109}$ quotient 1, 100, 009

(ii) $3\frac{1}{10} + 1\frac{2}{5} - 2\frac{3}{10}$

$\frac{3\times10+1}{10} + \frac{1\times5+2}{5} - \frac{2\times10+3}{10}$

$\frac{31}{10} + \frac{7}{5} - \frac{23}{10}$

$\frac{31\times1+7\times2-23\times1}{10}$

$\frac{31+14-23}{10} = \frac{45-23}{10} = \frac{22}{10} = 2\frac{2}{10}$

5	10, 10, 5
2	2, 2, 1
	1, 1, 1

$20\overline{)109}$ quotient 1, 100, 009

(iii) $3\frac{2}{3} + 4\frac{7}{18} - \frac{5}{6} - 1\frac{1}{12}$

$\frac{3\times3+2}{3} + \frac{4\times18+7}{18} - \frac{5}{6} - \frac{1\times12+1}{12}$

$\frac{11}{3} + \frac{79}{18} - \frac{5}{6} - \frac{13}{12}$

$\frac{11\times12+79\times2-5\times6-13\times3}{36}$

$\frac{132+158-30-39}{36}$

$\frac{276-69}{36} = \frac{207}{36} = 5\frac{27}{36}$

$\frac{290-69}{36} = \frac{221}{36} = 6\frac{5}{36}$

3	3, 18, 6, 12
3	1, 6, 2, 4
2	1, 2, 2, 4
2	1, 1, 1, 2
	1, 1, 1, 1

$36\overline{)207}$ quotient 5, 180, 027

$36\overline{)221}$ quotient 6, 216, 005

(iv) $3 + 2\frac{1}{2} - 1\frac{2}{3} - \frac{1}{4}$

$3 + \frac{2\times2+1}{2} - \frac{1\times3+2}{3} - \frac{1}{4}$

$\frac{3}{1} + \frac{5}{2} - \frac{5}{3} - \frac{1}{4}$

$\frac{12\times3+5\times6-5\times4-1\times3}{12}$

$\frac{36+30-20-3}{12}$

$\frac{66-23}{12} = \frac{43}{12} = 3\frac{7}{12}$

2	2, 3, 4
2	1, 3, 2
3	1, 3, 1
	1, 1, 1

$12\overline{)43}$ quotient 3, 36, 07

Chapter-6. Decimals Exercise 6.1

Question 1. Write the following decimals in numbers.

(a) Five point four = 5.4

(b) Seventeen point twenty two = 17.20

(c) Point zero seven eight. = .078

(d) Four hundred ten point zero four two eight = 410.0428

(e) Three hundred forty four and four tenths. = 344.4

Question 2. Write each of the following as decimals.

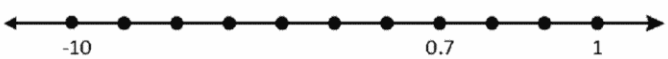
(a) $\frac{7}{10} = 0.7$ (b) $\frac{29}{10} = 2.9$ (c) $5\frac{5}{10} = \frac{53}{10} = 5.3$

(d) $\frac{3}{5} = 0.6$ (e) $\frac{5}{2} = 2.5$ (f) $8\frac{7}{10} = \frac{87}{10} = 8.7$

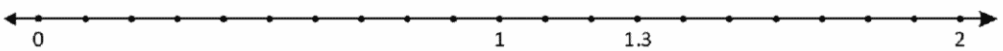
(g) $50 + 7 + \frac{7}{10} = 57.7$ (h) $500 + 20 + \frac{3+9}{10} = 523.9$

Question 3. Represent the following decimal numbers on the number line.

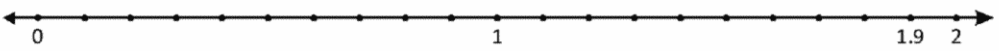
(a) 0.7 =



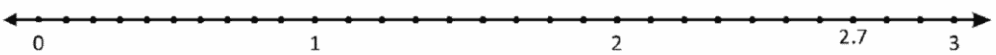
(b) 1.3 =



(c) 1.9 =

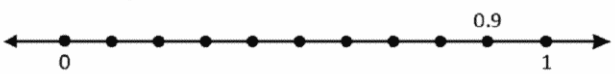


(d) 2.7 =

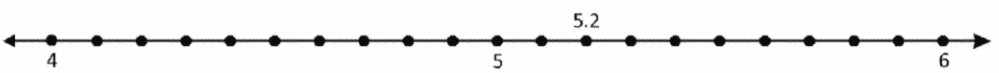


Question 4. Represent the following decimal numbers on the number line.

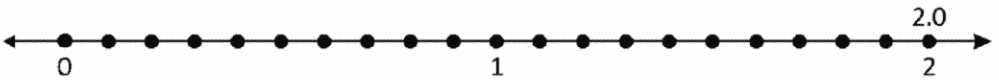
(a) 0.9 =



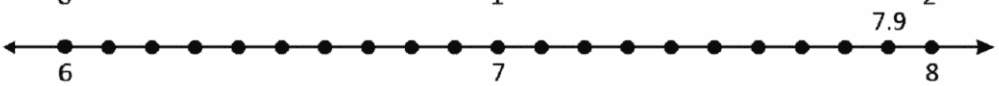
(b) 5.2 =



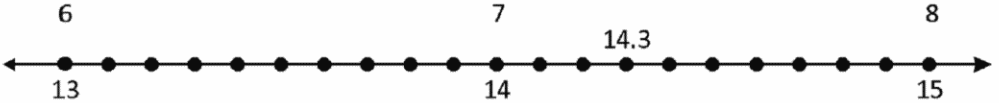
(c) 2.0 =



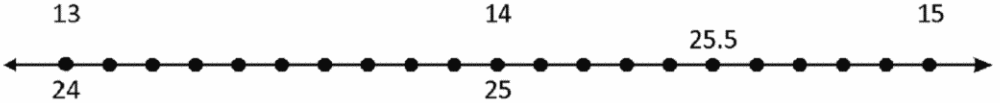
(d) 7.9 =



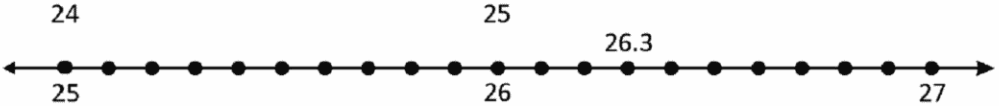
(e) 14.3 =



(f) 25.5 =



(g) 26.3 =



Question 5. Write each of the following in standard form :

(a) $4000 + 0 + 30 + 3 + \frac{3}{10} + \frac{6}{100} = 4033.36$

(b) $500 + 70 + 2 + \frac{1}{10} + \frac{2}{100} + \frac{4}{1000} = 572.124$

(c) $3 + \frac{8}{10} + \frac{2}{100} + \frac{3}{1000} + \frac{7}{10000} = 3.8237$

(d) $6 + \frac{0}{10} + \frac{0}{100} + \frac{0}{1000} + \frac{0}{10000} = 6$

Exercise 6.2

Question 1. Write as fractions :

(a) $0.24 = 0 + \frac{2}{10} + \frac{4}{100}$

(b) $0.072 = 0 + \frac{0}{10} + \frac{7}{100} + \frac{2}{1000}$

(c) $0.303 = 0 + \frac{3}{10} + \frac{0}{100} + \frac{3}{1000}$

(d) $0.043 = 0 + \frac{0}{10} + \frac{4}{100} + \frac{3}{1000}$

(e) $0.2005 = 0 + \frac{2}{10} + \frac{0}{100} + \frac{0}{1000} + \frac{5}{10000}$

(f) $0.5007 = 0 + \frac{5}{10} + \frac{0}{100} + \frac{0}{1000} + \frac{7}{10000}$

Question 2.

(a) $\frac{1}{5} = 0.2$

$$5\overline{)10}\ 0.2,\quad 10,\quad \times$$

(b) $\frac{2}{7} = 0.28$

$$7\overline{)20}\ 0.28,\quad 14,\quad 60,\quad 56,\quad 04$$

(c) $\frac{3}{4} = 0.75$

$$4\overline{)30}\ 0.75,\quad 28,\quad 20,\quad 20,\quad 00$$

(d) $\frac{14}{6} = 2.33$

$$6\overline{)14}\ 2.33,\quad 12,\quad 20,\quad 18,\quad 02$$

(e) $\frac{12}{5} = 2.4$

$$5\overline{)12}\ 2.4,\quad 10,\quad 02$$

(f) $\frac{27}{7} = 3.85$

$$7\overline{)27}\ 3.85,\quad 21,\quad 60,\quad 56,\quad 40,\quad 35,\quad 05$$

(g) $5\frac{15}{62} = \frac{325}{62} = 5.24$

$$62\overline{)325}\ 5.24,\quad 310,\quad 150,\quad 124,\quad 260,\quad 248,\quad 012$$

(h) $4\frac{33}{78} = \frac{345}{78} = 4.42$

$$78\overline{)345}\ 4.42,\quad 312,\quad 330,\quad 312,\quad 180,\quad 156,\quad 024$$

Question 3. Fill in the blanks from >, < and = :

(a) 11.05 < 11.5 (b) 10.30 > 10.03

(c) 2.50 < 2.65 (d) 17.9 = 17.9

(e) 12.5 < 15.2 (f) 120.03 > 12.030

Question 4. Arrange the following in descending order:

(a) 1.347, 1.437, 1.734, 1.743, 1.473 = 1.743, 1.734, 1.473, 1.437, 1.347

(b) 12.965, 9.307, 9.703, 9.730, 9.370 = 12.965, 9.730, 9.703, 9.370, 9.307

Question 5. Arrange the following in ascending order:

(a) 8.3, 7.30, 8.35, 7.41, 7.140 = 8.3, 7.30, 8.35, 7.41, 7.140

(b) 12.965, 13.596, 12.659, 12.695, 13.965 = 12.659, 12.695, 12.965, 13.956, 13.965

Question 6. Convert each of the following into like decimals :

(a) 1.8, 2.15, 3.7, 10.95 = 1.80, 2.15, 3.70, 10.95

(b) 4.27, 3.19, 3.6, 0.09 = 4.27, 3.19, 3.60, 0.09

Question 7. Convert each of the following into decimals :

(a) $\frac{5}{4}$ = 1.25

$$\begin{array}{r} 1.25 \\ 4\overline{)5} \\ 4 \\ \hline 10 \\ 08 \\ \hline 20 \\ 20 \\ \hline \times \end{array}$$

(b) $\frac{63}{50}$ = 1.26

$$\begin{array}{r} 1.26 \\ 50\overline{)63} \\ 50 \\ \hline 130 \\ 100 \\ \hline 300 \\ 300 \\ \hline \times \end{array}$$

(c) $\frac{11}{20}$ = 0.55

$$\begin{array}{r} 0.55 \\ 20\overline{)110} \\ 100 \\ \hline 100 \\ 100 \\ \hline \times \end{array}$$

(d) $\frac{16}{25}$ = 0.64

$$\begin{array}{r} 0.65 \\ 25\overline{)160} \\ 150 \\ \hline 100 \\ 100 \\ \hline \times \end{array}$$

(e) $\frac{13}{40}$ = 0.325

$$\begin{array}{r} 0.325 \\ 40\overline{)130} \\ 120 \\ \hline 100 \\ 80 \\ \hline 200 \\ 200 \\ \hline \times \end{array}$$

(f) $\frac{117}{50}$ = 2.34

$$\begin{array}{r} 2.34 \\ 50\overline{)117} \\ 100 \\ \hline 170 \\ 150 \\ \hline 200 \\ 200 \\ \hline \times \end{array}$$

(g) $\frac{3}{125} = 0.024$

$$
\begin{array}{r}
0.024 \\
125\overline{)\,300} \\
250 \\
\hline
500 \\
500 \\
\hline
\times
\end{array}
$$

(h) $\frac{21}{500} = 0.042$

$$
\begin{array}{r}
0.042 \\
500\overline{)\,2100} \\
2000 \\
\hline
1000 \\
1000 \\
\hline
\times
\end{array}
$$

Exercise 6.3

Question 1. Examples as rupees using decimals.

(a) 8 paise = 8 hundredths of rupee = $\frac{8}{100} \times 1$ = ₹ 0.08

(b) 45 paise = 45 hundredths of rupee = $\frac{45}{100} \times 1$ = ₹ 0.45

(c) 110 paise = 110 hundredths of rupee = $\frac{110}{100} \times 1$ = ₹ 1.10

(d) ₹ 28 and 5 paise = 28 + 5 = ₹ 28.5

(e) ₹ 92 and 10 paise = 92 + 10 = ₹ 92.10

Question 2. Express as centimeters using decimals.

(a) 6 mm = $\frac{6}{10}$ cm = 0.6 cm (b) 60 mm = $\frac{60}{10}$ cm = 6 cm

(c) 159 mm = $\frac{159}{10}$ cm = 15.9 cm (d) 8 mm = $\frac{8}{10}$ cm = 0.8 cm

Question 3. Express the following in meters using decimals.

(a) 18 cm = $\frac{18}{100}$ m = 0.18 m (b) 20 cm = $\frac{20}{100}$ m = 0.20 m

(c) 2 m 35 cm = 2.35 m (d) 325 cm = $\frac{325}{100}$ = 3.25 m

Question 4. Express the following in kilometers using decimals.

(a) 18 m = $\frac{18}{1000}$ km = 0.018 km (b) 327 m = $\frac{327}{1000}$ km = 0.327 km

(c) 9999 m = $\frac{9999}{1000}$ km = 9.999 (d) 20 km 5 m = 20.5 km

Question 5. Express the following in kilograms (kg) using decimals.

(a) 9 gm = $\frac{9}{1000}$ kg = 0.009 kg (b) 200 gm = $\frac{200}{1000}$ kg = 0.2 kg

(a) 3295 gm = $\frac{3295}{1000}$ kg = 3.295 kg (d) 8 kg 8 g = 8 kg $\frac{8}{1000}$ = 8.008 kg

Question 6. Express the following in liters (L) using decimals.

(a) 28 mL = $\frac{28}{1000}$ L = 0.028 L (b) 748 mL = $\frac{748}{1000}$ L = 0.748 L

(c) 2456 mL $= \frac{2465}{1000}$ L = 2.465 L (d) 4 L 52 mL = 4 L $\frac{52}{1000}$ = 4.052 L

Exercise 6.4

Question 1. Add :

(a) 360.69, 28,45.2 and 9.008

$$\begin{array}{r} 360.69 \\ 2845.2 \\ +\quad 9.008 \\ \hline 3214.898 \end{array}$$

(b) 0.007, 9.5 and 29.08

$$\begin{array}{r} 0.007 \\ 9.5 \\ +29.08 \\ \hline 38.587 \end{array}$$

(c) 22.5, 3.75 and 107.60

$$\begin{array}{r} 22.5 \\ 3.75 \\ +107.60 \\ \hline 133.85 \end{array}$$

(d) 5.37, 2.51, 4.41, 1.03

$$\begin{array}{r} 5.37 \\ 2.51 \\ 4.41 \\ +\ 1.03 \\ \hline 13\ 32 \end{array}$$

(e) 8.57, 9, 24.063

$$\begin{array}{r} 8.57 \\ 9.00 \\ +24.063 \\ \hline 41.633 \end{array}$$

(f) 7.42, 2.59

$$\begin{array}{r} 7.42 \\ +2.59 \\ \hline 10.01 \end{array}$$

Question 2. Subtract :

(a) 1.23 from 7.89

$$\begin{array}{r} 7.89 \\ -1.23 \\ \hline 6.66 \end{array}$$

(b) 1.186 from 9.2

$$\begin{array}{r} 9.200 \\ -1.186 \\ \hline 8.014 \end{array}$$

(c) 35.75 from 100

$$\begin{array}{r} 100.00 \\ -\ 35.75 \\ \hline 64.25 \end{array}$$

(d) 3.500 from 15.060

$$\begin{array}{r} 15.060 \\ -3.500 \\ \hline 11.56 \end{array}$$

(c) 35.75 from 100

$$\begin{array}{r} 525.00 \\ -936.25 \\ \hline 128.75 \end{array}$$

Question 3. Simplify :

(a) 328.09 – 23.8 + 45.077

$$\begin{array}{r} 328.09 \\ +\ 45.077 \\ \hline 373.167 \end{array} \qquad \begin{array}{r} 373.167 \\ -\ 23.800 \\ \hline 349.367 \end{array}$$

(b) 39.08 – 21.007 + 43.057 – 19.999

$$\begin{array}{r} 39.08 \\ +\ 43.057 \\ \hline 82.137 \end{array} \qquad \begin{array}{r} -\ 21.007 \\ -\ 19.997 \\ \hline -\ 41.006 \end{array} \qquad \begin{array}{r} 82.137 \\ -\ 41.006 \\ \hline 41.131 \end{array}$$

(c) (c) 132.95 – 98.85 + 84.985

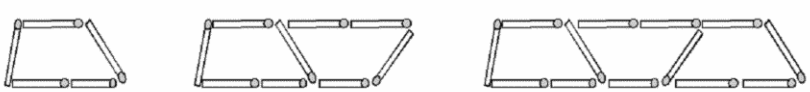
$$\begin{array}{r} 132.950 \\ +\ 84.985 \\ \hline 217.935 \end{array} \qquad \begin{array}{r} 217.935 \\ -\ 98.850 \\ \hline 119.085 \end{array}$$

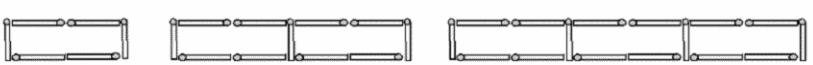
(d) 144.74 + 273 – 84 – 37.285

$$\begin{array}{r} 144.74 \\ +273.00 \\ \hline 417.74 \end{array} \qquad \begin{array}{r} -\ 84.000 \\ -\ 37.285 \\ \hline -121.285 \end{array} \qquad \begin{array}{r} 417.740 \\ -121.285 \\ \hline 296.455 \end{array}$$

Chapter 7. Algebra Exercise 7.1

Question 1. Find the rule which gives a number of matchsticks required to make the following patterns. Use a variable to write to rule.

(i) 

(ii) 

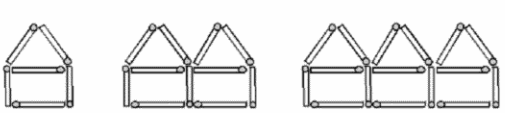
(iii) 

Figure	Numbers of rhombuses (n)	Number of matchsticks used	Number of matchsticks in terms of n
(i)	1	5 = 4 × 1 + 1	4n + 1
(ii)	2	9 = 4 × 2 + 1	4n + 1
(iii)	3	13 = 4 × 3 + 1	4n + 1

5n Ans. Where n is the number of pentagon.

Figure	Numbers of rhombuses (n)	Number of matchsticks used	Number of matchsticks in terms of n
(i)	1	6 = 5 × 1 + 1	5n + 1
(ii)	2	11 = 5 × 2 + 1	5n + 1
(iii)	3	16 = 5 × 3 + 1	5n + 1

(i) same of second one.

Question 2. Shipra is 3 years older than her sister Radha. Find an expression for Shipra's age in for us of Radha's age.

Shipra Radha age = x years

Shipra is 3 years older than his sister

Shipra age = Her Radha age + 3 years

= x + 3

= x + 3 years **Ans.**

Hence Radha's age is x + 3 years where x is Rahda's age.

Question 3. Ram has x number of balls. He distributed 5 of them among his friends. How many balls are left with him.

Ram has x no. of balls

Distributed 5 of them among his friends.

x – 5

The balls are left with them are x – 5 **Ans.**

Question 4. Mohan purchased 3 pens, each for ₹ x. If he were given a hundred rupee to the shopkeeper, then find the amount he will get back.

Mohan purchased 3 pens each for x.

₹ 100 was given to the shopkeeper

The purchased pens are 3 × x = 3x

The amount which will get back = 3x – 100

Question 5. X erasers are packed in each of 10 boxes and 3 erasers are left over. Find a rule to determine the total number of erasers.

X eraser are packed = 10 boxes = $x \times 10 = 10x$

3 erasers are left over

A rule to determine the total no. of erasers are

$10x - 3$ **Ans.**

Question 6. The length of rectangle is x units. Its breadth is 6 units less than its length, find a rule to determine its area.

Length of rectangle = x units

Breadth = 6 units = $x \times 6 = 6x$

A rule to determine its are = $x - 6x$ **Ans.**

Exercise 7.2

Question 1. Write the following using number literals and signs of basic operator.

(a) The sum of x and y = $x + y$

(b) u less than a number x = $x - u$

(c) two times a number x = $2 \times x = 2x$

(d) one forth of a number z = $\frac{1}{4}z$

(e) a less than b = $b - a$

(f) 2 less qthan the quotient of x by y = $\frac{2 - x}{y}$

Question 2. Add 2 to any number x and then multiply by 4. What is the result.

$4 (x + 2)$

$4 \times x + 4 \times 2$

$4x + 8$

$x = \frac{\cancel{8}}{\cancel{4}} = \frac{2}{1}$ = $x = 2$ **Ans.**

Question 3. y an article is sold at a profit ₹ 25, what is its selling price, taking the cost price as ₹ x.

x article cost is = 100

y an articled is sold at a profit ₹ 25 = 100 – 25 = ₹ 75

Ans. ₹ 75

Question 4. Marks scored by Rita are 10 more than twice the marks scored by Reena. If Reena scored x marks. What are Rita's marks.

Suppose the Rita's marks = x

Twice marks scored by Reena = 2x

$10 \times 10 = 100$

(i) $\frac{x}{2} = 100$

$x = 100 \times 2$

$x = 200$

10 more than = 200 + 10

210 Marks **Ans.**

Question 5. If a book cost ₹ x and pen costs ₹ y, then what is the cost of 5 books and 10 pens.

The book cost = x

Cost of 56 books = 5x

Cost of pen = y

10 pen cost = 10y

5x + 10y **Ans.**

Question 6. How can you write one third of x multiplied by the difference of y and z.

$\frac{1}{3}$ x (y – z) **Ans.**

Chapter-8. Equations Exercise 8.1

Question 1. Write each of the following as an equation.

(a)	Five ten than a number x is 12	=	x + 5 = 12
(b)	Sum of y and 5 is 16	=	y + 5 = 16
(c)	6 subtracted from the product 95 and m gives 12	=	m × 95 – 6 = 12
(d)	7 times a number x equals 42	=	7x – 42
(e)	One third of a number of increased by 7 gives 31	=	$\frac{1}{3}$x + 7 = 31
(f)	Twice a number subtracted from 17 is 11.	=	17 – 2x = 11

Question 2. Solve each of the following and verifying the result.

(a) x – 3 = 8

x = 8 + 3

x = 11 **Ans.**

(b) y + 7 = 5

y = 5 – 7

y = –2 **Ans.**

(c) $\frac{x}{3} = 5$

x = 5 × 3

x = 15 **Ans.**

(d) $\frac{4x}{5} = 8$

4x = 8 × 5

4x = 40

$x = \frac{40}{4}$

x = 10 **Ans.**

(e) 2 y = – 8

$y \frac{-8}{2}$

y = –4 **Ans.**

(f) $\frac{2}{3} = \frac{1}{3} + n$

$\frac{2}{3} - \frac{1}{3} = n$

$\frac{2-1}{3} = \frac{1}{3}$ n **Ans.**

$n = \frac{1}{3}$ **Ans.**

(g) x – 18 = – 18

x = –18 + 18

x = 0 **Ans.**

(h) $x - \frac{2}{5} = -\frac{2}{5}$

$x - \frac{6}{5} = +\frac{2}{5}$

$x - \frac{6+2}{5} = \quad x = -\frac{4}{5}$ **Ans.**

(i) $13\ c = 65$

$c = \frac{65}{13}$

$c = 5$ **Ans.**

(j) $130 = 10\ x$

$\frac{130}{10} = x$

$13 = x$

$x = 13$ **Ans.**

(k) $\frac{x}{2} = 5$

$x = 5 \times 2 \quad = \quad x = 10$ **Ans.**

(l) $\frac{m}{5} = 1.2$

$m = 1.2 \times 5 \quad = m = 6$ **Ans.**

Exercise 8.2

Question 1. Solve the following equations by the method of transposition.

(i) $4x - 8 = x + 7$

$4x - x = 7 + 8$

$3x = 15$

$x = \frac{15}{3} \quad = \quad x = 5$ **Ans.**

(ii) $x + 3 = -9$

$x = -9 - (3)$

$x = -9 - 3$

$x = -12$ **Ans.**

(iii) $x - 5 = 6$

$x = 6 + 5$

$x = 11$ **Ans.**

(iv) $x - 3 = -4$

$x - 3 = -4 + 3$

$x = -1$ **Ans.**

(v) $3x + 1 = 28$

$3x = 28 - 1$

$3x = 27$

$x = \frac{27}{3} \quad = \quad x = 9$ **Ans.**

(vi) $2x + 7 = 19$

$2x = 19 - 7$

$2x = 12$

$x = \frac{12}{2} \quad = \quad x = 6$ **Ans.**

(vii) $3x = 21$

$q = \frac{21}{3}$

$q = 7$ **Ans.**

(viii) $\frac{3}{7}x = 6$

$x = \frac{6 \times 7}{3}$

$x = \frac{42}{3} = 14$

$x = 14$ **Ans.**

(ix) $4x + 3 = x - 3$

$3 + 3 = x - 4x$

$6 = -3x$

$-\frac{6}{3} = x$

$-3 = x$

$x = -3$ **Ans.**

(x) $\frac{-m}{3} = 4$

$-m = 4 \times 3$

$-m = -12$

$m = 12$ **Ans.**

(xi) $\frac{5p}{2} = \frac{15}{4}$

$5p = \frac{15 \times 2}{4}$

$5p \times 4 = 30$

$5p = \frac{30}{4} = \frac{15}{2}$

$p = \frac{15}{2 \times 5} = 10$

$p = \frac{15}{10} = \frac{3}{2}$

$p = \frac{3}{2}$ **Ans.**

(xii) $\frac{x}{2} + 1 = \frac{2x}{5} - \frac{3}{2}$

$\frac{1+3}{2} = \frac{2x}{5} - \frac{x}{2}$

$\frac{2+3}{2} = \frac{4x-5x}{10}$

$\frac{5}{2} = \frac{-1x}{10}$

$-2x = 50$

$x = \frac{50}{2} = 25$

$x = -25$ **Ans.**

Chapter-9. Ratio Exercise 9.1

Question 1. The number of boys and girls in a coaching are 360 and 240 respectively.

(i) What is the ratio of number of girls to the number of boys.

$\frac{240}{360} = \frac{2}{3} = 2 : 3$ **Ans.**

2	5, 2
3	1, 2

(ii) What is the ratio of number of boys to the total number of students.

$\frac{360}{600} = \frac{6}{10} = \frac{3}{5} = 3 : 5$ **Ans.**

(240 + 360) = 600

Question 2. Nirmala is 69 years old and Meeta is 21 years old, find the following ratios in their lowest form.

(i) Nirmala's age : Meeta's age

$69 : 21 = \frac{69}{21} = \frac{23}{7} = 23 : 7$ **Ans.**

(ii) Meeta's age : Nirmala's age

$21 : 69 = \frac{21}{69} = 23 : 7$ **Ans.**

(iii) Meeta's age : Difference of their ages

$21 : 48 = \frac{21}{48} = 7 : 16$ **Ans.**

(iv) Nirmala's age : Sum of their ages

$69 : 69 + 21$

$69 : 90$

$\frac{69}{90} = \frac{23}{30} = 23 : 30$ **Ans.**

Question 3. Write their ratios in the simplest form :

(i) $12 : 16 = \frac{12}{16} = \frac{3}{4} = 3 : 4$ **Ans.**

(ii) $72 : 30 = \frac{72}{30} = \frac{24}{10} = \frac{12}{5} = 12 : 5$ **Ans.**

(iii) $330 : 550 = \frac{330}{550} = \frac{3}{5} = 3 : 5$ **Ans.**

(iv) $0.2 : 0.8 = \frac{0.2}{0.8} = \frac{1}{4} = 1 : 4$ **Ans.**

(v) $6 \text{ kg} : 48 \text{ kg} = \frac{6}{48} = \frac{1}{8} = 1 : 8$ **Ans.**

(vi) $1.04 : 0.26 = \frac{1.04}{0.26} = \frac{52}{13} = \frac{4}{1} = 4 : 1$ **Ans.**

(vii) 20 mL : 1 Litre = 1 Litre = 1000 $= \frac{20}{1000} = \frac{1}{50} = 1 : 50$ **Ans.**

(viii) 300 m : 1 km = 1 km = 1000 $= \frac{300}{1000} = \frac{3}{10} = 3 : 10$ **Ans.**

(ix) 1 cm : 1 mm = $\frac{10\text{ cm}}{1} = \frac{10}{1}$ = 10 : 1 **Ans.**

(x) 1 hour : 20 minutes = 1 hour = 60 minute = $\frac{\cancel{360}}{\cancel{120}} = \frac{3}{1}$ = 3 : 1 **Ans.**

(xi) 248 : 3248 = $\frac{248}{3248} = \frac{124}{1624} = \frac{62}{812} = \frac{31}{406}$ = 31 : 406 **Ans.**

Question 4. In a school there are 50 teachers and 850 students. What is the ratio of the number of students to the number of teachers?

50 : 850 = $\frac{50}{850} = \frac{1}{17}$ = 1 : 17 **Ans.**

Question 5. A car covers 195 km in 3 hrs. While a train cover 650 km in 5 hrs. Find the ratio of the speed of the car to the speed of the train.

Distance travelled in one hr by car = $\frac{195}{3}$ = 65

Distance travelled0 by train in 1 hr = $\frac{650}{5}$ = 130

$\frac{65}{130} = \frac{13}{26} = \frac{1}{2}$ = 1 : 2

1 : 2 is the ratio of the speed of the car to the sped of the train.

Question 6. Find two equivalent ratios of –

(i) 5 : 7 = $\frac{5\times5}{7\times5}, \frac{5\times6}{7\times6} = \frac{25}{35}, \frac{30}{42}$ = 25 : 35, 30 : 42

(ii) 3 : 11 = $\frac{3\times3}{11\times3} = \frac{9}{33}$ = 9 : 33 = $\frac{3\times4}{11\times4} = \frac{12}{44}$ = 12 : 44

(iii) 30 : 45 = $\frac{30\times2}{45\times2} = \frac{60}{90}$ = 60 : 90 = $\frac{30\times3}{45\times3} = \frac{90}{135}$ = 90 : 135

(iv) 42 : 24 = $\frac{42\times2}{24\times2} = \frac{84}{48}$ = 84 : 48 = $\frac{42\times3}{24\times3} = \frac{126}{72}$ = 126 : 72

Question 7. Write the following ratios in ascending order – (Smallest to Largest)

(i) 7 : 9, 4 : 7 = 4 : 7, 7 : 9 (ii) 3 : 7, 2 : 3 = 2 : 3, 3 : 7

(iii) 5 : 9, 1 : 3, = 1 : 3, 5 : 9 (iv) 6 : 7, 2 : 5 = 2 : 5, 6 : 7

Question 8. Write the following ratio in descending order – (Largest to Smallest)

(i) 1 : 6, 3 : 7, 5 : 14, 5 : 21 = 5 : 14, 5 : 21, 3 : 7, 1 : 6

(ii) 1 : 2, 2 : 3, 5 : 8, 4 : 5 = 5 : 8, 4 : 5, 2 : 3, 1 : 2

Question 9. Which ratio is greater –

(i) 7 : 8 or 2 : 3 = 7 : 8 > 2 : 3 (ii) 11 : 21 or 19 : 28 = 11 : 21 < 19 : 28

(iii) 7 : 16 or 13 : 24 = 7 : 16 < 13 : 24 (iv) 4 : 3, 7 : 10 or 4 : 7 = 4 : 3, 7 : 10 > 4 : 7

Exercise 9.2

Question 1. Determine if the following numbers are in proportion:

(i) 8, 10, 16, 20

$8 \times 20 = 160$

$10 \times 16 = 160$

Ans. Yes

(ii) 50, 75, 30, 45

$50 \times 45 = 2250$

$30 \times 75 = 2250$

Ans. Yes

(iii) 18, 36, 72, 144

$18 \times 144 = 2592$

$36 \times 72 = 2592$

Ans. Yes

(iv) 16, 30, 24, 45

$16 \times 45 = 720$

$30 \times 24 = 720$

Ans. Yes

(v) 200, 300, 400, 600

$200 \times 600 = 1,20,000$

$300 \times 400 = 1,20,000$

Ans. Yes

(vi) 224, 34, 68, 112

$224 \times 112 = 25,088$

$34 \times 68 = 2312$

Ans. No

Question 2. Determine of the following ratios form a proportion.

(i) 50 cm : 25 m and 20 mL : 16 mL

$\frac{50}{25} = \frac{10}{5}$, $\frac{20}{16} = \frac{10}{8}$

No. Thus 50 : 25 and 20 : 16 are not in proportion.

(ii) ₹ 12 : ₹ 60 and 10.8 km and 54 km

$\frac{12}{60} = \frac{6}{30} = \frac{2}{10} = \frac{1}{5}$, $\frac{10.8}{54} = \frac{108}{540} = \frac{54}{270} = \frac{27}{135} = \frac{9}{45} = \frac{1}{5}$

Thus. ₹ 12 : ₹ 60 and 10.8 and 54 are in proportion and can be written as ₹ 12 : ₹ 60 = 10.8 = 54

(iii) 60 persons : 50 persons and 18 L : 150 L

$\frac{60}{50} = \frac{6}{5}$, $\frac{18}{150} = \frac{6}{50} = \frac{2}{25}$

No. not is proportion.

(iv) 300 gm : 560 g and 4 m : 7 m

$\frac{300}{560} = \frac{4}{7}$, $\frac{15}{28} = 15 : 28$ $\frac{4}{7} = 4 : 7$

No. not is proportion.

Question 3. Find the value of x in each of the following proportions :

(i) 6 : x :: 78 : 65

$\frac{6}{x} \quad \frac{78}{65}$

$6 \times 65 = 390 \quad = 78 \times x = 78x \quad = 78x = 390$

$x = \frac{390}{18}$

$x = 5$ **Ans.**

(ii) 18 : x :: 27 : 3

$\frac{18}{x} \quad \frac{27}{13}$

$18 \times 3 = 54 \quad = 27 \times x = 27x \quad = 27x = 54$

$x = \frac{54}{27}$

$x = 2$ **Ans.**

(iii) $x : 45 :: 52 : 39$

$\frac{x}{45} \times \frac{54}{39}$

$x \times 39 = 39x$

$54 \times 45 = 2340$

$39x = 2340$

$x = \frac{2340}{39}$

$x = 60$ **Ans.**

(iv) $7 : 24 :: x : 360$

$\frac{7}{24} \times \frac{x}{360}$

$7 \times 360 = 2520$

$24 \times x = 24x$

$24x = 2520$

$x = \frac{2520}{24}$

$x = 105$ **Ans.**

(v) $800 : 300 :: x : 210$

$\frac{800}{300} \times \frac{x}{210}$

$800 \times 210 = 1,68,000$

$300 \times x = 300x$

$300x = 1,68,000$

$x = \frac{1,68,000}{300}$

$x = 560$ **Ans.**

Question 4. In a proportion the first, second and third terms are 9500, 7500 and 665 respectively. Find the Fourth term.

9500, 7500, 665 = ?

$7500 \times 665 = 49,87,500$

$\frac{4987500}{9500} = 525$ $\therefore$ The fourth no is 525.

$\frac{9500}{1500} = \frac{19}{3}$

Question 5. Find the mean proportion of the following :

(i) 5, 20 $= \frac{5}{20} = \frac{1}{4} = 1 : 4$ **Ans.**

(ii) 49, 36 $= 49 : 36$ **Ans.**

Exercise 9.3

Question 1. If the cost of 60 pens is ₹ 540. Find the cost of 9 pens.

The cost of 60 pens = 540

Cost of 1 pens $= \frac{540}{60} = 9$

1 pens cost = 9

Cost of 9 pens is $9 \times 9 = 81$

Question 2. The mass of 5 bags of cement is 250 kg. What is mass of 90 bags of cement.

The mass of 5 bags of cement = 250 kg

Mass of 1 bag $= \frac{250}{5} = 50$

Mass of 90 bags = $90 \times 50 = 4500$ kg

Question 3. In 25 minute a train travels 20 km. How far will it travel in 5 minutes.

25 minute = 20 km

5 minute = ?

$= \frac{20}{25} \times 5 = \frac{100}{25} = 4$

Therefore a train travel 1 minutes and covers 5 km.

Question 4. 11 buses can carry 495 people. How many persons can travel by 8 buses.

11 buses = 495 people

1 buses = $\frac{495}{11} = 45$

1 buses = 45 people

8 × 45 = 360 people

Question 5. 25 bags of rice each weighting 40 kg of cost ₹ 27500. Find the cost of 35 bags of rice each weighting 50 kg.

25 bags of rice weighing = 40 kg

Means total rice = 25 × 40 = 1000 kg

Cost of 1000 kg rice is ₹ 275000

Means per kg price = $\frac{27500}{1000} = 27.5$

We have to find cost of 35 bags weighing 50 kg.

Means 50 × 35 = 1750 kg.

So the cost of 1750 kg rice = 1750 × 27.5 = ₹ 48125 **Ans.**

Question 6. The cost of 7 kg of mangoes is ₹ 434. How many kg of mangoes can be purchased for ₹ 341?

Cost of 7 kg = ₹ 434

How many mangoes can be purchased for ₹ 341 = ?

1 kg = $\frac{434}{7}$ = 1 kg = ₹ 62

62 × 5 = 310

62 ÷ 2 = 31

Half kg = ₹ 31

5 kg = ₹ 310

310 + 31 = 341

5.5 **Ans.**

Question 7. If a car runs 448 km on 7 liters of petrol, how much petrol will be needed for a 160 km run.

448 km = 7 litres

160 km = x litres

$448x = 160 \times 7$

$448x = 1120$

$x = \frac{1120}{448}$ $x = 2.5$ **Ans.**

Question 8. A boy can run 70 m in 9 seconds. How much time does the needed 350 m at the same speed.

Speed = 70 minute in 9 seconds

Speed = 7.77 minute in seconds

Since you have been limited to use the came speed then

Time 350 m / 7.77

Time $= \frac{350}{7.77}$ = 45.04 seconds

The time required 45.04 seconds.

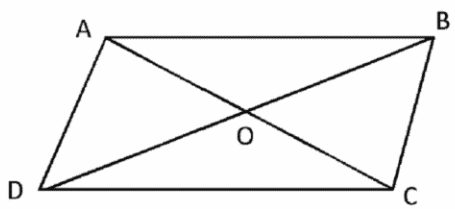
Chapter-10. Understanding Geometrical Shapes Exercise 10.1

Question 1. In fig. compare the line segments in fig. 1 using a divider and fill in the blanks using.

(i) AB _____ AD (ii) CD _____ AC

(iii) AC _____ BD (iv) AO _____ CO

(v) AB _____ CO (vi) AO _____ BC



Ans.

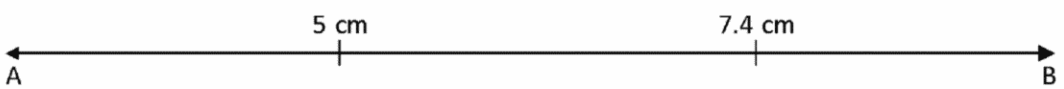
(i) AB > AD (ii) CD < AC

(iii) AC = BD (iv) AO = CO

(v) AB > CO (vi) AO < BC

Question 2. The end point A of line segment AB in a 3cm mark of a ruler and B is at 7.4 cm mark. What is the length of $\overline{AB}$.

Ans.



Question 3. Where will the hour hand of a clock stop if it

(i) Starts at 1 and makes $\frac{1}{4}$ of a revolution. (ii) Starts at 5 and makes $\frac{1}{2}$ of a revolution.

(i) Starts at 1 and makes $\frac{1}{4}$ of a revolution.

1 Revolution = 12 hrs.

$\frac{12}{4}$ = 3 hrs. So the clock will move 3 hrs. stop at 4.

(i) Starts at 5 and makes $\frac{1}{2}$ of a revolution.

1 Revolution = 12 hrs.

$\frac{1}{2}$ revolution $= \frac{12}{2}$ = 6 hrs. So the clock will move 6 hrs. stop at 11.

Question 4. What part of a revolution have you turned through if you stand facing.

(i) North and turn clockwise to face south

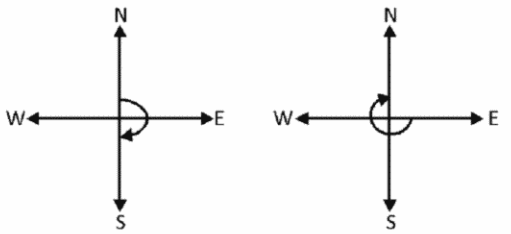
$\frac{1}{2}$ of the revolution

(ii) East and turn anticlockwise to face north

$\frac{3}{4}$ of the revolution

3 right angles

(ii) East and turn anticlockwise to face north



Question 5. Find the number of right angles turned through by the hour hand of a clock when it goes from : (i) 6 to 9 (ii) 1 to 7 (iii) 7 to 10 (iv) 2 to 11

(i) 6 to 9 = When we move from 6 to 9

= We know that

= 1 right angle = $\frac{1}{4}$ of revolution

$= \frac{1}{4} \times 12 = 3$ hrs.

We have 1 right angle.

(ii) 1 to 7 = We move 6 hrs.

= i.e., $\frac{1}{2}$ revolution

= i.e., 2 right angles.

(iii) 7 to 10 = We move 3 hrs.

= When we move 7 to 10.

= i.e., 1 right angle.

(iv) 2 to 11 = When we move from 2 to 11.

= We move 9 hrs.

= i.e., $\frac{3}{4}$ revolution

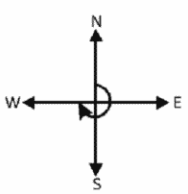
= i.e., 3 right angles.

Question 7. How many right angles do you make if you start facing.

(i) North and turn clockwise to west.

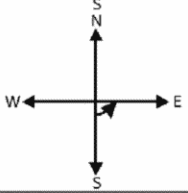
(ii) South and turn anticlockwise to east.

(i) North and turn clockwise to west.



3 right angles

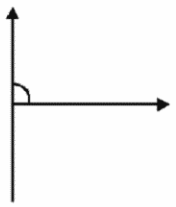
(ii) South and turn anticlockwise to east.

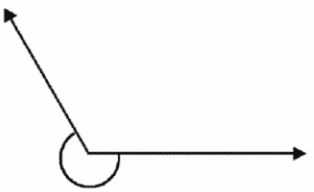


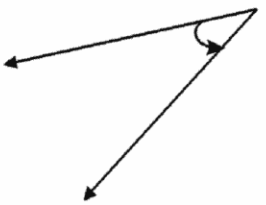
1 right angle

Exercise 10.2

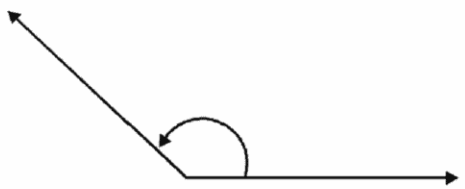
Question 1. Classify each of following angles as right, straight acute, obtuse or reflex.

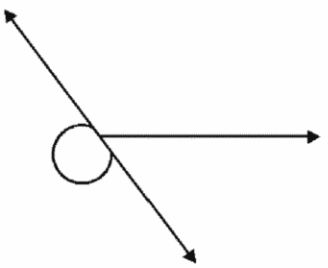
(a) 

(b) 

(c) 

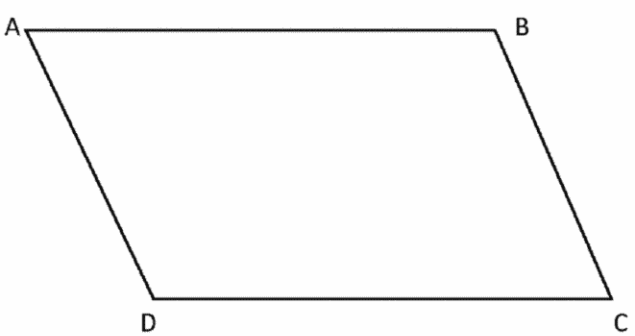
Ans. (a) Right angle (b) reflex angle (c) Acute angle

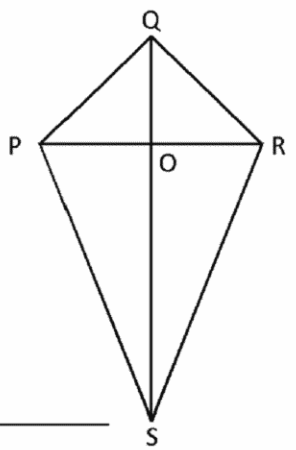
(d) 

(e) 

(d) Obtuse angle (e) straight angle

Question 2. In the given figures, specify whether the angles are acute, obtuse, right, straight or reflex angles.





(a) ∠ BCD _____ (b) ∠ CDA _____

(c) ∠ DAB _____ (d) ∠ ABC _____

(a) ∠ PQR _____ (a) ∠ Đ QOR _____

(c) ∠ QPO _____ (b) ∠ Đ OSR _____

Ans.

(a) ∠ BCD	Acute angle	(b) ∠ CDA	Obtuse angle
(c) ∠ DAB	Acute angle	(d) ∠ ABC	Obtuse angle
(a) ∠ PQR	Acute angle	(a) ∠ Đ QOR	Right angle
(c) ∠ QPO	Acute angle	(b) ∠ Đ OSR	Acute angle

Exercise 10.3

Question 1. Fill in the blanks :

(i) A quadrilateral in which all sides and all angles are equal is _____ .

(ii) A quadrilateral in which two pairs of adjacent sides are equal, but the opposite sides are unequal, is called a _____ .

(iii) In rhombus, _____ angles are equal and _____ sides are equal.

(iv) All rectangles, squares and rhombus are _____ but a trapezium is not.

(v) The diagonals of a rhombus bisect each other at _____ angles.

Ans.

(i) Square

(ii) Kite

(iii) Opposite, all

(iv) Parallelogram

(v) Right

Question 2. Name each of the following parallelograms.

(i) All sides are equal and the diagonals are unequal.

(ii) The adjacent sides are unequal and the diagonals are equal.

(iii) The adjacent sides are equal and the diagonals are equal.

Ans.

(i) Rhombus

(ii) Rectangle

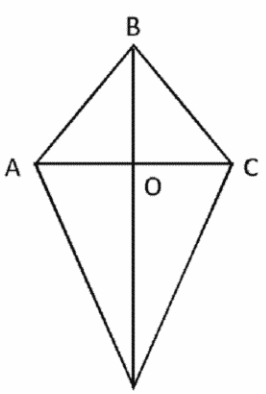
(iii) Square

Question 3. In fig. 1 kite ABCD has diagonals AC and BD 30 intersecting at O.

(i) Name three pairs equal line segments.

(ii) What is the measure of $\angle AOB$?

(iii) Is OB = OD?



Ans.

(i) AB = BC,

AD = CD

AO = OC

(ii) $\angle AOB = 90^{\circ}$

(iii) No.

Question 4. Answer True (T) or False (F) :

(i) Each angle of a rectangle is a right angle.

(ii) The diagonals of a square are perpendicular to one another.

(iii) All the sides of rhombus are of equal length.

(iv) The opposite sides of a rectangle are equal in length.

(v) The opposite sides of trapezium are parallel.

(vi) All sides of parallelelogiam are of equal length.

Ans.

(i) True

(ii) True

(iii) True

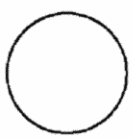
(iv) True

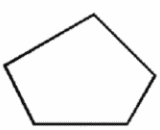
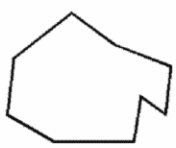
(v) False

(vi) False

Exercise 10.4

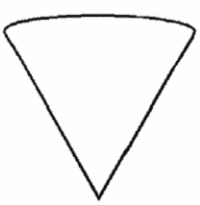
Question 1. Which of the following figures are not polygons, and why? Give reasons.

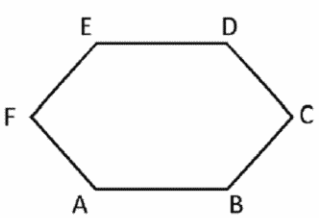
(a)  (b)  (c)  (d)  (e) 

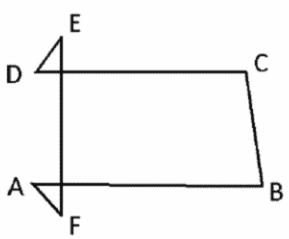
(f)  (g)  (h)  (i) 

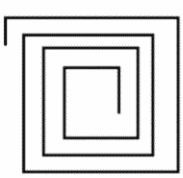
Ans. (a), (d), (e) and (f) are not polygon because of there curved shapes.

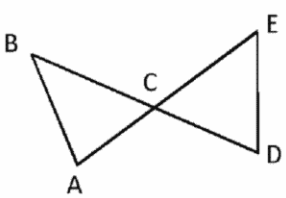
Question 2. Which of the following closed plane figures are not polygons?

(a) 

(b) 

(c) 

(d) 

(e) 

Ans. (a), (c)

Question 3. What is the shape of following?

(a) A brick (b) A match box (c) A ball (d) A dice

Ans. (a) Cuboid (b) Cuboid (c) Spherical (d) Cube

Question 4. Give two examples of each of the following shapes from your surroundings.

(a) Sphere (b) Cube (c) Cone (d) Cylinder (v) Cuboid

Ans.

(a) glass, pebble, basketball

(b) ice cube, sugar cube, dice

(c) ice-cream, cone, birthday cap

(d) coke tin, water tank

(e) match box, smart phone

Question 4. Mach the following :

(i)	One curved surface one plane surface.	(a) Cube
(ii)	One unbroken curved surface.	(b) Cylinder
(iii)	One curved surface two plane faces of equal size.	(c) Triangular
(iv)	Six square faces	(d) Sphere
(v)	One square base, four triangular faces	(e) Cone
(vi)	Three rectangular faces. Two triangular faces. Two triangular base or equal size.	(f) Pyramid

Ans. (i) e (ii) d (iii) b (iv) a (v) f (vi) c

Chapter-11. Basic Geometrical Ideas Exercise 11.1

Question 1. Fill in the blanks :

(i) A dot gives us an idea of a _____ .

(ii) An edge of a ruler gives an idea of a _____ .

(iii) A wall gives us an idea of a _____ .

(iv) Two lines lying in a move _____ if they are not parallel to each other.

(v) A line has _____ end points, a ray has _____ end points and a l i n e segment _____ end points.

Ans.

(i) point of object

(ii) portion of line

(iii) plane or flat surface

(iv) with one common point

(v) no, one, two

Question 2. Study figure 1 and answer the following :

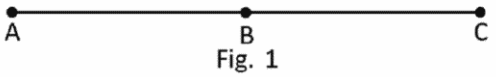


Fig. 1

(i) Name the three points.

(ii) Name the three line segments.

Ans.

(i) Three points A, B, C.

(ii) The three line segment – $\overline{AB}$, $\overline{BC}$, $\overline{AC}$.

Question 3. Study figure 2 and write the names of all the –

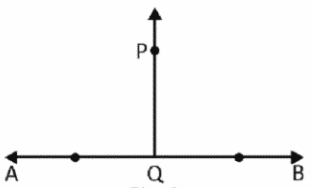


Fig. 2

(i) Points (ii) Line segments

(iii) Rays (iv) Lines

Ans. Points = P

Line segments = $\overline{AB}$, $\overline{PQ}$

Rays = $\overrightarrow{QA}$, $\overrightarrow{QB}$, $\overrightarrow{QP}$

Lines = $\overleftrightarrow{AB}$

Question 4. Study fig. 3 and name all the rays with initial points as A, B, C respectively.

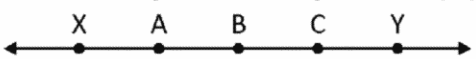


Fig. 3

Ans. Rays = $\overrightarrow{AX}$, $\overrightarrow{BX}$, $\overrightarrow{CX}$, $\overrightarrow{AY}$, $\overrightarrow{BY}$, $\overrightarrow{CY}$

Question 5. Write –

(i) All pairs of parallel lines

(ii) All pairs of intersecting lines

(iii) Lines whore point of intersecting of l

(iv) Lines whore point of intersection of D

(v) Lines whore point of Intersection of E

(vi) Lines whore point of Intersection of A

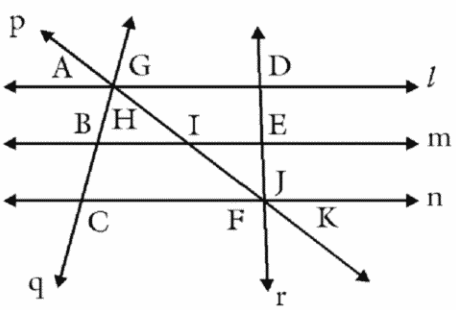


Fig. 4

Ans.

(i) l || m, m || n, l || n,

(ii) l, r ; m, r ; n, r ; l, q ; m, q ; n, q

(iii) p, n

(iv) l, r

(v) m, r

(vi) l, q

Exercise 11.2

Question 1. Study the given polygon PQRS in fig. 1 name its.

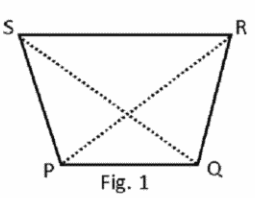


Fig. 1

(a) sides (b) vertices (c) diagonals (d) adjacent sides

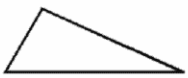
Ans. (a) Sides – PQ, QR, RS, SP

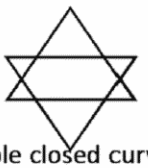
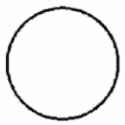
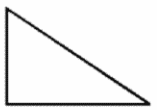
(b) Vertices – P, Q, R, S

(c) Diagonals – PR, SQ

(d) Adjacent sides – PQ, QR ; OR, SR ; SR ; SP ; SP ; PQ

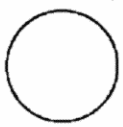
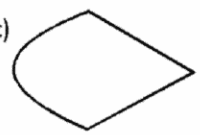
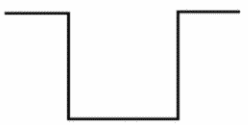
Question 2. Which of the following are simple closed curves?

(a)  (b)  (c)  (d) 

(e)  (f)  (g)  (h) 

Ans. Simple closed curves (b), (f) and (g).

Question 3. Classify the following curves as open or closed.

(a)  (b)  (c)  (d) 

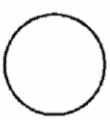
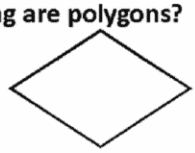
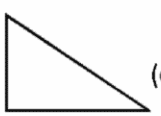
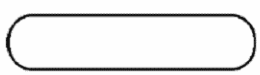
(e)  (f)  (g)  (h) 

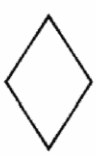
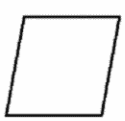
Ans. (a) Open curves (b) Closed curve (c) Closed curve

(d) Open curves (e) Open curve (f) Closed curve

(g) Open curves (h) Closed curve

Question 4. Which of the following are polygons?

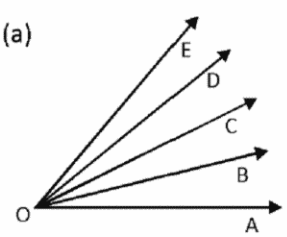
(a)  (b)  (c)  (d) 

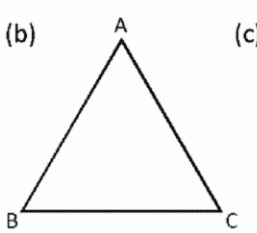
(e)  (f)  (g)  (h) 

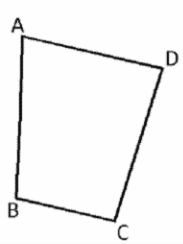
Ans. (b), (c), (e) and (f).

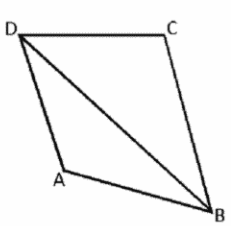
Exercise 11.3

Question 1. Name the angles formed in each of the following angles.

(a) 

(b) 

(c) 

(d) 

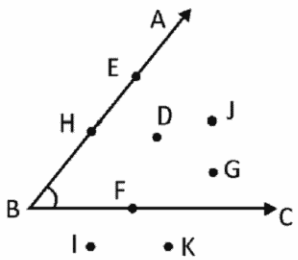
Ans. (a) ∠EOD, ∠DOC , ∠COB, ∠BOA, ∠EOC, ∠EOB, ∠EOA, ∠DOB, ∠DOA, ∠COA

(b) ∠ABC, ∠BCA, ∠CAB

(c) ∠ADC, ∠DCB, ∠CBA, ∠BAD

(d) ∠DAB, ∠ABC, ∠BCD, ∠CDA, ∠CDB, ∠CBC, ∠ADB, ∠ABD

Question 2. In figure –



(i) Write the name of the angle, its vertex and arms.

(ii) List the points which are

(a) In the interior of the angle.

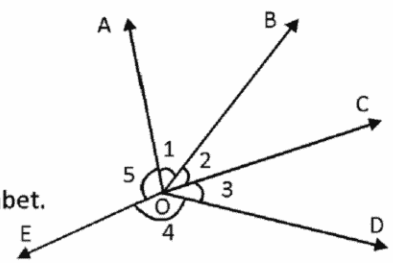
(b) In the exterior of the angle.

(c) On the angle.

Ans. (i) Angle ∠ABC, Vertex B, Arm $\overline{AB}$, arm BC

(ii) (a) Point D, J, G (b) Point I, K (c) Point H, E, F

Question 3. In figure. 3 rays OA, OB, OC, OD and OE start from the end point O forming various angles ∠1, ∠2, ∠3, ∠4 and ∠5.



(i) Name there angles using the capital letters of the English alphabet.

(ii) Name two points each in the interior of

(a) ∠AOB (b) ∠BOD (c)∠EOD (d) ∠EOA (e) ∠BOC

(iii) Name of the points in the interior of angles.

(a) ∠AOD (b) ∠BOD (c) ∠AOE (d) ∠EOC (e) ∠EOD

Ans. ∠AOB, ∠BOC, ∠COD, ∠DOE, ∠EOA

Exercise 11.4

Question 1. Fill in the blanks :

(i) A triangle has _____ angles and _____ sides.

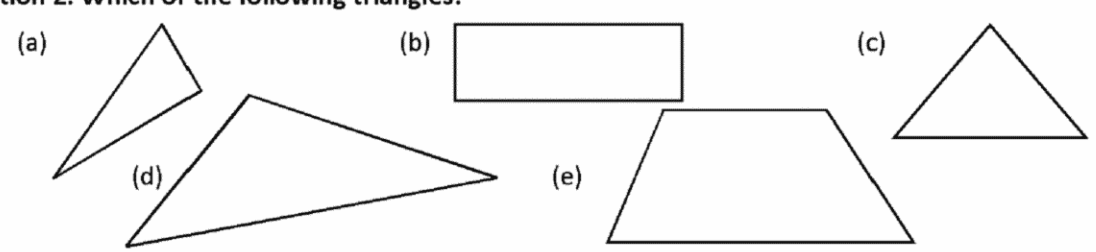
(ii) A triangle has _____ elements.

(iii) In a ΔABC, the side opposite to ∠A is _____ .

(iv) In a ΔPQR, the vertex opposite to side QR is _____ .

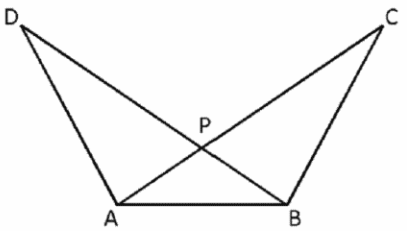
Ans. (i) three, three (ii) Three parts and three angles (iii) BC (iv) ∠P

Question 2. Which of the following triangles?



Ans. (a), (c) and (d) are triangles.

Question 3. In figure 1 name the following –



(i) All triangles

(ii) All angles opposite to side AB

(iii) All segments

(iv) Triangles with vertex P

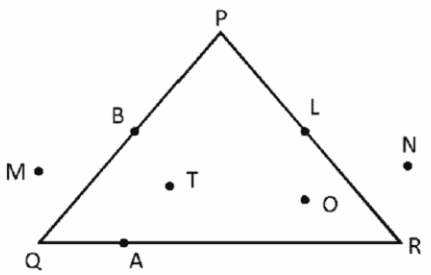
Ans. (i) ΔAPB, ΔPBC, ΔPDA, ΔABC ΔDAB

(ii) ∠D, ∠P, ∠C

(iii) Segments – AB, BC, PC, AP, AD, DP

(iv) ΔAPB, ΔPCB, ΔPAD

Question 4. Study fig. and write –



(i) Name the points which are in the triangular region PQR

(ii) Which of there lie on the ΔPQR

(iii) Which points lie in the interior of ΔPQR

Ans. (i) T, O, B, L, A

(ii) B, L, A

(iii) T, O

Exercise 11.5

Question 1. Fill in the blanks –

(i) A quadrilateral is a _____ sided polygon.

(ii) A quadrilateral has _____ sides, _____ vertices, _____ angles.

(iii) A diagonal of quadrilateral is a line segment that joins two _____ vertices of a quadrilateral.

(iv) Two sides of a quadrilateral which have a common end point are called its _____ .

Ans. (i) four sided polygon

(ii) 4 sides, 4 vertices and 4 angles

(iii) opposites

(iv) Angle

Question 2. Figure 1 shows a quadrilateral ABCD. Name the following –

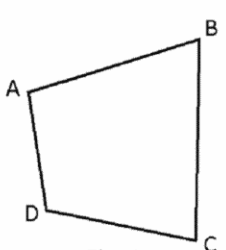


Fig. 1

(i) Two pairs of opposite sides

(ii) Four pairs of adjacent sides

(iii) Two pairs of opposite angles

(iv) Four pairs of adjacent angles

Ans. (i) Opposite sides – AB, DC ; AD, BC

(ii) Four pair of adjacent sides – AB, BC ; BC, CD ; CD, AD ; AD, AB

(iii) Two pair of opposite angles – $\angle A, \angle C$; $\angle B, \angle D$

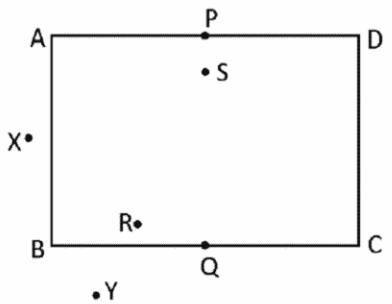
(iv) Four pairs of adjacent angles – $\angle A, \angle B$, ; $\angle B, \angle C$; $\angle C, \angle D$; $\angle A, \angle D$

Question 3. Draw a quadrilateral ABCD. Mark the following points.

(i) P and Q which are on the quadrilateral on the opposite sides.

(ii) R and S which are in the interior of the quadrilateral with R near to Q and S nearor to P.

(iii) X and Y which are on the exterior of the quadrilateral.



Exercise 11.6

Question 1. (i) What shape is a full moon? (ii) What shape are the wheels of the cycle.

Ans. (i) Full moon has circle shape. (ii) The wheel of cycle has circle shape.

Question 2. In figure 1 name the following –

(i) Three radii (ii) Three chords (iii) A diameter (iv) Two minor arc (v) Two sector

Ans. (i) Three radii BC, AC, CR

(ii) Three chords AB, BR, AR

(iii) A diameter AR

(iv) Two minor arc BPR, arc BQA

(v) Two sector ACB, BCR

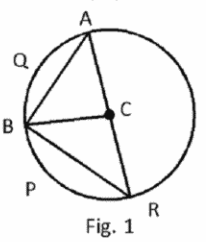


Fig. 1

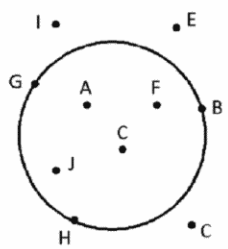
Question 3. In the circle in fig. 2 name the points where are

(i) in its interior (ii) on its exterior (iii) on the circle

Ans. (i) In its interior – A, F, C, J

(ii) ON its exterior – I, E, C

(iii) On the circle – G, B, H



Question 4. Fill in the blanks –

(i) All radius of a circle are _____ .

(ii) A _____ a circle is a chord that passes through its centre.

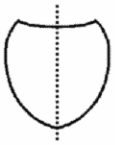
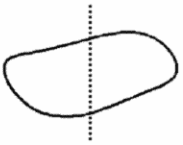
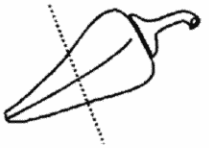
(iii) Every point on a circle is _____ from its centre.

(iv) The diameter of a circle is _____ times its radius.

Ans. (i) Equal (ii) Diameter (iii) Equidistant (iv) 2 times

Chapter-12. Exercise 12.1

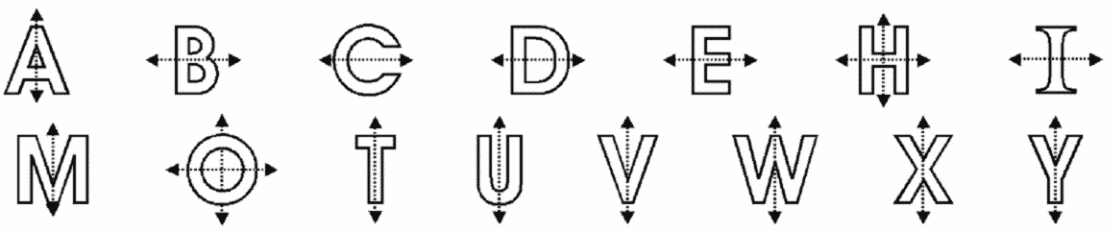
Question 1. Which of the following figures are symmetric?

(a)  (b)  (c)  (d)  (e) 

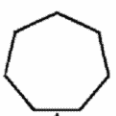
Ans. (b)

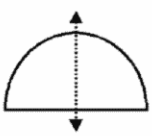
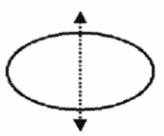
Question 2. Draw the line of symmetry in the following letters

Ans.



Question 3. Draw the lines of symmetry of the following shapes.

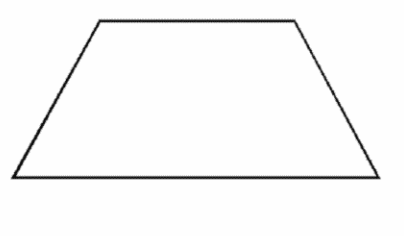
(a)  (b)  (c)  (d) 

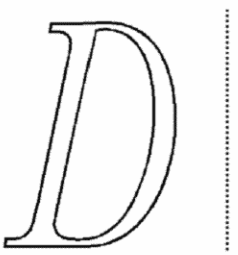
(a)  (b)  (c)  (d) 

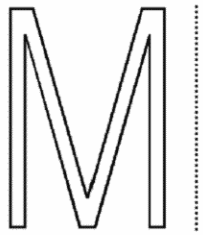
Question 4. Draw a horizontal line of symmetry for letters B, E, D.

Ans. 

Question 5. Copy the given diagrams in Fig. on squared paper and draw the other half of the shape using the dotted line as the number line.

(a) 

(b) 

(a) 

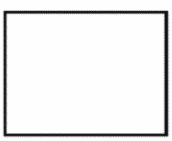
(b) 

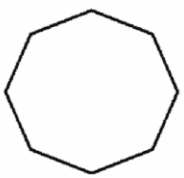
.....

Ans. Do it yourself on paper.

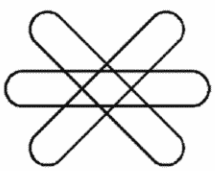
Exercise 12.2

Question 1. In each of the following symmetrical figures, draw as many lines of symmetry as possible.

(a) 

(b) 

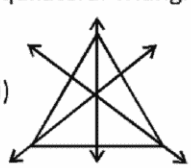
(c) 

(d) 

Ans. Children will do themselves one in order.

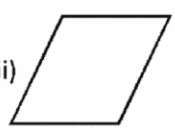
Question 2. Draw the following figure in your notebook and find the number of lines of symmetry for each figure.

Equilateral Triangle

(i) 

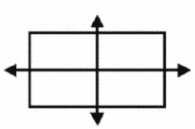
3 line of symmetry

Parallelogram

(ii) 

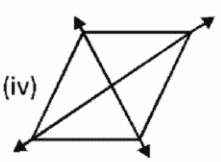
No line of symmetry

Rectangle

(iii) 

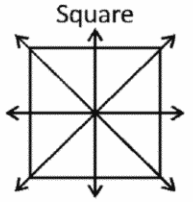
2 line of symmetry

Rhombus

(iv) 

2 line of symmetry

Square

(v) 

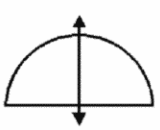
4 line of symmetry

Kite

(vi) 

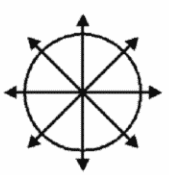
One line of symmetry

Semicircle

(vii) 

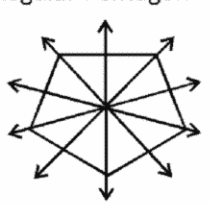
One line of symmetry

Circle

(viii) 

Infinite lines of symmetry

Regular Pentagon

(ix) 

5 lines of symmetry

Chapter-13. Data Handling Exercise 13.1

Question 1. In a class test, the following marks obtained by 33 students of class V out of maximum 22 marks.

17, 13, 18, 11, 17, 14, 14, 19, 18, 14, 13, 17, 15, 16, 15, 13, 12, 18, 16, 12, 18, 16, 15, 19, 16, 16, 15, 19, 15, 15, 14, 14, 14.

Find how many students obtained marks – (i) more than 17 (ii) less than 15

Marks	Tally Marks	Frequency
11	I	1
12	II	2
13	III	3
14	IIIIII	6
15	IIIIII	6
16	IIIII	5
17	III	3
18	IIII	4
19	III	3
	Total	33

More than 17 = 4 + 3 = 7 **Ans.**

Less than 15 = 6 + 3 + 2 + 1 = 12 **Ans.**

Question 2. The weight's (in k.g.) of 30 students of class VII are given below –

26, 28, 30, 28, 26, 32, 34, 33, 32, 34, 32, 28, 28, 34, 34, 34, 28, 26, 30, 32, 35, 36, 25, 24, 29, 28, 34, 35, 34, 35.

Using tally marks. Find the number of students with different weight. What is the weight of

(i) Maximum number of students (ii) Minimum number of students

(iii) How many students have weight less than 30

Marks	Tally Marks	Frequency
24	I	1
25	I	1
26	III	3
27	0	0
28	IIIIII	6
29	I	1
30	II	2
31	0	0
32	IIII	4
33	I	1
34	IIIIIII	7
35	II	2
36	I	1
	Total	29

(i) Maximum number of students = 34 kg

(ii) Minimum number of students = 24 kg, 25 kg, 29 kg, 35 kg, 36 kg

(iii) How many students have weight less than 30.

1 + 1 + 3 + 6 + 1 = 12 **Ans.**

Question 3. Following the choice of fruits of 30 students of class IV. Where a stands for apple, b for banana, c for orange and d for grapes.

a, b, a, d, a, c, d, a, b, c, a, d, d, c, a, c, d, a, c, a, a, b, c, c, d, c, a, c, d, a

Make the frequency table for different fruits. Find which fruit is preferred by most of the students and which is liked by least number of students.

Marks	Tally Marks	Frequency
a	IIIIIIIIII	11
b	II	3
c	IIIIIIIII	9
d	IIIIIII	7
	Total	30

Apple is more preferred by students

Banana is least preferred by students

Question 4. The following data shows the number of matchsticks in 50 boxes.

45, 47, 48, 50, 50, 51, 52, 51, 49, 45, 52, 53, 50, 53, 54, 48, 52, 54, 53, 50, 50, 55, 54, 51, 47, 49, 53, 48, 51, 52, 51, 46, 55, 52, 53, 53, 47, 51, 55, 52, 46, 53, 49, 51, 48, 54, 50, 55, 52, 47.

(i) Prepare a frequency table using tally marks.

(ii) How many boxes have less than 50 matchsticks?

(iii) How many boxes have equal to or more than 50 match sticks.

(iv) What is the highest number of matchsticks or any box.

Marks	Tally Marks	Frequency
45	II	2
46	II	2
47	IIII	4
48	IIII	4
49	III	3
50	IIIIII	6
51	IIIIIII	7
52	IIIIIII	7
53	IIIIIII	7
54	IIII	4
55	IIII	4
	Total	50

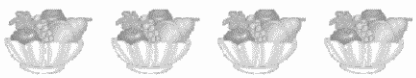
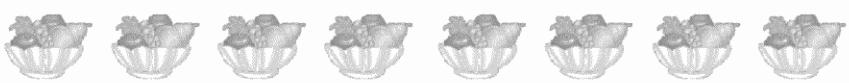
(i) How many boxes have less than 50 matchsticks 5 boxes.

(ii) How many boxes have equal to or more than 50 match students 4 boxes.

(iii) What is the highest number of matchsticks or any box 7 matchsticks.

Exercise 13.2

Question 1. In a fruit market five person sold the following number of fruit baskets in a season.

Name	Number of Basket Fold
Shanker	
Bhagwan	
Hanuman	
Uday	
Maliram	
Where 1  = 50 basket	

Read the pictograph and answer the following :

(i) Who sold the maximum number of baskets and how much?

(ii) Who sold the minimum number of baskets and how much?

(iii) How many basket were sold by Bhagwan and Hanuman?

(iv) How many more basket were sold by Maliram than Shankar?

Ans.

(i) The Maliram sold the maximum number of baskets $50 \times 8 = 400$

(ii) Uday sold the minimum number of baskets $50 \times 3 = 150$

(iii) Baskets were sold by Bhagwan and Hanuman

$50 \times 4 = 200$ (Bhagwan)

$50 \times 7 = 350$ (Hanuman)

(iv) The four baskets more were sold by Maliram than Shankar

$50 \times 4 = 200$

Question 2. Read the following pictograph and give answer to the question that follow :

Number of the Student	Number of Toys they have
Sanjay	
Rahul	
Atul	
Preeti	
Kirti	
Shafali	
Anu	
Where 1  = 4 toys	

(i) Who has maximum number of toys? Who has the minimum.

(ii) What are the total number of toys with all the seven students.

(iii) How many more toys are with Sanjay and Preeti than with Kirti and Shafali.

Ans.

(i) The maximum number of toys and Atul has the minimum.

(ii) The total number of toys with all the seven students are $28 \times 4 = 112$ toys

(iii) The four toys are more with the Preeti.

Question 3. The following are ages (in years) of 35 students of a school. Prepare a table using tally marks and then draw a pictograph using 1 for 2 students.

15 17 14 16 16 17 15 14 14 16 14 15 16 15 17 16 16 17 15 15 17 15 16 16 14 17 15 14 16 16 16 17 17 16 17

Ages	Tally Marks	Frequency
14	IIIIII	6
15	IIIIIIII	8
16	IIIIIIIIIII	12
17	IIIIIIIII	9
	Total	35

Question 4. Total number of students in coaching in different years shown in the following table.

Years	2005	2006	2007	2008	2009
No. of Students	300	450	500	700	650

Draw a pictograph using 1 for 100 student.

Years	No. of students
2005	
2006	
2007	
2008	
2009	
Where 1  = 100 students	

Exercise 13.3

Question 1. Draw bar graphs the show the following –

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Attendance in Class	30	28	25	29	34	32

Children will do in Bar graph.

Question 2. Draw bar graphs the show the following –

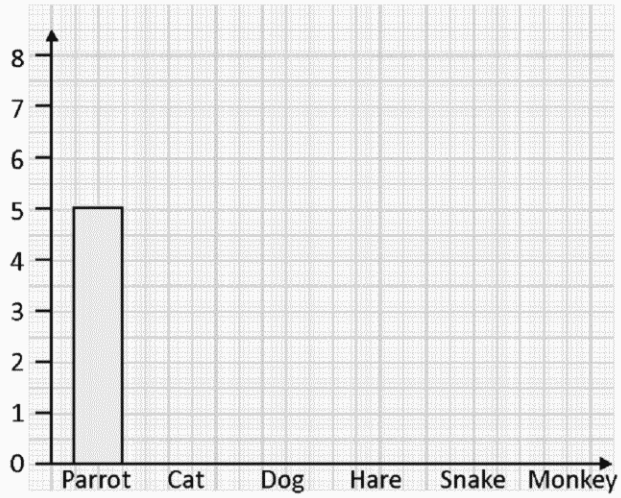
Pupils	Ayush	Rama	Rahul	Rohan	Anand	Hemant
Attendance in Class	35	29	38	32	22	25

Children will do in Bar graph.

Question 3. Rahul made a list of each kind of let that his friends had.

Use this table to complete the graphs shown below –

Pets	Parrot	Cat	Dog	Hare	Snake	Monkey
Number of Pupil who have this pet	5	7	8	3	0	1



Children will do in Bar graph.

Question 4. (a) What does the graph show?

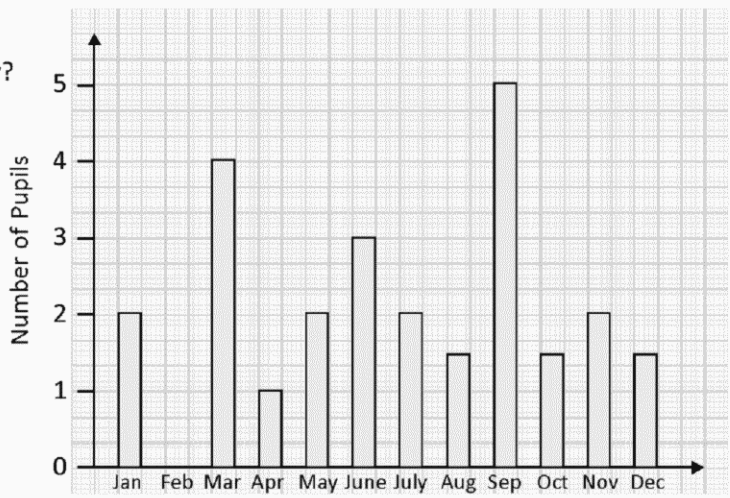
(b) What does the vertical line show?

(c) What does the horizontal line show?

(d) What does each bar stand for?

(e) Which month has the lowest birthday's?

(f) Which month has the most birthday's?



Ans.

(a) The bar graph shows the number of pupil in a year.

(b) The vertical line shows number of pupil.

(c) The horizontal line shows months.

(d) The bar stand for pupil strength.

(e) April has the lowest B' days.

(f) September has most B' days.

Question 5. Draw bar graphs the show the following –

Years	1993	1994	1995	1996	1997	1998
Project in thousands rupees	7	9	12	20	21	25

Children will do in Bar graph.

Question 6. Draw bar graphs the show the following –

Space Flights	Apollo 8	Apollo 9	Apollo 10	Apollo 11	Apollo 12
Days in Flight	6	10	8	11	10

Children will do in Bar graph.

Chapter-14. Mensuration Exercise 14.1

Question 1. The cost of fencing a rectangular park at ₹ 28.50. Permeter is ₹ 3648. Find its length and breadth if they are in ratio 5 : 3.

The cost of fencing = 28.50

Perimeter = 3648

Breadth = ?

Length = ?

Ratio = 5 : 3

Perimeter of rectangle = $\frac{3648}{28.50}$ = 128 m

Let the length of rectangular is 5x and breadth is 3x.

Therefore 2(5x + 3x) = 128

$8x = \frac{128}{2}$

8x = 64

x = 8

Length = 5 × 8 = 40 m

Breadth = 3 × 8 = 24 m

Question 2. A rectangular field in 50m by 40 m. Mahesh goes ten times round it. How much distance does he cover?

Distance covered by him = 10 (the perimeter)

Perimeter= 2(l + b)

= 2(50 + 40)

2 × 90 = 180 m

Distance covered by him 10 × 180 = 1800 m

Question 3. Rahul takes 2 rounds of a square park of side 125 m and Priya takes 3 rounds of a rectangular park of length 70 m and breadth 45 m. Who covers more distance and how much.

Rahul = 2 × Perimeter of square

2 × 4 × length of side

2 × 4 × 125 = 8 × 125 = 1000

Priya 3 times of rectangle

3 × 2 × (l + b)

6 × (70 + 45)

6 × (115) = 690

Rahul cover more distance by 310 m.

Question 4. Find the cost of fencing a rectangular park of length 350 m and breadth 250 m at the rate of ₹ 18.50 permeter.

Length of rectangular park = 350 m

Breadth of rectangular park = 250 m

Perimeter of park = 2 × (L + B)

2 × (350 + 250)

2 × 600 = 1200 m

Since the cost of fencing park per meter = ₹ 18.50 per meter

Therefore, cost of fencing park = 1200 × 18.50 = 22200 **Ans.**

Question 5. Find the perimeter of –

(i) A regular pentagon of side 8.5 cm

The pentagon has 5 sides

8.5 × 5 = 42.5 **Ans.**

(ii) A regular hexagon of side 3.5 cm

The hexagon has 6 sides

6 × 3.5 cm = 21 cm **Ans.**

(iii) A regular octagon of side 3.5 cm

Octagon has 3.5 cm

8 × 3.5 = 28 cm **Ans.**

(iv) A regular decagon of side 3.5 cm

Decagon has 10 sides

10 × 3.5 = 35 cm **Ans.**

Question 6. A piece of wire is 18 cm long. What will be length of each side if the wire is used to form.

(i) a square

4 × side = 18 cm

Side = $\frac{18}{4}$ = 4.5 cm

(ii) an equilateral triangle

3 × side = 18 cm

Side = $\frac{18}{3}$ = 6 cm

(iii) a regular pentagon

5 × side = 18 cm

Side = $\frac{18}{5}$ = 3.6 cm

(iv) a regular hexagon

6 × side = 18 cm

Side = $\frac{18}{6}$ = 3 cm

Question 7. A wooden photo frame is to be made of the shape of a regular hexagon of side 70 cm. Find the total cost if the cost of wooden stick to be used is ₹ 1.50 per cm.

Side = 70 cm

Perimeter of hexagon $6 \times 70 = 420$

$420 \times \frac{50}{100} = 630$

The total cost is 630.

Exercise 14.2

Question 1. The perimeter of a rectangle is 48m and the length is twice the breadth. Area of rectangle is?

The perimeter of rectangle is 48 m

Length = 2y breadth

Suppose the breadth is x

Length = 2x

It is stated that l = 2x .....(1)

Now the perimeter of the rectangle = 48 m

$2(l + b) = 48$

$2(2x + x) = 48$

$3x = \frac{48}{2}$

$3x = 24$

$x = \frac{24}{3}$

x = 8 m

Breadth 8 cm

Length = $2 \times 8 = 16$

Area = L × B

$= 16 \times 8 = 128\ m^2$

Question 2. The length and breadth of a rectangle are into the ratio 2 : 1. It its breadth is 20m then what will perimeter.

The length and breadth of rectangle is the radio 2 : 1

Breadth = 20 m

Perimeter = ?

Let length = 2x

Breadth = x

$2x - x = 20$

x = 20

Therefore, required perimeter =

2(2x + x) = 2 × 3x

2 × 3 × 20 = 120 m

Question 3. The perimeter of a rectangular field is 124m and breadth is 24m. Find the area.

The perimeter of a rectangle field = 124

Breadth = 24

Area = ?

Perimeter = 2(L + b)

124 = 2(L + 24)

124 = 2L + 48

124 – 48 = 2L

$\frac{76}{2}$ = L

38 = L

Area if rectangle

(L × B)

912m^2

Question 4. A room is 17m long and 12m. Find the cost of carpeting the room with a carpet 85cm broad at the rate of ₹ 120 per meter.

Area of room = 17 × 12 = 204

$\frac{204}{85}$ × 120 = 288

The cost of carpeting is 288. **Ans.**

Question 5. 25 squares each of perimeter 8cm are placed adjacent to each other to form a rectangle of length 50cm. What is the area of the rectangle formed.

Each side = 2 cm

Length of rectangle = 50 cm

Breadth = 2 cm

Area = 2 × B

50 × 2 = 100 cm^2

Question 6. Find the cost of levelling of mayground at ₹ 2.5 for square meter if it is 70 m long and 20 m wide. Find also the cost of fencing it at ₹ 1.5 per meter.

Length = 70 m

Width = 20 m

Area of playground = L × B

70 × 20 = 1400 m^2

And perimeter of playground = 2(L + B)

2(70 + 20)

2 × 90 = 180 m

Cost of levelling 1 m^2 = 2.5

Cost of levelling

1400 m2 = 1400 × 2.5 = ₹ 3500

Cost of fencing 1 m = ₹ 1.5

Cost of fencing 180 = 1.5 × 180 = 270

Total money = 3500 + 270 = ₹ 770

Question 7. A floor is 6m long and 5m wide. A square carpet of side 4m is laid on the floor. Find the area of floor not carperted.

Total area = l × b

6 × 5 = 30 sq. m

Area of carpret = 4 × 4 = 16 sq. m

Remaining area of the room = 30 – 16 = 14 sq. m

CHAPTER - 1 : INTEGERS (Exercise : 1.1)

Q. 1 **A pair of integers whose sum is 7 is.**

(a) 5 and 2 **(b) 4 and 3** **(c) 9 and 2** **(d) 9 and 2**

Ans. (a) 5 + 2 = 7 (b) 4 + 3 = 7 (a) and (b) ans.

Q. 2 **The smallest positive integer is.**

(a) 1 **(b) 0** **(c) 2** **(d) None of these**

Ans. Smallest positive number is? (a) ans.

Q. 3 **$|-58| - |-59|$ is**

(a) –1 **(b) 1** **(c) 11** **(d) 117**

Ans. $|-58| - |-59|$

$58 - 59$ = (a)

Q. 4 **Which of the following is a true statement.**

(a) 0 is the smallest integer. **(b) 1 is the smallest integer.**

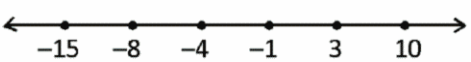
(c) 1 is the smallest integer **(d) we don't know the smallest integer**

Ans. (d) We don't knew the smallest integer.

Q. 5 **Represent each of the following integers on the number line.**

–4, 3, –1, 10, –8 and –15

Ans.



Q. 6 **Write the additive inverse of each of the following.**

–11, 10, $|-8|$, + $|3|$, $-|-4|$, $|-7|$

Ans. Additive inverse of –11 is 11 Additive inverse of 10 is –10

Additive inverse of $|-8|$ is –8 Additive inverse of $|+3|$ is –3

Additive inverse of $-|-4|$ is 4 Additive inverse of $|-7|$ is –7

Q. 7 **Find the value of each of the following.**

(a) $|-17| - |-4|$ **(b) $|15| + |-18|$** **(c) $-|11| - |-7|$**

(d) $12 - |-12|$ **(e) $-30 + |-30|$** **(f) 48 + (27)**

Ans. (a) $|-17| - |-4|$ (b) $|15| + |-18|$ (c) $|-11| - |-7|$

$17 - 4 = 13$ $15 + 18 = 33$ $11 - 7 = 4$

(d) $|12| - |-12|$ (e) $-30 + |-30|$ (f) $48 + 27$

$12 - 12 = 0$ $-30 + 30 = 0$ $= 75$

Q. 8 **Find the value of each of the following.**

(a) 15 – (–7) **(b) –21 – (–18)** **(c) –101 – (–102)**

(d) –29 – (–15) **(e) –55 – (–33 – 22)** **(f) (–15 – 13) + (18 – 10)**

Ans. (a) $15 - (-7)$
$15 + 7$
$= 22$ Ans.

(b) $-21 - (-18)$
$-21 + 18$
$= -3$ Ans.

(c) $(-101) - (-102)$
$-101 + 102$
1 Ans.

(d) $(-29) - (-15)$
$-29 + 15$
-14 Ans.

(e) $(-55) - (-33 - 22)$
$-55 - (-55)$
$-55 + 55 =$ **0 Ans.**

(f) $(-15 - 13) + (18 - 10)$
$(-28) + (8)$
$-28 + 8 =$ **-20 Ans.**

Q. 9 Arrange the following integers in descending order:

(a) $-11, -16, 8, 3, -9, 4$ **(b) $-25, 25, 15, -7, -3, 1$** **(c) $20, -1, 0, -5, 21, 9$**

Ans. (a) 8, 4, 3, –9, –11, –16 (b) 25, 15, 1, –3, –7, –25 (c) 21, 20, 9, 0, –1, –5

Q. 10 Arrange the following integers in ascending order.

(a) $-18, 7, 1, -10, 14, -21$ **(b) $3, -3, -9, -16, -1, 0$** **(c) $8, -5, 16, -27, 4, -8$**

Ans. (a) –21, –18, –10, 1, 7, 14 (b) –16, –9, –3, –1, 0, 3 (c) –27, –8, –5, 4, 8, 16

Q. 11 Which temperature is higher?

(a) + 8 °C, or –8 °C **(b) –2 °C, or 5 °C** **(c) + 7 °C, or + 10 °C**

Ans. (a) 8 °C (b) 5 °C (c) 10 °C

Exercise : 1.2

Q. 1 $(-25) \times (-10) \times (-4)$ is equal to:

(a) –1000 **(b) 1000** **(c) 1** **(d) –100**

Ans. $(-25) \times (-10) \times (-4)$
$250 \times (-4) = -1000$ **Ans. (a)**

Q. 2 $7 \times (-8)$ is

(a) –36 **(b) 56** **(c) –56** **(d) 1 – 561**

Ans. $7 \times (-8) = -56$ **Ans. (c)**

Q. 3 Product of $(9) \times (5) \times 6 \times (3)$ is!

(a) Negative **(b) Positive**

(c) Either negative or positive **(d) None of these**

Ans. $(9) \times 5 \times 6 \times (3)$ $(+) \times (+) \times (+) \times (+) = +$
$9 \times 30 \times (3) = 9 \times 90 = 810$ **Ans. (b)**

Q. 4 $(-16) \times (-13)$ is

(a) –208 **(b) 208** **(c) $-|208|$** **(d) 218**

Ans. $(-16) \times (-13) = 208$ $(-) \times (-) = +$ **Ans. (b)**

Q. 5 $(-2) \times (-3) \times (-4) \times (-5) \times (-6)$ is.

(a) –120 **(b) –720** **(c) 120** **(d) 720**

Ans. $(-2) \times (-3) \times (-4) \times (-5) \times (-6)$
$(6) \times (20) \times (-6)$ $(-) \times (-) = +$
$120 \times (-6)$ $(-) \times (+) = -$
$= -720$ $(+) \times (-) = -$
Ans. (c)

Q. 6 **(19) × (115) × 0 is**

(a) 1818 **(b) –2185** **(c) 0** **(d) –101**

Ans. (19) × (115) × 0

= 0 (Multiply by zero to any integer is always zero.) **Ans. (c)**

Find the product (7–10)

Q. 7 **(–15) × (40)**

Ans. (–15) × 40 = **–600 Ans.** (–) × (+) = –

Q. 8 **(–17) × (–25)**

Ans. (–17) × (–25) = **425 Ans.** (–) × (–) = +

Q. 9 **21 × (22)**

Ans. (21) × (22) = **462 Ans.**

Q. 10 **36 × (–16)**

Ans. 36 × (–16) = **–576 Ans.** (+) × (–) = –

Evaluate each of the following (11–15)

Q. 11 **(–22) × (–9) × (–3)**

Ans. (–22) × (–9) × (–3) (–) × (–) = +

198 × (–3) = **–594 Ans.** (+) × (–) = –

Q. 12 **(–18) × (–8) × 9**

Ans. (–18) × (–8) × 9 = 144 × 9 = **1296 Ans.** (–) × (–) = +

Q. 13 **If x ⊕ y = 2 × x × y, find 9 ⊕ 3.**

Ans. x ⊕ y = 2 × x × y (Given)

9 ⊕ 3 = 2 × 9 × 3 = **54 Ans.**

Q. 14 **If x ⊕ y = 3x – 2y, find 5 ⊕ 2.**

Ans. x ⊕ y = 3x – 2y (Given)

5 ⊕ 2 = 3 × 5 – 2 × 2 = 15 – 4 = **11 Ans.**

Q. 15 **Multiply 16 by (–4) and find the additive inverse of the resulting integer.**

Ans. 16 × (–4) = –64 Additive inverse of –64 is **64.**

Exercise : 1.3

Q. 1 **(–902) × 201 – 902 × (–1) is**

(a) –180400 **(b) –90200** **(c) 90200** **(d) 180400**

Ans. (–902) × 201 – (902) (–1)

(–902) (201 – 1)

(–902) (200) = 180400 **Ans. (a)**

Q. 2 **70 × (–493) + 70 × (–7) is**

(a) 34020 **(b) 34020** **(c) 35000** **(d) 3500**

Ans. 70 × (–493) + 70 × (–7)

70 (–493 – 7)

70 (–500) = –35000 **Ans. (c)**

Q. 3 $0 \div (-1) - 1506 \times (-1)$

(a) −1506 **(b) 1507** **(c) 1506** **(d) 0**

$0 \div (-1) = 0$ $0 - 1506 = -1506$ $-1506 \times -1 = 1506$

Ans. $0 \div (-1) = 0$ **Ans. (c)**

Q. 4 **Determine the integer whose product with −1 is**

(a) 1 **(b) 21** **(c) 44** **(d) 0** **(e) 1**

Ans. (d) zero multiply any number is always zero. −1, −21, −44, 0

Q. 5 **Find each of the following products.**

(a) $(-27) \times (-5)$ (b) $(-12) \times (-5) \times 5 \times (-1)$

(c) $(-1000) \times 11 \times 0 \times (-2)$ (d) $(-3) \times (-3) \times (-3) \times (-2) \times (-2)$

Ans. (a) $(-27) \times (-5) = 135$ $(-) \times (-) = +$

(b) $(-12) \times (-5) \times (5) \times (-1)$

$= 60 \times 5 \times (-1)$ $(-) \times (-) = +$

$= 300 \times (-1) = -300$ $(+) \times (-) = -$

(c) $(-1000) \times 0 \times 11 \times (-2) = 0$

Zero multiply any integer is always zero.

(d) $(-3) \times (-3) \times (-3) \times (-2) \times (-2)$

$9 \times (-3) \times (-2)\ (-2)$ $(-) \times (-) = +$

$-27 \times (-2)\ (-2)$ $(+) \times (-) = -$

$54 \times (-2) = -108$

Q. 6 **Find each of the following products using suitable properties.**

(a) $25 \times 15 \times (-2) \times 4$ **(b) $19 \times 125 \times (-5) \times (-8)$**

(e) $545 \times (-27) + 545 \times (-3)$ **(f) $625 \times (-35) + (-625) \times 65$**

Ans. (a) $25 \times (15) \times (-2) \times 4$

$25 \times (-2) \times (15) \times (4)$ $(+) \times (-) = -$

$-50 \times (15)\ (4)$

$-750 \times 4 = -3000$

(b) $19 \times 125 \times (-5) \times (-8)$

$19 \times 125 \times 40$ $(-) \times (-) = (+)$

$19 \times 5000 = 95000$ Ans.

(c) $545 \times (-27) + 545\ (-3)$

$545 \times (-27 - 3)$

$545 \times (-30) = -16350$ $(+) \times (-) = (-)$

(d) $625 \times (-35) + (-625) \times (65)$

$(-625) \times (35) + (-625) \times (65)$

$(-625)\ (35 + 65)$

$(-625)\ (100) = -62500$

Q. 7 **The temperature of a city was 26 °C on Monday. The temperature rose by 2 °C on everyday up to Thursday and fell by 5 °C on Friday. What was the temperature of the city on Friday?**

Ans. The temperature of a city on Monday = 26 °C

Temperature rose 2 °C on Tuesday

∴ Temperature on Tuesday = 26 + 2 = 28 °C

Temperature on Wednesday = 28 + 2 = 30 °C

Temperature on Thursday = 30 + 2 = 32 °C

Temperature fell by 5 °C on Friday

∴ Temperature on Friday = 32 – 5 = **27 °C Ans.**

Q. 8 On the first day of her training a girl managed to dive to a depth of 3 metres from second day on word he managed to dive 2 metres duper then the previous day. How far did she dive on the sixth day?

Ans.

1st day dive	=	3 m		
2nd day dive	=	3 + 2	=	5 m
3rd day dive	=	5 + 2	=	7 m
4th day dive	=	7 + 2	=	9 m
5th day dive	=	9 + 2	=	11 m
6th day dive	=	11 + 2	=	**13 m Ans.**

Q. 9 A cement company earns a profit of 8 per bag of white cement Sold and a loss of ₹ 5 per bag of grey cement sold.

(a) If the company sells 3000 bags of white cement and 5000 bags of grey cement in a month, what is its profit or loss.

(b) If is sold 6900 bags of grey cement, what is the number of white cement it must sell so that there is no profit or no loss.

Ans. (a) Profit on white cement = ₹ 8/bag

Profit on white cement on 3000 bags = 8 × 3000 = ₹ 24000

Loss on grey cement = ₹ 5/bag

Loss on 5000 grey cement bags = 5 × 5000 = ₹ 25000

Net loss = 25000 – 24000 = ₹ **1000 Ans.**

(b) Profit on white cement = ₹ 8/bag

Profit on x bags = ₹ 8x

Loss on grey cement = ₹ 5/bag

Loss on 6900 bags of grey cement = 5 × 6900 = ₹ 34500

Given : No profit no loss.

$\therefore 8x = 34500$

$x = \frac{34500}{8}$ = **4312.5 bag Ans.**

Exercise : 1.4

Q. 1 (54) ÷ (3) is (a) 3 (b) 9 (c) –3 (d) 18

Ans. $54 \div 3 = \frac{54}{3} = \frac{3 \times 18}{3} = 18$ **Ans.** (d)

Q. 2 **(25) ÷ (25) is** **(a) 1** **(b) –1** **(c) 0** **(d) 50**

Ans. $25 \div 25 = \frac{25}{25} = 1$ **Ans.** (a)

Q. 3 **0 ÷ (5) is** **(a) 0** **(b) 1** **(c) 5** **(d) –1**

Ans. $0 \div 5 = 0$ **Ans.** (a)

Q. 4 **(54) ÷ 9 is** **(a) 7** **(b) –7** **(c) 6** **(d) –6**

Ans. $54 \div 9 = \frac{54}{9} = \frac{9 \times 6}{9} = 6$ **Ans.** (c)

Q. 5 **42 ÷ 7 is** **(a) 6** **(b) –6** **(c) 35** **(d) 2**

Ans. $42 \div 7 = \frac{42}{7} = \frac{6 \times 7}{7} = 6$ **Ans.** (a)

Q. 6 **Evaluate each of the following :**

(a) [5 + (–9)] ÷ [(–4) ÷ 2]

(b) [(–56) ÷ 8] ÷ 7

(c) 81 ÷ [(27) ÷ (–9)]

(d) (–33) ÷ [(–36) +3]

Ans. (a) $[5 + (-9)] \div [(-4) \div 2]$

$[-4] \div \left[\frac{-4}{2}\right]$

$[-4] \div \left[\frac{-2 \times 2}{2}\right]$

$[-4] \div [-2]$

$\frac{-4}{-2} = \frac{-2 \times 2}{-2}$ **= 2 Ans.**

(b) $[(-56) \div 8] \div 7$

$\left[\frac{-56}{8}\right] \div 7$

$\left[\frac{-7 \times 8}{8}\right] \div 7$

$\frac{-1 \times 7}{7} = \frac{-7}{7}$ **= 1 Ans.**

(c) $81 \div [(27) \div (-9)]$

$81 \div \left[\frac{27}{-9}\right]$

$81 \div \left[\frac{3 \times 9}{9}\right]$

$81 \div -3$

$\frac{81}{-3}$ **= –27 Ans.**

(d) $(-33) \div [(-36) +3]$

$(-33) \div [-33]$

$\frac{-33}{-33}$ **= 1 Ans.**

Q. 7 **Write 3 pairs of integers (a, b) such that a ÷ b = 5**

Ans. $a \div b = 5$

$\frac{a}{b} = \frac{5}{1}$

$a = 5b$ When b = 2, 3, 4

Then a = 10, 15, 20

∴ (10, 2) (3, 15) and (4, 20)

Q. 8 **Divide :** (a) –169 by 13 (b) 625 ÷ (–5) (c) (–1728) by (–12) (d) 2401 ÷ (–7)

Ans. (a) $(-169) \div 13 = \frac{-169}{13} = \frac{-13 \times 13}{13} =$ **–13 Ans.**

(b) $625 \div (-5) = \frac{625}{-5} = \frac{5 \times 125}{-5} =$ **–125 Ans.**

(c) $(-1728) \div 12 = \frac{-1728}{12} = \frac{-144 \times 12}{12}$ = **–144 Ans.**

(d) $2401 \div (-7) = \frac{2401}{-7} = \frac{343 \times 7}{-7}$ = **–343 Ans.**

Q. 9 Match the following:

(a) 27 + 0 = 27	**(i) Additive identity**
(b) 18 +[19 + 17] = (18 + 19) + 17	**(ii) Multiplicative identity**
(c) (11) +9 = 9 + (11)	**(iii) Multiplicative property of zero**
(d) 5 × 8 × (7) × 0 × (2) = 0	**(iv) Commutatively in multiplication**
(e) (8) × (4) = (4) × (8)	**(v) Distributive property**
(f) 5 × [8 × (7)] = (5 × 8) × (7)	**(vi) Associative property of**
(g) (123) × 1 = 123	**(vii) Associative property of addition**
(h) 7 × [18 + 11] = 7 + 18 + 7 ×11	**(viii) Commutative property of addition**

Ans. (a) = (i) (b) = (vii) (c) = (viii) (d) = (iii)
(e) = (iv) (f) = (vi) (g) = (ii) (h) = (v)

Q. 10 Write true and false against each of the following.

(a) 27 ÷ 3 = 9 **(b) (–36) ÷ 6 = 6** **(c) 25 ÷ (1) = 25**
(d) 0 ÷ (–2) = 0 **(e) (–56) ÷ (–8) = –7** **(f) |55 ÷ (5)| = (22) ÷ (2)**
(g) (40) ÷ (1) = 40 **(h) (4) ÷ 0 = 0**

Ans. (a) $27 \div 3 = \frac{27}{3} = \frac{3 \times 9}{3} = 9$ **True**

(b) $-36 \div 6 = \frac{-36}{6} = \frac{-6 \times 6}{6} = -6$ **False**

(c) $25 \div 1 = \frac{25}{1} = 25$ **True**

(d) $0 \div -2 = \frac{0}{-2} = 0$ **True**

(e) $-56 \div -7 = \frac{-56}{7} = \frac{-7 \times 8}{-7} = 8$ **False**

(f) $55 \div 5 = \frac{55}{5} = \frac{11 \times 5}{5} = 11$

$22 \div 2 = \frac{22}{2} = \frac{11 \times 2}{2} = 11$ **True**

(g) $40 \div 1 = \frac{40}{1} = 40$ **True**

(h) $4 \div 0 = \frac{4}{0} = 0$ **True**

Q. 11 In a test, 5 marks are given for every correct answer and (–2) marks are given for every wrong answer. Ramesh answered all the question and scored 30marks through the got 10 correct answers. Find the total number of question in the test.

Ans. Number of correct answer = 10

$\therefore$ Marks obtained by correct = $10 \times 5 = 50$

Let the number of wrong answer be x

Marks deduce by wrong answer = – 2x

Given total marks = 30

50 + (–2x) = 30

50 – 30 = 2x

$\frac{20}{2} = x$

x = 10 Total number of questions 10 + 10 = **20 Ans.**

Q. 12 In a class test each correct answer get 5 marks and each wrong answer gets (–2) marks Anuja answered all the questions and Scored (–12) marks. If she answered 4 questions correctly find the number of questions whose answer were wrong.

Ans. Let the number of wrong answer be x

Marks deduce by wrong answer = – 2x

Marks obtained by correct answer = 5 × 4 = 20

Given Total marks obtained = –12

20 – 2x = – 12 20 + 12 = 2x

$\frac{32}{2} = 16 = x$

Number of wrong answer = **16 Ans.**

Q. 13 The temperature at 6 p.m. of a town was 37 °C. At mid night the temperature was 31 °C if the rise in temperature every hour is same, find the rise in temperature per hour.

Ans. Temperature at 6 p.m. = 37 °C

Temperature at midnight = 31 °C

Temperature rise in 6 hrs. = $3^7 - 3$ = 6 °C

Temperature rise in 1 hrs. = $\frac{6}{6}$ = **1 °C Ans.**

TEST YOUR PROGRESS

Q. 1 The sum of two integers is –12. If one of them is 43, find the other.

Ans. Let the other integer be x

43 + x = – 12

x = – 43 – 12 = – 55

Other number is **– 55 Ans.**

Q. 2 Determine the integer whose product with 15 is –225.

Ans. 15 × Integer = – 225

Integer = $\frac{-225}{15} = \frac{-15 \times 15}{15}$ = –15

Integer = **–15 Ans.**

Q. 3 Determine the integer whose product with –5 is 145.

Ans. – 5 × Integer = 145

Integer = $\frac{145}{-5} = \frac{(-5) \times (-29)}{(-5)}$ = –29

Integer = **–29 Ans.**

Q. 4 **If $a \times (-2) = -30$, find the value of a.**

Ans. $a \times (-2) = -30$

$$a = \frac{-30}{-2} = \frac{-2 \times 15}{-2} = 15$$

$a =$ **15 Ans.**

Q. 5 **What is the value of $105 \times 104 + 105 \times (-4)$?**

Ans. $105 \times 104 + 105 \times (-4)$

$105 (104 - 4)$

$105 \times 100 =$ **10500 Ans.**

Q. 6 **Evaluate:** **(a) $(-3) \times (-7) \times (-4) \times (-9)$** **(b) $13 \times (-15) \times (-16) \times 0 \times (-1)$**

Ans. (a) $(-3) \times (-7) \times (-4) \times (-9)$

$21 \times (-4) \times (-9)$

$-84 \times (-9) =$ **765 Ans.**

(b) $13 \times (-15) \times (-16) \times 0 \times (-1) = 0$

Multiply by zero to any integer is always zero.

Q. 7 **Multiply :** **(a) $(-24) \times 16$** **(b) $(-37) \times (-30)$**

Ans. (a) $(-24) \times 16 =$ **-384 Ans.**

(b) $(-37) \times (-30) =$ **1110 Ans.**

Q. 8 **Divide :** **(a) (-217) by 7** **(b) (-256) by (-8)**

Ans. (a) $\frac{-217}{7} = \frac{-31 \times 7}{7} =$ **-31 Ans.**

(b) $\frac{-256}{-8} = \frac{-8 \times 32}{-8} =$ **32 Ans.**

Q. 9 **Find the value of x in each of the following.**

(a) $(-17) \times [(-3) \times x] = (-17) \times (-3) - (-17) \times (4)$

(b) $(-25) \times [6 + (-4)] = (-25) \times x + (-25) \times (-4)$

Ans. (a) $(-17) [(-3) \times x] = [(-17) \times (-3) - (-17) \times (4)]$

$(-17) \times [-3x] = (-17) [-3 - 4]$

$(-17) \times (-3x) = (-17) (-7)$

$-(3x) = -7$

$x = \frac{-7}{-3} =$ **$\frac{7}{3}$ Ans.**

(b) $(-25) \times [6 \times (-4)] = (-25) \times x + (-25) \times (-4)$

$(-25) \times (-24) = -25x + 100$

$25 \times 24 = -25x + 100$

$600 - 100 = -25x$

$\frac{500}{-25} = x$

$\frac{-25 \times -20}{-25} = x$

$x =$ **-20 Ans.**

CHAPTER - 2 : FRACTION & DECIMALS

(Exercise : 2.1)

Q. 1 $\frac{2}{11} + \frac{3}{11}$ **is equal to**

(a) $\frac{5}{22}$ **(b)** $\frac{5}{11}$ **(c)** $\frac{3}{22}$ **(d)** $\frac{6}{11}$

Ans. $\frac{2}{11} + \frac{3}{11} = \frac{2+3}{11} = \frac{5}{11}$ **Ans.** (b)

Q. 2 **The number** $-3\frac{5}{6}$ **is equivalent to**

(a) -3 **(b)** $-3 \times \frac{5}{6}$ **(c)** $-3 + 5 \div 6$ **(d)** $-3 - \frac{5}{6}$

Ans. $-3\frac{5}{6} = (3 + \frac{5}{6}) = -3 - \frac{5}{6}$ **Ans.** (d)

Q. 3 **Fill in the blank:**

$\frac{2}{7}$ **is** $\square$ $\frac{4}{7}$

(a) less than **(b) greater than** **(c) equal to** **(d) less than or equal to**

Ans. $\frac{2}{7}$ $\boxed{<}$ $\frac{4}{7}$ [2 < 4] **Ans.** (a)

Q. 4 **Simplify :**

(a) $\frac{5}{3} + 1\frac{1}{4}$ **(b)** $3 + \frac{1}{3} + 8\frac{5}{6}$ **(c)** $8 - \frac{5}{4}$

(d) $3\frac{2}{3} - 1\frac{5}{6}$ **(e)** $1 + \frac{3}{1} \div \frac{1}{2}$ **(f)** $4\frac{1}{2} - 1\frac{1}{3} + \frac{11}{6}$

Ans. (a) $\frac{5}{3} + 1\frac{1}{4}$

$\frac{5}{3} + 1 + \frac{1}{4}$

$= 1 + \frac{5}{3} + \frac{1}{4}$ $[\frac{5}{3} \times \frac{4}{4} = \frac{20}{12}$

$= 1 + \frac{20}{12} + \frac{3}{12}$ $\frac{1}{4} \times \frac{3}{3} = \frac{3}{12}]$

$= 1 + \frac{20+3}{12}$

$= 1 + \frac{23}{12} = 1 + 1 + \frac{11}{12} = 2\frac{11}{12}$ **Ans.**

(b) $3 + \frac{1}{3} + 8\frac{5}{6}$

$3 + \frac{1}{3} + 8 + \frac{5}{6}$

$3 + 8 + \frac{1}{3} + \frac{5}{6}$

$11 + \frac{2}{6} + \frac{5}{6}$ $[\frac{1}{3} \times \frac{2}{6}]$

$11 + \frac{2+5}{6}$

$11 + \frac{7}{6} = 11 + 1 + \frac{1}{6} = 12\frac{1}{6}$ **Ans.**

(c) $8 - \frac{5}{4}$

$\frac{8}{1} - \frac{5}{4}$

$\frac{32-5}{4} = \frac{27}{4} = 6\frac{3}{4}$ **Ans.**

(d) $3\frac{2}{3} - 1\frac{5}{6}$

$3\frac{2}{3} - (1 + \frac{5}{6})$

$3 + \frac{2}{3} - 1 - \frac{5}{6}$

$3 - 1 + \frac{2}{3} - \frac{5}{6}$

$2 + \frac{2 \times 2}{3 \times 2} - \frac{5}{6}$

$2 + \frac{4}{6} - \frac{5}{6}$

$2 + \frac{4-5}{6} = 2 - \frac{1}{6}$

$\frac{2 \times 6}{6} - \frac{1}{6} = \frac{12}{6} - \frac{1}{6}$

$\frac{12-1}{6} = \frac{11}{6}$ **Ans.**

(e) $1 + \frac{3}{1} \div \frac{1}{2}$

$1 + \frac{3}{1} \times \frac{2}{1}$

$1 + 6 = 7$ **Ans.**

(f) $4\frac{1}{2} - 1\frac{1}{3} + \frac{11}{6}$

$4 + \frac{1}{2} - (1 + \frac{1}{3}) + 1\frac{5}{6}$

$4 + 1 - 1 + \frac{1}{2} - \frac{1}{3} + \frac{5}{6}$

$4 + \frac{1 \times 3}{2 \times 3} - \frac{1 \times 2}{3 \times 2} + \frac{5}{6}$

$4 + \frac{3}{6} - \frac{2}{6} + \frac{5}{6}$

$4 + \frac{3-2+5}{6}$

$4 + \frac{6}{6} = 4 + 1 = 5$ **Ans.**

Q. 5 Arrange the following in ascending order:

(a) $\frac{3}{4}, \frac{11}{12}, \frac{5}{6}, 1\frac{2}{3}$

Ans. (a) $\frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$

L.C.M. of 3, 4, 6 and 12 is 12

$\frac{11}{12} = \frac{11}{12}$

$\frac{5}{6} = \frac{5 \times 2}{6 \times 2} = \frac{10}{12}$

$1\frac{2}{3} = \frac{5}{3} = \frac{5 \times 4}{3 \times 4} = \frac{20}{12}$

Ascending Order

$\frac{9}{12} < \frac{10}{12} < \frac{11}{12} < \frac{20}{12}$

$\frac{3}{4} < \frac{5}{6} < \frac{11}{12} < \frac{2}{3}$

(b) $\frac{8}{15}, \frac{3}{5}, \frac{11}{16}, \frac{5}{4}$

(b) $\frac{8}{15} = \frac{8 \times 16}{15 \times 16} = \frac{128}{240}$

L.C.M. of 5, 4, 15 and 16 is 240

$\frac{3}{5} = \frac{3 \times 48}{5 \times 48} = \frac{144}{240}$

$\frac{11}{16} = \frac{11 \times 15}{16 \times 15} = \frac{165}{240}$

$\frac{5}{4} = \frac{5 \times 60}{4 \times 60} = \frac{300}{240}$

Ascending Order

$\frac{128}{240} < \frac{144}{240} < \frac{165}{240} < \frac{300}{240}$

$\frac{8}{15} < \frac{3}{5} < \frac{11}{16} < \frac{5}{4}$

Q. 6 Arrange the following in descending order :

(a) $\frac{17}{24}, \frac{7}{8}, \frac{7}{12}, \frac{9}{8}$ **(b)** $\frac{3}{8}, \frac{5}{7}, \frac{20}{21}, \frac{9}{14}$

Ans. (a) $\frac{17}{24} = \frac{17}{24}$

L.C.M. of 24, 8 and 12 is 24

$\frac{7}{8} = \frac{7 \times 3}{8 \times 3} = \frac{21}{24}$

$\frac{7}{12} = \frac{7 \times 2}{12 \times 2} = \frac{14}{24}$

$\frac{9}{8} = \frac{9 \times 3}{8 \times 3} = \frac{27}{24}$

Descending Order

$\frac{27}{24} > \frac{21}{24} > \frac{17}{24} > \frac{14}{24}$

$\frac{9}{8} > \frac{7}{8} > \frac{17}{24} > \frac{7}{12}$

(b) $\frac{3}{8} = \frac{3 \times 21}{8 \times 21} = \frac{63}{168}$

L.C.M. of 8, 7, 21 and 14 is 168

$\frac{5}{7} = \frac{5 \times 24}{7 \times 24} = \frac{120}{168}$

$\frac{20}{21} = \frac{20 \times 8}{21 \times 8} = \frac{160}{168}$

$\frac{9}{14} = \frac{9 \times 12}{14 \times 12} = \frac{108}{168}$

Descending Order

$\frac{160}{168} > \frac{120}{168} > \frac{108}{168} > \frac{63}{168}$

$\frac{20}{21} > \frac{5}{7} > \frac{9}{14} > \frac{3}{8}$

Q. 7 Write the equivalent fraction of $\frac{16}{20}$ with:

(a) Numerator 4 **(b) Denominator 25**

Ans. (a) $\frac{16}{20} = \frac{4 \times 4}{4 \times 5} = \frac{4}{5}$ **Ans.**

(b) $\frac{16}{20} = \frac{4 \times 4}{4 \times 5} = \frac{4}{5} = \frac{4 \times 5}{5 \times 5} = \frac{20}{25}$ **Ans.**

Q. 8 Ritika studies $5\frac{2}{3}$ hours daily. She devotes $2\frac{4}{5}$ hours of her time for English and Mathematics. How much time does she devote for other subjects?

Ans. Time devote for other subjects $= 5\frac{2}{3} - 2\frac{4}{5}$

$= 5 + \frac{2}{3} - 2 - \frac{4}{5}$ $= 3 + \frac{2}{3} - \frac{4}{5}$

$= 3 + \frac{2 \times 5}{3 \times 5} - \frac{4 \times 3}{3 \times 5}$ $= 3 + \frac{10}{15} - \frac{12}{15}$

$= 3 + \frac{10 - 12}{15}$ $= 3 - \frac{2}{15}$

$= 2 + 1 - \frac{2}{15}$ $= 2 + \frac{15}{15} - \frac{2}{15}$

$= 2 + \frac{15 - 2}{15}$ $= 2 + \frac{13}{15}$

Time devote for other subjects $= 2\frac{13}{15}$ **Ans.**

Q. 9 A rectangular garden is $10\frac{1}{5}$ m long and $8\frac{1}{2}$ m broad. Find the perimeter of the garden.

Ans. Perimeter of garden $= 2$ (length + breadth)

$= 2\left(10\frac{1}{5} + 8\frac{1}{2}\right)$

$= 2\left(10 + \frac{1}{5} + 8\frac{1}{2}\right)$

$= 2\left(18 + \frac{1}{5} + \frac{1}{2}\right)$

$= 36 + \frac{2}{5} + 1 \quad = 37 + \frac{2}{5}$

Perimeter of garden $= \mathbf{37\frac{2}{5}}$ **Ans.**

Q. 10 David finished colouring a picture in $\frac{7}{12}$ hour. John finished colouring the same picture in $\frac{5}{6}$ hour. Who worked longer? By what fraction was it longer.

Ans. David finished colouring $= \frac{7}{12}$ hours

John finished colouring $= \frac{5}{6}$ hours $= \frac{5 \times 2}{6 \times 2} = \frac{10}{12}$ hours

John take more time then David.

$\frac{10}{12} - \frac{7}{12} = \frac{10-7}{12} = \frac{3}{12}$ hrs.

$= \frac{3 \times 1}{3 \times 4} = \mathbf{\frac{1}{4}}$ **Ans.**

Q. 11 The length and breadth of a rectangular filed are $32\frac{2}{3}$, cm and $19\frac{1}{4}$, cm. Find its perimeter.

Ans. Perimeter $= 2$ (length + breadth)

$= 2\left(32\frac{2}{3} + 19\frac{1}{4}\right)$

$= 2\left(32 + \frac{2}{3}\ 19 + \frac{1}{4}\right)$

$= 2\left(32 + 19 + \frac{2}{3} + \frac{1}{4}\right)$

Perimeter of rectangle $= 2\left(51 + \frac{2 \times 4}{3 \times 4} + \frac{1 \times 3}{4 \times 3}\right)$

$= 2\left(51 + \frac{8}{12} + \frac{3}{12}\right) = 2\left(51 + \frac{8+3}{12}\right)$

$= 2\left(51 + \frac{11}{12}\right) = 102 + \frac{11 \times 2}{12}$

$= 102 + \frac{11}{6} = \mathbf{102\frac{11}{6}}$ **m. Ans.**

Exercise : 2.2

Q. 1 ₹ $56 \times \frac{3}{4}$ **is** **(a) ₹ 96** **(b) ₹ 47** **(c) ₹ 42** **(d) ₹ 32**

Ans. ₹ $56 \times \frac{3}{4} = \frac{4 \times 14 \times 3}{4} =$ ₹ 42 **Ans. (c)**

Q. 2 $\frac{6}{7}$ **of 21 is** **(a) 18** **(b) 32** **(c) 48** **(d) 56**

Ans. $\frac{6}{7}$ of $21 = \frac{6 \times 21}{7} = \frac{6 \times 3 \times 7}{7} = 18$ **Ans. (a)**

Q. 3 Find the products :

(a) $\frac{5}{8} \times \frac{4}{7}$ **(b)** $\frac{1}{8} \times \frac{15}{8}$ **(c)** $\frac{4}{9} \times 2\frac{4}{7}$

(d) $\frac{2}{5} \times 3\frac{1}{4}$ **(e)** $6\frac{2}{5} \times \frac{7}{9}$ **(f)** $5 \times 4\frac{3}{10}$

Ans. (a) $\frac{5}{8} \times \frac{4}{7} = \frac{5 \times 4}{4 \times 2 \times 7} = \frac{5}{14}$ **Ans.**

(b) $\frac{1}{8} \times \frac{15}{8} = \frac{1 \times 15}{8 \times 8} = \frac{15}{64}$ **Ans.**

(c) $\frac{4}{9} \times 2\frac{4}{7} = \frac{4}{9} \times \frac{18}{7} = \frac{4 \times 2 \times 9}{9 \times 7} = \frac{8}{7} = 1\frac{1}{7}$ **Ans.**

(d) $\frac{2}{5} \times 3\frac{1}{4} = \frac{2}{5} \times \frac{13}{4} = \frac{2 \times 13}{5 \times 2 \times 2} = \frac{13}{10} = 1\frac{3}{10}$ **Ans.**

(e) $6\frac{2}{5} \times \frac{7}{9} = \frac{32}{5} \times \frac{7}{9} = \frac{32 \times 7}{5 \times 9} = \frac{224}{45} = 4\frac{44}{45}$ **Ans.**

(f) $5 \times 4\frac{3}{10} = 5 \times \frac{43}{10} = \frac{5 \times 43}{5 \times 2} = \frac{43}{2} = 21\frac{1}{2}$ **Ans.**

Q. 4 Find the products:

(a) $\frac{5}{6} \times \frac{8}{14} \times \frac{3}{27}$ **(b)** $2\frac{5}{8} \times 2\frac{3}{6} \times 1\frac{4}{2}$ **(c)** $\frac{14}{25} \times \frac{35}{51} \times \frac{17}{49}$

Ans. (a) $\frac{5}{6} \times \frac{8}{14} \times \frac{3}{27} = \frac{5 \times \cancel{2} \times \cancel{2} \times 2 \times \cancel{3}}{3 \times \cancel{2} \times \cancel{2} \times 7 \times \cancel{3} \times 3 \times 3} = \frac{10}{189}$ **Ans.**

(b) $2\frac{5}{8} \times 2\frac{3}{6} \times 1\frac{4}{2} = \frac{21}{8} \times \frac{15}{6} \times \frac{6}{2} = \frac{21 \times 15 \times 6}{8 \times 6 \times 2} = \frac{315}{16} = 19\frac{11}{16}$ **Ans.**

$= \frac{21 \times \cancel{3} \times 5 \times 3}{8 \times \cancel{3} \times 2 \times 2} = \frac{315}{32} = 9\frac{27}{32}$ **Ans.**

(c) $\frac{14}{25} \times \frac{35}{51} \times \frac{17}{49} = \frac{14 \times 35 \times 17}{25 \times 51 \times 49} = \frac{\cancel{7} \times 2 \times \cancel{7} \times 5 \times \cancel{17}}{5 \times 5 \times 3 \times \cancel{17} \times \cancel{7} \times \cancel{7}} = \frac{2}{15}$ **Ans.**

Q. 5 Find :

(a) $\frac{1}{9}$ **of 4** **(b)** $\frac{1}{7}$ **of** $\frac{1}{7}$ **(c)** $\frac{2}{7}$ **of** $\frac{3}{5}$

(d) $\frac{1}{12}$ **of** $\frac{144}{169}$ **(e)** $\frac{1}{8}$ **of** $\frac{5}{13}$ **(f)** $\frac{1}{13}$ **of** $\frac{13}{19}$

Ans. (a) $\frac{1}{5}$ of $4 = \frac{1}{9} \times 4 = \frac{4}{9}$ **Ans.**

(b) $\frac{1}{7}$ of $\frac{1}{7} = \frac{1}{7} \times \frac{1}{7} = \frac{1}{49}$ **Ans.**

(c) $\frac{2}{7}$ of $\frac{3}{5} = \frac{2}{7} \times \frac{3}{5} = \frac{6}{35}$ **Ans.**

(d) $\frac{1}{12}$ of $\frac{144}{169} = \frac{1}{12} \times \frac{144}{169} = \frac{1 \times \cancel{12} \times 12}{\cancel{12} \times 169} = \frac{12}{169}$ **Ans.**

(e) $\frac{1}{8}$ of $\frac{5}{13} = \frac{1}{8} \times \frac{5}{13} = \frac{5}{104}$ **Ans.**

(f) $\frac{1}{13}$ of $\frac{13}{19} = \frac{1}{13} \times \frac{13}{19} = \frac{1}{19}$ **Ans.**

Q. 6 Which is greater : $\frac{1}{6}$ **of** $\frac{6}{7}$ **OR** $\frac{2}{3}$ **of** $\frac{3}{7}$

Ans. $\frac{1}{6}$ of $\frac{6}{7} = \frac{1}{6} \times \frac{6}{7} = \frac{1}{7}$

$\frac{2}{3}$ of $\frac{3}{7} = \frac{2}{3} \times \frac{3}{7} = \frac{2}{7}$

$\frac{2}{7} > \frac{1}{7} \Rightarrow \frac{2}{3}$ of $\frac{3}{7} > \frac{1}{6}$ of $\frac{6}{7}$

Q. 7 **1 m cloth costs ₹ $13\frac{2}{5}$. Arup bought $2\frac{1}{4}$ cm cloth for his shirt. How much did the cloth cost him?**

Ans. 1 m cloth cost = ₹ $13\frac{2}{5}$ = ₹ $\frac{67}{5}$

$2\frac{1}{4}$ m = $\frac{9}{4}$ m cloth cost = ₹ $\frac{67}{5} \times \frac{9}{4}$ = ₹ $\frac{603}{20}$

= ₹ $30\frac{3}{20}$ **Ans.**

Q. 8 **1 litre of milk costs ₹ $31\frac{3}{4}$. Find The cost of $3\frac{1}{9}$ litre of milk.**

Ans. 1 litre of milk cost = ₹ $31\frac{3}{4}$ = ₹ $\frac{127}{4}$

$3\frac{1}{9} = \frac{28}{9}$ litre of milk cost = ₹ $\frac{127}{4} \times \frac{28}{9}$

= ₹ $\frac{127 \times \cancel{4} \times 7}{\cancel{4} \times 9}$ = ₹ $\frac{889}{9}$ = ₹ $98\frac{7}{9}$ **Ans.**

Q. 9 **If 1 litre of petrol cost ₹ $70\frac{1}{2}$. What is the cost of 14 litres of petrol?**

Ans. 1 litre of petrol cost = ₹ $70\frac{1}{2}$ = ₹ $\frac{141}{2}$

14 litre of petrol cost = ₹ $\frac{141}{2} \times 14$

= ₹ 141×7 = **₹ 987 Ans.**

Q. 10 **In a class of 45 students, $\frac{1}{5}$ of the total play cricket and $\frac{2}{5}$ of the total play hockey. The remaining students play football. Find the number of students who play.**

(a) Cricket **(b) Hockey** **(c) Football**

Ans. (a) Number of student play cricket = $\frac{1}{5}$ of 45 = $\frac{1}{5} \times 45$

= $\frac{9 \times 5}{5}$ = 9

∴ Number of students play cricket = **9**

(b) Number of students play hockey = $\frac{2}{5}$ of 45 = $\frac{2}{5} \times 45$

= $\frac{2 \times \cancel{5} \times 9}{\cancel{5}}$ = 18

∴ Number of students play hockey = **18**

(c) Number of students play football = 45 – 9 – 18

= **18**

Q. 11 **The length and breadth of a rectangle are $11\frac{1}{2}$ cm and $7\frac{3}{4}$ cm respectively. Find its area.**

Ans. Area of rectangle = length × width

= $11\frac{1}{2} \times 7\frac{3}{4}$ cm^2

= $\frac{23}{2} \times \frac{31}{4}$ cm^2

= $\frac{713}{8}$ = **$89\frac{1}{8}$ cm^2 Ans.**

Exercise : 2.3

Q. 1 The reciprocal of $3\frac{2}{7}$ is

(a) $\frac{5}{7}$ (b) $\frac{7}{5}$ (c) $\frac{23}{7}$ (d) $\frac{7}{23}$

Ans. Reciprocal of $3\frac{2}{7}$ is

$3\frac{2}{7} = \frac{23}{7}$ $\therefore$ Reciprocal of $\frac{23}{7}$ is $\frac{7}{23}$ **Ans. (d)**

Q. 2 $85 \div \frac{17}{20}$ is equal to.

(a) 100 (b) 85 (c) 34 (d) 170

Ans. $85 \div \frac{17}{20} = 85 \times \frac{17}{20} = \frac{5 \times 17 \times 20}{17} = 100$ **Ans. (a)**

Q. 3 The cost of $\frac{3}{4}$ litre of milk is ₹ 21. Then the cost of 1 litre of milk is

(a) ₹ 28 (b) ₹ $\frac{63}{4}$ (c) ₹ 21 (d) ₹ 84

Ans. Cost of $\frac{3}{4}$ litre of milk = ₹ 21

Cost of 1 litre of milk = ₹ $21 \div \frac{3}{4}$ = ₹ $21 \times \frac{4}{3}$

= ₹ $\frac{3 \times 7 \times 4}{3}$ = 28 $\therefore$ Cost of 1 litre of milk = ₹ 28 **Ans (a)**

Q. 4 $\frac{5}{16} \div 1$ is equal to.

(a) $\frac{16}{5}$ (b) $\frac{5}{16}$ (c) 80 (d) none of these

Ans. $\frac{5}{16} \div 1 = \frac{5}{16} \div \frac{1}{1} = \frac{5}{16} \times \frac{1}{1} = \frac{5}{16}$ **Ans. (b)**

Do the following division on (5-12)

Q. 5 $\frac{2}{5} \div 4$

Ans. $\frac{2}{5} \div 4 = \frac{2}{5} \div \frac{4}{1} = \frac{2}{5} \times \frac{1}{4} = \frac{\cancel{2} \times 1}{5 \times \cancel{2} \times 2} = \frac{1}{10}$ **Ans.**

Q. 6 $15\frac{1}{2} \div 6$

Ans. $15\frac{1}{2} \div 6 = \frac{31}{2} \div 6 = \frac{31}{2} \times \frac{1}{6} = \frac{31}{12} = 2\frac{7}{12}$ **Ans.**

Q. 7 $15 \div \frac{8}{13}$

Ans. $15 \div \frac{8}{13} = 15 \times \frac{13}{8} = \frac{195}{8} = 24\frac{3}{8}$ **Ans.**

Q. 8 $\frac{4}{7} \div \frac{9}{14}$

Ans. $\frac{4}{7} \div \frac{9}{14} = \frac{4}{7} \times \frac{14}{9} = \frac{4 \times \cancel{7} \times 2}{\cancel{7} \times 9} = \frac{8}{9}$ **Ans.**

Q. 9 $3\frac{3}{5} \div \frac{4}{5}$

Ans. $3\frac{3}{5} \div \frac{4}{5} = \frac{18}{5} \div \frac{4}{5} = \frac{18}{5} \times \frac{5}{4} = \frac{\cancel{2} \times 9 \times \cancel{5}}{\cancel{5} \times \cancel{2} \times 2} = \frac{9}{2} = 4\frac{1}{2}$ **Ans.**

Q. 10 $15\frac{3}{7} \div 1\frac{23}{49}$

Ans. $15\frac{3}{7} \div 1\frac{23}{49} = \frac{108}{7} \div \frac{72}{49} = \frac{108}{7} \times \frac{49}{72}$

$= \frac{\cancel{2} \times \cancel{2} \times \cancel{3} \times \cancel{3} \times 3 \times \cancel{7} \times 7}{\cancel{7} \times \cancel{2} \times \cancel{2} \times 2 \times \cancel{3} \times \cancel{3}} = \frac{21}{2} = 10\frac{1}{2}$ **Ans.**

Q. 11 $3\frac{5}{8} \div 1\frac{5}{24}$

Ans. $3\frac{5}{8} \div 1\frac{5}{24} = \frac{29}{8} \div \frac{29}{24} = \frac{29}{8} \times \frac{24}{29} = \frac{\cancel{8} \times 3 \times \cancel{29}}{\cancel{8} \times \cancel{29}} = 3$ **Ans.**

Q. 12 $52\frac{2}{13} \div 1\frac{1}{12}$

Ans. $52\frac{2}{13} \div 1\frac{1}{12} = \frac{678}{13} \times \frac{12}{13} = \frac{8136}{169}$

$169\overline{)8136}\ (48$

676

1376

1352

24

$= 43\frac{24}{169}$ **Ans.**

Q. 13 Observe the pattern and write the next three numbers in each. First one has been done for you.

(a) $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$ **(b)** $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}$ **(c)** $\frac{5}{16}, \frac{5}{8}, \frac{5}{4}$ **(d)** $\frac{6}{3}, \frac{5}{3}, \frac{4}{3}$

Ans. (a) $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \frac{1}{64}$ (b) $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}, \frac{1}{243}, \frac{1}{729}$

(c) $\frac{5}{16}, \frac{5}{8}, \frac{5}{4}, \frac{5}{2}, \frac{5}{1}, \frac{10}{1}$ (d) $\frac{6}{3}, \frac{5}{3}, \frac{4}{3}, \frac{3}{3}, \frac{2}{3}, \frac{1}{3}$

Q. 14 Fill in the blanks from = < or > :

(a) $\left(\frac{3}{4} + \frac{7}{11}\right) + \frac{2}{9}$ [=] $\left(\frac{2}{9} + \frac{7}{11}\right) + \frac{3}{4}$

(b) $\left(\frac{6}{7} \times \frac{7}{6}\right) \times \frac{4}{6}$ [<] $\left(\frac{4}{6} \times \frac{6}{7}\right) + \frac{7}{6}$

Q. 15 Deepak buys $2\frac{1}{2}$ kg of Sweets and out of that makes packets weighing $\frac{1}{4}$ kg each. How many packets does he make.

Ans. Deepak buys sweets $= 2\frac{1}{2} = \frac{5}{2}$ kg

Packets weighing $= \frac{1}{4}$ kg

$\therefore$ Number of packets $= \frac{5}{2} \div \frac{1}{4} = \frac{5}{2} \times \frac{4}{1} = \frac{5 \times \cancel{2} \times 2}{\cancel{2}} = 10$

$\therefore$ Number of packets $=$ **10 Ans.**

Q. 16 $\frac{3}{5}$ of a total number of students in a school are girls. If there are 164 boys, how many girls are there?

Ans. Let the total number of student be x

$\therefore \frac{3}{5} \times x =$ Number of girls

$\left(1-\frac{3}{5}\right) \times x$ = Number of boys

$\frac{5-3}{5} \times x = 164 \Rightarrow \frac{2}{5} \times x = 164$

$x = \frac{164 \times 5}{2} = \frac{2 \times 82 \times 5}{2}$

$x = 82 \times 5 = 410$

$\therefore$ Number of students = 410

$\therefore$ Number of girls = $\frac{3}{5} \times 410$

$= \frac{3 \times \cancel{5} \times 82}{\cancel{5}} = 3 \times 82 = 246$

$\therefore$ Number of girls = **246 Ans.**

Exercise : 2.4

Q. 1 35 mm can be expressed in km as –

(a) 3.5 km (b) 0.035 km (c) 0.0035 km (d) 0.000035 km

Ans. 35 mm = $\frac{35}{10 \times 100 \times 1000}$ km = 0.000035 = **Ans. (d)**

Q. 2 2g is terms of kg is

(a) 0.2 kg (b) 0.02 kg (c) 20 kg (d) 0.002 kg

Ans. 2 g = $\frac{2}{1000}$ kg = 0.002 kg **Ans. (d)**

Q. 3 0.3 + 0.04 is equal to –

(a) 0.7 (b) 0.43 (c) 0.34 (d) 0.07

Ans. 0.3 + 0.04 = 0.30 + 0.04 = 0.34 **Ans. (c)**

Q. 4 0.8 0.17 is equal to –

(a) 0.63 (b) 0.09 (c) 0.53 (d) 10.9

Ans. 0.8 – 0.17 = 0.80 – 0.17 = 0.63 **Ans. (a)**

Q. 5 Write in the expended form. (a) 46.23 (b) 56.1234 (c) 10.001

Ans. (a) 46.23 = $4 \times 10 + 6 \times 1 + \frac{2}{10} + \frac{3}{100}$

(b) 56.1234 = $5 \times 10 + 6 \times 1 + \frac{1}{10} + \frac{2}{100} + \frac{3}{1000} + \frac{4}{10000}$

(c) 10.001 = $1 \times 10 + 0 \times 1 + \frac{0}{10} + \frac{0}{100} + \frac{1}{1000} = 1 \times 10 + \frac{1}{1000}$

Q. 6 Write in the decimal form.

(a) $500 + 20 + 8 + \frac{2}{10} + \frac{3}{100} + \frac{5}{1000}$

(b) $5000 + 600 + 20 + 5 + \frac{1}{10} + \frac{7}{100} + \frac{5}{1000} + \frac{9}{10000}$

Ans. (a) 528.235 (b) 5625.1759

Q. 7 Arrange in descending order:

(a) 11.201, 1.201, 1.201, 12.01, 2.11 (b) 3.003, 3.03, 3.3, 0.03

Ans. (a) 12.01 > 11.201 > 2.11 > 1.201 = 1.201 (b) 3.3 > 3.03 > 3.003 > 0.03

Q. 8 Arrange in ascending order:

(a) 3.32, 3.478, 3.039, 1.09, 0.092 **(b) 0.72, 0.68, 0.504, 1.02**

Ans. (a) 0.092 < 1.09 < 3.039 < 3.32 < 3.478 (b) 0.504, 0.68, 1.02, 1.02

Q. 9 Add: (a) 6.66, 5.34, 9.66 **(b) 6.9, 3.8, 4.2** **(c) 18.456, 28.389, 9.999**

Ans. (a)

	(1)		(1)	
	6	.	6	6
+	5	.	3	4
+	9	.	6	6
	2	**1**	**.**	**6**	**6**

(b)

	(1)	(1)		(1)
		6	.	9
+		3	.	8
+		4	.	2
		1	**4**	**.**	**9**

(c)

	(2)	(1)		(2)	(2)	
	1	8	.	4	5	6
+	2	8	.	3	8	9
+		9	.	9	9	9
	5	**6**	**.**	**8**	**4**	**4**

Q. 10 Subtract: (a) 6.426 – 5.389 **(b) 1 – 0.098** **(c) 4203 – 3946.323**

Ans. (a)

		(3)	(1)	
	6	.	~~4~~	~~2~~	6
−	5	.	3	8	9
		1	**.**	**0**	**3**	**7**

(b)

		(9)	(9)	
	~~1~~	.	~~0~~	~~0~~	~~0~~
−	0	.	0	9	8
		0	**.**	**9**	**0**	**2**

(c)

	(1)	(9)	(2)		(9)	(9)	
	4	~~2~~	~~0~~	~~3~~	.	~~0~~	~~0~~	~~0~~
−	3	9	4	6	.	3	2	3
		2	**5**	**6**	**.**	**6**	**7**	**7**

Q. 11 My car can hold 45.5 litres of petrol. I filled it with 38.7 litres. How much more petrol can it hold.

Ans.

	(3)	(4)		
	~~4~~	~~5~~	.	5
−	3	8	.	7
		6	**.**	**8**

6.8 litre petrol con it hold.

Q. 12 Kishor had ₹ 58.90 in his purse, Rathan had ₹ 49.98 and Susheela had ₹ 61.35. How much money did they have altogether.

Ans.

	(1)	(2)	(2)		(1)	
	₹	5	8	.	9	0
+		4	9	.	9	8
+		6	1	.	3	5
	₹	**1**	**7**	**0**	**.**	**2**	**3**

Total amount = **₹ 170.23 Ans.**

Q. 13 What should be subtracted from 48.93 to get 30.56?

Ans.

	(7)	(8)		
4	~~8~~	.	~~9~~	3
− 3	0	.	5	6
	1	**8**	**.**	**3**	**7**

₹ 18.37 Subtract to get ₹ 30.56

Exercise : 2.5

Q. 1 0.8 × 0.06 is equal to

(a) 0.48 **(b) 4.8** **(c) 0.048** **(d) 48**

Ans. 0.8 × 0.06 = 0.048 **Ans. (c)**

Q. 2 **5.873 × 10 is equal to**

(a) 58730 **(b) 58.73** **(c) 5.8730** **(d) 587.3**

Ans. 5.873 × 10 = 58.73 **Ans. (b)**

Q. 3 **0. 03 × 2 + 0. 1 × 0. 9 is equal to**

(a) 0.15 **(b) 9.06** **(c) 6.09** **(d) 0.015**

Ans. 0.03 × 2 + 0.1 × 0.9 = 0.06 + 0.09 = 0.15 **Ans. (a)**

Q. 4 **Find:** **(a) 3.4 × 10** **(b) 5.45 × 10** **(c) 14.5 × 10**

(d) 48.8 × 100 **(e) 9.13 × 100** **(f) 20.63 × 100**

Ans. (a) 3.4 × 10 = **34** (b) 5.45 × 10 = **54.5**

(c) 14.5 × 10 = **145** (d) 48.8 × 100 = **4880**

(e) 9.13 × 100 = **913** (f) 20.63 × 100 = **2063**

Q. 5 **Find:** **(a) 0.0045 × 1000** **(b) 11.645 × 7.1** **(c) 15.02 × 3.004**

(d) 100.01 × 0.01 **(e) 12.5 × 0.48** **(f) 4.135 × 2.8**

(g) 10.05 × 10.5 **(h) 6.9 × 83** **(i) 2.5 × 0.3**

Ans. (a) 0.0045 × 1000 = **4.5**

(b) 11.645 × 7.1 $= \frac{11645}{1000} \times \frac{71}{10}$

$= \frac{11645 \times 71}{10000}$

= **82.6795**

11.645 × 7.1
11645
81515×
82.6795

(c) 15.02 × 3.004 $= \frac{1502}{100} \times \frac{3004}{1000}$

$= \frac{1502 \times 3004}{100000}$

$= \frac{4512008}{100000}$

= **45.12008**

1502 × 3004
6008
0000×
000××
4506×××
4512008

(d) 100.01 × 0.01 $= \frac{10001}{100} \times \frac{01}{100} = \frac{10001 \times 1}{10000}$ = **1.0001**

(e) 12.5 × 0.48 $= \frac{125}{10} \times \frac{48}{100} = \frac{25 \times 5 \times 4 \times 12}{10 \times 25 \times 4}$ = **6**

(f) 4.135 × 2.8 $= \frac{4135}{1000} \times \frac{28}{10}$

$= \frac{4135 \times 28}{10000}$

$= \frac{115780}{10000}$ = **11.5780**

4135 × 28
33080
8270×
115780

(g) 10.05 × 10.5 $= \frac{1005}{100} \times \frac{105}{10}$

$= \frac{1005 \times 105}{1000}$

$= \frac{105525}{1000}$ = **105.525**

1005×105
5025
0000×
1005××
105525

(h) $6.9 \times 83 = \frac{6.9 \times 83}{10}$

$= \frac{5727}{10}$

$= \mathbf{572.7}$

69×83
207
552×
5727

(i) $2.5 \times 0.3 = \frac{25}{10} \times \frac{3}{10} = \frac{75}{10} = \mathbf{0.75}$

Q. 6 Find the product: (a) 2.01 × 3.1 × 5.4 (b) 4.5 × 4.6 × 4.7

Ans. (a) $2.01 \times 3.1 \times 5.4$

$= \frac{201}{100} \times \frac{31}{10} \times \frac{54}{10}$

$= \frac{201 \times 31 \times 54}{10000}$

$= \frac{336474}{10000} = \mathbf{33.6474}$

201×31
201
603×
6231

6231 × 54
24924
31155×
336474

(b) $4.5 \times 4.6 \times 4.7$

$= \frac{45}{10} \times \frac{46}{10} \times \frac{47}{10}$

$= \frac{45 \times 46 \times 47}{1000}$

$= \frac{97290}{97.29} = 1000$

45×46
270
180×
2070

2070×47
14490
8280×
97290

Q. 7 The cost of one cricket ball is ₹ 150.7. Find the cost of 100 such cricket balls.

Ans. Cost of 1 cricket ball = ₹ 150.7

Cost of 100 cricket ball = ₹ 150.7 × 100

= 15070.0 = **₹ 15070 Ans.**

Q. 8 One kg of apples costs ₹ 85.4. Find the cost of 4.5 kg of three apples.

Ans. Cost of 1 kg apple = ₹ 85.4

Cost of 4.5 kg apple = ₹ 85.4 × 4.5

$= \frac{854}{10} \times \frac{45}{10} = \frac{854 \times 45}{100}$

$= \frac{854 \times 45}{100} = \frac{2 \times 427 \times 5 \times 9}{2 \times 5 \times 10}$

$= \frac{427 \times 9}{10} = \frac{3843}{10}$

= **₹ 384.30 Ans.**

Q. 9 A motor bike covers a distance of 69.3 km in one litre of petrol. How much distance will it cover in 4.5 litres of petrol?

Ans. In 1 litre petrol, motor bike cover the distance = 69.3 km

In 4.5 litre petrol, motor bike cover the distance = 69.3 × 4.5

$= \frac{693}{10} \times \frac{45}{10} = \frac{693 \times 45}{100}$

$= \frac{31185}{100} = \mathbf{311.85\ km\ Ans.}$

693×45
3465
2772×
31185

Q. 10 The length and breadth of a rectangle are 10.2 cm and 3.5 cm find its area.

Ans. Area of rectangle = length × breadth

$= 10.2 \times 3.5$

$= \frac{102}{10} \times \frac{35}{10}$

$= \frac{2 \times 51 \times 5 \times 7}{10 \times 2 \times 5}$

$= \frac{51 \times 7}{10} = \frac{357}{10}$ = **35.7 Ans.**

Exercise – 2.6

Q.1 Convert the following fraction into decimal numbers.

(a) $15\frac{3}{27}$ **(b)** $4\frac{11}{22}$ **(c)** $\frac{3}{5}$ **(d)** $\frac{2}{20}$ **(e)** $2\frac{7}{5}$ **(f)** $1\frac{3}{8}$

Ans. (a) $15\frac{3}{27} = 15 + \frac{3 \times 1}{3 \times 9}$

$= 15 + \frac{1}{9}$

$= 15 + 0.11$

$= 15.11$ **Ans.**

	0 . 1 1
9	1 0
	9
	1 0
	9
	1

(b) $4\frac{11}{22} = 4 + \frac{11}{22}$

$= 4 + \frac{11 \times 1}{11 \times 2}$

$= 4 + \frac{1}{2} = 4 + 0.5$

$= 4.5$ **Ans.**

	0 . 5
2	1 0
	1 0
	×

(c) $\frac{3}{5} = \frac{3}{5} \times \frac{2}{2} = \frac{6}{10}$ = **0.6 Ans.**

(d) $\frac{2}{20} = \frac{2 \times 5}{20 \times 5} = \frac{10}{100}$ = **0.10 Ans.**

(e) $2\frac{7}{5} = 2 + \frac{7}{5} = 2 + \frac{7}{5} \times \frac{2}{2}$

$= 2 + \frac{14}{10} = 2 + 1.4$ = **3.4 Ans.**

(f) $1\frac{3}{8} = 1 + \frac{3}{8} = 1 + 0.375$ = **1.375 Ans.**

Q. 2 Divide : (a) 0.9 by 1000 (b) 3.5 by 1000 (c) 0.55 × 100

(d) 4.8 by 10 (e) 18.19 by 100 (f) 0.634 by 100

Ans. (a) 0.9 by 1000 = $0.9 \div 1000 = \frac{0.9}{1000}$ = **0.0009 Ans.**

(b) $\frac{3.5}{1000}$ = **0.0035 Ans.**

(c) $0.55 \div 100 = \frac{0.55}{100}$ = **0.0055 Ans.**

(d) $4.8 \div 10 = \frac{4.8}{10}$ = **0.48 Ans.**

(e) $1819 \div 100 = \frac{18.19}{100}$ = **0.1819 Ans.**

(f) $0.634 \div 100 = \frac{0.634}{100} =$ **0.00634 Ans.**

Q. 3 Find the quotients: (a) 103.4 ÷ 2.068 (b) 3.25 ÷ 2.6 (c) 129 ÷ 15
(d) 1.56 ÷ 1.3 (e) 144 ÷ 1.2 (f) 24 ÷ 0.006

Ans. (a) $103.4 \div 2.068 = \frac{1034}{10} \div \frac{2068}{1000} = \frac{1034}{10} \times \frac{1000}{2068}$

$= \frac{1034 \times 100}{1034 \times 2} = \frac{100}{2} =$ **50 Ans.**

(b) $3.25 \div 2.6 = \frac{325}{100} \div \frac{26}{10} = \frac{325}{100} \times \frac{10}{26}$

$= \frac{325}{26 \times 10}$

$= \frac{13 \times 5 \times 5}{13 \times 2 \times 5 \times 2}$

$= \frac{5}{4} =$ **1.25 Ans.**

5	3 2 5
5	6 5
13	1 3
	1

	1
4	5
	4
	1

(c) $129 \div 15$

	8
15	1 2 9
	1 2 0
	9

Quotient = **8.6 Ans.**

(d) $1.56 \div 1.3 = \frac{156}{100} \div \frac{13}{10} = \frac{156}{100} \times \frac{10}{13}$

$= \frac{13 \times 12}{10 \times 13} = \frac{12}{10} =$ **1.2 Ans.**

(e) $144 \div 1.2 = 144 \div \frac{12}{10} = \frac{144}{1} \times \frac{10}{12}$

$= \frac{144 \times 10}{12} = \frac{1440}{12} =$ **120 Ans.**

(f) $24 \div 0.006 = 24 \div \frac{006}{1000} = \frac{24}{1} \times \frac{1000}{6}$

$= \frac{24 \times 1000}{6} = \frac{24000}{6} =$ **4000 Ans.**

Q. 4 Find: (a) 36 ÷ 0.2 (b) 3.25 ÷ 0.5 (c) 0.48 ÷ 0.8
(d) 0.272 ÷ 0.04 (e) 0.1503 ÷ 0.003 (f) 0.0108 ÷ 0.012

Ans. (a) $36 \div 0.2 = 36 \div \frac{2}{10} = \frac{36}{1} \times \frac{10}{2}$

$= \frac{36 \times 10}{2} = \frac{360}{2} =$ **180 Ans.**

(b) $3.25 \div 0.5 = \frac{325}{100} \div \frac{5}{10} = \frac{325}{100} \times \frac{10}{5}$

$= \frac{325 \times 10}{100 \times 5} = \frac{65}{10} =$ **6.5 Ans.**

(c) $0.48 \div 0.8 = \frac{048}{100} \div \frac{08}{10} = \frac{48}{100} \times \frac{10}{8}$

$= \frac{48 \times 10}{100 \times 8} = \frac{6}{10} =$ **0.6 Ans.**

(d) $0.272 \div 0.04 = \frac{272}{1000} \div \frac{04}{100} = \frac{272}{1000} \times \frac{100}{4}$

$= \frac{2 \times 2 \times 2 \times 2 \times 17}{10 \times 2 \times 2} = \frac{68}{10} =$ **6.8 Ans.**

(e) $0.1503 \div 0.003 = \frac{1503}{10000} \div \frac{3}{1000} = \frac{1503}{10000} \times \frac{1000}{3}$

$= \frac{3 \times 501}{3 \times 10} = \frac{501}{10} =$ **50.1 Ans.**

(f) $0.0108 \div 0.012 = \frac{0108}{10000} \div \frac{012}{1000} = \frac{108}{10000} \times \frac{1000}{12}$

$= \frac{2 \times 2 \times 3 \times 3 \times 3}{10 \times 2 \times 2 \times 3} = \frac{9}{10} =$ **0.9 Ans.**

Q. 5 Divide: (a) 79.596 by 11 (b) 10.08 by 9 (c) 1.875 by 25
(d) 8.435 by 7 (e) 57.44 by 8 (f) 6.5016 by 21

Ans. (a)

```
7 ) 79.596 ( 7.236
    77
    ---
     25
     22
    ---
      39
      33
    ---
       66
       66
    ---
       00
```

7.236 Ans.

(b)

```
9 ) 10.08 ( 1.12
   -09
    ---
     10
    -09
    ---
      18
     -18
    ---
      ×
```

1.12 Ans.

(c)

```
25 ) 1.875 ( 0.075
     175
     125
    ---
      125
     -125
    ---
      ×
```

0.075 Ans.

(d)

```
7 ) 8.435 ( 1.205
   -7
    ---
     14
    -14
    ---
      03
     -0
    ---
      35
      35
    ---
      ×
```

1.205 Ans.

(e)

```
8 ) 57.44 ( 7.18
   -56
    ---
     14
     -8
    ---
      64
      64
    ---
      ×
```

7.18 Ans.

(f)

```
21 ) 6.5016 ( 0.3096
    -63
     ---
      20
     -00
     ---
      201
     -189
     ---
       126
      -126
     ---
       ×
```

0.3096 Ans.

Q. 6 Cost of 2 kg potatoes is ₹ 19.50 then cost of 1kg potatoes is –

(a) ₹ 39 (b) ₹ 10.5 (c) ₹ 9.50 (d) ₹ 9.75

Ans. Cost of 1 kg. potato $= ₹ \frac{19.50}{2} = ₹ 9.75$ **Ans. (d)**

Q. 7 0.32 ÷ 0.4 is equal to

(a) 8 (b) 0.8 (c) 0.008 (d) 0.08

Ans. $0.32 \div 0.4 = \frac{32}{100} \div \frac{4}{10} = \frac{32}{100} \times \frac{10}{4}$

$= \frac{4 \times 8 \times 10}{10 \times 10 \times 4} = \frac{8}{10} = 0.8$ **Ans. (b)**

Q. 8 **107 ÷ 10 is equal to**

(a) 1.07 **(b) 10.7** **(c) 0.107** **(d) 0.0107**

Ans. $\frac{107}{10}$ = 10.7 **Ans. (b)**

Q. 9 **A Vehicles covers a distances of 43.2 km in 2.4 litres of petrol. How much distance will it cover in one litre of petrol?**

Ans. In 2.4 litres of petrol covered distance = 43.2 km

In 1 litre of petrol covered distance $= \frac{43.2}{2.4} = \frac{432}{24}$

$= \frac{2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3}{2 \times 2 \times 2 \times 3}$

$= 2 \times 3 \times 3 =$ **18 km Ans.**

Q. 10 **The area of a rectangle is 80.75 sq. m if its length is 9.5 m find the breadth.**

Ans. Breadth of rectangle $= \frac{\text{Area of rectangle}}{\text{Length of rectangle}}$

$= \frac{80.75}{9.50} = \frac{8075}{100} \times \frac{100}{950}$

$= \frac{323 \times 25}{25 \times 38} = \frac{19 \times 17}{2 \times 19} = 8.5$ m

$\therefore$ Breadth of rectangle = **8.5 m Ans.**

Exercise : 2.7

Q. 1 **Convert :** **(a) 6163 m into km** **(b) 642 mm into m** **(c) 303.3 m into km**

Ans. (a) 6163 m $= \frac{6163}{1000}$ km = **6.163 km Ans.**

(b) 642 mm $= \frac{642}{1000}$ m = **0.642 m Ans.**

(c) 303.3 m $= \frac{303.3}{1000}$ km = **0.3033 km Ans.**

1 km = 1000 m

1 m = 1000 mm

Q. 2 **Convert :** **(a) 11 km into m** **(b) 7.35 km into m** **(c) 19.03 dam into cm**

Ans. (a) 11 km = 11 × 1000 m = **11000 m Ans.**

(b) 7.35 km = 7.35 × 1000 m = **7350 m Ans.**

(c) 19.03 dam = 19.03 × 10 m = 190.3 × 100 cm = **19030 cm Ans.**

Q. 3 **Convert:** **(a) 5.2 kg into g** **(b) 72.5 cg into g** **(c) 58.5 g into dag**

Ans. (a) 5.2 kg = 5.2 × 1000 = **5200 gm Ans.**

(b) 72.5 cg $= \frac{72.5}{100}$ gm = **0.725 gm Ans.**

(c) 58.5 gm $= \frac{58.5}{10}$ = **5.85 dag Ans.**

(c) 58.5 gm = = **5.85 dag Ans.**

Q. 4 **Convert :** **(a) 1533 l into kl** **(b) 21 l into kl** **(c) 3.7 kl into kl and l**

Ans. (a) 1533 l $= \frac{1533}{1000}$ kl = **1.533 kl Ans.**

(b) 21 l $= \frac{21}{1000}$ kl = **0.021 kl Ans.**

(c) 3.7 kl = 3.7 × 1000 = **3700 litre Ans.**

Q. 5 Convert : (a) 8.56 l into cl (b) 18.5 kl into kl and l (c) 8.7 l into ml

Ans. (a) 8.56 l = 8.56 × 1000 cl = **8560 cl Ans.**

(b) 18.5 kl = 18.5 × 1000 l = **18500 l Ans.**

(c) 8.7 l = 8.7 × 1000 ml = **8700 ml Ans.**

Q. 6 Convert : (a) 3020 mg into g (b) 312 mg into dag (c) 1003 g into kg

Ans. (a) 3020 mg = $\frac{3020}{1000}$ gm = **3.020 gm Ans.**

(b) 312 mg = $\frac{312}{10000}$ dag = **0.0312 dag Ans.**

(c) 1003 gm = $\frac{1003}{1000}$ kg = **1.003 kg Ans.**

Q. 7 Komal bought 1500 g potatoes, 1 kg 250 g onions and 500 g cauliflower. Find the total weight of vegetables bought by her.

Ans. Potatoes = 1500 gm = 1.500 kg

Onions = 1 kg 250 gm = 1.250 kg

Cauliflower = 500 gm = 0.500 kg

Total weight of vegetables = 1.500 + 1.250 + 0.500 = **3.250 kg. Ans.**

Q. 8 Sarita bought 2 litres of milk, 750 m/ of oil and 1500 m/ of cold drink. find the total weight with Sarita.

Ans. Milk = 2 litres = 2.000 liters

Oil = 750 m/ = 0.750 litres

Cold drink = 1500 m/ = 1.500 litres

Totle volume = 2.000 + 0.750 + 1.500 = **4.250 litres Ans.**

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CHAPTER 3 : RATIONAL NUMBER

(Exercise : 3.1)

Q. 1 **0.37 is equivalent to.**

(a) 0.74 **(b) 0.370** **(c) 0.037** **(d) 3.70**

Ans. 0.37 is equivalent to 0.370 **Ans. (b)**

Q. 2 **Which of the following pair of rational number is equivalent?**

(a) $\frac{-40}{6}, \frac{10}{6}$ **(b)** $\frac{5}{7}, \frac{20}{28}$ **(c)** $\frac{2}{7}, \frac{15}{21}$ **(d)** $\frac{5}{11}, \frac{-20}{44}$

Ans. $\frac{-40}{6} \neq \frac{10}{6}$, $\frac{5}{7} = \frac{5 \times 4}{7 \times 4} = \frac{20}{28}$ **Ans. (b)**

Q. 3 **The standard form of** $\frac{-54}{90}$ **is**

(a) $\frac{-54}{90}$ **(b)** $\frac{54}{-90}$ **(c)** $\frac{-3}{5}$ **(d)** $\frac{3}{-5}$

Ans. $\frac{-54}{90} = \frac{-\cancel{2} \times \cancel{3} \times \cancel{3} \times 3}{\cancel{2} \times \cancel{3} \times \cancel{3} \times 5} = \frac{-3}{5}$ **Ans. (c)**

Q. 4 **If** $\frac{3}{7}$ **and** $\frac{5}{x}$ **are equivalent rational number, then x equals**

(a) 5 **(b) 42** **(c) 19** **(d) 35**

Ans. $\frac{3}{7} = \frac{15}{x} = \frac{3}{7} = \frac{3 \times 5}{7 \times 5} = \frac{15}{x}$

$\therefore\ x = 7 \times 5 = 35$ **Ans (d)**

Q. 5 $\frac{p}{q}$ **is a rational number when**

(a) $p = 0,\ q \neq 0$ **(b)** $p = 0, q = 0$ **(c)** $p \neq 0, q = 0$ **(d)** $p = 1, q = 0$

Ans. $p = 0, q \neq 0$ **Ans. (a)**

Q. 6 Write each of the following rational numbers with positive denominators:

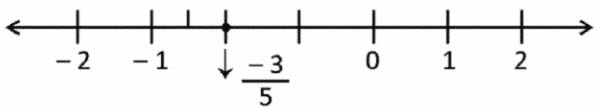
(a) $\frac{3}{-2}$ **(b)** $\frac{-4}{-5}$ **(c)** $\frac{-2}{5}$ **(d)** $\frac{15}{-16}$

Ans. (a) $\frac{3}{-2} = \frac{-3}{2}$ (b) $\frac{-4}{-5} = \frac{4}{5}$ (c) $\frac{-2}{5}$ (d) $\frac{-15}{16}$

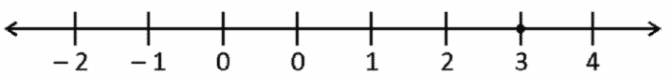
Q. 7 Represent the following rational numbers on the number line:

(a) $\frac{-3}{5}$ **(b)** $\frac{15}{5}$ **(c)** $\frac{-12}{4}$ **(d)** -5 **(e)** $\frac{-18}{4}$

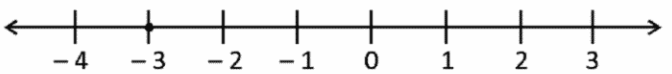
Ans. (a) $\frac{-3}{5}$



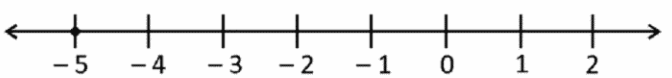
(b) $\frac{15}{5} = \frac{5 \times 3}{5} = 3$



(c) $\frac{-12}{4} = \frac{-3 \times 4}{4} = -3$



(d) -3



(e) $\frac{-18}{4} = \frac{-6 \times 3}{4} = \frac{-9}{2}$

Q. 8 Write the numerator and denominator of each of the following rational numbers.

(a) $\frac{-5}{23}$ **(b)** $\frac{11}{-7}$ **(c) 0** **(d)** $\frac{-2}{5}$

Ans.

	Numerator	Denominator
(a)	–5	23
(b)	– 11	7
(c)	0	1 or any real number except zero
(d)	– 2	5

Q. 9 Write 3 equivalent rational numbers of each of the following:

(a) $\frac{-3}{8}$ **(b)** $\frac{-1}{5}$ **(c)** $\frac{13}{11}$

Ans. (a) $\frac{-3}{8} = \frac{-3}{8} \times \frac{2}{2} = \frac{-6}{16}$

$\frac{-3}{8} = \frac{-3}{8} \times \frac{3}{3} = \frac{-9}{24}$

$\frac{-3}{8} = \frac{-3}{8} \times \frac{4}{4} = \frac{-12}{32}$

(b) $\frac{-1}{5} = \frac{-1}{5} \times \frac{3}{3} = \frac{-3}{15}$

$\frac{-1}{5} = \frac{-1}{5} \times \frac{4}{5} = \frac{-4}{20}$

$\frac{-1}{5} \times 9 = \frac{-1}{5} \times 9 = \frac{-9}{5}$

(c) $\frac{13}{11} = \frac{13}{11} \times \frac{4}{4} = \frac{52}{44}$

$\frac{13}{11} = \frac{13}{11} \times \frac{6}{6} = \frac{78}{66}$

$\frac{13}{11} = \frac{13}{11} \times \frac{8}{8} = \frac{104}{88}$

Q. 10 Write $\frac{-3}{-2}$ as rational number with (a) Numerator 21 (b) denominator 10

Ans. (a) $\frac{-3}{-2} = \frac{3}{2} = \frac{3}{2} \times \frac{7}{7} = \frac{21}{14}$ **Ans.**

(b) $\frac{-3}{-2} = \frac{3}{2} = \frac{3}{2} \times \frac{5}{5} = \frac{15}{10}$ **Ans.**

Q. 11 Reduce each of the following rational numbers to standard form (a) $\frac{32}{56}$ (b) $\frac{-552}{216}$

Ans. (a) $\frac{32}{56} = \frac{\cancel{2} \times \cancel{2} \times \cancel{2} \times 2 \times 2}{\cancel{2} \times \cancel{2} \times \cancel{2} \times 7} = \frac{4}{7}$ **Ans.**

(b) $\frac{-552}{216} = \frac{-\cancel{2} \times \cancel{2} \times \cancel{2} \times \cancel{3} \times 23}{\cancel{2} \times \cancel{2} \times \cancel{2} \times \cancel{3} \times 3 \times 3} = \frac{-23}{9}$ **Ans.**

Q. 12 Find the value of x if the given pairs of rational numbers are equivalent.

(a) $\frac{5}{3}$ and $\frac{x}{12}$ (b) $\frac{x}{8}$ and $\frac{-3}{12}$

Ans. (a) $\frac{5}{3} = \frac{x}{12} = \frac{5}{3} \times \frac{4}{4} = \frac{20}{12} = \frac{x}{12}$

$\therefore$ x = **20 Ans.**

(b) $\frac{x}{8} = \frac{-3}{12} = \frac{-1 \times \cancel{3}}{\cancel{3} \times 4} = \frac{x}{8} = \frac{-1}{4}$

$\frac{x}{8} = \frac{-1 \times 2}{4 \times 2} = \frac{-2}{8}$ $\therefore$ x = **– 2 Ans.**

Exercise : 3.2

Q. 1 Which of the two given rational number is greater?

(a) $\frac{5}{9}$ or $\frac{-3}{-8}$ (b) $\frac{9}{-13}$ or $\frac{7}{-12}$

Ans. (a) $\frac{5}{9} = \frac{5 \times 8}{9 \times 8} = \frac{40}{72}$

$\frac{-3}{-8} = \frac{3}{8} = \frac{3 \times 9}{8 \times 9} = \frac{27}{72}$

$\frac{40}{72} > \frac{27}{72}$ $\therefore$ $\frac{5}{9} > \frac{-3}{8}$

(b) $\frac{7}{-12} = \frac{-9}{13} = \frac{-9}{13} \times \frac{12}{12} = \frac{-108}{156}$

$\frac{7}{-12} = \frac{-7}{12} = \frac{-7 \times 13}{12 \times 13} = \frac{-84}{156}$

$\frac{-84}{156} > \frac{-108}{156}$ $\therefore$ $\frac{7}{-12} > \frac{-9}{13}$

Q. 2 Which of the two given rational numbers is Smaller?

(a) $\frac{2}{3}$ **or** $\frac{4}{7}$ **(b)** $\frac{7}{9}$ **or** $\frac{-5}{9}$

Ans. (a) $\frac{2}{3} = \frac{2}{3} \times \frac{7}{7} = \frac{14}{21}$

$\frac{4}{7} = \frac{4}{7} \times \frac{3}{3} = \frac{12}{21}$

$\frac{12}{21} > \frac{14}{21} \quad \therefore \quad \frac{4}{7} > \frac{2}{3}$

(b) Negative number is always smaller then positive number.

$\therefore \frac{-5}{9} < \frac{7}{9}$

Q. 3 Find in the boxes with correct symbol out of >, < or =

(a) $\frac{-3}{7} \square \frac{6}{-13}$ **(b)** $\frac{5}{-13} \square \frac{-35}{91}$ **(c)** $\frac{-7}{8} \square 0$ **(d)** $\frac{-8}{9} \square \frac{-9}{10}$

Ans. (a) $\frac{-3}{7} = \frac{-3 \times 13}{7 \times 13} = \frac{-39}{91}$

$\frac{6}{-13} = \frac{-6}{13} \times \frac{7}{7} = \frac{-42}{91}$

$\frac{-39}{91} > \frac{-42}{91} \quad \therefore \quad \frac{-3}{7} \boxed{>} \frac{-6}{13}$

(b) $\frac{5}{-13} = \frac{-5}{13}$

$\frac{-35}{91} = \frac{-5 \times 7}{13 \times 7} = \frac{-5}{13}$

$\frac{5}{-13} = \frac{-5}{13} \quad \therefore \quad \frac{5}{-13} \boxed{=} \frac{-5}{13}$

(c) Negative number is always smaller then zero.

$\therefore \frac{-7}{8} \boxed{<} 0$

(d) $\frac{-8}{9} = \frac{-8}{9} \times \frac{10}{10} = \frac{-80}{90}$

$\frac{-9}{10} = \frac{-9}{10} \times \frac{9}{9} = \frac{-81}{90}$

$\frac{-80}{90} > \frac{-81}{90} \quad \therefore \quad \frac{-8}{9} \boxed{>} \frac{-9}{10}$

Q. 4 Arrange in ascending order : (a) $\frac{2}{5}, \frac{7}{10}, \frac{8}{15}, \frac{13}{30}$ **(b)** $\frac{-3}{4}, \frac{-7}{5}, 0, \frac{-1}{2}$

Ans. (a) $\frac{2}{5} = \frac{2 \times 6}{5 \times 6} = \frac{12}{30}$

$\frac{7}{10} = \frac{7 \times 3}{10 \times 3} = \frac{21}{30}$

$\frac{8}{15} = \frac{8 \times 2}{15 \times 2} = \frac{16}{30}$

$\frac{13}{30} = \frac{13}{30}$

$\frac{12}{30} < \frac{13}{30} < \frac{16}{30} < \frac{21}{30}$

$\frac{2}{5} < \frac{13}{30} < \frac{8}{15} < \frac{7}{10}$ **Ans.**

(b) $\frac{-3}{4}, \frac{-7}{5}, 0, \frac{-1}{2}$

Ans. $\frac{-7}{5} > \frac{-3}{4} > \frac{-1}{2} > 0$

Q. 5 Arrange in descending order :

(a) $\frac{5}{11}, \frac{-1}{3}, \frac{2}{5}, \frac{11}{12}$

(a) $\frac{5}{11}, \frac{-1}{3}, \frac{2}{3}, \frac{11}{12},$

Ans, $\frac{11}{12}, \frac{5}{11}, \frac{2}{5}, \frac{-1}{3},$

(b) $-2, \frac{-13}{6}, \frac{8}{-3}, \frac{1}{3}$

(b) $\frac{-2}{1} \times \frac{6}{6} = \frac{-12}{6}$

$\frac{-13}{6} \times \frac{2}{2} = \frac{-26}{6}$

$\frac{8}{-3} = \frac{-8}{3} \times \frac{2}{2} = \frac{-16}{6}$

$\frac{1}{3} = \frac{1}{3} \times \frac{2}{2} = \frac{1}{6}$

$\frac{1}{6} > \frac{-12}{6} > \frac{-16}{6} > \frac{-26}{6}$

$\frac{1}{3} > -2 > \frac{8}{-3} > \frac{-13}{6}$

Q. 6 Write 5 rational numbers between.

(a) -3 and -2 **(b)** $\frac{-4}{5}$ **and** $\frac{-2}{3}$

Ans. (a) $\frac{-3}{1} \times \frac{6}{6} = \frac{-18}{6}$

$\frac{-2}{1} \times \frac{6}{6} = \frac{-12}{6}$

$\frac{-13}{6}, \frac{-14}{6}, \frac{-15}{6}, \frac{-16}{6}$ and $\frac{-17}{6}$ **Ans.**

(b) $\frac{-4}{5} = \frac{-4}{5} \times \frac{3}{3} = \frac{-12}{15} = \frac{-12}{15} \times \frac{3}{3} = \frac{-36}{45}$

$\frac{-2}{3} = \frac{-2}{3} \times \frac{5}{5} = \frac{-10}{15} = \frac{-10}{15} \times \frac{3}{3} = \frac{-30}{45}$

$\frac{-31}{45}, \frac{-32}{45}, \frac{-33}{45}, \frac{-34}{45}$ and $\frac{-35}{45}$ **Ans.**

Exercise : 3.3

Q. 1 $1\frac{3}{7} + (-3\frac{5}{14})$ **is equal to**

(a) $-1\frac{13}{14}$ **(b)** $-2\frac{1}{4}$ **(c)** $-4\frac{11}{14}$ **(d)** $-2\frac{9}{14}$

Ans. $1\frac{3}{7} + (-3\frac{5}{14}) = \frac{10}{7} + \frac{-47}{14}$

$\frac{20}{14} + \frac{47}{14} = \frac{-27}{14} = -1\frac{13}{14}$ **Ans. (a)**

Q. 2 The additive inverse of $\frac{7}{-15}$ **is –**

(a) $\frac{-7}{15}$ **(b)** $\frac{15}{-7}$ **(c)** $\frac{-15}{7}$ **(d)** $\frac{7}{15}$

Ans. $\frac{7}{-15} = \frac{-7}{15}$

Additive inverse of $\frac{-7}{15}$ is $\frac{7}{15}$ **Ans. (d)**

Q. 3 If we subtract $\frac{-2}{15}$ **from** $\frac{-3}{5}$ **the result is**

(a) $\frac{-7}{15}$ **(b)** $\frac{-1}{15}$ **(c)** $\frac{-11}{15}$ **(d)** $\frac{7}{15}$

Ans. $\frac{-3}{5} = \left(\frac{-2}{15}\right) = \frac{-3\times3}{5\times3} - \left(\frac{-2}{15}\right)$

$\frac{-9}{15} + \frac{2}{15} = \frac{-9+2}{15} = \frac{-7}{15}$ **Ans. (a)**

Q. 4 $\frac{-5}{9}$ **– (–3) is equal to**

(a) $\frac{-8}{9}$ **(b)** $\frac{22}{9}$ **(c)** $\frac{2}{9}$ **(d)** $\frac{-32}{9}$

Ans. $\frac{-5}{9} - (-3) = \frac{-5}{9} + 3 = \frac{3}{1} = \frac{3\times9}{1\times9}$

$\frac{-5}{9} + \frac{27}{9} = \frac{-5+27}{9} = \frac{22}{9}$ **Ans. (b)**

Q. 5 Add : (a) $\frac{2}{5}$ **and** $\frac{-3}{5}$ **(b)** $\frac{5}{12}$ **and** $\frac{-4}{9}$

Ans. (a) $\frac{2}{5} + \frac{-3}{5} = \frac{2-3}{5} = \frac{-1}{5}$ **Ans.**

(b) $\frac{5}{12} + \frac{-4}{9} = \frac{5\times3}{12\times3} + \frac{-4\times4}{9\times4}$

$= \frac{15}{36} + \frac{-16}{36} = \frac{15+(-16)}{36} = \frac{-1}{36}$ **Ans.**

Q. 6 Similarly : $\frac{(-11)}{12} + \frac{7}{18} + \frac{5}{(-9)}$

Ans. $\frac{-11}{12} + \frac{7}{18} + \frac{5}{-9}$

$\frac{-11}{12} = \frac{-11\times3}{12\times3} = \frac{-33}{36}$

$\frac{7}{18} = \frac{7\times2}{18\times2} = \frac{14}{36}$

$\frac{5}{-9} = \frac{-5}{9}\times\frac{4}{4} = \frac{-20}{36}$

$\frac{(-33)+14+(-20)}{36} = \frac{-19+(-20)}{36} = \frac{-39}{36}$

$\frac{-13\times3}{3\times12} = \frac{-13}{12} = -1\frac{1}{12}$ **Ans.**

Q. 7 Evaluate : (a) $-2\frac{1}{3} + \frac{13}{36} + \frac{11}{(-12)}$ **(b)** $\frac{-1}{3} + 1\frac{1}{4} + \left(-1\frac{1}{8}\right)$

Ans. (a) $-2\frac{1}{3} + \frac{13}{36} + \frac{11}{-12} = -2 - \frac{1}{3} + \frac{13}{36} - \frac{11}{12}$

$-2 - \frac{1\times12}{3\times12} + \frac{13}{36} - \frac{11\times3}{12\times3} = -2 - \frac{12}{36} + \frac{13}{36} - \frac{33}{36}$

$-2 + \frac{-12+13-33}{36} = -2 + \frac{-32}{36} = -2 + \frac{4\times-8}{4\times9}$

$-2 - \frac{8}{9} = -2\frac{8}{9}$ **Ans.**

(b) $-\frac{1}{3} + 1\frac{1}{4} + \left(-1\frac{1}{8}\right)$

$-\frac{1}{3} + 1 + \frac{1}{4} - 1 - \frac{1}{8} = -\frac{1\times8}{3\times8} + \frac{1\times6}{4\times6} - \frac{1\times3}{8\times3}$

$-\frac{8}{24} + \frac{6}{24} - \frac{3}{24} = \frac{-8+6-3}{24} = \frac{-5}{24}$ **Ans.**

Q. 8 **Subtract :** **(a)** $\frac{5}{12}$ **from** $\frac{-3}{28}$ **(b)** $\frac{4}{5}$ **from** $\frac{2}{9}$ **(c)** -4 **from** $\frac{-3}{7}$

Ans. (a) $\frac{-3}{28} - \left(\frac{5}{12}\right) = \frac{-3\times3}{28\times3} - \frac{5\times7}{12\times7}$ LCM of 28, 12 is 84.

$\frac{-9}{84} - \frac{35}{84} = \frac{-9-35}{84}$

$\frac{-44}{84} = \frac{4\times(-11)}{4\times21} = \mathbf{\frac{-11}{21}}$ **Ans.**

(b) $\frac{2}{9} - \frac{4}{5} = \frac{2\times5}{9\times5} - \frac{4\times9}{5\times9}$

$\frac{10}{45} - \frac{36}{45} = \frac{10-36}{45} = \mathbf{\frac{-26}{45}}$ **Ans.**

(c) $\frac{-3}{7} - (-4) = \frac{-3}{7} + 4$

$\frac{-3}{7} + 1 + 3 = \frac{-3}{7} + \frac{7}{7} + 3$

$\frac{-3+7}{7} + 3 = \frac{4}{7} + 3 = \mathbf{3\frac{4}{7}}$ **Ans.**

Q. 9 **What should be added to** $\frac{-13}{12}$ **to get** $2\frac{7}{36}$ **?**

Ans. $2\frac{7}{36} - \left(\frac{-13}{36}\right) = 2 + \frac{7}{36} + \frac{13}{36}$

$2 + \frac{7+13}{36} = 2 + \frac{4+5}{4\times9}$

$2 + \frac{5}{9} = 2\frac{5}{9}$ = Add $2\frac{5}{9}$ to get $2\frac{7}{36}$

Q. 10 **Subtract the sum of** $\left(\frac{-3}{4}\right.$ **and** $\left.\frac{1}{3}\right)$ **from the sum of** $\left(\frac{2}{3}\right.$ **and** $\left.\frac{-1}{2}\right)$

Ans. $\left(\frac{2}{3} + \frac{-1}{2}\right) - \left(\frac{-3}{4} + \frac{1}{3}\right)$

$\left(\frac{2\times2}{3\times2} + \frac{-3\times3}{2\times3}\right) - \left(\frac{-3\times3}{4\times4} + \frac{1\times4}{3\times4}\right)$

$\left(\frac{4}{6} + \frac{-3}{6}\right) - \left(\frac{-9}{12} + \frac{4}{12}\right) = \frac{4-3}{6} - \frac{-9+4}{12}$

$\frac{1}{6} + \frac{5}{12} = \frac{2}{12} + \frac{5}{12} = \mathbf{\frac{7}{12}}$ **Ans.**

Q. 11 **What should be added to** $\left(\frac{-1}{5} + \frac{2}{3}\right)$ **to make it 1?**

Ans. $1 - \left(\frac{-1}{5} + \frac{2}{3}\right) = 1 - \left(\frac{-1\times3}{5\times3} + \frac{2\times5}{3\times5}\right)$

$1 - \left(\frac{-3}{15} + \frac{10}{15}\right) = 1 - \left(\frac{10-3}{15}\right) = 1 - \frac{7}{15}$

$\frac{15}{15} - \frac{7}{15} = \frac{15-7}{15} = \mathbf{\frac{8}{15}}$ Added to get 1

Q. 12 **The sum of two rational numbers is** $\frac{-3}{11}$ **. If one of them is** $\frac{-5}{9}$ **, find the other.**

Ans. Another number $= \frac{-3}{11} - \left(\frac{-5}{9}\right) = \frac{-3}{11} + \frac{5}{9}$

$= \frac{-3\times9}{11\times9} + \frac{5\times11}{9\times11} = \frac{-27}{99} + \frac{55}{99}$

$= \frac{-27+55}{99} = \frac{28}{99}$ **Ans.**

Q. 13 The difference of two rational numbers is $1\frac{1}{2}$. If the smaller number is $2\frac{3}{4}$, find the other.

Ans. Other number $= 1\frac{1}{2} + 2\frac{3}{4}$

$= 1 + \frac{1}{2} + 2 + \frac{3}{4} = 1 + 2 + \frac{1}{2} + \frac{3}{4}$

$= 3 + \frac{1\times2}{2\times2} + \frac{3}{4} = 3 + \frac{2}{4} + \frac{3}{4}$

$= 3 + \frac{2+3}{4} = 3 + \frac{5}{4}$

$= 3 + 1 + \frac{1}{4}$

Other number $= 4\frac{1}{4}$ **Ans.**

Exercise : 3.4

Q. 1 $\left(-1\frac{1}{9}\right) \times \left(3\frac{3}{5}\right)$ is equal to –

(a) 4 (b) –4 (c) $-3\frac{3}{45}$ (d) $3\frac{3}{45}$

Ans. $\left(-1\frac{1}{9}\right) \times \left(3\frac{3}{5}\right) = \left(\frac{-10}{9}\right) \times \left(\frac{18}{5}\right)$

$\frac{-10}{9} \times \frac{18}{5} = \frac{-2\times5\times2\times9}{9\times5} = -4$ **Ans. (b)**

Q. 2 Which of the following is equal to $\frac{-2}{125}$?

(a) $\frac{3}{4} \times \frac{8}{275}$ (b) $\frac{-2}{5} \times \frac{-1}{25}$ (c) $\frac{-4}{25} \times \frac{1}{10}$ (d) $-1 \times \frac{-2}{125}$

Ans. $\frac{-2}{125} = \frac{-2\times2}{125\times2} = \frac{-4}{25\times5\times2} = \frac{-4}{25} \times \frac{1}{10}$ **Ans. (c)**

Q. 3 $\left(\frac{-2}{3}\right) \times \left(\frac{-3}{4}\right) \div \left(\frac{-16}{21}\right)$ is equal to –

(a) $\frac{-8}{49}$ (b) $\frac{-21}{32}$ (c) $\frac{-32}{147}$ (d) $\frac{-3}{8}$

Ans. $\left(\frac{-2}{3}\right) \times \left(\frac{-3}{4}\right) \div \left(\frac{-16}{21}\right) = \frac{(-2)\times(-3)}{3\times4} \div \left(\frac{-16}{21}\right)$

$\frac{\cancel{2}\times\cancel{3}}{\cancel{3}\times\cancel{2}\times1} \div \left(\frac{-16}{21}\right) = \frac{1}{2} \div \left(\frac{-16}{21}\right)$

$\frac{1}{2} \times \frac{-21}{16} = \frac{-21}{32}$ **Ans. (b)**

Q. 4 Find the products : (a) $\frac{4}{9} \times \left(\frac{-5}{12}\right) \times \frac{7}{18}$ (b) $\frac{16}{35} \times \left(\frac{-15}{14}\right) \times \frac{15}{-60}$

Ans. (a) $\frac{4}{9} \times \left(\frac{-5}{12}\right) \times \frac{7}{18} = \frac{(4)\times(-5)\,(7)}{9\times9\times2}$

$\frac{-5\times7}{9\times9\times6} = \frac{-35}{486}$ **Ans.**

(b) $\frac{16}{35} \times \frac{-15}{14} \times \left(\frac{15}{-60}\right) = \frac{16}{35} \times \frac{-15}{14} \times \frac{-15}{60}$

$\frac{16}{35} \times \frac{15}{2\times7} \times \frac{\cancel{-15}}{\cancel{-15}\times4} = \frac{16\times15\times1}{5\times7\times2\times7\times4}$

$$\frac{\cancel{4}^{2}\times\cancel{4}\times\cancel{5}\times 3}{\cancel{5}\times 7\times\cancel{2}\times 7\times\cancel{7}} = \frac{2\times 3}{7\times 7} = \frac{6}{49}$$ Ans.

Q. 5 Multiply : (a) 6 by $\left(\frac{-5}{30}\right)$ (b) $\frac{19}{30}$ by $\left(\frac{21}{-12}\right)$ (c) $\frac{-3}{18}$ by $\frac{15}{16}$

Ans. (a) $6\times\frac{-5}{30} = \frac{6\times(5)}{6\times 5} = \frac{6\times 5\times(-1)}{6\times 5} = -1$ Ans.

(b) $\frac{19}{30}\times\frac{21}{-12} = \frac{19\times(-21)}{30\times 12} = \frac{-19\times\cancel{3}\times 7}{\cancel{3}\times 10\times 12} = \frac{-133}{120} = -1\frac{13}{20}$ Ans.

(c) $\frac{-3}{18}\times\frac{15}{16} = \frac{-3\times\cancel{3}\times 5}{\cancel{3}\times 6\times 16} = \frac{-15}{96}$

Q. 6 Simplify : (a) $\left(\frac{2}{3}+\frac{8}{16}\right)\times\left[\frac{11}{24}+\frac{7}{-8}\right]$ (b) $\left(\frac{15}{7}\div\frac{9}{5}\right)\times\left(\frac{5}{12}-\frac{7}{18}\right)$

Ans. (a) $\left(\frac{2}{3}+\frac{8}{16}\right)\times\left(\frac{11}{24}+\frac{7}{-8}\right)$

$\left(\frac{2}{3}+\frac{8\times 1}{8\times 2}\right)\times\left(\frac{11}{24}+\frac{-7}{8}\right) = \left(\frac{2\times 2}{3\times 2}+\frac{1\times 3}{2\times 3}\right)\times\left(\frac{11-21}{8\times 3}\right)$

$\left(\frac{4+3}{3\times 2}\right)\times\left(\frac{-10}{8\times 3}\right) = \frac{7}{3\times 2}\times\frac{-5\times 2}{8\times 3}$

$\frac{7\times -5}{3\times 3\times 8} = \frac{-35}{72}$ Ans.

(b) $\left(\frac{15}{7}\div\frac{9}{5}\right)\times\left(\frac{5}{12}-\frac{7}{18}\right)$

$\left(\frac{15}{7}\times\frac{9}{5}\right)\times\left(\frac{5\times 3}{12\times 3}-\frac{7\times 2}{18\times 2}\right) = \left(\frac{15\times 5}{7\times 9}\right)\times\left(\frac{15-14}{36}\right)$

$\frac{15\times 5\times 1}{7\times 9\times 36} = \frac{3\times 5\times 5\times 1}{7\times 3\times 3\times 36} = \frac{25}{756}$ Ans.

Q. 7 Evaluate : (a) $\left(\frac{-1}{10}\div\frac{-8}{5}\right)\times\left(\frac{4}{9}\right)$ (b) $\frac{-50}{20}\div\left(1\frac{5}{6}\times\frac{16}{33}\right)$

Ans. (a) $\left(\frac{-1}{10}\div\frac{-8}{5}\right)\times\frac{4}{9} = \left(\frac{-1}{10}\times\frac{-5}{8}\right)\times\frac{4}{9}$

$\frac{1\times\cancel{5}\times\cancel{4}}{\cancel{5}\times 2\times\cancel{4}\times 2\times 9} = \frac{1}{36}$ Ans.

(b) $\frac{-50}{20}\div\left(1\frac{5}{6}\times\frac{16}{33}\right) = \frac{-50}{20}\div\left(\frac{16}{33}\times\frac{16}{33}\right)$

$\frac{-50}{20}\div\left(\frac{\cancel{11}\times\cancel{2}\times 8}{\cancel{2}\times 3\times 3\times\cancel{11}}\right) = \frac{-50}{20}\div\frac{8}{9}$

$\frac{-5}{2}\times\frac{9}{8} = \frac{-45}{16}$ Ans.

Q. 8 Multiply the sum of $\frac{2}{3}$ and $\frac{(-1)}{5}$ by the sum of $\frac{3}{7}$ and $\frac{-5}{21}$

Ans. $\left(\frac{2}{3}+\frac{(-1)}{5}\right)\times\left(\frac{3}{7}+\frac{-5}{21}\right)$

$\left(\frac{2\times 5}{3\times 5}+\frac{-1\times 3}{5\times 3}\right)\times\left(\frac{3\times 3}{7\times 3}+\frac{-5}{21}\right) = \left(\frac{10-3}{15}\right)\times\left(\frac{9-5}{21}\right)$

$\frac{7}{15}\times\frac{4}{21} = \frac{\cancel{7}\times 4}{15\times\cancel{7}\times 3} = \frac{4}{45}$ Ans.

Q. 9 **Simplify :** $\left(\frac{1}{5}+\frac{1}{6}\right) \div \left(\frac{5}{6}+\frac{4}{15}\right)$

Ans. $\left(\frac{1}{5}+\frac{1}{6}\right) \div \left(\frac{5}{6}+\frac{4}{15}\right)$

$\left(\frac{1\times6}{5\times6}+\frac{1\times5}{6\times5}\right) \div \left(\frac{5\times5}{6\times5}+\frac{4\times2}{15\times2}\right) = \left(\frac{6+5}{30}\right) \div \left(\frac{25+8}{30}\right)$

$\frac{11}{\cancel{30}} \times \frac{\cancel{30}}{33} = \frac{\cancel{11}\times1}{\cancel{11}\times3} = \frac{1}{3}$ **Ans.**

Q. 10 **The product of two rational number is 10. If one of the numbers is –8, find the other.**

Ans. Other number = Product of two number ÷ one number

$= 10 \div -8$

$= \frac{10}{-8} = \frac{2\times5}{-2\times4} = \frac{10}{-8} = \frac{5}{-4}$

$\therefore$ Other number is $\frac{5}{-4}$ **Ans.**

Q. 11 **If 24 pairs of trousers of equal size can be prepared with 54 m of cloth, what length of cloth is required for each pair of trousers?**

Ans. Length of each pair of trouser $= \frac{54}{24}$ m

$= \frac{\cancel{2}\times\cancel{3}\times\cancel{3}\times3}{\cancel{2}\times\cancel{3}} = \frac{9}{4} = 2\frac{1}{4}$ **Ans.**

Exercise : 3.5

Q. 1 **Which of the following is not a rational number?**

(a) 3.4 **(b)** $\frac{9}{4}$ **(c) 1.010010001...** **(d)** $1.7\overline{32}$

Ans. **(c) 1.010010001..**

Q. 2 $\frac{41}{90}$ **is equivalent to**

(a) $0.\overline{45}$ **(b)** $0.4\overline{5}$ **(c)** $1.\overline{5}$ **(d)** $1.4\overline{5}$

Ans. $\frac{41}{90} = \frac{4.1}{9} = 0.455.... = 0.4\overline{5}$ **Ans. (b)**

Q. 3 $\frac{11}{90}$ **is equivalent to**

(a) $0.1\overline{2}$ **(b) 1.12** **(c) 1.1** **(d) 0.01 + 0.2**

Ans. $\frac{11}{90} = \frac{1.1}{9} = 0.122.... = 0.\overline{12}$ **Ans. (a)**

Q. 4 **Express each of following rational numbers as decimals :**

(a) $\frac{8}{23}$ **(b)** $\frac{29}{139}$ **(c)** $\frac{36}{-4}$ **(d)** $\frac{109}{28}$ **(e)** $\frac{1}{8}$

Ans. (a) $\frac{8}{23} = 0.\overline{347826086956 2}$ (b) $\frac{29}{139} = 0.20863.....$

(c) $\frac{36}{-4} = \frac{+4\times(-9)}{4} = -9 = -9.00$

(d) $\frac{109}{28} = 3.89.....$ (e) $\frac{1}{8} = 0.125$

(a) $23\overline{)80}\,0.347826086956526$

69
110
92
180
161
190
184
60
46
140
138
200
184
160
138
220
207
130
115
150
138
120
115
50
46
140
138
2.0

(b) $139\overline{)290}\,0.2086330935$

278
1200
1112
880
834
460
417
430
417
1300
125
490
417
730
695
450

(d) $28\overline{)109}\,3.89$

84
250
224
260
252
008

(e) $8\overline{)10}\,0.125$

8
20
16
40
40
×

Q. 5 Find the decimal representation of each of the following rational numbers :

(a) $\frac{7}{6}$ (b) $\frac{-3}{14}$ (c) $\frac{16}{9}$ (d) $\frac{19}{36}$ (e) $\frac{5326}{13}$

Ans. (a) $\frac{7}{6}$ = 1.1666... = $1.1\overline{6}$

(b) $\frac{-3}{14}$ = 2.14285714.... = $2.\overline{142857}$

(c) $\frac{16}{9}$ = 1.77.. = $1.\overline{7}$

(d) $\frac{19}{36}$ = 0.527 = $0.52\overline{7}$

(e) $\frac{5326}{13}$ = 409.69230769.... = $409.6\overline{920769}$

(a) $6\overline{)7(}1.666$

6
10
6
40
36
40
36
4

(b) $23\overline{)30(}2.142857$

28
20
14
60
56
40
28
120
112
80
70
100
98
2

(c) $9\overline{)16(}1.77$

9
70
63
70
63
7

(d) $36\overline{)190(}0.527$

180
100
72
280
252
28

(e) $13\overline{)5326(}409.6923076$

52
126
117
90
78
120
117
30
26
40
39
100
91
90
78
12

Q. 6 Express each of the decimal numbers in the form $\frac{P}{Q}$, $q \neq 0$.

(a) 0.125 (b) 5.625 (c) 3.185 (d) 4.075 (e) 9.3125

Ans. (a) 0.125

$= \frac{125}{1000}$

$= \frac{5 \times 5 \times 5}{5 \times 5 \times 5 \times 2 \times 2 \times 2} = \frac{1}{8}$ **Ans.**

(b) 5.625

$= \frac{5625}{1000}$

$= \frac{5 \times 5 \times 5 \times 5 \times 3 \times 3}{5 \times 5 \times 5 \times 2 \times 2 \times 2} = \frac{45}{8}$ **Ans.**

(c) 3.185

$= \frac{3185}{1000}$

$= \frac{5 \times 637}{5 \times 200} = \mathbf{\frac{637}{200}}$ **Ans.**

(d) 4.075

$= \frac{4075}{1000}$

$= \frac{5 \times 5 \times 163}{5 \times 5 \times 40} = \mathbf{\frac{163}{40}}$ **Ans.**

(e) 9.3125

$= \frac{93125}{10000}$

$= \frac{5 \times 5 \times 5 \times 5 \times 149}{5 \times 5 \times 5 \times 5 \times 16} = \mathbf{\frac{149}{16}}$ **Ans.**

TEST YOUR PROGRESS

Q. 1 Identify the following as positive or negative rational numbers :

(a) $\mathbf{\frac{-3}{19}}$ **(b)** $\mathbf{\frac{-6}{-23}}$ **(c)** $\mathbf{\frac{-1}{-7}}$

Ans. (a) $\frac{-3}{-19} = \frac{3}{19}$ (b) $\frac{-6}{-23} = \frac{6}{13}$ (c) $\frac{-1}{-7} = \frac{1}{7}$

All are positive rational numbers.

Q. 2 Write each of the following rational numbers with a positive denominator :

(a) $\mathbf{\frac{-1}{-7}}$ **(b)** $\mathbf{\frac{-2}{-11}}$ **(c)** $\mathbf{\frac{7}{-23}}$

Ans. (a) $\frac{-1}{-7} = \frac{1}{7}$ (b) $\frac{-2}{-11} = \frac{2}{11}$ (c) $\frac{7}{-23} = \frac{-7}{23}$

Q. 3 Add the following :

(a) $\mathbf{\frac{-2}{14}}$ **and** $\mathbf{\frac{3}{7}}$ **(b)** $\mathbf{\frac{7}{9}}$ **and** $\mathbf{\frac{-5}{3}}$ **(c)** $\mathbf{\frac{-4}{5}}$ **and** $\mathbf{\frac{-5}{4}}$

Ans. (a) $\frac{-2}{14} + \frac{3}{7} = \frac{-2}{14} + \frac{3 \times 2}{7 \times 2}$

$\frac{-2}{14} + \frac{3 \times 2}{7 \times 2} = \frac{-2}{14} + \frac{6}{14}$

$= \frac{-2 + 6}{14}$ $\frac{4}{14} = \frac{2 \times 2}{2 \times 7} = \mathbf{\frac{2}{7}}$ **Ans.**

(b) $\frac{7}{9} + \frac{-5}{3} = \frac{7}{9} + \frac{-5 \times 3}{3 \times 3}$

$\frac{7}{9} + \frac{-15}{9}$

$\frac{7 + (-15)}{9} = \mathbf{\frac{-8}{9}}$ **Ans.**

(c) $\frac{-4}{5} + \frac{(-5)}{4} = \frac{-4 \times 4}{5 \times 4} + \frac{-5 \times 5}{4 \times 5}$

$\frac{-16}{20} + \frac{-25}{20} = \frac{-16 + (-25)}{20} = \mathbf{\frac{-41}{20}}$ **Ans.**

Q. 4 Multiply : (a) $\mathbf{\frac{6}{7}}$ **by** $\mathbf{\frac{-11}{14}}$ **(b)** $\mathbf{\frac{-9}{8}}$ **by** $\mathbf{\frac{-14}{15}}$ **(c)** $\mathbf{\frac{1}{-12}}$ **by** $\mathbf{\frac{-15}{16}}$

Ans. (a) $\frac{6}{7} \times \frac{-11}{14} = \frac{6 \times (-11)}{7 \times 2 \times 7}$

$\frac{2 \times 3 \times (-11)}{7 \times 2 \times 7} = \mathbf{\frac{-33}{49}}$ **Ans.**

(b) $\frac{-9}{8} \times \frac{-14}{15} = \frac{9 \times 14}{8 \times 15}$

$\frac{3 \times 3 \times 2 \times 7}{2 \times 4 \times 3 \times 5} = \mathbf{\frac{21}{20}}$ **Ans.**

(c) $\frac{1}{-12} \times \frac{-15}{16} = \frac{-1 \times (-15)}{12 \times 16}$

$\frac{5 \times 3}{3 \times 4 \times 10} = \frac{\mathbf{5}}{\mathbf{64}}$ **Ans.**

Q. 5 Divide : (a) $\frac{-2}{6}$ by $\frac{4}{7}$ (b) $\frac{-9}{13}$ by $\frac{23}{7}$ (c) – 10 by $\frac{2}{5}$

Ans. (a) $\frac{-2}{7} \div \frac{4}{7} = \frac{-2}{7} \times \frac{7}{4}$

$\frac{-2 \times 7}{7 \times 2 \times 2} = \frac{\mathbf{-1}}{\mathbf{2}}$ **Ans.**

(b) $\frac{-9}{13} \div \frac{23}{7} = \frac{-9}{13} \times \frac{7}{23}$

$= \frac{\mathbf{-63}}{\mathbf{299}}$ **Ans.**

(c) $\frac{1}{-12} \div \frac{-15}{16} = \frac{1}{-12} \times \frac{-16}{15}$

$\frac{1}{3 \times 4} \times \frac{4 \times 4}{3 \times 5} = \frac{\mathbf{4}}{\mathbf{45}}$ **Ans.**

CHAPTER – 4 : POWER AND EXPONENTS

Exercise : 4.1

Q. 1 If $(-x)^3 = -64$, then value of x is –

(a) 4 (b) –8 (c) 8 (d) –4

Ans. $(-x)^3 = -64$

$(-x)^3 = -4 \times (-4) \times (-4) = (-4)^3$

Compare Base $= -x = -4 \Rightarrow x = 4$ **Ans. (a)**

Q. 2 $p \times p \times p \times p \times q \times q \times q \times q$

(a) p^3q^4 (b) p^4q^3 (c) $(pq)^3$ (d) $(pq)^4$

Ans. $p \times p \times p \times p \times q \times q \times q \times q$

$p^4 \times a^4 = (pq)^4$ **Ans. (d)**

Q. 3 In $\left(\frac{4}{5}\right)^3$, the base is

(a) 4 (b) 5 (c) 3 (d) $\frac{4}{5}$

Ans. $\left(\frac{4}{5}\right)^3$, base is $\frac{4}{5}$ **Ans. (d)**

Q. 4 Express each of the following in exponential form :

(a) $5 \times 5 \times 5 \times 3 \times 3 \times (-4) \times (-4)$

(b) $(-7) \times (-7) \times (-7) \times (-7)$

(c) $\frac{9 \times 9 \times 9}{11 \times 11 \times 11}$

(d) $a \times a \times a \times a \times b \times b \times b \times b \times b$

Ans. (a) $5 \times 5 \times 5 \times 3 \times 3 \times (-4) \times (-4)$

$= 5^3 \times 3^2 \times (-4)^2$

$= 5^3 \times 3^2 \times 4^2$

$= 5^3 \times (3 \times 4)^2 = \mathbf{5^3 \times 12^2}$ **Ans.**

(b) $(-7) \times (-7) \times (-7) \times (\times 7)$

$= (-7)^4$

$= \mathbf{(7)^4}$ **Ans.**

(c) $\frac{9 \times 9 \times 9}{11 \times 11 \times 11}$

$\frac{9^3}{11^3} = \left(\frac{9}{11}\right)^3$ **Ans.**

(d) $a \times a \times a \times a \times b \times b \times b \times b \times b$

$= a^4 b^5$ **Ans.**

Q. 5 Evaluate each of the following :

(a) $2^3 + 5^2$ **(b)** $(-2)^3 \times (-3)^2 \times (-5)^2$ **(c)** $\left(\frac{-2}{5}\right)^3 \times \left(\frac{-1}{4}\right)^2$ **(d)** $15 \times (5)^2 \times (3)^3$

Ans. (a) $2^3 + 5^2$

$= 8 + 25 = 33$ **Ans.**

(b) $(-2)^3 \times (-3)^2 \times (-5)^2$

$= -8 \times 9 \times 25$

$= -8 \times 25 \times 9$

$= -200 \times 9 = -1800$ **Ans.**

(c) $\left(\frac{-2}{5}\right)^3 \times \left(\frac{-1}{4}\right)^2$

$\frac{-8}{125} \times \frac{1}{16}$

$\frac{-8 \times 1}{125 \times 8 \times 2} = \frac{-8}{2000}$ **Ans.**

(d) $15 \times (5)^2 \times (3)^3$

$= 15 \times 25 \times 27$

$= 375 \times 27 = 10125$ **Ans.**

Q. 6 Evaluate each of the following :

(a) 15^3 **(b)** $(-12)^4$ **(c)** $\left(\frac{-2}{3}\right)^5$ **(d)** $\left(\frac{4}{5}\right)^4$ **(e)** $\left(\frac{-2}{-11}\right)^3$

Ans. (a) $15^3 = 15 \times 15 \times 15 = 225 \times 15 =$ **3375 Ans.**

(b) $(-12)^4 = (-12) \times (-12) \times (-12) \times (-12) = 144\ (-12) \times (-12)$

$= -1728 \times (-12) =$ **20736 Ans.**

(c) $\left(\frac{-2}{3}\right)^5 = \frac{(-2) \times (-2) \times (-2) \times (-2) \times (-2)}{(3) \times (3) \times (3) \times (3) \times (3)} = \frac{-32}{243}$ **Ans.**

(d) $\left(\frac{4}{5}\right)^4 = \frac{4 \times 4 \times 4 \times 4}{5 \times 5 \times 5 \times 5} = \frac{256}{625}$ **Ans.**

(e) $\left(\frac{-2}{-11}\right)^3 = \left(\frac{2}{11}\right)^3 = \frac{2 \times 2 \times 2}{11 \times 11 \times 11} = \frac{8}{1331}$ **Ans.**

Q. 7 **Simplify :** **(a)** $\left(\frac{2}{7}\right)^2 \times \left(\frac{11}{3}\right)^2 \times \left(\frac{3}{11}\right)^2$ **(b)** $\left[\left(\frac{1}{2}\right)^3 + \left(\frac{3}{4}\right)\right] \times \left(\frac{-2}{3}\right)^4$

Ans. (a) $\left(\frac{2}{7}\right)^2 \times \left(\frac{11}{3}\right)^2 \times \left(\frac{3}{11}\right)^2 = \frac{2 \times 2 \times 11 \times 11 \times 3 \times 3}{7 \times 7 \times 3 \times 3 \times 11 \times 11}$

$\frac{2 \times 2}{7 \times 7} = \frac{4}{49}$ **Ans.**

(b) $\left[\left(\frac{1}{2}\right)^3 + \left(\frac{3}{4}\right)\right] \times \left(\frac{-2}{3}\right)^4 = \left(\frac{1}{8} + \frac{3}{4}\right) \times \left(\frac{-2}{3}\right)^4$

$\left(\frac{1}{8} + \frac{3 \times 2}{4 \times 2}\right) \times \left(\frac{2}{3}\right)^4 = \left(\frac{1+6}{8}\right) \times \left(\frac{2 \times 2 \times 2 \times 2}{3 \times 3 \times 3 \times 3}\right)$

$\frac{7 \times 2 \times 2 \times 2 \times 2}{2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3} = \frac{14}{81}$ **Ans.**

Q. 8 Find the reciprocal of each of the following :

(a) $\left(\frac{-2}{3}\right)^2$ **(b)** $\left(\frac{-2}{7}\right)^4$ **(c)** $\left(\frac{-5}{11}\right)^{11}$

Ans. (a) $\left(\frac{-2}{3}\right)^2$ reciprocal is $= \left(\frac{-3}{2}\right)^2$ **Ans.**

(b) $\left(\frac{-2}{7}\right)^4$ reciprocal is $= \left(\frac{7}{-2}\right)^4$ **Ans.**

(c) $\left(\frac{-5}{11}\right)^{11}$ reciprocal is $= \left(\frac{11}{-5}\right)^{4}$ Ans.

Q. 9 Find the value of –

(a) $(-1)^{24} \times (-1)^{12} \times (-5)^5$ (b) $(-1)^{41} - (-1)^{52}$ (c) $(-2)^x = 512$

Ans. (a) $(-1)^{24} \times (-1)^{12} \times (-5)^5$

$(1) \times (1) \times (-1) \times (5)^5$

$= -5^5$ **Ans.**

(–1) Even Number = (1) Even Number
(–1) Odd Number = (1) Odd Number

(b) $(-1)^{41} - (-1)^{52}$

$= (-1) - (1)$

$= -1 - 1 \quad = \quad -2$ **Ans.**

(c) $(+2)x \quad = \quad 512$

$(+2)x \quad = \quad (2)9$

Compare the power

$x = 9$ **Ans.**

2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

Q. 10 Compare the following numbers :

(a) 2.7×10^{12} ; 1.5×10^8 (b) 4×10^{14} ; 3×10^{17}

Ans. (a) 2.7×10^{12} ; 1.5×10^8

$10^{12} > 10^8$

$\therefore \quad 2.7 \times 10^{12} > 1.5 \times 10^8$

(b) 4×10^{14} ; 3×10^{17}

$10^{17} > 10^{14}$

$\therefore \quad 3 \times 10^{17} > 4 \times 10^{4}$

Exercise : 4.2

Q. 1 $\frac{5^0 + 7^0 + 12^0}{4 \div \frac{1}{4}}$ **is equal to –**

(a) $\frac{1}{4}$ (b) 0 (c) 1 (d) $\frac{3}{16}$

Ans. $\frac{5^0 + 7^0 + 12^0}{4 \div \frac{1}{4}} = \frac{1 + 1 + 1}{4 \times \frac{1}{4}} = \frac{3}{16}$ **Ans. (d)**

Q. 2 $(-3)^3 \times (-4)^2$ is equal to –

(a) $(12)^6$ (b) 432 (c) $(12)^5$ (d) –432

Ans. $(-3)^3 \times (-4)^2 = -27 \times 16 = -432$ **Ans. (d)**

Q. 3 $(3^2)^4$ is equal to –

(a) 3^8 (b) 3^6 (c) 3^{16} (d) 3^4

Ans. $(3^2)^4 = 3^{2 \times 4} = 3^8$ **Ans. (a)**

Q. 4 Simplify each of the following and express the answer in exponential form :

(a) $(4^2 \times 16)^4$ (b) $(12^3)^5$ (c) $\left(\frac{-7}{9}\right)^{16} \times \left(\frac{-7}{9}\right)^0$

Ans (a) $(4^2 \times 16)^4 = \{(2 \times 2)^2 \times (2 \times 2 \times 2 \times 2)\}^4$

$= \{(2)^2 \times (2^4)\}^4 = (4^4 + 4)^2 = 4^{16}$ **Ans.**

$= \{2^4 \times 2^4)\} = (2^{4+4})^2 = 2^{8 \times 2} = 2^{16}$ **Ans.**

(b) $(12^3)^5 = (12)^{3 \times 5} = (12)^{15}$ **Ans.**

(c) $\left(\frac{-7}{9}\right)^{16} \times \left(\frac{-7}{9}\right)^0 = \left(\frac{-7}{9}\right)^{16} \times 1 = \left(\frac{-7}{9}\right)^{16} = \left(\frac{7}{9}\right)^{16}$ **Ans.**

Q. 5 Simplify each of the following and express the answer in exponential form :

(a) $2^3 \times 2^7 \times 4^2$ (b) $x^4 y^4$ (c) $\frac{4^7}{4^3 \times 4^4}$

Ans. (a) $2^3 \times 2^7 \times 4^2 = 2^{3+7} \times (2 \times 2)^2 = 2^{10} \times (2^2)^2$

$2^{10} \times 2^4 = 2^{10+4} = 2^{14}$ **Ans.**

(b) $x^4 y^4 = (xy)^4$ **Ans.**

(c) $\dfrac{4^7}{4^3 \times 4^4} = \dfrac{4^7}{4^{3+4}} = 4^{7-7} = 4^0 =$ **1 Ans.**

Q. 6 Find the value of each of the following :

(a) $\left(\dfrac{3}{4}\right)^3 \times \left(\dfrac{1}{3}\right)^2$ **(b)** $\left(\dfrac{1}{2}\right)^5 \times \left(\dfrac{1}{2}\right)^2$

(c) $(2^{20} \div 2^{15}) \times 2^3$ **(d)** $(7^2)^3 \div 7^4$

Ans. (a) $\left(\dfrac{3}{4}\right)^3 \times \left(\dfrac{1}{3}\right)^2 = \dfrac{3^3}{3^2} \times \left(\dfrac{1}{4}\right)^3$

$3^{3-2} \times \left(\dfrac{1}{4}\right)^3 = \dfrac{3}{4^3} = \dfrac{3}{64}$ **Ans.**

(b) $\left(\dfrac{1}{2}\right)^5 \times \left(\dfrac{1}{2}\right)^2 = \left(\dfrac{1}{2}\right)^{5+2} = \left(\dfrac{1}{2}\right)^7$

$\dfrac{1}{2^7} = \dfrac{1}{128}$ **Ans.**

(c) $(2^{20} \div 2^{15}) \times 2^3 = (2^{20-15}) \times 2^3$

$2^5 \times 2^3 = 2^8 =$ **256 Ans.**

(d) $(7^2)^3 \div 7^4 = 7^{2\times3} \div 7^4 = 7^{6-4} = 7^2 =$ **49 Ans.**

Q. 7 Simplify each of the following :

(a) $\dfrac{\left(\dfrac{-3}{4}\right)^4 \times \left(\dfrac{5}{3}\right)^3}{\left(\dfrac{25}{9}\right) \times \left(\dfrac{9}{16}\right)}$ **(b)** $\dfrac{3^7 \times x^6}{27 \times x^3}$

(c) $\dfrac{12^4 \times 9^3 \times 16}{6^3 \times 64 \times 3^3}$ **(d)** $\dfrac{\left(\dfrac{4}{11}\right)^5 \times \left(\dfrac{-2}{3}\right)^4}{\left(\dfrac{4}{9}\right) \times \left(\dfrac{4}{11}\right)^3}$

Ans. (a) $\dfrac{\left(\dfrac{-3}{4}\right)^4 \times \left(\dfrac{5}{3}\right)^3}{\left(\dfrac{25}{9}\right) \times \left(\dfrac{9}{16}\right)} = \dfrac{\left(\dfrac{3}{4}\right)^4 \times \left(\dfrac{5}{3}\right)^3}{\dfrac{25}{9} \times \dfrac{9}{16}}$

$\dfrac{\dfrac{3^4}{3^3} \times \dfrac{5^3}{4^4}}{\dfrac{25}{9}} = \dfrac{3^{4-3} \times 5^3}{4^4 \times \dfrac{25}{4^2}}$

$\dfrac{3 \times 5^3}{4^{4-2} \times 5 \times 5} = \dfrac{3 \times 5^{3-2}}{4^2}$

$\dfrac{3 \times 5}{16} = \dfrac{15}{16}$ **Ans.**

(b) $\frac{3^7 \times x^6}{27 \times x^3} = \frac{3^7 \times x^6}{3 \times 3 \times 3 \times x^3}$

$3^{7-3} \times x^{6-3} = 3^4 x^3 =$ **$81x^3$ Ans.**

(c) $\frac{12^4 \times 9^3 \times 16}{6^3 \times 64 \times 3^3} = \frac{(2 \times 2 \times 3)^4 \times (3 \times 3)^3 \times (2 \times 2 \times 2 \times 2)}{(2 \times 3)^3 \times (2 \times 2 \times 2 \times 2 \times 2 \times 2) \times 3^3}$

$\frac{(2^2 \times 3)^4 \times (3^2)^3 \times 2^4}{(2 \times 3)^3 \times 2^6 \times 3^3} = \frac{2^8 \times 3^4 \times 3^6 \times 2^4}{2^3 \times 3^3 \times 2^6 \times 3^3}$

$\frac{2^{8+4} \times 3^{4+6}}{2^{3+6} \times 3^{3+3}} = 2^{12-9} \times 3^{10-6} = 2^3 \times 3^4 = 2 \times 81 =$ **162 Ans.**

(d) $\frac{\left(\frac{4}{11}\right)^5 \times \left(\frac{-2}{3}\right)^4}{\left(\frac{4}{9}\right) \times \left(\frac{4}{11}\right)^3} = \frac{\left(\frac{4}{11}\right)^5}{\left(\frac{4}{11}\right)^3} \times \frac{\left(\frac{2}{3}\right)^4}{\left(\frac{2}{3}\right)^2}$

$\left(\frac{4}{11}\right)^{5-3} \times \left(\frac{2}{3}\right)^{4-2} = \left(\frac{4}{11}\right)^2 \times \left(\frac{2}{3}\right)^2$

$\left(\frac{4 \times 2}{11 \times 3}\right)^2 =$ **$\left(\frac{8}{33}\right)^2$ Ans.**

Q. 8 Evaluate each of the following :

(a) $\left(\frac{3}{101}\right)^{18} \div \left(\frac{3}{101}\right)^{17}$ **(b)** $\left(\frac{8}{11}\right)^{27} \times \left(\frac{-11}{8}\right)^{27}$

(c) $\left(\frac{3}{7}\right)^2 \div \left(\frac{3}{7}\right)^4$ **(d)** $\left(\frac{113}{95}\right)^{101} \times \left(\frac{113}{95}\right)^{101}$

Ans. (a) $\left(\frac{3}{101}\right)^{18} \div \left(\frac{3}{101}\right)^{17} = \left(\frac{3}{101}\right)^{18-17} =$ **$\frac{3}{101}$ Ans.**

(b) $\left(\frac{8}{11}\right)^{27} \div \left(\frac{-11}{8}\right)^{17} = \left(\frac{8}{11} \times \frac{-11}{8}\right)^{27} = (-1)^{27} =$ **-1 Ans.**

(c) $\left(\frac{3}{7}\right)^2 \div \left(\frac{3}{7}\right)^4 = \left(\frac{3}{7}\right)^{2-4} = \left(\frac{3}{7}\right)^{-2} = \left(\frac{7}{3}\right)^2 =$ **$\frac{49}{9}$ Ans.**

(d) $\left(\frac{113}{95}\right)^{101} \div \left(\frac{113}{95}\right)^{101} = \left(\frac{113}{95}\right)^{101-101} = \left(\frac{113}{95}\right)^0 =$ **1 Ans.**

Q. 9 If $\frac{X}{y} = \left(\frac{2}{3}\right)^{11} \div \left(\frac{2}{3}\right)^8$, find the value of $\left(\frac{x}{y}\right)^2$

Ans. $\frac{X}{y} = \left(\frac{2}{3}\right)^{11} \div \left(\frac{2}{3}\right)^8 = \left(\frac{2}{3}\right)^{11-8} = \left(\frac{2}{3}\right)^3 = \frac{8}{27}$

$\therefore \left(\frac{x}{y}\right)^2 = \left(\frac{8}{27}\right)^2 =$ **$\frac{64}{729}$ Ans.**

Q. 10 Express each of the following as a product of prime factors only in exponential from.

(a) 32×243 (b) 1331 (c) 2500 (d) 100000

Ans. (a) $32 \times 243 =$ **$2^5 \times 3^5$ Ans.**

(b) $1331 = 11 \times 11 \times 11 =$ **11^3 Ans.**

(c) $2500 = 5 \times 5 \times 5 \times 5 \times 2 \times 2 =$ **$5^4 \times 2^2$ Ans.**

(d) 100000 = $5 \times 5 \times 5 \times 5 \times 5 \times 2 \times 2 \times 2 \times 2 \times 2$ = **$2^5 \times 5^5$ Ans.**

Exercise : 4.3

Q. 1 Write each of the following numbers in the standard form :

(a) 540 (b) 653000 (c) 36390000

(d) 5354300000 (e) 5080000000000 (f) 1027000000

Ans. (a) 540 = $500 + 40 + 0$

= $5 \times 100 + 4 \times 10 + 0$

= $5 \times 10^2 + 4 \times 10^1 + 0 \times 10^0$

(b) 653000 = $600000 + 50000 + 3000$

= $6 \times 100000 + 5 \times 10000 + 3 \times 1000$

= $6 \times 10^5 + 5 \times 10^4 + 3 \times 10^3$

(c) 36390000 = $3 \times 10000000 + 6 \times 1000000 + 3 \times 100000 + 9 \times 10000$

= $3 \times 10^7 + 6 \times 10^6 + 3 \times 10^5 + 9 \times 10^4$

(d) 5354300000 = $5 \times 1000000000 + 3 \times 100000000 + 5 \times 10000000 + 4 \times 1000000 + 3 \times 100000$

= $5 \times 10^9 + 3 \times 10^8 + 5 \times 10^7 + 4 \times 10^6 + 3 \times 10^5$

(e) 5080000000000 = $5 \times 1000000000000 + 8 \times 10000000000$

= $5 \times 10^{12} + 8 \times 10^{10}$

(f) 1027000000 = $1 \times 1000000000 + 2 \times 10000000 + 7 \times 1000000$

= $1 \times 10^9 + 2 \times 10^7 + 7 \times 10^6$

Q. 2 Write each of the following in expanded form :

(a) 684502 (b) 5807294

Ans. (a) 684502 = $600000 + 80000 + 4000 + 500 + 2$

= $6 \times 10^5 + 8 \times 10^4 + 4 \times 10^3 + 5 \times 10^2 + 2 \times 10^0$

(b) 5807294 = $5000000 + 800000 + 70000 + 200 + 90 + 4$

= $5 \times 10^6 + 8 \times 10^5 + 7 \times 10^3 + 2 \times 10^2 + 9 \times 10^1 + 4 \times 10^0$

Q. 3 Find the number corresponding to each of the following expanded form :

(a) $8 \times 10^6 + 3 \times 10^5 + 1 \times 10^4 + 4 \times 10^1 + 9 \times 10^0$

(b) $6 \times 10^4 + 5 \times 10^3 + 3 \times 10^2 + 9 \times 10^1 + 7 \times 10^0$

Ans. (a) $8 \times 10^6 + 3 \times 10^5 + 1 \times 10^4 + 4 \times 10^1 + 9 \times 10^0$

= 8000000 + 300000 + 10000 + 40 + 9 + = **8310049 Ans.**

(b) $6 \times 10^4 + 5 \times 10^3 + 3 \times 10^2 + 9 \times 10^1 + 7 \times 10^0$

= 60000 + 5000 + 300 + 90 + 7 = **65397 Ans.**

Q. 4 Express each of the following in standard form.

(a) 273×10^4 (b) 1001×10^6 (c) 543:87

Ans. (a) $273 \times 10^4 = \frac{273}{100} \times 100 \times 10^4 = 2.73 \times 10^2 \times 10^4 =$ **2.73×10^6 Ans.**

(b) $1001 \times 10^6 = \frac{1001}{1000} \times 100 \times 10^6 = 1.001 \times 10^3 \times 10^6 =$ **1.001×10^9 Ans.**

(c) $543.87 = \frac{543.87}{100} \times 100 = 5.4387 \times 100 =$ **5.4387×10^2 Ans.**

Q. 5 **Speed of light is 300000000 m per second. Express it in the standard form.**

Ans. 300000000 m/sec

3×100000000 m/sec. = **3.0×10^8 m/sec. Ans.**

Q. 6 **The distance of the sum from the centre of the Milkey Way Galaxy is estimated to be 300,000,000,000,000,000,000 mitre. Express it in standard form.**

Ans. 300, 000, 000, 000, 000, 000, 000

$3 \times 100,000,000,000,000,000,000$ m = **3×10^{20} m Ans.**

TEST YOUR PROGRESS

Q. 1 **Write the reciprocal of :**

(a) $\left(\frac{2}{3}\right)^4$ **(b)** $\left(\frac{-3}{5}\right)^{61}$ **(c)** 2^6 **(d)** $(-5)^6$

Ans. (a) Reciprocal of $\left(\frac{2}{3}\right)^4 = \left(\frac{3}{2}\right)^4$

(b) Reciprocal of $\left(\frac{-3}{5}\right)^{61} = \left(\frac{-5}{3}\right)^{61}$

(c) Reciprocal of $2^6 = \frac{1}{2^6} = \frac{1}{64}$

(d) Reciprocal of $(-5)^6 = \frac{1}{-5^6} = -30$

Q. 2 **Write exponent form of (–a) × (–a) × (–a) × (–a) × (–a)**

Ans. (–a) × (–a) × (–a) × (–a) × (–a) = **$(-a)^5$ Ans.**

Q. 3 **Write exponent form of 115 × 115 × 115 × 115 × 115 × 115**

Ans. 115 × 115 × 115 × 115 × 115 × 115 = **115^6 Ans.**

Q. 4 **Evaluate : (a) $5^4 \div 5^3$ (b) $(-3)^5 \div (-3)^3$**

Ans. (a) $5^4 \div 5^3 = 5^{4-3} =$ **5 Ans.**

(b) $(-3)^5 \div (-3)^3 = (3)^{5-3} = 3^2 =$ **9 Ans.**

Q. 5 **Find the value of** $\left(\frac{-5}{6}\right)^{11} \div \left(\frac{-5}{6}\right)^{11}$

Ans. $\left(\frac{-5}{6}\right)^{11} \div \left(\frac{-5}{6}\right)^{11} = \left(\frac{-5}{6}\right)^{11-11} = \left(\frac{-5}{6}\right)^{11-11} = \left(\frac{-5}{6}\right)^0 =$ **1 Ans.**

Q. 6 **Find the value of** $\left(\frac{5}{9}\right)^2 \times \left(\frac{5}{9}\right)^3 \times \left(\frac{9}{5}\right)^5$

Ans. $\left(\frac{5}{9}\right)^2 \times \left(\frac{5}{9}\right)^3 \times \left(\frac{9}{5}\right)^5 = \left(\frac{5}{9}\right)^{2+3} \times \left(\frac{9}{5}\right)^5$

$\left(\frac{5}{9} \times \frac{9}{5}\right)^5 = (1)^5 =$ **1 Ans.**

Q. 7 **Express the result in the exponential form.** $\frac{3^{23} \times 13^8}{13^7 \times 3^{22}}$

Ans. $\frac{3^{23} \times 13^8}{13^7 \times 3^{22}} = \frac{3^{23}}{3^{22}} \times \frac{13^8}{13^7}$

$= 3^{23-22} \times 13^{8-7}$

$= 3 \times 13 =$ **39 Ans.**

Q. 8 **Simplify :** $\left(\frac{4}{5}\right)^3 \times \left(\frac{5}{9}\right)^4 \times \left(\frac{9}{4}\right)^4$

Ans. $\left(\frac{4}{5}\right)^3 \times \left(\frac{5}{9}\right)^4 \times \left(\frac{9}{4}\right)^4 = \frac{4^3 \times 5^4 \times 9^4}{5^3 \times 9^4 \times 4^4}$

$\frac{4^3}{4^4} \times \frac{5^4}{5^3} \times \frac{9^4}{9^4} = \frac{1}{4^{4-3}} \times 5^{4-3} \times 9^{4-4}$

$\frac{1}{4} \times 5 \times 9^0 = \frac{5}{4} \times 1 = \frac{5}{4}$ **Ans.**

Q. 9 **Simplify :** $\frac{5^8 \times a^5 \times 10^3 \times 2^6}{8 \times 5^9 \times b^5 \times 2^2}$

Ans. $\frac{5^8 \times a^5 \times 10^3 \times 2^6}{8 \times 5^9 \times b^5 \times 2^2} = \frac{5^8 \times a^5 \times (5 \times 2)^3 \times 2^6}{2 \times 2 \times 2 \times 5^9 \times b^5 \times 2^2}$

$\frac{5^8 \times a^5 \times 5^3 \times 2^3 \times 2^6}{2^3 \times 5^9 \times b^5 \times 2^2} = \frac{5^{8+3} \times 2^{3+6} \times a^5}{2^{3+2} \times 5^9 \times b^5}$

$\frac{5^{11}}{5^9} \times \frac{2^9}{2^5} \times \frac{a^5}{b^5} = 5^{11-9} \times 2^{9-5} \times \frac{a^5}{b^5}$

$\frac{5^2 \times 2^4 \times a^5}{b^5} = \frac{25 \times 16 \times a^5}{b^5} = \frac{400\,a^5}{b^5}$ **Ans.**

Q. 10 **Find the value of** $\frac{\left(\frac{2}{3}\right)^4 \times \left(\frac{5}{6}\right)^3}{\left(\frac{5}{6}\right)^4 \times \left(\frac{2}{3}\right)^2}$

Ans. $\frac{\left(\frac{2}{3}\right)^4 \times \left(\frac{5}{6}\right)^3}{\left(\frac{5}{6}\right)^4 \times \left(\frac{2}{3}\right)^2} = \frac{\left(\frac{2}{3}\right)^4}{\left(\frac{2}{3}\right)^2} \times \frac{\left(\frac{5}{6}\right)^3}{\left(\frac{5}{6}\right)^4}$

$\left(\frac{2}{3}\right)^{4-2} \times \left(\frac{5}{6}\right)^{3-4} = \left(\frac{2}{3}\right)^2 \times \left(\frac{5}{6}\right)^{-1} = \left(\frac{2}{3}\right)^2 \times \left(\frac{6}{5}\right)$

$\frac{2 \times 2}{3 \times 3} \times \frac{2 \times 2}{5} = \frac{2 \times 2 \times 2}{3 \times 5} = \frac{8}{15}$ **Ans.**

Q. 11 **Write in the standard form :**

(a) 381710000000 **(b) 5976000,000,000,000,000,000,000**

Ans. (a) 381710000000 = **3.817×10^{11} Ans.**

(b) 5976000,000,000,000,000,000,000 = **5.976×10^{24} Ans.**

CHAPTER : 5 (RATIO AND PROPORTION)

Exercise : 5.1

Tick (✔) mark the correct answer: (1-3)

Q. 1 **The ratio of 200 kg to 2 kg is –**

(a) 100 : 1 **(b) 10 : 1** **(c) 1 : 1** **(d) 1 : 10**

Ans. 200 : 2

$2 \times 100 : 2 \times 1$ = 100 : 1 **Ans. (a)**

Q. 2 **If 3 : 33 = 333 : x then the value of x is –**

(a) 3333 **(b) 3636** **(c) 3663** **(d) 3993**

Ans. 3 : 33 = 333 : x

Product of extrems = Product of means

$3 \times x = 33 \times 333$

$x = \frac{33 \times 333}{3} = 11 \times 333$

$x = 3663$ **Ans. (c)**

Q. 3 **The ratio between 3 litres and 1500 m/ is –**

(a) 1 : 5 **(b) 2 : 1** **(c) 1 : 500** **(d) 3 : 5**

Ans. 3 litres : 1500 m/

3×1000 ml : 1500 m/

$3 \times 500 \times 2 : 3 \times 500 \times 1 = 2 : 1$ **Ans. (b)**

Q. 4 **Find the ratio in the simplest form of each of the following :**

(a) 2.5 litres and 750 m/ **(b) 5.80 and 0.029** **(c) 3.750 kg and 1.125 kg**

Ans. (a) 2.5 litres : 750 ml

2.5×100 ml : 250×3

10 : 3 Ans.

(b) 5.80 : 0.029

multiply by 1000

5800 : 29

$29 \times 200 : 29 \times 1$

200 : 1 Ans.

(c) 3.750 kg : 1.125 kg

3.750 : 1.125

3750 : 1125

$150 \times 25 : 25 \times 45$

150 : 45 = **10 : 3 Ans.**

Q. 5 **In a test a student secured 185 marks in English and 250 marks in Mathematics. Find**

(a) The ratio between the marks in English and marks in Mathematics.

(b) The ratio between the marks in Mathematics and total marks secured.

Ans. (a) 185 : 250

$5 \times 37 : 250$

37 : 50 Ans.

(b) 250 : (185 + 250)

250 : 435

50 : 87 Ans.

Q. 6 **If A : B = 5 : 3 and B : C = 7 : 8 find A : B : C**

Ans. A : B = 5 : 3 and B : C = 7 : 8

L.C.M of (3, 7) = 21

A : B = 5 : 3 = 21 : 24

= 35 : 21

A : B : C = **35 : 21 : 24 Ans.**

Q. 7 **Divide ₹ 5898 among Ritika, Priya, Ritu in the ratio 3 : 5 : 7**

Ans. Total amount = ₹ 5898

Sum of ratio = 3 + 5 + 7 = 15

Ritika's share = $\frac{3}{15} \times$ Total amount

$= \frac{3}{3 \times 5} \times 5898 = \frac{5898}{5} =$ **₹ 1179.60**

Priya's share = $\frac{5}{15} \times$ Total amount

$= \frac{5}{5 \times 3} \times 5898 = \frac{5898}{3} =$ **₹ 1966.00**

Ritu's share $= \frac{7}{15} \times$ Total amount

$= \frac{7}{15} \times 5898 = \frac{41286}{15} =$ **₹ 2752.40**

Q. 8 Two numbers are in the ratio 5 : 6 if 8 is subtracted from each, the new numbers are in the ratio 4 : 5 find the numbers.

Ans. Ratio of two number = 5 : 6

$\therefore$ Number are 5x and 6x = (5x – 8) : (6x – 8) : : 4 : 5

Product of extrems : Product of ends

(5x – 8) 5 = (6x – 8) 4

25x – 40 = 24x – 32

25x – 24x = 40 – 32 = **x = 8 Ans.**

Q. 9 Write the following ratios in ascending order :

(a) 1 : 3, 2 : 5, 3 : 7 (b) 1 : 2, 2 : 3, 3 : 11, 4 : 5

Ans. (a) $1:3 = \frac{1}{3} = \frac{1}{3} \times \frac{35}{35} = \frac{35}{105}$

L.C.M of (3, 5, 7) = 105

$2:5 = \frac{2}{5} = \frac{2}{5} \times \frac{21}{21} = \frac{42}{105}$

$3:7 = \frac{3}{7} = \frac{3}{7} \times \frac{15}{15} = \frac{45}{105}$

$\frac{35}{105} < \frac{42}{105} < \frac{45}{105}$ $\therefore$ **1 : 3 < 2 : 5 < 3 : 7 Ans.**

(b) 1 : 2, 2 : 3, 3 : 11, 4 : 5

$1:2 = \frac{1}{2} = \frac{1}{2} \times \frac{165}{165} = \frac{165}{330}$

$2:3 = \frac{2}{3} = \frac{2}{3} \times \frac{110}{110} = \frac{220}{330}$

$3:11 = \frac{3}{11} = \frac{3}{11} \times \frac{30}{30} = \frac{90}{330}$

$4:5 = \frac{4}{5} = \frac{4}{5} \times \frac{66}{66} = \frac{264}{330}$

$\frac{90}{330} < \frac{165}{330} < \frac{220}{330} < \frac{264}{330}$

$\frac{3}{11} < \frac{1}{2} < \frac{2}{3} < \frac{4}{5} =$ $\therefore$ **3 : 11, 1 : 2, 2 : 3, 4 : 5 Ans.**

Q. 10 Write the following ratios in descending order :

(a) 1 : 4, 2 : 3, 3 : 5 (b) 1 : 3, 4 : 7, 5 : 6

Ans. (a) $1:4 = \frac{1}{4} = \frac{1}{4} \times \frac{15}{15} = \frac{15}{60}$

$2:3 = \frac{2}{3} = \frac{2}{3} \times \frac{20}{20} = \frac{40}{60}$

$3:5 = \frac{3}{5} = \frac{3}{5} \times \frac{12}{12} = \frac{36}{60}$

$\frac{40}{60} > \frac{36}{60} > \frac{15}{60}$

$\frac{2}{3} > \frac{3}{5} > \frac{1}{4} =$ $\therefore$ **2 : 3 > 3 : 5 > 1 : 4 Ans.**

(b) $1:3 = \frac{1}{3} = \frac{1}{3} \times \frac{42}{42} = \frac{42}{126}$

$4:7 = \frac{4}{7} = \frac{4}{7} \times \frac{18}{18} = \frac{72}{126}$

$5:6 = \frac{5}{6} = \frac{5}{6} \times \frac{21}{21} = \frac{105}{126}$

$\frac{105}{126} > \frac{72}{126} > \frac{42}{126}$

$\frac{5}{6} > \frac{4}{7} > \frac{1}{3}$ = ∴ **5 : 6 > 4 : 7 > 1 : 3 Ans.**

Q. 11 Rohan and Sohan have their pocket money in the ratio 5 : 3. If Rohan gives ₹ 20 to Sohan, both of them will have equal pocket money. How much pocket money did each of them have in the beginning?

Ans. Ratio of pocket money = 5 : 3

∴ Rohan's money = ₹ 5x

And Sohan's money = ₹ 3x

Given $5x - 20 = 3x + 20$

$5x - 3x = 20 + 20$

$\therefore x = \frac{40}{2} = 20$

∴ Rohan's money = ₹ 5x = 5 × 20 = **₹ 100**

Sohan's money = ₹ 3x = 3 × 20 = **₹ 60**

Q. 12 Ritika walks 25 km in 5 hours and Dinesh walks 21 km in 7 hours. Find the ratio of their speeds.

Ans. Speed = $\frac{\text{Distance}}{\text{Time}}$

Ritika's speed = $\frac{25}{5}$ = 5 km/hr

Dinesh's speed = $\frac{21}{7}$ = 3 km/hr

∴ Ratio in speed = **5 : 3 Ans.**

Exercise : 5.2

Tick (✔) mark the correct answer: (1-4)

Q. 1 If 3, x, 27 are in continued proportion then x is –

(a) 30 (b) 24 (c) 36 (d) 9

Ans. 3 : x : x : 27

$x \times x = 3 \times 27$

$x = \sqrt{3 \times 3 \times 3 \times 3} = 3 \times 3 = 9$ **Ans. (d)**

Q. 2 The ratio between length and bredth of a rectangular field is 5 : 3. If the length is 120 m then breadth is –

(a) 24 m (b) 72 m (c) 15 m (d) 40 m

Ans 5 : 3 : : 120 : x

$5 \times x = 120 \times 3$

$x = \frac{120 \times 3}{5} = 24 \times 3 = 72$

$\therefore$ breadth of rectangle is 72 m **Ans. (b)**

Q. 3 The fourth proportional to 4, 12 and 9 is –

(a) 3 **(b) 27** **(c) $\frac{16}{3}$** **(d) 36**

Ans. 4 : 12 : : 9 : x

$4 \times x = 12 \times 9$

$x = \frac{12 \times 9}{4} = 3 \times 9 = 27$ **Ans. (b)**

Q. 4 The ratio between income and expenses of a person are 7 : 5. Then ratio between total income and savings is –

(a) 5 : 2 **(b) 12 : 2** **(c) 7 : 2** **(d) 2 : 7**

Ans. Ratio of income and expenses = 7 : 5

$\therefore$ Income = ₹ 7 x

Expenses = ₹ 5 x

$\therefore$ Saving = 7x – 5x = 2x

Income : Saving = 7x : 2x = 7 : 2 **Ans. (c)**

Q. 5 Find x in each of the following :

(a) 75 : 15 = x : 7 **(b) ₹ 30 : ₹ 75 :: 16 m : x**

Ans. (a) $\frac{75}{15} = \frac{x}{7}$

$\frac{15}{1} = \frac{x}{7} = x = 5 \times 7 = 35$ **Ans.**

(b) 30 : 75 : : 16 : x

$30 \times x = 75 \times 16$

$x = \frac{75 \times 16}{30} = x = 5 \times 8 = 40$

x = **₹ 40 Ans.**

Q. 6 State which of the following are proportions?

(a) 3 : 7 :: 2 : 7 **(b) 10 : 21 :: 4 : 84**

Ans. (a) 3 : 7 : : 2 : 7

$3 \times 7 = 21$ = Product of extrems

$7 \times 2 = 14$ = Product of means

Product of extrems $\neq$ Product of means

These are not proportional

(b) 10 : 21 : : 4 : 84

Product of extrems = $10 \times 84 = 840$

Product of means = $21 \times 4 = 84$

These are not proportional

Q. 7 Find whether 6, 10, 14 and 22 are in proportion or not. If not, what must be added to each of the numbers so that they become proportional?

Ans. $6 : 10 :: 14 : 22$

Product of extrems $= 6 \times 22 = 132$

Product of means $= 10 \times 14 = 140$

Product of extrems $\neq$ Product of means

These are not propertionals

Now $(6 + x) : (10 + x) :: (14 + x) : (22 + x)$

$(6 + x)(22 + x) = (10 + x)(14 + x)$

$6(22 + x) + x(22 + x) = 10(14 + x) + x(14 + x)$

$132 + 6x + 22x + x^2 = 140 + 10x + 14x + x^2$

$132 + 28x = 140 + 24x$

$28x - 24x = 140 - 132$

$4x = 8$

$x = \frac{8}{4} = 2$

2 must be added to each numbers to make propertional.

Q. 8 In an office ratio between male and female employees is 13 : 7. If the number of female employees in the office is 98, find the number of male employees in the office.

Ans. Ratio make and female $= 13 : 7$

$M : F = 13 : 7$

$13 : 7 :: M : 98 = 7 \times M = 13 \times 98$

$M = \frac{13 \times 98}{7} = 13 \times 14 = 182$

Number of male = **182 Ans.**

Q. 9 The ratio of men and women passengers on a fight was 4 : 7. There were 98 women passengers on the flight. Find the number of men passengers.

Ans. Men : Women $= 4 : 7$

$4 : 7 :: Men : 98$

$7 \times Men = 4 \times 98$

$Men = \frac{4 \times 98}{7} = 4 \times 14 = 56$

Number of men = **56 Ans.**

Q. 10 Sonam sells tickets worth ₹ 1880 and gets a commission of ₹ 376. If Veena gets a commission of ₹ 648, how much worth of tickets did she sell.

Ans. Sonam ticket : Commission :: Veena ticket worth : Income

$1880 : 376 :: x : 648$

$376 \times x = 1880 \times 648$

$x = \frac{1880 \times 648}{376} = \frac{1880 \times 8 \times 81}{8 \times 47}$

$x = \frac{1880 \times 81}{47} = \frac{47 \times 40 \times 81}{47}$

$x = 40 \times 81 = ₹ 3240$

$47\overline{)1880}(40$
188
$\times 0$

Veena's ticket worth ₹ **3240 Ans.**

Exercise : 5.3

Q. 1 If 15 oranges cost ₹ 110, what do 39 oranges cost?

Ans. 15 oranges cost = ₹ 110

1 orange cost = $₹ \frac{110}{15}$

39 oranges cost = $₹ \frac{110 \times 39}{15} = \frac{5 \times 22 \times 3 \times 13}{5 \times 13} = ₹ 22 \times 13 = 286$

Cost of 39 oranges = ₹ **286 Ans.**

Q. 2 The price of 8 umbrellas is ₹ 2200. Find the cost of 18 umbrellas?

Ans. Price of 8 umbrella is ₹ 2200

Price of 1 umbrella is = $₹ \frac{2200}{8}$

Price of 18 umbrellas is = $₹ \frac{2200 \times 18}{8} = 275 \times 18 = ₹ 4950$

Price of 18 umbrellas = ₹ **4950 Ans.**

Q. 3 If 22.5 metres of a uniform iron rod weighs 85.5 kg, what will be the length of 22.8 kg of the same rod?

Ans. 85.5 kg has length of rod = 22.5 m

1 kg has length of rod = $\frac{22.5}{85.5}$

22.5 kg has length of rod = $\frac{22.5}{85.5} \times 22.8 = \frac{225}{822} \times \frac{228}{10}$

$= \frac{\cancel{5} \times \cancel{5} \times \cancel{3} \times \cancel{3}}{\cancel{5} \times \cancel{3} \times \cancel{3} \times \cancel{19}} = \frac{\cancel{19} \times 3 \times 2 \times \cancel{2}}{\cancel{5} \times \cancel{2}} = 6$

22.8 kg has length of rod = **6m Ans.**

Q. 4 If the cost of 5 litres of milk is ₹ 160, how much milk can be had for ₹ 544?

Ans. For ₹ 160, milk bought = 5 litres

For ₹ 1, milk bought = $\frac{5}{160}$

For ₹ 544, milk bought = $\frac{5}{160} \times 544$

$= \frac{\cancel{5} \times \cancel{8} \times \cancel{4} \times 17}{\cancel{5} \times \cancel{8} \times \cancel{4}}$ = **17 litres Ans.**

Q. 5 At a particular time of a day, a 7-m-high flagstaff casts a shadow which is 8.2 m long. What is the height of the building which casts a shadow 20.5 metres in length at the same moment?

Ans. Length of flagstaff : Shadow flagstaff :: Hight of building : Shadow of building

7 : 8.2 :: x : 20.5

Product of means = Product of extrems

$8.2 \times x = 7 \times 20.5$

$x = \frac{7 \times 20.5}{8.2} = \frac{7 \times 205}{82}$

$x = \frac{7 \times 5 \times \cancel{41}}{\cancel{41} \times 2} = \frac{35}{2} = 17.5$ m

Height of the building = **17.5 m Ans.**

Q. 6 A car covers a distance of 144 km in 8 litres of petrol. How much petrol is needed to cover a distance of 387 km?

Ans. For 144 km, needed petrol = 8 litres

For 1 km, needed petrol = $\frac{8}{144}$

For 387 km, need petrol = $\frac{8}{144} \times 387$

$= \frac{\cancel{8} \times \cancel{9} \times 43}{\cancel{8} \times \cancel{9} \times 2} = \frac{43}{2} = 21.5$

For 387 km, needed petrol = **21.5 litres Ans.**

TEST YOUR PROGRESS

Q. 1 Find the ratio of :

(a) 80 paise to ₹ 4 (b) 3.5 metres to 25 metres

Ans. (a) 80 psise = 400 paise

80 : 400 = 80 : 8 × 5 = **1 : 5 Ans.**

(b) 3.5 : 25 Multiply by 10

35 : 250 = 5 × 7 : 5 × 50 = **7 : 50 Ans.**

Q. 2 Express each of the following rations in its simplest farm :

(a) 38 : 45 (b) 118 : 222 (c) 37 : 158 (d) 324 : 144

Ans. (a) 38 : 45 It is simplest form

(b) 118 : 222

2 × 59 : 2 × 111 = **59 : 111 Ans.**

(c) 37 : 158 It is simplest form

(d) 324 : 144

36 × 9 : 36 × 4 = **9 : 4 Ans.**

Q. 3 Compare the following ratio :

(a) 5 : 6 and 2 : 3 (b) 17 : 25 and 3 : 5 (c) 5 : 8 and 4 : 5 (d) 16 : 16 and 34 : 40

Ans. (a) $5 : 6 = \frac{5}{6}$

$2 : 3 = \frac{2}{3} = \frac{2 \times 2}{3 \times 2} = \frac{4}{6}$

$\frac{5}{6} > \frac{4}{6}$ $\frac{5}{6} > \frac{2}{3}$

(b) $17 : 25 = \frac{17}{25}$

$3 : 5 = \frac{3}{5} = \frac{3 \times 5}{5 \times 5} = \frac{15}{25}$

$\frac{17}{25} > \frac{15}{25}$ 17 : 25 > 3 : 5

(c) $5 : 8 = \frac{5}{8} = \frac{5 \times 5}{8 \times 5} = \frac{25}{40}$

$4 : 5 = \frac{4}{5} = \frac{4 \times 8}{5 \times 8} = \frac{32}{40}$

$\frac{32}{40} > \frac{25}{40}$ 4 : 5 > 5 : 8

(d) $16 : 16 = \frac{16}{16} = 1 = \frac{40}{40}$

$34 : 40 = \frac{34}{40}$

$\frac{40}{40} > \frac{34}{40}$ $\quad 16 : 16 > 34 : 40$

Q. 4 If the cost of 2 pencils is ₹ 5, how many pencils can be bought for ₹ 40?

Ans. For ₹ 5, bought 2 pencils

For ₹ 1, bought $\frac{2}{5}$ pencils

For ₹ 40, bought $\frac{2}{5} \times 40$ pencils $= \frac{2 \times 5 \times 8}{5} = 16$

16 pencils bought in ₹ **40 Ans.**

Q. 5 If 50 mm rainfall is recorded in 20 minutes, how much rainfall is expected in one hour?

Ans. In 20 minutes rainfall is 50 mm

In 1 minutes rainfall is $\frac{50}{20}$ mm

In 1 hr or 60 minutes rainfall is $\frac{50}{20} \times 60 = \frac{50 \times 20 \times 3}{20} = 150 \text{ mm} = 15 \text{ cm}$

15 cm rainfall recorded in 1 hr.

Q. 6 The extension in an elastic string varies directly as the weight hung on it. If a weight of 150 g produces an extension of 2.8 cm, what weight would produce an extension of 19.6 cm?

Ans. 2.8 cm extension required = 150 gm

1 cm extension required = $\frac{150}{2.8}$

19.6 cm extension required = $\frac{150}{2.8} \times 19.6$

$= \frac{150 \times 196}{28} = 150 \times 7 =$ **1050 gm Ans.**

Q. 7 Ratio of the number of male and female workers in a factory is 5 : 6. If there are 115 male workers determine the number of female workers in the factory.

Ans. Male : Female = 5 : 6

$5 : 6 :: 115 : x = 5x = 115 \times 6$

$x = \frac{115 \times 6}{5} = \frac{5 \times 23 \times 6}{5} = 138$

Number of female = **138 Ans.**

Fill in the blanks:

Q. 8 2 : 8 = _____ : 32

$2.8 = 2 \times 4 : 8 \times 4$

$= (8) : 32$

Q. 9 3 : 4 = 12 : _____

$3 : 4 = 12 : 16$

$4 \times 3 : 4 \times 4 = 12 : (16)$

Q. 10 7 : _____ = 15 : 45

$7 : 2 = 15 : 45$

$15 : 45 = 1 : 3$

$1 \times 7 = 3 \times 7 = 7 : (21)$

Q. 11 _____ : 12 = 9 : 18

$6 : 12 :: 9 : 18$

$6 : 12 :: 1 : 2$

$(6) : 12 :: 6 : 12$

CHAPTER : 6 (Percentage And Its Applications)

Exercise : 6.1

Q. 1 **0.38 when expressed as a percent is –**

(a) 3.8% **(b) 0.38%** **(c) 38%** **(d) 380%**

Ans. 0.38 = 0.38 × 100% = 38% **Ans. (c)**

Q. 2 $\frac{3}{5}$ **when expressed as a percent is –**

(a) 6.0% **(b) 60.0%** **(c) 30%** **(d) 35%**

Ans. $\frac{3}{5} = \frac{3}{5} \times 100\% = \frac{3 \times 5 \times 20}{5}\% = 60\%$ **Ans. (b)**

Q. 3 $12\frac{1}{2}$ **% when expressed as a decimal is –**

(a) 125.0 **(b) 12.5** **(c) 1.25** **(d) 0.125**

Ans. $12\frac{1}{2}\% = 12.5\% = \frac{12.5}{100} = 0.125$ **Ans. (d)**

Q. 4 **Convert each of the following fractions into a percent :**

(a) $\frac{7}{20}$ **(b)** $\frac{5}{12}$ **(c)** $\frac{9}{15}$ **(d)** $\frac{125}{625}$

(e) $\frac{111}{300}$ **(f)** $\frac{189}{150}$ **(g)** $\frac{3}{8}$ **(h)** $\frac{1231}{1250}$

Ans. (a) $\frac{7}{20} = \frac{7}{20} \times 100\% = 7 \times 5\% = 35\% = 0.35$ **Ans.**

(b) $\frac{5}{12} = \frac{5}{12} \times 100\% = \frac{5 \times 25}{3}\% = \frac{125}{3}\% = 41.6\% = 0.416$ **Ans.**

(c) $\frac{9}{15} = \frac{9}{15} \times 100\% = \frac{9 \times 100}{15}\% = 3 \times 20\% = 60\% = 0.6$ **Ans.**

(d) $\frac{125}{625} = \frac{125}{625} \times 100\% = \frac{125 \times 5 \times 20}{125 \times 5}\% = 20\% = 0.2$ **Ans.**

(e) $\frac{111}{300} = \frac{111}{300} \times 100\% = \frac{111}{3}\% = 37\% = 0.37$ **Ans.**

(f) $\frac{189}{150} = \frac{189}{150} \times 100\% = \frac{63 \times 3 \times 50 \times 2}{50 \times 3}\% = 126\% = 1.26$ **Ans.**

(g) $\frac{3}{8} = \frac{3}{8} \times 100\% = \frac{3 \times 25}{2}\% = 37.5\% = 0.375$ **Ans.**

(h) $\frac{1231}{1250} = \frac{1231}{1250} \times 100\% = \frac{1231 \times 2}{25}\% = \frac{2462}{25}\% = 98.48\% = 0.9848$ **Ans.**

Q. 5 **Write each of the following percentage as a decimal:**

(a) 63% **(b) 252%** **(c) 275%** **(d) 47%**

Ans. (a) 63% = $\frac{63}{100}$ **% Ans.**

(b) 252% = $\frac{252}{100}\% = \frac{63}{25}\% = 2\frac{13}{25}\% = 2.52$ **Ans.**

(c) 275% = $\frac{275}{100}\% = \frac{11}{4}\% = 2\frac{3}{4}\% = 2.75$ **Ans.**

(d) 47% = $\frac{47}{100}$ **% Ans.**

Q. 6 In a test Pawan scored 29.5 marks out of total 50 marks. What was his percentage of marks?

Ans. % marks $= \frac{\text{marks obtained}}{\text{total marks}} \times 100\ \%$

$= \frac{29.5}{50} \times 100\ \% \quad = \quad 29.5 \times 2 \quad =$ **59% Ans.**

Q. 7 Harish saves ₹ 2500 out of a total monthly salary of ₹ 20000. Find his percentage of saving.

Ans. % saving $= \frac{\text{saving}}{\text{total income}} \times 100\ \%$

$= \frac{2500}{20000} \times 100\ \% \quad = \quad \frac{25}{2} \quad =$ **12.5% Ans.**

Q. 8 In a class of 40 students, 10 students secured first division marks, 15 students secured second division marks and 13 students just passed. What percent of students failed?

Ans. Number of failed students $= 40 - (10 + 15 + 13)$

$= 40 - 38 \quad = \quad 2$

% student failed $= \frac{\text{student failed}}{\text{total student}} \times 100\ \%$

$= \frac{2}{40} \times 100\ \% \quad =$ **5% Ans.**

Q. 9 In the word PERCENTAGE what percent of the letters are E's?

Ans. PERCENTAGE letters total $= 10$

Number of E $= 3$

$\%\ E = \frac{3}{10} \times 100\% \quad =$ **30% Ans.**

Q. 10 A candidate got 47500 votes in an election and was declared by his opponent by a margin of 5000 votes. If there were only two candidates and no votes were declared invalid. Find the percent of votes obtained by the winning candidate.

Ans. Winner got's $=$ 47500 votes

Opponent gots $=$ $45500 - 5000 \quad =$ 42500

Total votes $=$ $47500 + 42500 \quad =$ 90000

% of winner's vote $= \frac{47500}{90000} \times 100\ \% \quad = \quad \frac{475}{9}\ \%$

$= 52\frac{7}{9}\ \% \quad =$ **52.78 % Approx Ans.**

Exercise : 6.2

Q. 1 A number increased by 25% becomes 30. The number is –

(a) 37.5 (b) 24 (c) 25 (d) 22.5

Ans. Let the number be x

$x + \frac{25}{100} \times x \quad = \quad 30$

$x + \frac{x}{4} = 30 \quad = \quad \frac{4x + x}{4} \quad = \quad 30$

$\frac{5x}{4} = 30 \quad = \quad x \quad = \quad \frac{30 \times 4}{5} \quad = \quad 24$

Number is 24 **Ans. (b)**

Q. 2 **0.4% of 100 is –** **(a) 0.4** **(b) 4** **(c) 40** **(d) 400**

Ans. 0.4 % of 100

$0.4 \times \frac{1}{100} \times 100 = 0.4$ **Ans. (a)**

Q. 3 **What percent of 1 day (24 hours) is 72 minutes?**

(a) 5.0% **(b) 300%** **(c) $\frac{100}{3}$ %** **(d) 7.2%**

Ans. 1 day = 24 hours = 24×60 = 1440 minutes

% minutes = $\frac{72}{1440} \times 100\ \%$ = 5% **Ans. (a)**

Q. 4 **What percent is each of the following?**

(a) 60 paise of ₹ 5 **(b) 325 ml of 6 litres** **(c) 105 m of 20 km**

Ans. (a) 60 paise of ₹ 5 = 60 paise of 5 × 100 paise

% paise = $\frac{60}{500} \times 100\ \%$ = **12% Ans.**

(b) 325 m/ of 6 litre = 325 m/ of 6 litre or 6000 m/

% m/ = $\frac{325}{6000} \times 1000\ \%$ = $\frac{65}{12}\ \%$ = $5\frac{5}{12}$ **= 5.416 Ans.**

(c) 105 m of 20 km = 105 m of 20 km or 20000 m

% m = $\frac{105}{20000} \times 100\ \%$ = $\frac{21}{40}\ \%$ = **0.525% Ans.**

Q. 5 **Find the value of each of the following?**

(a) $30\frac{1}{4}$ % of 500 kg **(b) 15.5% of 100 litres** **(c) 35% of ₹ 500**

Ans. (a) $30\frac{1}{4}$ % of 500 kg = $\frac{121}{4}$ % of 500 kg

$\frac{121}{4} \times \frac{1}{100} \times 500$ kg = $\frac{605}{4}$ kg = **151.25 kg Ans.**

(b) 15.5 of 100 litres

$15.5 \times \frac{1}{100} \times 100$ = **15.5 litres Ans.**

(c) 35% of ₹ 500

$\frac{35}{35} \times \frac{1}{100} \times 500$ kg = 35×5 = **₹ 175 Ans.**

Q. 6 **A school team won 6 medals this year against 4 medals won last year. What is the percent increase.**

Ans. Increase % = $\frac{6-4}{4} \times 100\%$

= $\frac{2}{4} \times 100\%$ = **50% Ans.**

Q. 7 **The number of illiterate persons in a country decreased from 150 lakhs to 100 lakhs in 10 years. What is the percentage decrease?**

Ans. % illiterate persons decreased = $\frac{150-100}{150} \times 100$

= $\frac{50}{150} \times 100\ \%$ = $\frac{100}{3}$ = **$33\frac{1}{3}$ Ans.**

Q. 8 After spending 74% of his monthly earnings, a man saves ₹ 9100. Find his monthly earning.

Ans. Let the monthly earning be ₹ x

Saving = 100 – 74 = 26 %

26% of x = 9100

$26 \times \frac{1}{100} \times x = 9100 = \frac{9100 \times 100}{26} = 350 \times 100 = 35000$

Monthly earning = **₹ 35000 Ans.**

Q. 9 Ram has to score 36% marks for passing the examination. He gets 178 marks and fails by 22 marks. Find the maximum marks.

Ans. Let the maximum makes be x

Passing marks = 36% of makes = $\frac{36x}{100}$

$\frac{36x}{100} = 178 + 22$

$x = \frac{200 \times 100}{36} = \frac{20000}{36} =$ **555.5 Ans.**

Exercise : 6.3

Q. 1 A trader bought an articles for ₹ 15000 and sold it at a gain of 12%. His selling price is –

(a) ₹ 18000 (b) ₹ 16800 (c) ₹ 13200 (d) ₹ 15180

Ans. (a) C.P. = ₹ 15000 gain = 12%

S.P. = C.P. + Profit

$= 15000 + \frac{12}{100} \times 15000$

$= 15000 + 1800$

S.P. = ₹ 16800 **Ans. (b)**

Q. 2 A shopkeeper bought a chair for ₹ 375 and sold it for ₹ 400. The gain percent is –

(a) $6\frac{2}{3}$ **%** **(b) 20 %** **(c)** $6\frac{1}{4}$ **%** **(d) 25 %**

Ans. C.P. = ₹ 375, S.P. ₹ 400

$\% \text{ Gain} = \frac{\text{S.P.} - \text{C.P.}}{\text{C.P.}} \times 100\ \%$

$= \frac{400 - 375}{375} \times 100\ \% = \frac{25 \times 100}{375}$

$= \frac{100}{15} = 6\frac{2}{3}\ \%$ **Ans. (a)**

Q. 3 An articles bought for ₹ 80 was sold for ₹ 90. The gain or loss % is –

(a) 12.5% loss (b) 15% gain (c) 12.5% gain (d) 15% loss

Ans. C.P. = ₹ 80, S.P. = ₹ 90

$\% \text{ Gain} = \frac{\text{S.P.} - \text{C.P.}}{\text{C.P.}} \times 100\ \%$

$= \frac{90 - 80}{80} \times 100\ \% = \frac{10 \times 100}{80}$

$= \frac{25}{2} = 12.5\ \%$ **Ans. (c)**

Q. 5 Find the Profit/Loss and Profit/Loss percent:

	C.P. (₹)	S.P. (₹)	Profit (₹)	Loss (₹)	Profit/Loss %
Bike	35000	36400	–	–	–
Car	284000	319500	–	–	–
Computer	17030	15327	–	–	–
Toothpaste	33	44	–	–	–

Ans. Bike : Profit = S.P. – C.P.

= 36400 – 35000 = ₹ 1400

% Profit = $\frac{\text{Profit}}{\text{C.P.}} \times 100\ \%$ = $\frac{1400}{35000} \times 100\ \%$

% Profit = 4%

Car : Profit = S.P. – C.P.

= 319500 – 284000 = ₹ 35500

% Profit = $\frac{\text{Profit}}{\text{C.P.}} \times 100\ \%$ = $\frac{35500}{284000} \times 100\ \%$

= $\frac{3550}{284}\ \%$ = **12.5 % Ans.**

Computer : Loss = C.P. – S.P.

= 17030 – 15327 = ₹ 1703

% Loss = $\frac{\text{Loss}}{\text{C.P.}} \times 100\ \%$

= $\frac{1703}{17030} \times 100\ \%$ = 10%

Toothpaste : Profit = S.P. – C.P.

= 44 – 33 = ₹ 11

% Profit = $\frac{\text{Profit}}{\text{C.P.}} \times 100\ \%$ = $\frac{11}{33} \times 100\ \%$

= $33\frac{1}{3}\ \%$ Ans.

Q. 6 A vender buys 8 oranges for ₹ and sells them at ₹ 1.25 per orange. Find his gain or loss percent.

Ans. C.P. of 8 oranges = ₹ 1 × 8 = ₹ 8

S.P. of 8 oranges = ₹ 1.25 = ₹ 10

Profit = S.P. – C.P.

= 10 – 8 = ₹ 2

% Profit = $\frac{\text{Profit}}{\text{C.P.}} \times 100\ \%$ = $\frac{2}{8} \times 100\ \%$

% Profit = **25% Ans.**

Q. 7 A shopkeeper bought an refrigerator from a wholesaler for ₹ 6500 and sold it for ₹ 9500. Find his profit or loss percent.

Ans. C.P. of refrigerator = ₹ 6500

S.P. of refrigerator = ₹ 9500

Profit = S.P. – C.P.

= 9500 – 6500 = ₹ 3000

% Profit = $\frac{\text{Profit}}{\text{C.P.}} \times 100\ \%$ = $\frac{3000}{6500} \times 100\ \%$

% Profit = $\frac{600}{13}$ = $\mathbf{46\frac{2}{3}\ \%}$ **Ans.**

Q. 8 A man purchased a certain number of bananas at the rate of 1 for ₹ 5 and sold them at the rate of 4 for ₹ 6. In this transaction his total gain was ₹ 20. Find the number of bananas he bought.

Ans. Do yourself::-

Q. 9 If the selling price of 20 articles is equal to the cost price of 23 articles, find the loss or gain percent.

Ans. Giving S.P. of 20 articles = Cost price of 23 articles

Let the cost price of 1 article be ₹ 1

Cost price of 20 articles = ₹ 20

Sell price of 20 articles = ₹ 23

Profit = S.P – C.P.

Profit = ₹ 23 – 20 = ₹ 23

% Profit = $\frac{\text{Profit}}{\text{C.P.}} \times 100\%$

= $\frac{3}{20} \times 100\%$ = **15 % Ans.**

Q. 10 By selling a bicycle for ₹ 2024, a shopkeeper loses 12%, If he wishes to make a gain of 12%. What will be the selling price of the bicycle?

Ans. Given S.P. = ₹ 2024, Loss = 12%

Let the C.P. be ₹ x

Loss = C.P. – S.P.

12% of x = x – 2024

$\frac{12}{100} \times x$ = x – 2024 = $x - \frac{12}{100}x$ = 2024

$\frac{100x - 12x}{100}$ = 2024 = $\frac{88x}{100}$ = 2024

$x = \frac{2024 \times 100}{88}$ = 23 × 100 = ₹ 2300

∴ C.P. = ₹ 2300

Profit = 120% of C.P.

Profit = $\frac{12}{100} \times 2300$ = ₹ 276

S.P. on 12% profit = 2300 + 276

∴ S.P. of bicycle = **₹ 2576 Ans.**

Exercise : 6.4

Q. 1 The simple interest on ₹ 5000 for 1 year at 10% p.a. is –

(a) ₹ 50 (b) ₹ 500 (c) ₹ 5000 (d) ₹ 5050

Ans. S.I. = $\frac{\text{Profit}}{100}$

= $\frac{5000 \times 10 \times 1}{100}$ = ₹ 500 **Ans. (b)**

Q. 2 If the simple interest on a certain sum for 1st year is ₹ 200, then simple interest at the same rate for 3rd year is –

(a) ₹ 600 (b) ₹ 500 (c) ₹ 400 (d) ₹ 200

Ans. S.I. for 1st year = S.I. for 3rd year = ₹ 200 **Ans. (d)**

Q. 3 A sum of money amount to ₹ 1200 in two years and ₹ 1500 in 5 years, then the simple interest on the sum for one year is –

(a) ₹ 200 (b) ₹ 500 (c) ₹ 100 (d) ₹ 300

Ans. Amount in 2 years = ₹ 1200

Amount in 5 years = ₹ 1500

Interest in 3 years = 1500 – 1200 = ₹ 300

Interest in 1 years = $\frac{300}{3}$ = ₹ 100 **Ans. (c)**

Q. 4 Nitesh deposited ₹ 38000 in a finance company for 3 years and received ₹ 53870 in all as amount after 3 years. What was the rate of simple interest per annual.

Ans. Amount after 3 years = ₹ 53870

Principle amount = ₹ 38000

S.I. for 3 years = 53870 – 38000 = ₹ 15870

Rate of interest per year = $\frac{\text{S.P.} \times 100}{\text{P} \times \text{T}}$

= $\frac{15870 \times 100}{38000 \times 3}$ = $\frac{529}{38}$ = $13\frac{35}{38}$ **% Ans.**

Q. 5 Sanjana borrowed ₹ 1600 from her friend at 8% per annual simple interest. She returned the money along with interest after 2 years. How much money did she pay back?

Ans. S.I. for 2 year = $\frac{\text{P} \times \text{R} \times \text{T}}{100}$

= $\frac{1600 \times 8 \times 2}{100}$ = ₹ 256

Amount paid after 2 year = ₹ 1600 + ₹ 256 = **₹ 1856 Ans.**

Q. 6 Rohan lent ₹ 28000 to his two friends. He gave ₹ 10,000 at 10% p.a. simple interest to one of his friends and the remaining to other at 12% p.a. How much interest did he receive after 2 years?

Ans. Case - I = Interest on ₹ 1000 = @ 10% p.a.

Case - II = Interest on ₹ 18000 = @ 12% p.a.

Time = 2 year

Case - I = S.I. = $\frac{P \times R \times T}{100}$ = $\frac{10000 \times 10 \times 2}{100}$ = ₹ 2000

Case - II = S.I. = $\frac{P \times R \times T}{100}$ = $\frac{18000 \times 12 \times 2}{100}$ = ₹ 4320

Total interest paid ₹ 2000 + 4320 = **₹ 6320 Ans.**

Q. 7 A certain sum of money doubles itself in 8 years. In how much time it becomes 4 times of itself at the same rate of simple interest?

Ans. Let the principle amount be ₹ 100

Double in 8 years ∴ ₹ S.I. = 200 – 100 = ₹ 100

S.I. = $\frac{P \times R \times T}{100}$

100 = $\frac{100 \times R \times 8}{100}$

R = $\frac{100}{8}$ = $\frac{25}{2}$ %

For 4 times then S.I. = 400 – 100 = ₹ 300

S.I. = $\frac{P \times R \times T}{100}$

300 = $\frac{100 \times 25/2 \times T}{100}$

300 = $\frac{25 \times T}{2}$ = $\frac{300 \times 2}{25}$ = T = 24 year

Amount is 4 times itself in **24 years.**

Q. 8 The difference between simple interest on a certain sum of money for 2 years and 3 years at 10% per annum is ₹ 300. Find the sum.

Ans. Let the sum be ₹ P

S.I. for 2 years = $\frac{P \times 2 \times 10}{100}$ = ₹ $\frac{2P}{10}$

S.I. for 2 years = $\frac{P \times 3 \times 10}{100}$ = ₹ $\frac{3P}{10}$

Given $\frac{3P}{10} - \frac{2P}{10}$ = 300

$\frac{P}{10}$ = 300

P = 300 × 10 = 3000

∴ Principle amount is ₹ **3000 Ans.**

Q. 9 What sum of money should be invested for 5 years at 8% p.a. to earn the some interest as ₹ 3600 at 10% p.a. for 4 years?

Ans. S.I. on ₹ 3600 @ 10% p.a. for 4 year

S.I. = $\frac{P \times R \times T}{100}$ = $\frac{3600 \times 10 \times 4}{100}$ = ₹ 1440

1440 = $\frac{P \times 8 \times 5}{100}$

$$P = \frac{1440 \times 100}{8 \times 5} = ₹\ 3600$$

$\therefore$ Principle amount is **₹ 3600 Ans.**

TEST YOUR PROGRESS

Q. 1 In an election, there were only were candidates. The total number of voters this constituency were 5000 and 70% of the total votes were polled. If the winning candidate got 62% of the votes polled, then how many votes were in favour of the other candidate?

Ans. Total number of votes = 5000

$$\text{Polling } 70\% = 5000 \times \frac{70}{100} = 3500$$

Winner got 62% of the vote pulled.

$\therefore$ Other candidate got (100 – 62) = 38% of the vote pulled.

$$= \frac{38}{100} \times 3500 = 1330$$

Q. 2 In an examination, 85% of the total examines passed. If the number of failures is 210, find the total number of examination.

Ans. 85% student passed

$\therefore$ (100 – 85%) student failed.

15% of total students. = 210

$$\frac{15}{100} \times \text{Total students} = 210$$

$$\text{Total students} = \frac{210 \times 100}{15} = \textbf{1400 Ans.}$$

Q. 3 The selling price of 16 articles is equal to the cost price of 20 articles. Find the gain or loss percent.

Ans. Let the cost price be ₹ 1

Cost price of 16 articles = ₹ 16

S.P. price of 16 articles = ₹ 20

Profit = S.P. – C.P.

= 20 – 16 = ₹ 4

$$\%\ \text{Profit} = \frac{\text{Profit}}{\text{C.P.}} \times 100$$

$$\%\ \text{Profit} = \frac{4}{16} \times 100 = \textbf{25\% Ans.}$$

Q. 4 At what rate percent per annum will ₹ 3600 amounts to ₹ 4734 in 3½ years?

Ans. S.I. = A – P

= 4734 – 3600 = ₹ 1134

$$\text{S.I.} = \frac{P \times R \times T}{100} = 1134 = \frac{3600 \times R \times 7/2}{100}$$

$$1134 = 18 \times R \times 7$$

$$\frac{1134}{18 \times 7} = \frac{162}{8} = 9 = R$$

$\therefore$ % rate = **9% Ans.**

Q. 5 **A sum of money on simple interest amounts to ₹ 837 in 3 years and ₹ 891 in 4 years. Find the sum and rate percent per annum.**

Ans. Sum of money after 3 years ₹ 837

Interest for 1 year = 891 – 837 = ₹ 54

Interest for 3 year = ₹ 54 × 3 = ₹ 162

Principle + Interest for 3 year = Amount

Principle + 162 = 837

Principle = 837 – 162 = 675

∴ Principle is ₹ 675

$$\text{S.I.} = \frac{P \times R \times T}{100}$$

$$54 = \frac{675 \times R \times 1}{100}$$

$$\frac{54 \times 100}{675} = R$$

$$\frac{2 \times 100}{25} = 8 = R$$

∴ % rate of interest is **8%** and Principle amount is **₹ 675.**

CHAPTER – 7 (ALGEBRAIC EXPRESSIONS)

Exercise : 7.1

Q. 1 **The degree of the polynomial $2x^3y - 3x^2y^4 + 5x^2y^3 - 7xy$ is**

(a) 5 **(b) 2** **(c) 6** **(d) 4**

Ans. Polynomial has $-3x^2y^4$ term

∴ Degree of the polynomial is 2 + 4 = 6 **Ans. (c)**

Q. 2 **The degree of the polynomial $2x - 3x^2 + 4x^3 - x^4 + 1$ is**

(a) 4 **(b) 3** **(c) 1** **(d) 2**

Ans. Polynomial has $-x^4$ term

∴ Degree of the polymial is 4 **Ans. (a)**

Q. 3 **Write the coefficient of –**

(a) x in –11x **(b) x^2 in $5x^2z$** **(c) x in $-50xy^2z^3$**

Ans. Coefficient of – (a) $-11x$ is -11

(b) $5x^2z$ is $5z$

(c) $-50\,xy^2z^3$ is $-50\,y^2z^3$

Q. 4 **Write each of the following into algebraic language.**

(a) One half of the sum of x squared and y

(b) One third of product of x and y squared

(c) The difference of x squared and product of x with y

(d) Product of a and b subtracted from twice the sum of x and y.

Ans. (a) $\frac{1}{2}(x^2 + y)$ (b) $\frac{1}{3}xy^2$

(c) $x^2 - xy$ (d) $2xy - ab$

Q. 5 **From each of the following algebraic expressions, separate the term with variables and terms which are constants:**

(a) 11 pq + 9p2 – 16 **(b) $2p^2q^2r^2 - 5p^2r + 3q^2p + 25$**

Ans.

Variable Terms	Constant Term
(a) 11 pq + 9 p^2	– 16
(b) $2p^2q2r^2 - sp^2r + 3q^2p$	25

Q. 6 **Find the constant term in each of the following expression.**

(a) $3x^2 - 17$ **(b) $2x^2y^2 - 7x^2y^2$**

Ans. (a) – 17 (b) There is no constant term.

Q. 7 **Identify the numerical coefficients of terms (other than constants) in each of the following expression:**

(a) 7x + 11y **(b) 10 m + 50 n** **(c) $2x^3 + x^2 + 5x - 1$**

(d) $9x^2 - y^2 + xy^2 + 7x^2y + 1$ **(e) $\frac{22}{15}x^2 + \frac{1}{3}x$**

Ans.

(a) Coefficient of x is 7 Coefficient of y is 11

(b) Coefficient of m is 10 Coefficient of n is 50

(c) Coefficient of x^3 is 2 Coefficient of x^2 is 1
Coefficient of x is 5

(d) Coefficient of $9x^2$ is 9 Coefficient of y^2 is –1
Coefficient of xy^2 is 1 Coefficient of $7x^2y$ is 7

(e) Coefficient of x^2 is $\frac{22}{15}$ Coefficient of x is $\frac{1}{3}$

Q. 8 **Classify into monomials, binomials and trinomials :**

(a) 2x + 3y – 4z **(b) 5y + 3z** **(c) $m^2 + mn$** **(d) $x^2 + y^2$**

(e) 5x – 11z **(f) 11xyzw** **(g) $1 - x^2 - y^2$** **(h) $xy^2 + 15$**

Ans. (a) Trinomial (b) Binomial (c) Binomial (d) Binomial

(e) Binomial (f) Monomial (g) Trinomial (h) Binomial

Q. 9 **Identify the pair of like terms or unlike terms :**

(a) 7x, – 51x **(b) –11x, –11y** **(c) 3xy, $5x^2y^2$** **(d) m^2p, mp^2**

Ans. (a) Like terms (b) Unlike Terms (c) Unlike Terms (d) Unlike Terms

Exercise : 7.2

Q. 1 **The sum of 3x and –4x is –**

(a) 7x **(b) $-12x^2$** **(c) –7x** **(d) –x**

Ans. $3x + (-4x) = (3 - 4)x = -x$ **Ans. (d)**

Q. 2 **$x - x^2 - 3x + 4x^2$ is equal is –**

(a) $5x^2 - 4x$ **(b) $3x^2 - 5x$** **(c) $3x^2 - 2x$** **(d) $5x^2 - 2x$**

Ans. $x - x^2 - 3x + 4x^2$

$x - 3x - x^2 + 4x^2$

$(1 - 3)x + (-1 + 4)x^2$

$-2x + 3x^2$ **Ans. (c)**

Q. 3 **11pq + (–5qp) + 3pq is equal to**

(a) 9pq **(b) 17pq** **(c) –9qp** **(d) –19pq**

Ans. 11pq + (–5pq) + 3pq

(11 – 5 + 3) pq = 9pq **Ans. (a)**

Q. 4 **Add :**

(a) –2xy + 3, 7xy – 5, 3xy + 8, –xy – 1

(b) x + y – 2zm 2x – y + 3z, –x + 3y + 5z

(c) $1 - 4x^2y$, $5 + 3xy^2$, $-2 + xy^2$, $7x^2y + 4$

(d) 5m – 7n, 3n – 4m + 2, 2m – 3mn – 5

Ans. (a)

$-2xy$	$+$	3
$+7xy$	$-$	5
$+3xy$	$+$	8
$+-xy$	$-$	1
$7xy$	**$+$**	**5**

(b)

$x+y$	$-$	$2z$
$+2x-y$	$+$	$3z$
$+-x+3y$	$+$	$5z$
$2x+3y$	**$+$**	**$6z$**

$x+y$	$-2zm$	
$2x-y$		$+3z$
$-x+3y$		$+5z$
$0x+3y$	**$-2zm$**	**$+8z$**

(c)

$1-4x^2y$	$+$	$-$
$+5+-$	$+$	$3xy^2$
$-2\ -$	$+$	xy^2
$+4+7x^2y$	$+$	$-$
$8\ \ 3x^2y$	**$+$**	**$4xy^2$**

(d)

$5m$	$-7n$		
$-4m$	$+3n$	$+2$	
$2m$		-5	$-3mn$
$3m$	**$-4n$**	**-3**	**$-3mn$**

Q. 5 **Simplify combining like terms :**

(a) $\frac{1}{3}a^3 + 5a^2 + \frac{1}{2}a + \frac{5}{3}a^3 + 4a^2 + \frac{7}{2}a$

(b) $5x^2 - x + 7 + 3 - 2x^2 + 3x - 1 + x^2 + 11x$ **(c)** $5x^2 + 7x^2 - 6x^2$

Ans. **Do yourself::-**

Q. 6 **Add :** **(a)** $\frac{1}{3}a^3 - \frac{3}{4}a^2 + 5, \frac{2}{3}a^3 - \frac{1}{4}a^2 + 3, 2a^3 + 2a^2 - 5$

(b) $2a^3 - a^2 + 5a - 1, 5 - 3a + 2a^2 - a^3, 7 - a^2 + 4a + 3a^3$

Ans. (a) $\frac{1}{3}a^3 + \frac{2}{3}a^3 + 2a^3 - \frac{3}{4}a^2 - \frac{1}{4}a^2 + 2a^2 + 5 + 3 - 5$

$\left(\frac{1}{3} + \frac{2}{3} + 2\right)^{a^3} - \left(\frac{-3}{4} - \frac{1}{4} + 2\right)^{a^2} + (5 + 3 - 5)$

$3a^3 - a^2 + 3$ Ans.

(b) $2a^3 - a^3 + 3a^3 + (-a^2) + 2a^2 - a^2 + 5a - 3a + 4a - 1 + 5 + 7$

$(2 - 1 + 3)a^3 + (-1 + 2 - 1)a^2 + (5 - 3 + 4)a + (-1 + 5 + 7)$

$4a^3 + 0a^2 + 6a + 11$ Ans.

Exercise : 7.3

Q. 1 The difference of $4m^2n$ and $8m^2n$ is –

(a) $-12m^2n$ **(b) $-4m^4n^2$** **(c) $-4m^2n$** **(d) $4m^2n$**

Ans. $4m^2n - 8m^2n = -4m^2n$ **Ans. (c)**

Q. 2 $11x - (9x)$ is equal to –

(a) $-2x$ **(b) $2x$** **(c) $20x$** **(d) $3x$**

Ans. $11x - (9x) = 11x - 9x = 2x$ **Ans. (b)**

Q. 3 Subtract :

(a) $3x^2y^2$ from $-5x^2y^2$

(b) $a^2 - b^2$ from $a^2 + b^2$

(c) $10x^2 + 11xy + 10y^2$ from $12xy - 3x^2 - 4y^2$

(d) $\frac{2}{5}x^2y^2z^3$ from $\frac{-7}{15}x^2y^2z^3$

Ans. (a) $-5x^2y^2 - (3x^2y^2)$

$-x^2y^2 - 3x^2y^2$

$-8x^2y^2$ Ans.

(b) $a^2 + b^2 - (a^2 - b^2)$

$a^2 + b^2 - a^2 + b^2$

$a^2 + a^2 + b^2 + b^2 = 2b^2$ **Ans.**

(c) $12xy - 3x^2 - 4y^2 - (10x^2 + 11xy + 10y^2)$

$12xy - 3x^2 - 4y^2 - 10x^2 - 11xy - 10y^2$

$12xy - 11xy - 3x^2 - 10x^2 - 4y^2 - 10y^2$

$(12 - 11)xy + (-3 - 10)x^2 + (-4 - 10)y^2 =$ **$xy - 13x^2 - 14y^2$ Ans.**

(d) $\frac{-7}{15}x^2y^2z^3 - \frac{2}{5}x^2y^2z^3$

$\left(\frac{-7}{15} - \frac{2}{5}\right)x^2y^2z^3 = \left(\frac{-7-6}{15}\right)x^2y^2z^3$

$\frac{-13}{15}x^2y^2z^3$ Ans.

Q. 4 Subtract :

(a) $5x + 11y - 13z$ from $7x - 3y + 2z$

(b) $-4a - 5b + 3c$ from $2a + 7b - c$

(c) $\frac{1}{4}x^2 - \frac{5}{2}xy + \frac{1}{3}y^2$ from $\frac{3}{4}x^2 - \frac{1}{2}xy + \frac{2}{3}y^2$

(d) $p^2 - 5pq + 3q^2 - 1$ from $3p^2 - 2pq + q^2 + 5$

Ans. (a)

$7x$	$-3y$	$+2z$
$5x$	$+11y$	$-13z$
$(-)$	$(-)$	$(+)$
$2x$	**$-14y$**	**$+15z$**

(b)

$2a$	$+7b$	$-c$
$-4a$	$-5b$	$+3c$
$(+)$	$(+)$	$(-)$
$6a$	**$+12b$**	**$-4c$**

(c) $\left(\frac{3}{4}x^2 - \frac{1}{2}xy + \frac{2}{3}y^2\right) - \left(\frac{1}{4}x^2 - \frac{5}{2}xy + \frac{1}{3}y^2\right)$

$\frac{3}{4}x^2 - \frac{1}{2}xy + \frac{2}{3}y^2 - \frac{1}{4}x^2 + \frac{5}{2}xy - \frac{1}{3}y^2$

$\frac{3}{4}x^2 - \frac{1}{4}x^2 - \frac{1}{2}xy + \frac{5}{2}xy + \frac{2}{3}y^2 - \frac{1}{3}y^2$

$\left(\frac{3}{4} - \frac{1}{4}\right)x^2 + \left(\frac{5}{2} - \frac{1}{2}\right)xy + \left(\frac{2}{3} - \frac{1}{3}\right)y^2$

$\frac{1}{2}x^2 + 2xy + \frac{1}{3}y^2$

(d) $3p^2 - 2pq + q^2 + 5 - (p^2 - 5pq + 3q^2 - 1)$

$3p^2 - 2pq + q^2 + 5 - p^2 + 5pq - 3q^2 + 1$

$3p^2 - p^2 - 2pq + 5qp + q^2 - 3q^2 + 5 + 1$

$(3 - 1)p^2 + (5 - 2)pq + q^2(1 - 3) + (5 + 1)$

$2p^2 + 3pq - 2q^2 + 6$

Q. 5 From the sum of $x^2 - y^2 + 1$ and $2x^2 + 3y^2 - 3$, Subtract the sum of $x^2 + 4$ and $y^2 - 5$.

Ans. $\{(x^2 - y^2 + 1) + (2x^2 + 3y^2 - 3)\} - \{x^2 + 4) + (y^2 - 5)\}$

$\{x^2 - y^2 + 1 + 2x^2 + 3y^2 - 3\} - \{x^2 + 4 + y^2 - 5\}$

$(x^2 + 2x^2 - y^2 + 3y^2 + 1 - 3) - (x^2 + y^2 + 4 - 5)$

$(3x^2 + 2y^2 - 2) - (x^2 + y^2 - 1)$

$3x^2 + 2y^2 - 2 - x^2 - y^2 + 1$

$3x^2 - x^2 + 2y^2 - y^2 - 2 + 1$

$(3 - 1)x^2 + (2 - 1)y^2 + (-2 + 1) = \mathbf{2x^2 + y^2 - 1}$ **Ans.**

Q. 6 If $A = 5x^3 - 4x^2 + 7x + 15$, $B = 3x^3 - x^2 + 2x + 10$ and $C = 2x^3 - 3x^2 + 5x + 5$, find A – B – C.

Ans. A – B – C

$(5X^3 - 4X^2 + 7X + 15) - (3X^3 - X^2 + 2X + 10) - (2X^3 - 3X^2 + 5x + 5)$

$5x^3 - 4x^2 + 7x + 15 - 3x^3 + x^2 - 2x - 10 - 2x^3 + 3x^2 - 5x - 5$

$5x^3 - 3x^3 - 2x^3 - 4x^3 + x^2 + 3x^2 + 7x - 2x - 5x + 15 - 10 - 5$

$(5 - 3 - 2)x^3 + (-4 + 1 + 3)x^2 + (7 - 2 - 5)x + (15 - 10 - 5)$

$0x^3 + 0x^2 + 0x + 0 = \mathbf{0}$ **Ans.**

Q. 7 The perimeter of a triangle is (7x + 5y – 11z) metres. If its two sides are (2x + 3y +z) m and (3x + y – 7z) m find its third side.

Ans. Third side = Perimeter – Sum of two sides

= $(7x + 5y - 11z) - \{(2x + 3y + 3) + (3x + y - 7z)\}$

= $(7x + 5y - 11z) - (2x + 3y + z + 3x + y - 7z)$

= $(7x + 5y - 11z) - (2x + 3x + 3y + y + z - 7z)$

= $(7x + 5y - 11z) - (5x + 4y - 6z)$

= $7x + 5y - 11z - 5x - 4y + 6z$

= $7x - 5x + 5y - 4y - 11z + 6z$

= $(7 - 5)x + (5 - 4)y + (-11 + 6)z = 2x + y - 5z$

$\therefore$ Third side = $\mathbf{(2x + y - 5z)m}$ **Ans.**

Q. 8 A wire is 17x + 5 metres long. A length of 5x + 7 metres is cut from it. How much wire is left?

Ans. Length of left wire = $(17x + 5) - (5x + 7)$

$= 17x + 5 - 5x - 7$

$= 17x - 5x + 5 - 7$

$= (17 - 5)x + (5 - 7)$

$=$ **$(12x - 2)$m Ans.**

Q. 9 What must be subtracted from $x^3 - x^2 + x - 2$ to get 1?

Ans. $1 - (x^3 - x^2 + x - 2) = 1 - x^3 + x^2 - x + 2$

$1 + 2 - x^3 + x^2 - x = 3 - x^3 + x^2 - x$

$(3 - x^3 + x^2 - x)$ Subtract to get 1

Exercise : 7.4

Q. 1 The value of $3x^2 - 4y^2$ when x = 5 and y = 2 is

(a) 49 (b) 59 (c) 91 (d) 67

Ans. $3x^2 - 4y^2$ When x = 5 and y = 2

$= 3(5)^2 - 4(2)^2 = 3 \times 25 - 4 \times 4$

$= 75 - 16 = 59$ **Ans. (b)**

Q. 2 The value of $4 - 5x$ when x = –2 is

(a) –6 (b) 6 (c) 2 (d) 14

Ans. $4 - 5x$ When x = – 2

$= 4 - 5(-2) = 4 + 10 = 14$ **Ans. (d)**

Q. 3 Find the value of each of the following expressions, when x = 2 and y = –2

(a) $x^2 + 2xy + y^2$ (b) $2x^2 - 3xy + 3y^2$ (c) $x^2 - 2xy + y^2$

Ans. (a) $x^2 + 2xy + y^2$

$(2)^2 + 2(2)(-2) + (-2)^2$

$4 - 8 + 4$

$8 - 8 =$ **0 Ans.**

(b) $2x^2 - 3xy + 3y^2$

$2(2)^2 - 3(2)(-2) + 3(-2)^2$

$2 \times 4 + 3 \times 4 + 3 \times 4$

$8 + 12 + 12 =$ **32 Ans.**

(c) $x^2 - 2xy + y^2$

$(2)^2 - 2(2)(-2) + (-2)^2$

$4 + 8 + 4 =$ **16 Ans.**

Q. 4 Find the value of each of the following expression, when x = –1

(a) $2x^2 - 3x + 5$ (b) $x^3 - 1$ (c) $2x^3 + 3x^2 - x + 2$

Ans. (a) $2x^2 - 3x + 5$ at x = – 1

$2(-1)2 - 3(-1) + 5$

$2 \times 1 + 3 + 5$

$2 + 3 + 5 =$ **10 Ans.**

(b) $x^3 - 1$

$= (-1)^3 - 1$

$= -1 - 1$

$=$ **– 2 Ans.**

(c) $2x^3 + 3x^2 - x + 2$ at x = – 1

$= 2(-1)^3 + 3(-1)^2 - (-1) + 2$

$= 2(-1) + 3(1) + 1 + 2$

$= -2 + 3 + 1 + 2 =$ **4 Ans.**

Q. 5 **When x = 1, y = 2 and z = –3, find the value of –**

(a) $x^3 + y^3 + z^3 - 3xyz$ **(b)** $x^2 + y^2 + z^2 + 3y^2x - xy$

Ans. (a) x = 1, y = 2 and z = –3

$x^3 + y^3 + z^3 - 3xyz$

$(1)^3 + (2)^3 + (-3)^3 - 3(1)(2)(-3)$

$1 + 8 - 27 + 18$

$27 - 27 = 0$ **Ans.**

(b) $x^2 + y^2 + z^2 + 3xy^2 - xy$

$= (1)^2 + (2)^2 + (-3)^2 + 3(1)(2)^2 - (1)(2)$

$= 1 + 4 + 9 + 3 \times 4 - 2$

$= 14 + 12 - 2$

$=$ **24 Ans.**

Q. 6 **Subtract :**

(a) $\frac{1}{4}x^2 - \frac{5}{2}xy + \frac{1}{3}y^2$ **from** $\frac{3}{4}x^2 - \frac{1}{2}xy + \frac{2}{3}y^2$

(b) $p^2 - 5pq + 3q^2 - 1$ **from** $3p^2 - 2pq + q^2 + 5$

(c) $11x^2 - xy - 9y^2$ **from** $5xy - 2x^2 + 3y^2$

(d) $-4a - 5b + 3c$ **from** $2a + 7b - c$

(e) $10x^2 + 11xy + 10y^2$ **from** $12xy - 3x^2 - 4y^2$

(f) $-m^2 + 7mn$ **from** $3m^2 - 2mn + 5$

Ans. (a) $\left(\frac{3}{4}x^2 - \frac{1}{2}xy + \frac{2}{3}y^2\right) - \left(\frac{1}{4}x^2 - \frac{5}{2}xy + \frac{1}{3}y^2\right)$

$\frac{3}{4}x^2 - \frac{1}{2}xy + \frac{2}{3}y^2 - \frac{1}{4}x^2 + \frac{5}{2}xy - \frac{1}{3}y^2$

$\frac{3}{4}x^2 - \frac{1}{4}x^2 - \frac{1}{2}xy + \frac{5}{2}xy + \frac{2}{3}y^2 - \frac{1}{3}y^2$

$\left(\frac{3}{4} - \frac{1}{4}\right)x^2 + \left(\frac{5}{2} - \frac{1}{2}\right)xy + \left(\frac{2}{3} - \frac{1}{3}\right)y^2$

$\frac{1}{2}x^2 + 2xy + \frac{1}{3}y^2$

(b) $3p^2 - 2pq + q^2 + 5 - (p^2 - 5pq + 3q^2 - 1)$

$3p^2 - 2pq + q^2 + 5 - p^2 + 5pq - 3q^2 + 1$

$3p^2 - p^2 - 2pq + 5qp + q^2 - 3q^2 + 5 + 1$

$(3 - 1)p^2 + (5 - 2)pq + q^2(1 - 3) + (5 + 1)$

$2p^2 + 3pq - 2q^2 + 6$

(c)

$5xy$	$-2x^2$	$3y^2$
$-xy$	$+11x^2$	$-9y^2$
(+)	(–)	(+)
$6xy$	**$13x^2$**	**$12y^2$**

(d)

$2a$	$+7b$	$-c$
$-4a$	$-5b$	$+3c$
(+)	(+)	(–)
$6a$	**$+12b$**	**$-4c$**

(e) $12xy - 3x^2 - 4y^2 - (10x^2 + 11xy + 10y^2)$

$12xy - 3x^2 - 4y^2 - 10x^2 - 11xy - 10y^2$

$12xy - 11xy - 3x^2 - 10x^2 - 4y^2 - 10y^2$

$(12 - 11)xy + (-3 - 10)x^2 + (-4 - 10)y^2 = xy - 13x^2 - 14y^2$ **Ans.**

(f) $(3m^2 - 2mn + 5) - (-m^2 + 7mn)$

$3m^2 - 2mn + 5 + m^2 - 7mn$

$3m^2 + m^2 - 2mn - 7mn + 5$

$(3 + 1)m^2 + (-2 - 7)mn + 5$

$4m^2 - 9mn + 5$

Q. 7 **If $a = -1$, $b = 2$ and $c = -3$, find the value of $a^2 + 2(b^2 - 3) + a^2c^2$.**

Ans. $a = -1$, $b = 2$ and $c = -3$

$a^2 + 2(b^2 - 3) + a^2c^2$

$(-1)^2 + 2\{(2)^2 - 3\} + (1)^2(-3)^2$

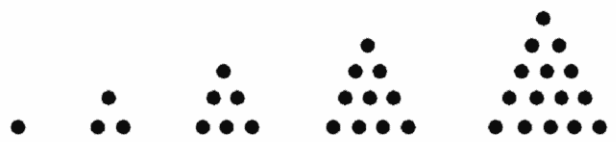
$1 + 2(4 - 3) + (1)(9)$

$1 + 2 \times 1 + 9$

$1 + 2 + 9 = 12$ **Ans.**

Exercise : 7.5

Q. 1 **Observe the following pattern made from dots of triangle numbers.**



1 3 6 10 15

1, 3, 6, 10, 15, ... are called triangle number.

Write the next triangle number .....

Write the rule for the number of dots in the nth triangle number.

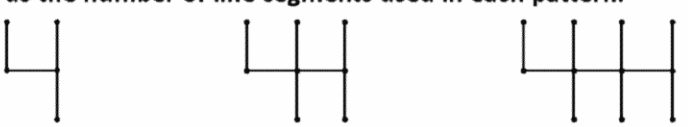
Ans. $3 = 1 + 2$, $6 = 3 + 3$, $10 = 6 + 4$, $15 = 10 + 5$

$\therefore$ Next number $= 15 + 6 = 21$

nth number $= \frac{n(n + 1)}{2}$

Q. 2 **Observe the following pattern of digits made from the line segments. Find the rule which given us the number of line segments used in each pattern:**

(a)

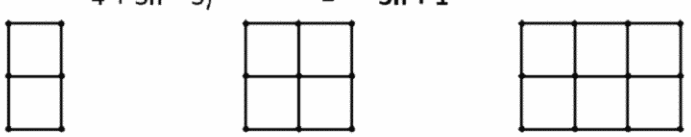


4 7 10

Rule :- $4 + (n - 1)(3)$

$4 + 3n - 3 = 3n + 1$

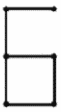
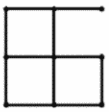
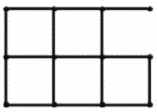
(b)



7 12 17

Rule :- $7 + (n - 1)5$

$7 + 5n - 5 = 5n + 2$

(c)   

6 11 16

Rule :- $6 + (n - 1)\,5 = 5n + 1$

Q. 3 Write the following as formulae :

(a) The cost C of a number of books in the product of number of books (n) and the price (x) per book.

(b) The sum of angles (A, B and C) of a triangle is 180^0.

Ans. (a) $C = nx$ (b) $A + B + C = 180^0$

Q. 4 Write the first six number of the number pattern whose rules are given below :

(a) 2n – 1 (b) 4n + 1 (c) 7n + 10 (d) $n^2 + 1$

Ans. (a) $2n - 1$

$n = 1 \Rightarrow 2(1) - 1 = 2 - 1 = 1$

$n = 2 \Rightarrow 2(2) - 1 = 4 - 1 = 3$

$n = 3 \Rightarrow 2(3) - 1 = 6 - 1 = 5$

$n = 4 \Rightarrow 2(4) - 1 = 8 - 1 = 7$

$n = 5 \Rightarrow 2(5) - 10 = 2 - 1 = 9$

$n = 6 \Rightarrow 2(6) - 12 = 2 - 1 = 11$

(b) $4n + 1$

$n = 1 \Rightarrow 4(1) + 1 = 4 + 1 = 5$

$n = 2 \Rightarrow 4(2) + 1 = 8 + 1 = 9$

$n = 3 \Rightarrow 4(3) + 1 = 12 + 1 = 13$

$n = 4 \Rightarrow 4(4) + 1 = 16 + 1 = 17$

$n = 5 \Rightarrow 4(5) + 1 = 20 + 1 = 21$

$n = 6 \Rightarrow 4(6) + 1 = 24 + 1 = 25$

(c) $7n + 10$

$n = 1 \Rightarrow 7(1) + 10 = 7 + 10 = 17$

$n = 2 \Rightarrow 7(2) + 10 = 14 + 10 = 24$

$n = 3 \Rightarrow 7(3) + 10 = 21 + 10 = 31$

$n = 4 \Rightarrow 7(4) + 10 = 28 + 10 = 38$

$n = 5 \Rightarrow 7(5) + 10 = 35 + 10 = 45$

$n = 6 \Rightarrow 7(6) + 10 = 42 + 10 = 52$

(d) $n^2 + 1$

$n = 1 \Rightarrow (1)^2 + 1 = 1 + 1 = 2$

$n = 2 \Rightarrow (2)^2 + 1 = 4 + 1 = 5$

$n = 3 \Rightarrow (3)^2 + 1 = 9 + 1 = 10$

$n = 4 \Rightarrow (4)^2 + 1 = 16 + 1 = 17$

$n = 5 \Rightarrow (5)^2 + 1 = 25 + 1 = 26$

$n = 6 \Rightarrow (6)^2 + 1 = 36 + 1 = 37$

TEST YOUR PROGRESS

Q. 1 Add : $\frac{1}{7}$ abc, $\frac{3}{7}$ abc, $\frac{2}{7}$ abc.

Ans. $\frac{1}{7}\,abc + \frac{3}{7}\,abc + \frac{2}{7}\,abc$

$\left(\frac{1}{7} + \frac{3}{7} + \frac{2}{7}\right) abc = \frac{1+3+2}{7}\,abc = \frac{6}{7}$ **abc Ans.**

Q. 2 Add the algebraic expressions : x + y – z and x – y + z

Ans. $(x + y - z) + (x - y + z)$

$x + y - z + x - y + z$

$x + x + y - y - z + z = 2x$ **Ans.**

Q. 3 Subtract a + b + c from a – b – c

Ans. $(a - b - c) - (a + b + c)$

$a - b - c - a - b - c$

$a - a - b - b - c - c = -2b - 2c$ **Ans.**

Q. 4 **Subtract : $2x - y + z$ from $3x - 2y + 2z$**

Ans. $(3x - 2y + 2z) - (2x - y + z)$

$3x - 2y + 2z - 2x + y - z$

$3x - 2x - 2y + y + 2z - z$

$(3 - 2)x + (-2 + 1)y + (2 - 1)z$ = **$x - y + z$ Ans.**

Q. 5 **Identify the like terms : $3x, 2x^2y, -5x, 3xy^2, -x^2y, 5xy^2$**

Ans. $3x$ and $-5x$ are like terms

$2x^2y$ and $-x^2y$ are like terms

$3xy^2$ and $5xy^2$ are like terms

Q. 6 **Identify monomial, binomial and trinomial :**

(a) $7xyz$ (b) 15 (c) $3x + 4y$ (d) $a + b - 2c$ (e) $abcd$

Ans. (a) $7xyz$ = Monomial Term (b) 15 = Monomial Term

(c) $3x + 4y$ = Binomial Term (d) $a + b - 2c$ = Trinomial Term

(e) $abcd$ = Monomial Term

Q. 7 **Write the factors of each term of the following expressions :**

(a) $3x^3 + 2xyz$ **(b) $5x^2 + 7xy$**

Ans. (a) $3x^3 + 2xyz$ (b) $5x^2 + 7xy$

$x(3x + 2y)$ $x(5x + 7y)$

Q. 8 **Find the value of $-3xyz$ for $x = 1$, $y = -1$ and $z = -2$**

Ans. $-3xyz$ for $x = 1$, $y = 1$ and $z = -2$

$-3(1)(-1)(-2)$ = -6

Q. 9 **What is coefficient of b in $\frac{2}{3} a^2 bc^3$?**

Ans. $\frac{2}{3} a^2bc^3$

Coefficient of b is $\frac{2}{3} a^2c^3$

Q. 11 **From the sum of $x^2 + y^2$ and $x^2 - 2y^2$, subtract $x^2 - y^2 + 1$**

Ans. $(x^2 + y^2) + (x^2 - 2y^2) - (x^2 - y^2 + 1)$

$x^2 + y^2 + x^2 - 2y^2 - x^2 + y^2 - 1$

$x^2 + x^2 + x^2 + y^2 - 2y^2 + y^2 - 1$

$x^2 + 0y^2 - 1$ = **$x^2 - 1$ Ans.**

Chapter : 8 (LINER EQUATIONS)

Exercise : 8.1

Q. 1 **Which of the following is not a linear equation?**

(a) $2x = 5$ (b) $x^2 = 1$ (c) $y - 1 = 0$ (d) $m + n = 1$

Ans. $x^2 = 1$ is a quadratic equation. **Ans. (b)**

Q. 2 **Which of the following is not a linear equation in one variable?**

(a) $x = 0$ (b) $3x - 1 = x + 2$ (c) $5x = 4x - 2$ (d) $3n - 4m = 10$

Ans. $3n - 4m = 10$ is a linear equation in two variables.

Ans. (d)

Q. 3 Rewrite each of the following statement in the form of equation.

(a) One third of a number added to 7 is equal to 12.

(b) The sum of thrice of x and 5 is 17.

(c) 5 subtracted from 2 times of a number b given us 3.

(d) 3 added to two seventh of y is minus 3 gives 3.

Ans. (a) $\frac{x}{3} + 7 = 12$ (b) $3x + 5 = 17$

(c) $2b - 5 = 3$ (d) $\frac{2}{7} y + 3 = -3$

Q. 4 Write each of the following equations in statement form.

(a) $m - 4 = 1$ (b) $\frac{4m}{5} = 12$ (c) $2m = 16$ (d) $x + 3 = 7$

Ans. (a) 4 subtract from m is 1 (b) Four-fifth of m is twelve.

(c) Two times of m is sixteen (d) Sum of x and 3 is seven.

Q. 5 Write an equation for each of the following statements :

(a) Three times of a number is equal to 3 added to twice the number.

(b) Five subtracted from half of a number m equals 0.

(c) 5 times of a number a added to 7 times another number b is equal to 43.

(d) Difference of squares of two numbers a and b, a > b is equal to 13.

Ans. (a) $3x = 2x + 3$ (b) $\frac{m}{2} - 5 = 0$

(c) $5a + 7b = 43$ (d) $a^2 - b^2 = 13$

Q. 6 Check whether the values of the variable given against each, satisfies the equation or not :

(a) $x + 3 = 0, x = 3$ (b) $x + 5 = 0, x = -5$ (c) $3x - 4 = 2, x = 2$

(d) $5x = 20, x = 0$ (e) $\frac{m}{4} = 3, m = 12$

Ans. (a) $x + 3 = 0$ = $3 + 3 \neq 0$ $\therefore$ $x = 3$ is not satisfies the equation.

(b) $x + 5 = 0$ = $-5 + 5 = 0$ $\therefore$ $x = 5$ is satisfies the equation.

(c) $3x - 4 = 2$ = $3(2) - 4 = 6 - 4 = 2$ $\therefore$ $x = 2$ is satisfies the equation.

(d) $5x = 20$ = $5 \times 0 \neq 20$ $\therefore$ $x = 0$ is not satisfies the equation.

(e) $\frac{m}{4} = 3$

$\frac{12}{4} = 3$ $\therefore$ $x = 12$ is satisfies the equation.

Exercise : 8.2

Q. 1 The solution of the equation $\frac{1}{2}(2p - 1) = 2$ is

(a) 2 (b) 1 (c) 5 (d) $\frac{5}{2}$

Ans. $\frac{1}{2}(2p - 1) = 2$ Multiply by 2 both sides.

$2p - 1 = 2 \times 2$

$2p = 4 + 1$

$\therefore$ $p = \frac{5}{2}$ **Ans. (d)**

Q. 2 The solution of the equation $\frac{3x+5}{2} = \frac{2x+5}{3}$ is

(a) –1 **(b) 1** **(c) 2** **(d) –2**

Ans. $\frac{3x+5}{2} = \frac{2x+5}{3}$

Multiply by 6 to both sides L.C.M. of 2, 3 is 6

$\frac{6(3x+5)}{2} = \frac{6(2x+5)}{3}$

$3(3x+5) = 2(2x+5) = 9x+15 = 4x+10$

$9x-4x = 10-15 = 5x = -5$

$x = \frac{-5}{5} = -1$ **Ans. (a)**

Q. 3 **Solve each of the following linear equation. Also verify your answer.**

(a) $3x + \frac{5}{2} = \frac{17}{2}$ **(b)** $3(t+2) + 4 = 16$ **(c)** $2x + 9 = 17$

(d) $\frac{2}{3}m = 8$ **(e)** $\frac{p}{4} - 1 = 3$

Ans. (a) $3x + \frac{5}{2} = \frac{17}{2}$

$3x = \frac{17}{2} - \frac{5}{2}$

$3x = \frac{17-5}{2} = \frac{12}{2}$

$x = \frac{6}{3} = 2$

Verification :

L.H.S $3x + \frac{5}{2}$

$3 \times 2 + \frac{5}{2} = \frac{12+5}{2} = \frac{17}{2}$

L.H.S. = R.H.S. $= \frac{17}{2}$

(b) $3(t+2)+4 = 16$

$3t+6+4 = 16$

$3t+10 = 16$

$3t = 16-10$

$t = \frac{6}{3} = 2$

Verification :

L.H.S. $= 3(t+2)+4$

$= 3(2+2)+4$

$= 12+4 = 16$

L.H.S. = R.H.S. $= 16$

(c) $2x + 9 = 17$

$2x = 17-9$

$\therefore x = \frac{8}{2} = 4$

Verification :

L.H.S. $= 2(4)+9 = 8+9 = 17$

L.H.S. = R.H.S $= 17$

(d) $\frac{2}{3}m = 8$ multiplying by 3

$3 \times \frac{2}{3}m = 3 \times 8$

$2m = 24$ $\therefore m = \frac{24}{2} = 12$

Verification :

L.H.S. $= \frac{2}{3} \times 12 = 8 =$ R.H.S.

L.H.S. = R.H.S. $= 8$

(e) $\frac{p}{4} - 1 = 3$

$\frac{p}{4} = 3+1$ Multiply by 4

$4 \times \frac{p}{4} = 4 \times 4$ $\therefore p = 16$

Verification : L.H.S. $\frac{16}{4} = 1 = 4-1 = 3$

L.H.S. = R.H.S. $= 3$

Q. 4 **Solve each of the following linear equation by hit and trial method.**

(a) $x + 4 = 10$ **(b)** $7x + 1 = 36$ **(c)** $4x - \frac{3x}{2} = 15$

(d) $\frac{2m}{3} - 5 = \frac{3m+1}{4}$ **(e)** $\frac{2}{5}(2y + 5) + \frac{1}{3}(4y - 1) = 9$

Ans. (a) $x + 4 = 10$

$x = 10 - 4$

$= 6$

(b) $7x + 1 = 36$

$7x = 36 - 1$

$x = \frac{35}{7} = 5$

(c) $4x - \frac{3x}{2} = 15$

$\frac{8x - 3x}{2} = 15$

$5x = 15 \times 2$

$x = \frac{15 \times 2}{5} = 6$

$\therefore x = 6$

(d) $\frac{2m}{3} - 5 = \frac{3m+1}{4}$

$\frac{2m - 15}{3} = \frac{3m+1}{4}$

$\frac{12(2m - 15)}{3} = \frac{12(3m+1)}{4}$

$4(2m - 15) = 3(3m + 1)$

$8m - 60 = 9m + 3$

$8m - 9m = 3 + 60$

$-m = 63$

$\therefore m = -63$

(e) $\frac{2}{5}(2y + 5) + \frac{1}{3}(4y - 1) = 9$

$\frac{4y}{5} + 10 + \frac{4y}{3} - \frac{1}{3} = 9$

$\frac{4y}{5} + \frac{4y}{3} = 9 - 10 + \frac{1}{3}$

$\frac{4y}{5} + \frac{4y}{3} = -1 + \frac{1}{3}$

$\frac{12y + 20y}{15} = \frac{-3 + 1}{3} = \frac{32y}{15} = \frac{-2}{3}$

$y = \frac{-2 \times 15}{3 \times 32} = \frac{-5}{16}$ **Ans.**

Q. 5 **Construct 3 equations starting with $x = -4$.**

Ans. $x = 4$

(i) $x + 6 = -2$

(ii) $x + 4 = 0$

(iii) $2x = -8$

Exercise : 8.3

Q. 1 **If $\frac{2}{5}$ of a number is 16. Then the number is**

(a) $\frac{32}{5}$ **(b)** $\frac{8}{5}$ **(c) 40** **(d) 20**

Ans. $\frac{2}{5}$ of a number $= 16$

$\frac{2}{5} \times$ number $= 16$

$\therefore$ number $= \frac{16 \times 5}{2} = 40$ **Ans. (c)**

Q. 2 **If 3 is subtracted from 4 times the number the result is 17. The number is.**

(a) 4 **(b) 3** **(c) 6** **(d) 5**

Ans. $4x - 3 = 17$

$4x = 3 + 17$

$x = \frac{20}{4} = 5$ **Ans. (d)**

Q. 3 **Twice a number when decreased by 7 gives 45. Find the number.**

Ans. $2x - 7 = 45$

$2x = 7 + 45$

$x = \frac{52}{2} = 26$ $\therefore$ number is **26 Ans.**

Q. 4 **A number added to its two-thirds is equal to 55. Find the number.**

Ans. $x + \frac{2x}{3} = 55$

$\frac{3x + 2x}{3} = 55$

$\frac{5x}{3} = 55 \Rightarrow x = \frac{55 \times 3}{5} = 33$

$\therefore$ number is **33 Ans.**

Q. 5 **If 7 is added to three-fourth of a number. The result is 19, find the number**

Ans. $\frac{3}{4}x + 7 = 19 = \frac{3x}{4} = 19 - 7$

$\frac{3x}{4} = 12 = x = \frac{12 \times 4}{3} = 16$

$\therefore$ number is **16 Ans.**

Q. 6 **When 3 is subtracted from one-fourth of a number the result is 5, find the number.**

Ans. $\frac{x}{4} - 3 = 5$

$\frac{x}{4} = 5 + 3$

$x = 4 \times 8 = 32$ $\therefore$ number is **32 Ans.**

Q. 7 **A number when multiplied by 4, exceeds itself by 45. Find the number.**

Ans. $4x = x + 45$

$4x \times x = 45$

$3x = 45$

$x = \frac{45}{3} = 15$ $\therefore$ number is **15 Ans.**

Q. 8 **Five years ago a man was seven times as old as his son. Five years hence, the father will be three times as old as his son. Find their present ages.**

Ans. Let 5 year ago son's age be x years

$\therefore$ Father's age will be 7x years

5 year hence son's age be (x + 10) years

Father's age (7x + 10) years

Given $7x + 10 = 3(x + 10)$

$7x + 10 = 3x + 30$

$7x - 3x = 30 - 10$

$4x = 20$

$x = \frac{20}{4} = 5$

Present age : Father's age $7x + 5 = 7 \times 5 + 5 =$ 40 years

Son's age $x + 5 = 5 + 5 =$ 10 years

Q. 9 A number consists of two digits. The sum of digits is 5. If 9 is subtracted from the number, the digits are reversed find the number.

Ans. Let the unit digit be x

$\therefore$ Ten digit is $(5 - x)$

Number $= 10(5 - x) + x$

$= 50 - 10x + x = 50 - 9x$

Reverse Number $= 10x + 5 - x = 9x + 5$

Given : $50 - 9x - 9 = 9x + 5$

$41 - 5 = 9x + 9x$

$36 = 18x$

$x = \frac{36}{18} = 2$

Number $= 50 - 9x = 50 - 18 = 32$ $\therefore$ Number is **32 Ans.**

Q. 10 Sachin scored twice as many runs as Rahul. Together their runs fill two short of a double century. How many runs did each score?

Ans. Let Rahul's run score be x

$\therefore$ Sachin's run score be 2x

$x + 2x = 2 \times 100 - 2$

$3x = 198$

$x = \frac{198}{3} = 66$

$\therefore$ Rahul score $= 66$

And Sachin score $= 2 \times 66 =$ **132 Ans.**

Q. 11 The length of a rectangular field is twice is breadth. If the perimeter of the field is 150 metres, find its length and breadth.

Ans. Let breadth of the rectangle be x m

$\therefore$ Length is 2xm

Perimeter $= 150$m

$2(l + b) = 150$

$l + b = \frac{150}{2} \Rightarrow x + 2x = 75$

$3x = 75$ $\therefore$ $x = \frac{75}{3} = 25$

$\therefore$ Breadth of rectangle $=$ **25m**

And length of rectangle $= 2 \times 25 =$ **50 m**

Q. 12 **People of a village planted trees in the village garden. Some of the trees were fruits tree. The number of non-fruits trees were two more than three times the number of fruits trees. Find the number of fruits trees planted if the number of non-fruits trees was 47.**

Ans. Let the number of fruit tree be x

$\therefore$ non fruit tree be $3x + 2$

Given : $3x + 2 = 47$

$3x = 47 - 2$

$x = \frac{45}{3} = 15$

$\therefore$ Number of fruit tree are **15. Ans.**

TEST YOUR PROGRESS

Q. 1 **Rewrite the following statements in the form of equation.**

(a) Thrice of a number is twice the sum of the number and 5.

(b) Three-fifth of x when added to 7 become 22.

Ans. (a) $3x = 2(x + 5)$

(b) $\frac{3}{5}x + 7 = 22$

Q. 2 **Solve the equation : $2(x - 4) + 3(x + 2) = 4(x + 5)$**

Ans. $2(x - 4) + 3(x + 2) = 4(x + 5)$

$2x - 6 + 3x + 6 = 4x + 20$

$5x - 4x = 20$

$\therefore$ **x = 20**

Q. 3 **Write a statement for the equation : $\frac{2}{3}x - 4 = 4$**

Ans. $\frac{2}{3}x - 4 = 4$

$\frac{2}{3}x = 4 + 4$

$2x = 8 \times 3$

$x = \frac{8 \times 3}{2} = 2$ $\therefore$ **x = 12**

Q. 4 **Solve the equation : $\frac{3y}{10} + \frac{2y}{5} = \frac{7y}{25} + \frac{29}{25}$**

Ans. $\frac{3y}{10} + \frac{2y}{5} = \frac{7y}{25} + \frac{29}{25}$

$\frac{3y}{10} + \frac{4y}{10} = \frac{7y}{25} + \frac{29}{25}$

$\frac{3y + 4y}{10} - \frac{7y}{25} = \frac{29}{25}$

$\frac{7y \times 5}{10 \times 5} - \frac{7y \times 2}{25 \times 2} = \frac{29}{25}$

$\frac{35y}{50} - \frac{14y}{50} = \frac{29}{25} \Rightarrow \frac{21y}{50} = \frac{29}{25}$

$y = \frac{29}{25} \times \frac{50}{21} = \frac{58}{21}$ $\therefore$ **$y = \frac{58}{21}$**

Q. 5 **Solve the equation :** $\frac{x-6}{4} - \frac{x-4}{6} = 1 - \frac{x}{10}$

Ans. $\frac{x-6}{4} - \frac{x-4}{6} = 1 - \frac{x}{10}$

$\frac{3(x-6)}{4\times 3} - \frac{2(x-4)}{2\times 6} = \frac{10}{10} - \frac{x}{10}$

$\frac{3x-18}{12} - \frac{2x-8}{12} = \frac{10-x}{10}$

$\frac{3x-18-2x+8}{12} = \frac{10-x}{10}$

$\frac{x-10}{12} = \frac{10-x}{10}$

$10x - 100 = 120 - 12x$

$10x + 12x = 120 + 100$

$22x = 220$

$x = \frac{220}{22} = 10$ $\therefore$ **x = 10**

Q. 6 **Solve the equation :** $\frac{x}{2} - 1 = \frac{x}{3} + 4$

Ans. $\frac{x}{2} - 1 = \frac{x}{3} + 4$

$\frac{x}{2} - \frac{x}{3} = 1 + 4$

$\frac{x\times 3}{2\times 3} - \frac{2\times 3x}{2\times 3} = 5$

$\frac{3x-6x}{6} = 5 \Rightarrow \frac{-3x}{6} = 5$

$\frac{-x}{2} = 10$

$x = \frac{10\times 2}{-1} = -20$ $\therefore$ **x = –20**

Q. 7 **Solve the equation :** $\frac{3}{4}(7x-1) - \left[2x - \frac{1-x}{2}\right] = \frac{2x+3}{2}$

Ans. $\frac{3}{4}(7x-1) - \left[\frac{2x}{1} - \frac{1-x}{2}\right] = \frac{2x+3}{2}$

$\frac{3}{4}(7x-1) - \left[\frac{4x-1+x}{2}\right] = \frac{2x+3}{2}$

$\frac{3(7x-1)}{4} - \frac{5x-1}{2} = \frac{2x+3}{2}$

Multiply by 4

$3(3x-1) - 2(5x-1) = 2(2x+3)$

$21x - 3 - 10x + 2 = 4x + 6$

$21x - 10x - 1 = 4x + 6$

$11x - 4x = 6 + 1$

$7x = 7$

$x = 1$

$\therefore$ **x = 1**

Chapter - 9 (LINES AND ANGLES)

Exercise : 9.1

Q. 1 **The pair of supplementary angles is –**

(a) 142^0, 38^0 **(b) 35^0, 55^0** **(c) 145^0, 25^0** **(d) 153^0, 28^0**

Ans. $142 + 38 = 180^0$ **Ans. (a)**

Q. 2 **The measure of an angle complement to the angle of 80^0 is**

(a) 100^0 **(b) 80^0** **(c) 10^0** **(d) 170^0**

Ans. $80^0 + x = 90^0$

$x = 90 - 80 = 10^0$ **Ans. (c)**

Q. 3 **The pair of complementary angles is**

(a) 100^0, 10^0 **(b) 35^0, 57^0** **(c) 90^0, 10^0** **(d) 95^0, 85^0**

Ans. $35 + 57 = 90^0$ **Ans. (b)**

Q. 4 **Write the complement of each of the following angles.**

(a) 27^0 **(b) 49^0** **(c) 72^0**

Ans. (a) Complement of 27^0 is $90^0 - 27^0 = 63^0$

(b) Complement of 49^0 is $90^0 - 49^0 = 41^0$

(c) Complement of 72^0 is $90^0 - 72^0 = 18^0$

Q. 5 **Write the supplement of each of the following angles.**

(a) 15^0 **(b) 117^0** **(c) 175^0**

Ans. (a) Supplement of 15^0 is $180^0 - 15^0 = 165^0$

(b) Supplement of 117^0 is $180^0 - 117^0 = 63^0$

(c) Supplement of 175^0 is $180^0 - 175^0 = 5^0$

Q. 6 **An angles is $\frac{4}{5}$ of its supplement. What is its magnitude?**

Ans. Let the angle be x^0

$$x = \frac{4}{5}(180^0 - x)$$

$$5x = 4 \times 180 - 4x$$

$$5x + 4x = 4 \times 180$$

$$9x = 720$$

$$x = \frac{720}{9} = 80^0 \quad \therefore \text{ Angle is } \mathbf{80^0} \text{ Ans.}$$

Q. 7 **An angles is $\frac{1}{5}$ of its complement. What is its measure?**

Ans. Let the angle be x^0

Given $x = \frac{1}{5}(90 - x)$

$$5x = 90 - x$$

$$5x + x = 90$$

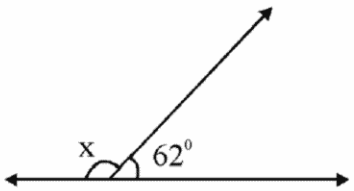
$$6x = 90$$

$$x = \frac{90}{6} = 15$$

$\therefore$ Angle is **15^0 Ans.**

Q. 8 Find the value of x in the following figures.

(a)

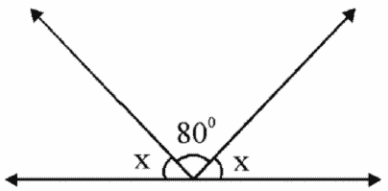


$x + 62^0 = 180$ (Linear Pair)

$x = 180 - 62$

$x = \mathbf{118^0}$ **Ans.**

(b)



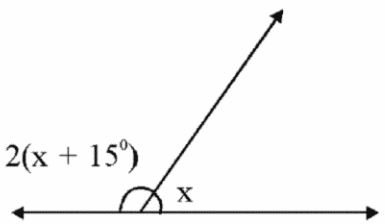
$x + 80 + x = 180$ (Straight Angle)

$2x = 180 - 80 = 100$

$x = \frac{100}{2} = 50$

$\therefore$ **x = 50 Ans.**

(c)



$2(x + 15) + x = 180^0$

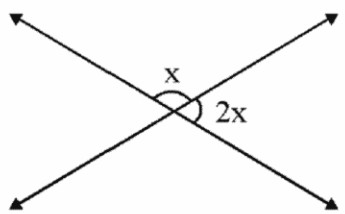
$2x + 30 + x = 180$

$3x = 180 - 30$

$x = \frac{150}{3} = 50^0$

$\therefore$ **$x = 50^0$ Ans.**

(d)



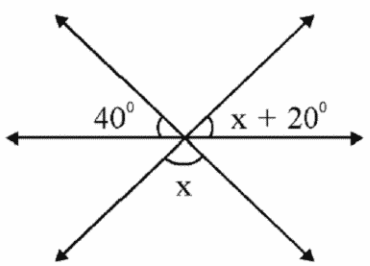
$x + 2x = 180$ (Linear Pair)

$3x = 180$

$x = \frac{180}{3} = 60^0$

$\therefore$ **$x = 60^0$ Ans.**

(e)



$x = y$ (Vertically opposite angle)

$40 + y + x + 20 = 180$ (Straight Angle)

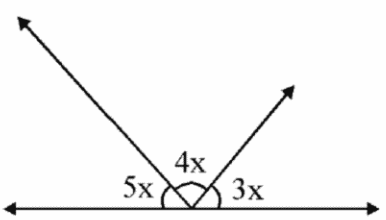
$60 + x + x = 180$

$2x = 180 - 60$

$x = \frac{120}{2} = 60^0$

$\therefore$ **$x = 60^0$ Ans.**

(f)



$5x + 4x + 3x = 180$ (Straight Angle)

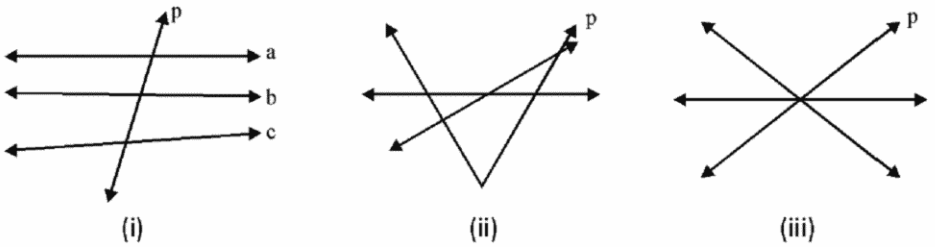
$12x = 180$

$x = \frac{180}{12} = 15^0$

$\therefore$ **$x = 15^0$ Ans.**

Exercise : 9.2

Q. 1 In fig in which case line 'p' is not a transversal?



(i) (ii) (iii)

Ans. Transversal line in insect two or more line in different points.

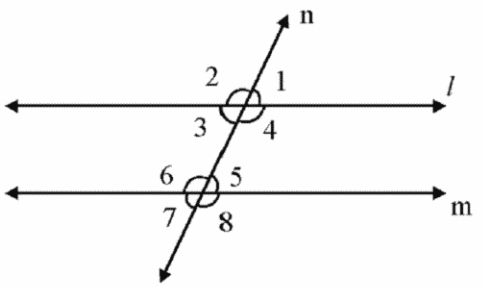
Ans. (iii)

Q. 2 In fig l || m and n is a transversal

If $\angle 4 = 120^0$, then the measure of $\angle 7$ is

(a) 120^0 (b) 60^0

(c) 30^0 (d) 50^0



Ans. $\angle 4 = 120^0$

$\angle 4 = \angle 8$ Corresponding Angle

$\therefore \angle 8 = 120^0$

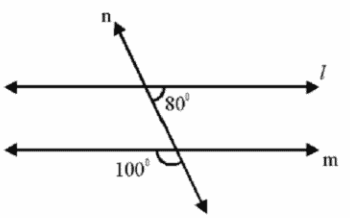
$\angle 7 + \angle 8 = 180^0$

$\angle 7 + 120 = 180^0$

$\angle 7 = 180 - 120 = 60^0$ **Ans. (b)**

Q. 3 In fig n is a transversal intersecting l and m.

In which case l || m?

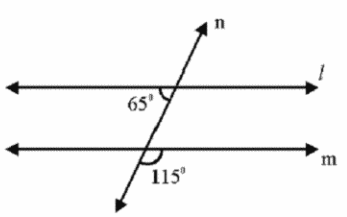


(i) $y = 100$ (Vertically opposite angle)

$y + 80 = 100 + 80 = 180^0$

These are cointerior angle

$\therefore$ Lines l and m are parallel.



(ii) $115^0 = x$ (Vertically opposite angle)

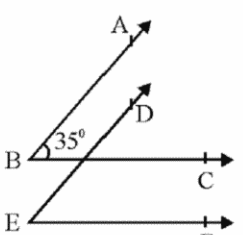
$115 + 65 = 180^0$

These are cointerior angle

$\therefore$ Lines l is parallel to line m.

Q. 4 In fig. the arms of $\angle ABC$ and $\angle DEF$ are parallel.

If $\angle ABC = 35^0$, find $\angle DEF$.



Given AB || DE

BC || EF

And $\angle ABC = 35^0$

AB || DE

$\therefore \angle ABC = \angle DGE$ (Corresponding Angle)

$35^0 = \angle DGE$

$\angle DGE = 35^0$

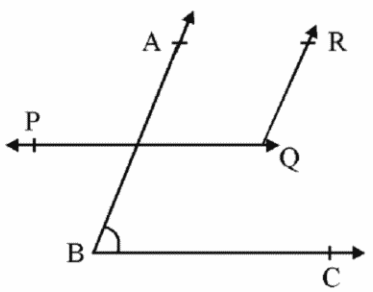
BC || EF

$\therefore \angle DGC = \angle DEF$ (Corresponding Angle)

$35^0 = \angle DEF$

$\angle$ **DEF = 35°**

Q. 5 In fig. AB || PQ and BC || PQ and $\angle ABC = 60^0$, find $\angle PQR$.



$\angle ABC = 60^0$ (Given)

PQ || BC

$\therefore \angle ASQ = \angle ABC$ (Corresponding Angle)

$\angle ASQ = 60^0$

$\angle$AB || RQ

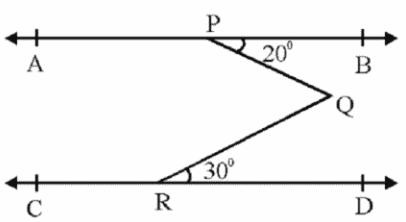
$\angle ASQ + \angle RQS = 180^0$ (Cointerior Angle)

$60^0 + \angle RQP = 180^0$

$\angle PQR = 180 - 60 = 120^0$

$\angle$ **PQR = 120°**

Q. 6 In fig. AB || CD and Q is any point in between them such that $\angle BPQ = 20^0$, and $\angle QRD = 30^0$, find $\angle PQR$.



Construction draw QR || AB

AB || QR

$\angle BPQ = \angle PQS$ (Alternative Angle)

$20^0 = \angle PQS$

QR || CD

$\therefore \angle SQC = \angle QRD$ (Alternative Angle)

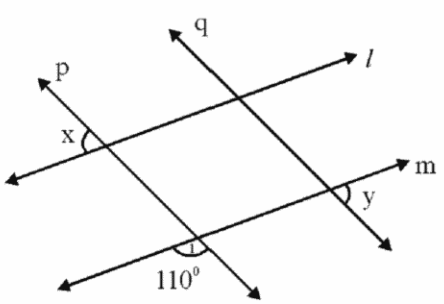
$\angle SQC = 30^0$

$\therefore \angle PQR = \angle PQS + \angle SQR$

$\angle PQR = 20 + 30 = 50^0$

$\therefore \angle PQR = 50^0$

Q. 7 In fig. *l* || m and p || q. If $\angle 1 = 110^0$, find x and y.



line *l* || m

$\therefore 110 + y = 180^0$ (Cointerior Angle)

$y = 180^0 - 110^0$

$y = 70^0$

l || m

$\therefore \angle 1 = 55^0$ (Alternative Angle)

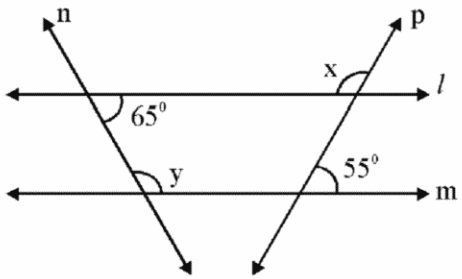
$\angle 1 + \angle x = 180^0$ (Linear pair)

$55 + x = 180$

$x = 180 - 55 = 125^0$

$\angle x = 70^0$ both are opposite angles.

Q. 8 In fig. $l \parallel m$, then find the value of x and y.



$l \parallel m$

$\therefore 65 + y = 180^0$ (Cointerior Angle)

$y = 180 - 65 = 115^0$

$l \parallel m$

$\therefore \angle 1 = 55^0$ (Alternative Angle)

$\angle 1 + \angle x = 180^0$ (Linear Angle)

$55 + x = 180$

$x = 180 - 55 = 125^0$

$x = 125^0$ and $y = 115^0$

TEST YOUR PROGRESS

Q. 1 State which of the following statements are true and which are false.

(a) Two complementary angles form a linear pair.

(b) The supplement of an obtuse angle can form a linear pair.

(c) One acute angle and one obtuse angle can form a linear pair.

(d) The supplement of an acute angle is also an acute angle.

(e) Adjacent angle can be supplementary.

Ans. (a) **(False)** Two complementary angles from a perpendicular lines.

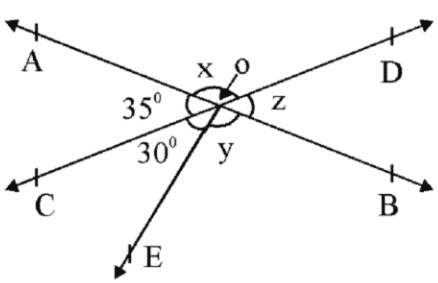
(b) **(True)** Sum linear pair and sum of supplement angles are equal.

(c) **(False)** Sum one acute angle and obtuse angle always is not 180^0.

(d) **(False)** Supplementary angle of acute angle is always obtuse angle.

(e) **(False)** Sum of adjacent angle are less than 180^0.

Q. 2 In fig $\overrightarrow{AB}$ and $\overrightarrow{CD}$ are two lines intersecting at 0. If $\angle AOC = 35^0$ and $\angle COE = 30^0$, find the values of x, y and z.



$35 + x^0 = 180^0$ (Linear Pair)

$x = 180 - 35 = 145^0$ $\therefore$ **$x = 145^0$**

$x = 30 + y$ (Vertically opposite angle)

$145 - 30 = y$ $\therefore$ **$y = 115^0$**

$30 + y + z = 180$ (Straight Angle)

$30 + 115 + z = 180$

$z = 180 - 145 = 35$ $\therefore$ **$z = 35^0$**

Q. 3 Two supplementary angles are in the ratio 5:4 find the angles.

Ans. Two supplementary angles are in ratio 5 : 4

$\therefore$ angles will be 5x and 4x $\quad (x \neq 0)$

Given $\quad 5x + 4x = 180$

$9x = 180$

$x = \frac{180}{9} = 20$

$\therefore$ Angles are $\quad 5x = 5 \times 20 = \mathbf{100^0}$

$4x = 4 \times 20 = \mathbf{80^0}$

Q. 4 Find the angle which is supplement of itself.

Ans. Let the angle be x^0

Supplement angle be x^0 $\quad$ Given

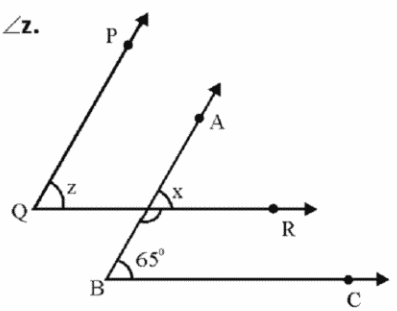
$x + x = 180$

$2x = 180$

$x = \frac{180}{2} = 90^0$

$\therefore$ 90^0 is supplement of itself.

Q. 5 In fig, PQ || AB and QR || BC. If $\angle ABC = 65^0$, find $\angle x$, $\angle y$ and $\angle z$.



PQ || AB $\quad$ Given

$\therefore z = x$ $\quad$ (Corresponding angles)

QR || BC

$\therefore x = 65$ $\quad$ (Corresponding angles)

$\therefore x = z = 65^0$

$x + y = 180^0$ $\quad$ (Linear Pair)

$65 + y = 180^0$

$y = 180 - 65$

$y = 115^0$

$x = 65^0$, $y = 115^0$ and $z = 65^0$

Chapter : 10 (THE TRIANGLE & ITS PROPERTIES)

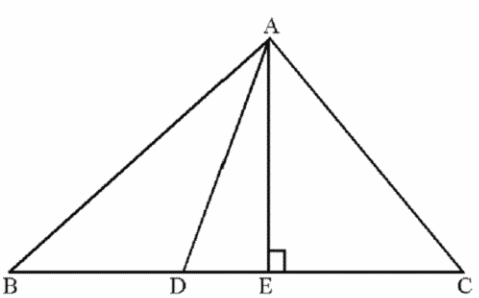
Exercise : 10.1

Q. 1 In fig. ABC is a triangle with D as the mid point of BC, Name AD and AE. Is AD = AE?

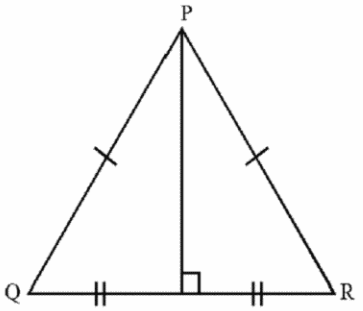
AD is the median

and AE is the altitude

Median and altitude is not equal in scelen triangle.



Q. 2 Draw an isosceles triangle PQR. Draw the median through P and the altitude from P. What do you observe?

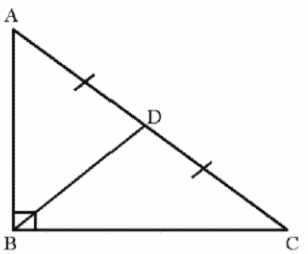


In isosceles triangle PQR in which

PQ = PR

Then altitude and median are coincident.

Q. 3 Draw a rough sketch of a right angled triangle ABC, with $\angle B = 90^0$. Through A, draw the median and altitude. Are these the same?



Median and altitude (B) are coincident.

Exercise : 10.2

Q. 1 The number of medians, that can be drawn in a triangle.

(a) 1 **(b) 2** **(c) 3** **(d) 4**

Ans. 3 medians can be drawn in a triangle. **And. (c)**

Q. 2 The sum of the measures of the angles of a quadrilateral is –

(a) 180^0 **(b) 90^0** **(c) 360^0** **(d) None of these**

Ans. The sum of the measure of the angles of a quadrilateral is 360^0. **Ans. (c)**

Q. 3 The number of altitudes that can be drawn in a triangle are

(a) 1 **(b) 2** **(c) 3** **(d) 4**

Ans. 3 altitudes can be drawn in a triangle. **Ans. (c)**

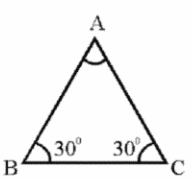
Q. 4 In an isosceles triangle, the two equal angles are each equal to 30^0. Find the third angle.

Ans. $\angle A + \angle B + \angle C = 180^0$

$\angle A + 30^0 + 30^0 = 180^0$

$\therefore \quad \angle A = 180 - 60^0$

$\therefore \quad \angle A = 120^0$

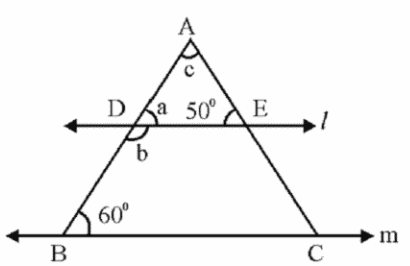


Q. 5 In fig. l || m, $\angle B = 60^0$ $\angle E = 50^0$. Find the value of a, b, c.

Given l || m $\angle B = 60^0$ $\angle E = 50^0$

l || m (Given)

$\therefore \angle a = 60^0$ (Corresponding angles)



$\therefore \angle c = 50^0$ (Corresponding angles)

$\angle A + \angle B + \angle C = 180^0$

$\angle C + 60^0 + 50^0 = 180^0$

$\angle C = 180 - 110 = 70 \quad \therefore \angle C = 70^0$

$\angle a + \angle b = 180^0$ (Linear pair)

$6a + b + 180^0 \Rightarrow b = 12^0$

$a = 60^0$, $b = 120^0$, $c = 70^0$

Q. 6 State which of the following are triangle :

(a) $\angle A = 40^0$, $\angle B = 50^0$, $\angle C = 60^0$ **(b) $\angle P = 57^0$, $\angle Q = 57^0$, $\angle C = 57^0$**

(c) $\angle A = 120^0$, $\angle B = 0^0$, $\angle C = 60^0$

Ans. (a) $\angle A + \angle B + \angle C = 40^0 + 50^0 + 60^0 = 150^0$

Sum of $\angle A$, $\angle B$ and $\angle C$ is less then 180^0

$\therefore$ It is not form triangle.

(b) $\angle P + \angle Q + \angle R = 57^0 + 57^0 + 57^0 = 171^0$

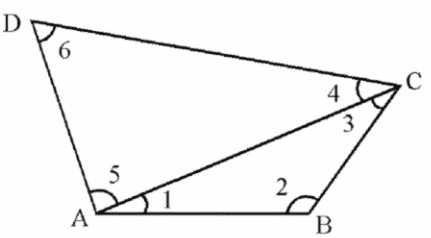
$\therefore$ It is not form triangle.

(c) $\angle A + \angle B + \angle C = 120^0 + 0^0 + 60^0 = 180^0$

$\angle B$ is zero.

$\therefore$ These are not formal triangle.

Q. 7 In figure, find the sum of $\angle 1$, $\angle 2$, $\angle 3$, $\angle 4$, $\angle 5$ and $\angle$. Hence, write what is the sum of the angles of a quadrilateral.



In $\triangle$ ABC

$\angle 1 + \angle 2 + \angle 3 = 180^0$

In $\triangle$ ACD

$\angle 4 + \angle 5 + \angle 6 = 180^0$

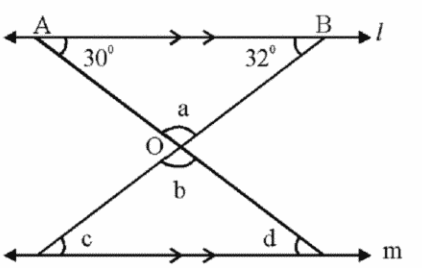
$\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 = 360^0$

$\therefore (\angle 1 + \angle 5) + \angle 2 + (\angle 3 + \angle 4) + \angle 6 = 360^0$

$\angle A + \angle B + \angle C + \angle D = 360^0$

Sum of the angles of a quadrilateral is 360^0.

Q. 8 In figure l || m. Find the values of a, b, c and d.



Given l || m

In $\triangle$ OAB

$a + 30^0 + 32^0 = 180^0$

$\therefore a = 180 - 620 = 118^0$

$b = a$ (Vertically opposite angles)

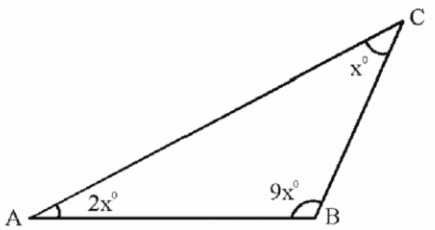
$\therefore b = 118^0$

$\angle C = 32^0$ (Alternative angles)

$\angle D = 30^0$ (Alternative angles)

$\therefore \angle a = 118^0, \angle b = 118^0, \angle c = 32^0$ and $\angle d = 30^0$.

Q. 9 In fig. if $\angle A = 2x^0$, $\angle B = 9x^0$ and $\angle C = x^0$, then find x and hence find the angles of the triangle.



In $\triangle$ ABC

$\angle A + \angle B + \angle C = 180^0$

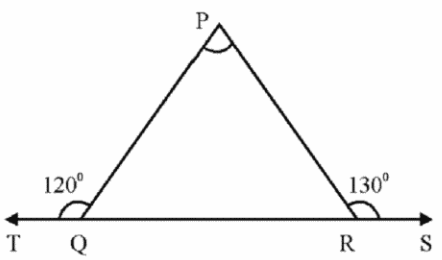
$2x + 9x + x = 180^0$

$12x = 180^0$

$x = \frac{180}{12} = 15$

$\therefore x = 15^0$. $\angle A = 30^0$, $\angle B = 135^0$, $\angle C = 15^0$

Q. 10 In fig. the two exterior angles are 120^0 and 130^0 respectively. Find $\angle P$.



$\angle PQR + 120^0 = 180^0$ (Linear pair)

$\angle PQR = 180^0 - 120^0$

$\therefore \angle PQR = 60^0$

$\angle PRS + \angle PRQ = 180^0$ (Linear pair)

$\angle PRQ = 180^0 - 130^0 = 50^0$

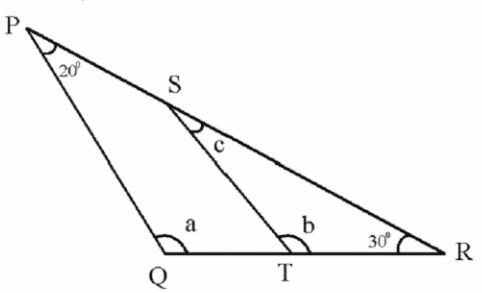
In $\triangle$ PQR

$\angle QPR + \angle PQR + \angle PRQ = 180^0$

$\angle QPR + 60 + 50 = 180^0$

$\therefore \angle P = 180^0 - 110^0 = 70^0$ $\therefore \angle$ **P = 70^0**

Q. 11 In figure PQ || ST, $\angle P = 20^0$ and $\angle R = 30^0$. Find the values of a, b and c.



Given PQ || ST, $\angle P = 20^0$ and $\angle R = 30^0$.

PQ || ST

$\therefore \angle a = \angle b$ (Corresponding angles)

In $\triangle$ PQR

$\angle P + \angle Q + \angle R = 180^0$

$20^0 + a + 30^0 = 180^0$

$\angle a = 180^0 - 50^0 = 130^0$

$\angle a = \angle b = 130^0$

In $\triangle$ STR

$\angle S + \angle T + \angle R = 180^0$

$\angle C + 130^0 + 30^0 = 180^0$

$\angle C = 180^0 - 160^0 = 20^0$

$\therefore$ a = 130^0, b = 130^0 and c = 20^0

Exercise : 10.3

Q. 1 **Find the length of the hypotenuse of each of the following right angled triangles.**

$\triangle$ ABC, AB = 9cm, BC = 12cm and $\angle B = 90^0$.

Ans. In $\triangle$ ABC, $\angle B = 90^0$

$\therefore AC^2 = AB^2 + BC^2$

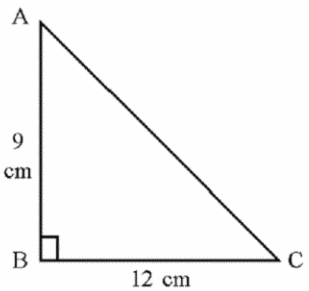
$= 9^2 + 12^2$

$= 81 + 144$

$= 225$

$AC = \sqrt{225} = \sqrt{15 \times 15}$

$\therefore AC =$ **15 cm Ans.**



Q. 2 **A rectangular picture frame 7cm by 24 m. Find its diagonal.**

Ans. In $\triangle$ ABC, $\angle B = 90^0$

$\therefore AC^2 = AB^2 + BC^2$

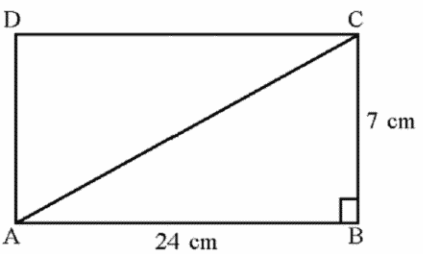
$= 24^2 + 7^2$

$= 576 + 49$

$= 625$

$AC = \sqrt{625} = \sqrt{25 \times 25}$

Diagonal (AC) AC = **25 cm Ans.**



Q. 3 **The following triplets from the lengths in cm of the sides of a triangle. State which of them can form right angled triangles.**

(a) 7, 24, 25 **(b) 11, 60, 65**

Ans. (a) $7^2 = 49$, $24^2 = 576$, $25^2 = 625$

$7^2 + 24^2 = 49 + 576 = 625 = 25^2$

$\therefore$ 7, 24 and 25 form a right triangle.

(b) $11^2 = 121$, $60^2 = 3600$, $65^2 = 4225$

$11^2 + 60^2 = 121 + 3600 = 3721$

$11^2 + 60^2 \neq 652$

(11, 60 and 65 cm) can not form a right triangle.

Q. 4 **The hypotenuse of a right triangle is 65m and one leg is 25cm. Find the length of the other leg.**

Ans. Length of other side of right triangle $= \sqrt{\text{Hypotenuse}^2 - (\text{side})^2}$

$= \sqrt{65^2 - 25^2}$

$= \sqrt{4225 - 625}$

$= \sqrt{3600}$

$= \sqrt{60 \times 60}$

$\therefore$ Length of other side = **60 m Ans.**

Q. 5 A ladder 17m long reaches a window of a building 15m above the ground. Find the distance of the foot of the ladder form the building.

Ans. In $\triangle OAB$, $\angle O = 90^0$

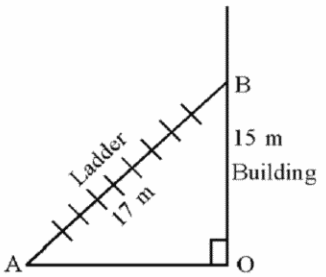
$\therefore AB^2 = OA^2 + OB^2$

$17^2 = OA^2 + 15^2$

$289 = OA^2 + 225$

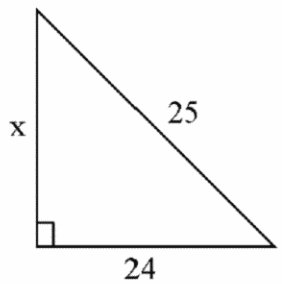
$289 - 225 = 64 = OA^2$

$\therefore OA = \sqrt{64} =$ **8m Ans.**



Q. 6 Find the unknown side x in each of the following right angled triangles:

(i)



$x^2 + 24^2 = 25^2$

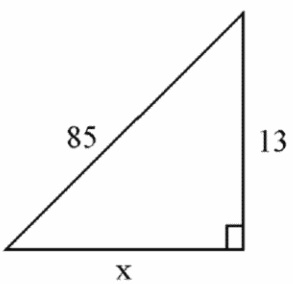
$x^2 + 576 = 625$

$x^2 = 625 - 576$

$x = \sqrt{49}$

$x =$ **7 Ans.**

(ii)



$x^2 + 13^2 = 85^2$

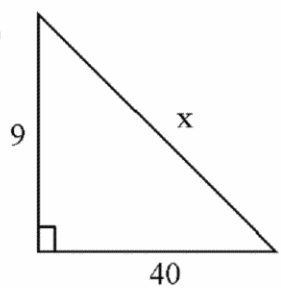
$x^2 = 85^2 - 13^2$

$x^2 = 7225 - 169$

$x^2 = 7056$

$x =$ **84 Ans.**

(iii)



$9^2 + 40^2 = x^2$

$81 + 1600 = x^2$

$1681 = x^2$

$\therefore x = \sqrt{1681}$

$x = \sqrt{41 \times 41} =$ **41 Ans.**

Q. 7 A man goes 10m due South and then 24m due East. Find his distance from the starting point?

Ans. Starting point is O

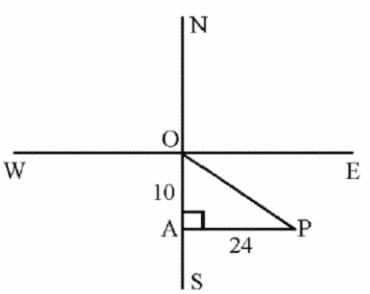
and final point is P

South and East directions are perpendiculars other

$\therefore \angle A = 90^0$

In $\triangle OAP$

$OP^2 = OA^2 + AP^2$



$= 10^2 + 24^2$

$= 100 + 576$

$OP^2 = 676$

$\therefore OP = \sqrt{676}$

$OP = \sqrt{2 \times 2 \times 13 \times 13} = 26$

$\therefore$ Distance from starting point = **26 m Ans.**

Q. 8 A ladder 7.4 m long in placed against a wall in such as way that the foot of the ladder in 2.4 m away from th foot of the wall. Find the height of the wall to which the ladder reaches.

Ans. $\angle O = 90^0$

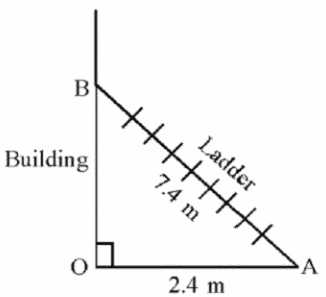
$\therefore AB^2 = OA^2 + OB^2$

$(7.4)^2 = (2.4)^2 + OB^2$

$54.76 = 5.76 + OB^2$

$\therefore OB = \sqrt{49} = 7$

$\therefore$ Ladder reaches 7m at the well.



Exercise : 10.4

Q. 1 Is it possible to have a triangle with the following sides?

(a) 3.1 cm, 1.7 cm, 4.1 cm **(b) 6cm, 3cm, 2cm**

Ans. (a) $1.7 + 3.1 = 4.8$

$4.8 > 4.1$

Yes it is possible to have a triangle with the given sides.

(b) $3 + 2 = 5$

$5 < 6$

No it is not possible to make the triangle.

Q. 2 Two sides of a triangle are 3cm and 5cm. What can be the maximum of the third side?

Ans. Two sides of triangles 3cm and 5cm.

Third side $> 5 - 3$

$\therefore$ Third side > 2 cm

Third side $< 5 + 3$ cm

Third side < 8 cm

Q. 3 In figure, AD is a median of ΔABC. Show that AB + BC + AD > AD.

Ans. In ΔABD,

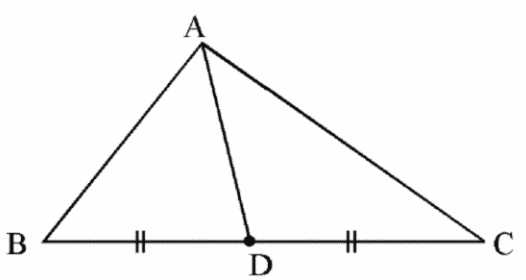
$AB + BC > AD$ .... (i)

In ΔADC,

$AC + CD > AD$ .... (ii)

Adding (i) & (ii)

$AB + BD + AC + CD > AD + AD$



AB + (BD + CD) + AC > 2AD

AB + BC + AC > 2AD **Hence Proved**

Q. 4 In figure, S in any point on the side OR of ΔPQR. Show that PQ + QR + PR > 2 PS.

Ans. In ΔPQS

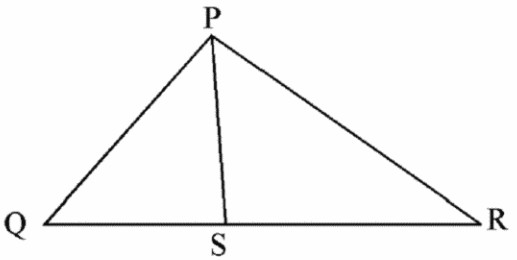
PQ + QS > PS .... (i)

In ΔPSR

PR + RS > PS .... (ii)

Adding = PQ + QS + RS + PR > PS + PS

PQ + QR + PR ? 2 PS



Hence Proved

Q. 5 In figure, PQRS is a quadrilateral. Show that PQ + QR + SR + PS > 2 (PR + QS)

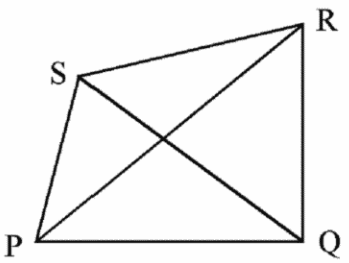
Ans. In ΔOPQ

OP + OQ > PQ .... (i)

Similarly OQ + OR > QR .... (ii)

OR + OS > RS .... (iii)

OS + OP > PS .... (iv)



Adding (i), (ii), (iii) and (iv)

OP + OQ + OQ + OR + OR + OS + OS + OP > PQ + QR + RS + PS

2(OP + OR + OQ + OS) > PQ + QR + RS + PS **Hence Proved**

Q. 6 In figure, T is a point in the exterior of ΔPQR. Show that PQ + QR + PR < 2 (TP + TQ + TR)

Ans. In ΔTPQ

TP + TQ > PQ ....(i)

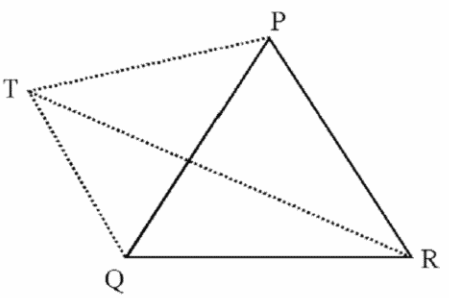
Similarly TR + TQ > QR ....(ii)

TP + TR > PR ....(iii)

Adding (i) (ii) & (iii)

2(TP + TQ + TR) > PQ + QR + PR

∴ PQ + QR + PR < 2(TP + TQ + TR) **Hence Proved**



Q. 7 The lengths of two sides of a triangle are 6cm and 9cm. Between what two measure should the lengths of the third side fall?

Ans. Third side < 6 + 9

∴ Third side < 15 cm

Third side > 9 – 6 cm

Third side > 3 cm.

Q. 8 P, Q and R are three collinear points. Can you draw a triangle with length of sides equal to that of PQ, QR and PR? Give reasons for your answer.

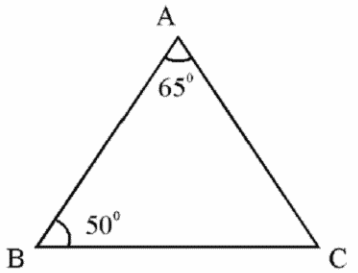
Ans. PQ + QR = PR

Sum of two side is not gredere than third side.

∴ Triangle is not possible.

TEST YOUR PROGRESS

Q. 1 **In figure, which sides of ΔABC are equal?**



Ans. In ΔABC

$\angle A + \angle B + \angle C = 180^0$

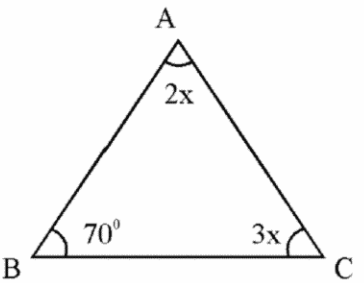
$65 + 50 + \angle C = 180$

$\angle C = 65^0$

$\therefore \angle A = \angle C = 65^0$

$\therefore$ **AB = BC**

Q. 2 **In figure, find x in ΔABC.**



Ans. In ΔABC

$\angle A + \angle B + \angle C = 180^0$

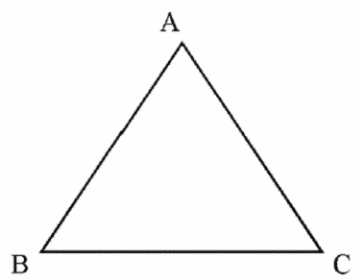
$2x + 70^0 + 3x = 180$

$5x = 180 - 70$

$\therefore x = \frac{110}{5} = 22$

x = 22

Q. 3 **Angles of a triangle are in that ratio 6:9:12. Find the angles.**



Ans. Ratio of angles = 6 : 9 : 12

$\angle A = 6x$, $\angle B = 9x$ and $\angle C = 12x$

$\therefore \angle A + \angle B + \angle C = 180^0$

$6x + 9x + 12x = 180$

$x = \frac{180}{27} = \frac{20}{3}$

$\therefore \angle A = 6x = 6 \times \frac{20}{3} = 40^0$

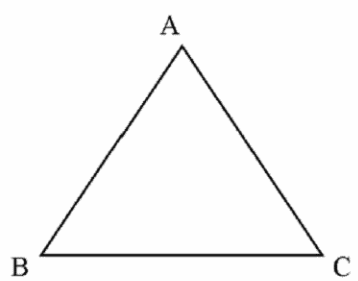
$\angle B = 9x = 9 \times \frac{20}{3} = 60^0$

$\angle C = 12x = 12 \times \frac{20}{3} = 80^0$

Q. 4 **Two angles of a triangle are equal and third angle is smaller than other by 15^0. Find the angles.**

Ans. Let $\angle B = \angle C = x^0$ (Given)

In ΔABC



$\therefore \angle A = x - 150$

$\angle A + \angle B + \angle C = 180^0$

$x - 15 + x + x = 180$

$3x = 180 + 15$

$x = \frac{192}{3} = 65$

$\therefore \angle A = 65 - 15 = 50^0$

$\angle B = \angle C = 65^0$

Q. 5 **Draw an equilateral triangle ABC. Draw the median AD and also altitude through a. What do you observe?**

Ans. Median and altitude are coincident.

Q. 6 **Draw a triangle PQR. Product QP to S such that PS = PR. Join RS, show that QS>QR.**

Ans. QS = QP + PS

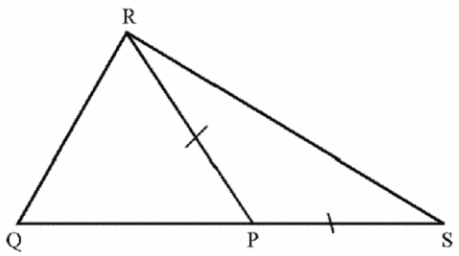
QS = QP + PR ....(i)

In $\triangle PQR$,

QP + PR > QR ....(ii)

From (i) & (ii)

QS > QR **Hence Proved**



Q.7 **The lengths of two sides of triangle are 7cm and 10cm. Between what two measure should the length of the third side fall.**

Ans. Third side > difference of two sides

$\therefore$ Third sides > 10 – 7

Third sides > 3cm

Third side < sum of two sides

Third side < 10 + 7

Third side < 17 cm

3cm < Third side < 17 cm

Q. 8 **A man goes 15m due West and then 8m due North. How for is he from the starting point?**

Ans. Intial position i.e. starting point is 0

and Final position is B.

$AB \perp OA$

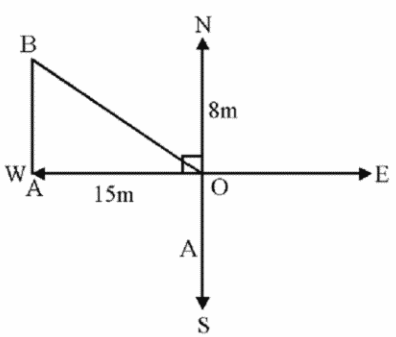
In $\triangle OAB$ $\angle A = 90^0$

$OB^2 = OA^2 + AB^2$

$= 15^2 + 8^2$

$= 225 + 64 = 289$

$\therefore OB = \sqrt{289} = 17$



$\therefore$ Distance between intial and final position **17 m. Ans.**

Q. 9 **Two sides of a triangle are 11cm and 5.5cm. What will be the minimum length of the third side?**

In figure (i) and (ii) Find x and y.

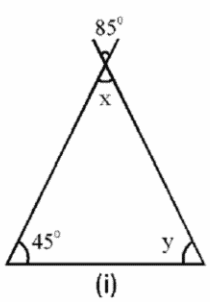
Ans. Minimum length of third side > Difference of two side

> 11 – 535

> 5.5 cm

(i) $x = 85^0$ (Vertically apposite angle)

$85 + 45^0 + y^0 = 180^0$



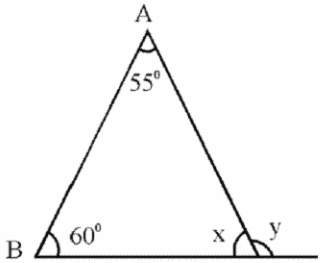
(i)

$85 + 45 + y = 180$

$y = 180 - 130 = 50^0$

$\therefore$ $x = 85^0$ and $y = 50^0$

(ii) In ?



$55 + 60 + x = 180$

$x = 180 - 115 = 65^0$

$y = 55 + 60 = 115^0$

Q. 10 An exterior angle of a triangle is 115^0 and one of its interior opposite angles is of measure 70^0. Find the measure of the other interior opposite angle.

Ans. Given $\angle ACD = 115^0$

$\angle B = 70^0$

$\angle ACD = \angle A + \angle B$

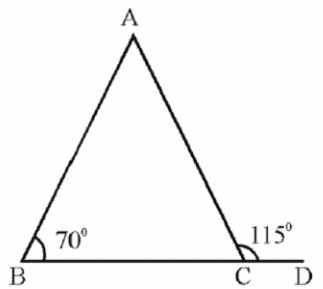
$115 = \angle A + 70^0$

$\therefore$ $\angle A = 115 - 70 = 45^0$

$\angle C + 115^0 = 180^0$ (Linear Pair)

$\therefore$ $\angle C = 180 - 115 = 65^0$

$\angle A = 45^0$, $\angle B = 70^0$ and $\angle C = 65^0$



Q. 11 In figure, P is any point in the interior of $\triangle ABC$. Show that $2(PA + PB + PC) > AB + BC + AC$.

Ans. In $\triangle APB$

$PA + PB > AB$ ....(i)

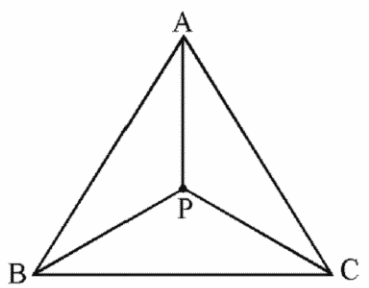
Similarly $PB + PC > AC$ ....(ii)

$PB + PC > BC$ ....(iii)

Adding (i), (ii) & (iii)

$PA + PB + PB + PC + PC + PB > AB + AC + BC$

$2(PA + PB + AC) > AB + AC + BC$



Q. 12 A pole 13m high stands 12m away from a building which is 18m high. Find the distance between the top of the pole and the top of the building.

Ans. AB is the pole and CD is the building

Draw $BP \perp CD$

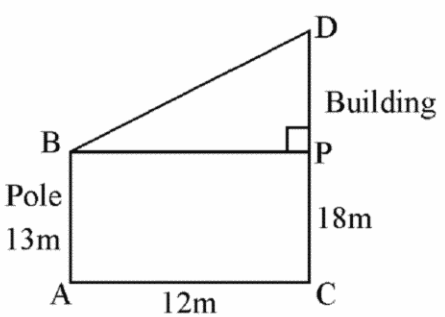
$\angle A = \angle C = \angle P = 90^0$

$\therefore$ ACPB is a rectangle

$\therefore$ AB = PC = 13m

AC = BP = 12m

DP = CD – CP = 18 – 13 = 5m



In $\triangle BPD$, $\angle P = 90^0$

$BD^2 = BP^2 + PD^2$

$= 12^2 + 5^2$

$= 144 + 25$

$= 169$

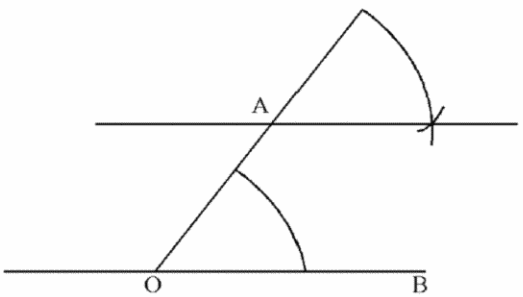
$\therefore BD = \sqrt{625} = 13m$

$\therefore$ Distance between top of pole and top of building is **13m**.

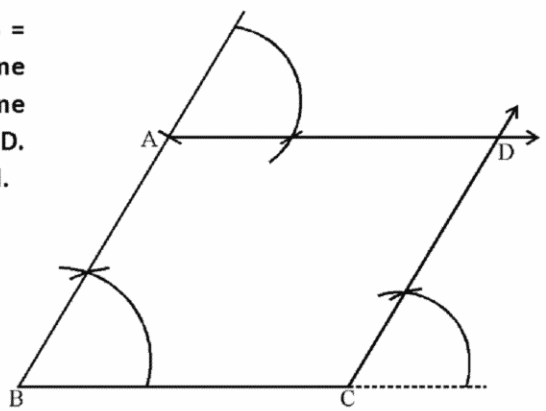
Chapter : 11 (CONSTRUCTIONS)

Exercise : 11.1

Q. 1 **Use the property of equal corresponding angles to draw a line parallel to a given line from a point out side it.**

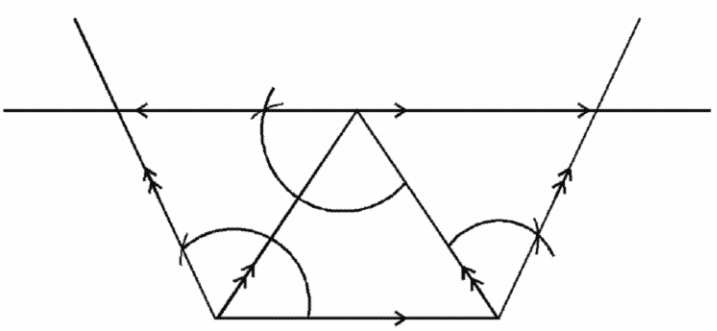


Q. 2 **Draw an $\angle ABC$ of measure 60^0 such that AB = 6cm and BC = 8cm. Through C draw a line parallel to AB and through A draw a line parallel to BC, intersecting each other at D. What type of quadrilateral have you obtained.**

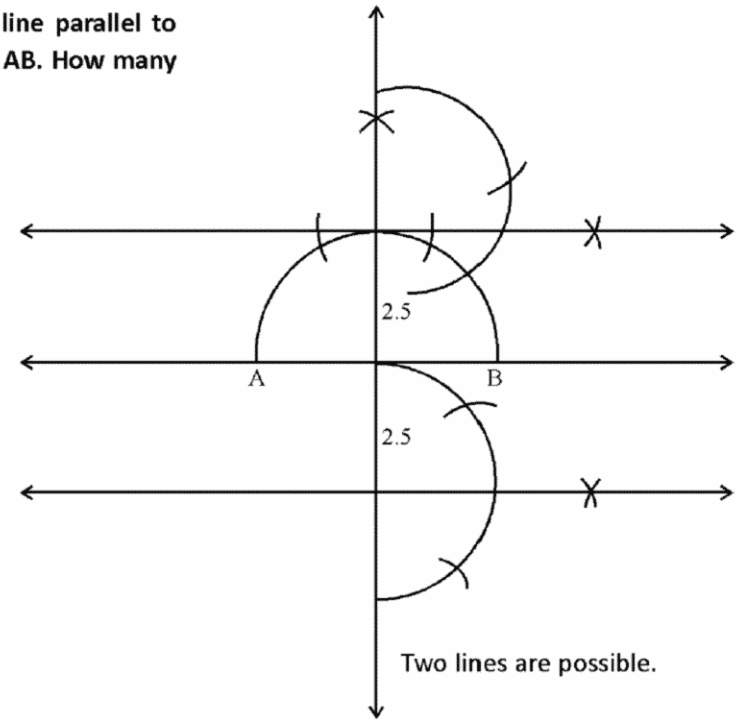


ABCD is a parallel gram

Q. 3 **Take three non-collinear points A, B and C. Join in pairs to get OABC. Though each vertex of the triangle, draw a line parallel to the opposite side.**



Q. 4 Draw a line AB. Draw another line parallel to AB at a distance of 2.5 cm from AB. How many such line can be drawn.



Two lines are possible.

Q. 5 Using ruler and set squares, draw a line parallel to a given line AB through a point P. not on AB. Also write the steps of construction.

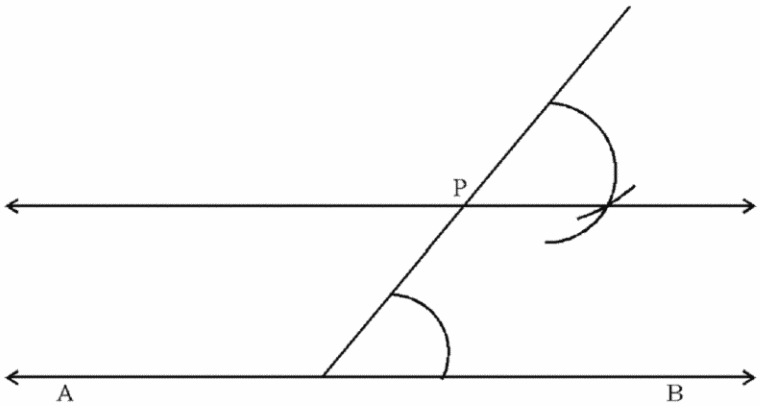
Ans. Do yourself::-

Q. 6 Draw a line parallel to a given line ∠M at a distance of

(a) 6.3 cm (b) 4.7 cm (c) 2.5 cm

Ans. Do yourself::-

Q. 7 From a point P outside a given line AB, draw a line PN parallel to AB, using ruler and compasses.



Exercise : 11.2

Q. 1 Construct a ΔPQR in which QR= 6cm, $\angle Q = 45^0$ and $\angle P = 35^0$. Measure $\angle R$. What kind of triangle is this.

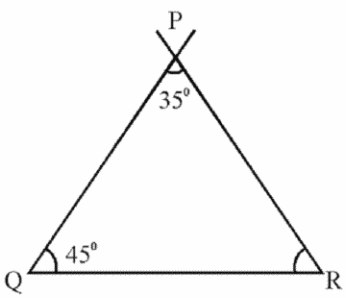
$\angle P + \angle Q + \angle R = 180^0$

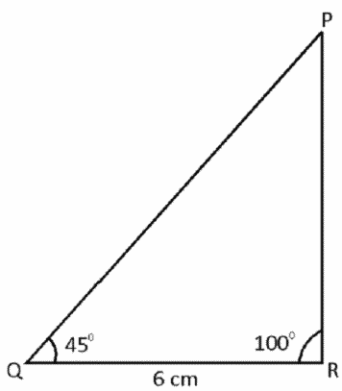
$35 + 45 + \angle R = 180$

$\angle R = 180 - 80$

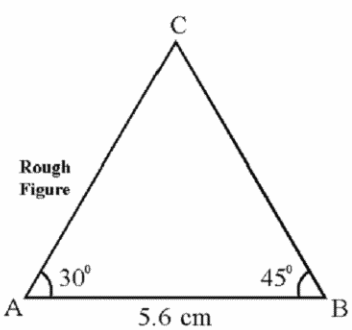
$\angle R = 100^0$

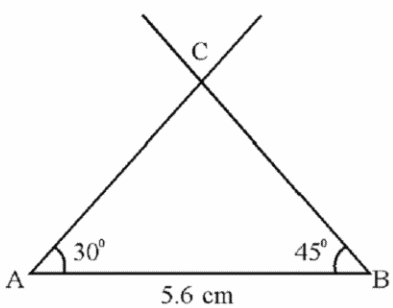
$\therefore$ Triangle is obtuse triangle.





Q. 2 Construct a ΔABC, given $\angle BAC = 30^0$, AB = 5.6 cm and $\angle ABC = 45^0$.





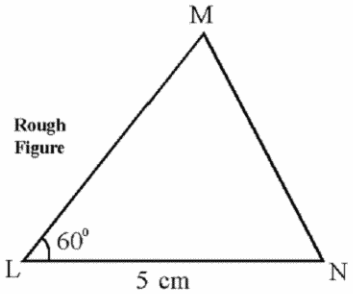
Q. 3 Construct a ΔLMN, given $\angle L = 60^0$, $\angle M = 90^0$ and LN = 5cm

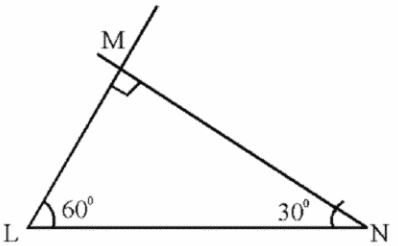
$\angle L + \angle M + \angle N = 180^0$

$60^0 + 90^0 + \angle N = 180$

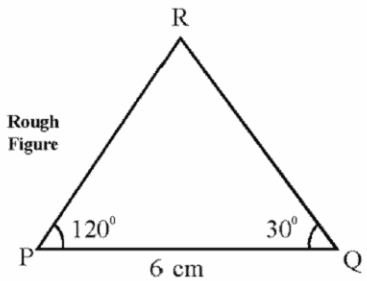
$\angle N = 180 - 150 = 30$

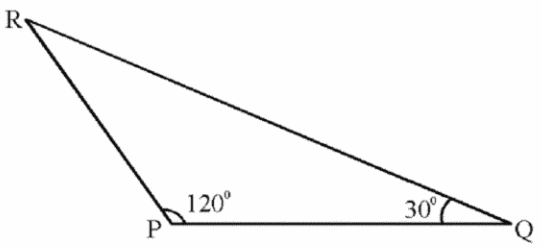
$\angle N = 30$





Q. 4 Construct a ΔPQR in given ∠P = 120°, ∠Q = 30° and PQ = 6cm

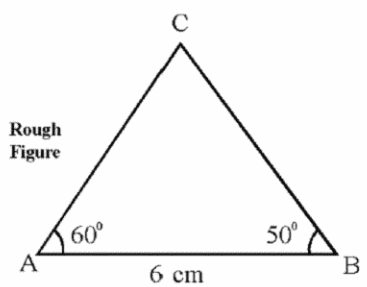


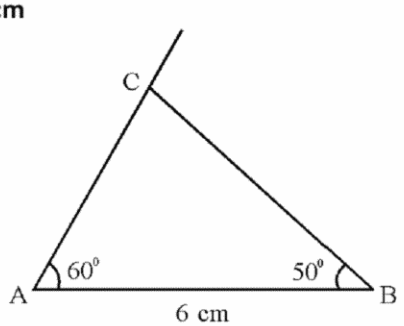


Q. 5 Which of the following can be drawn as a triangle?

(a) ΔPQR in which ∠P = 120°, ∠Q = 30° and PQ = 6cm

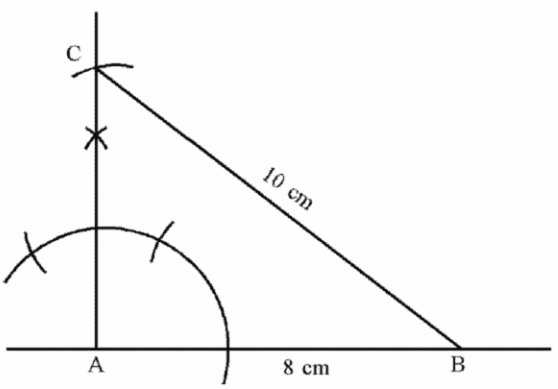
(b) ΔABC with ∠A = 60°, ∠B = 50° and AB = 6cm

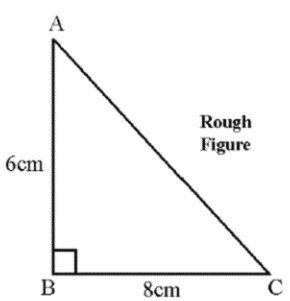




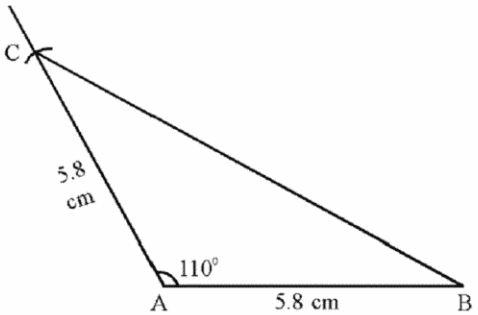
Exercise : 11.3

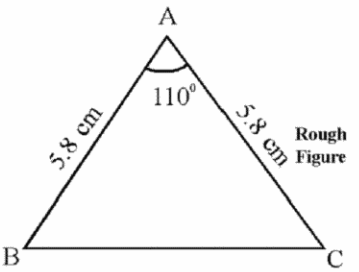
Q. 1 Construct a right triangle in which the sides containing the right angle are 6cm and 8 cm. Measure the length of the hypotenuse.





Q. 2 **Construct an isosceles triangle in which the lengths of each of its equal sides is 5.8 cm and the angle between the equal sides is 110^0.**

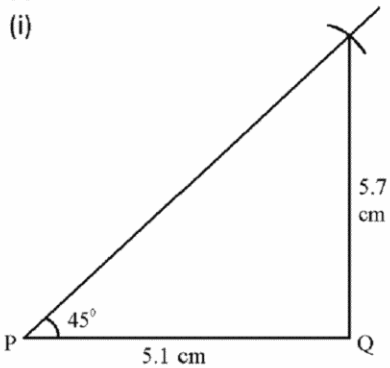


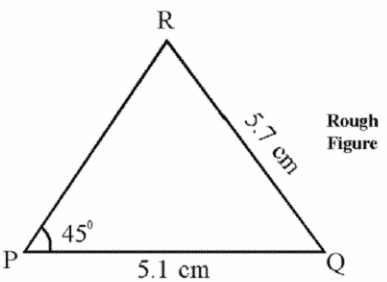


Q. 3 **Construct a $\triangle PQR$, having given :**

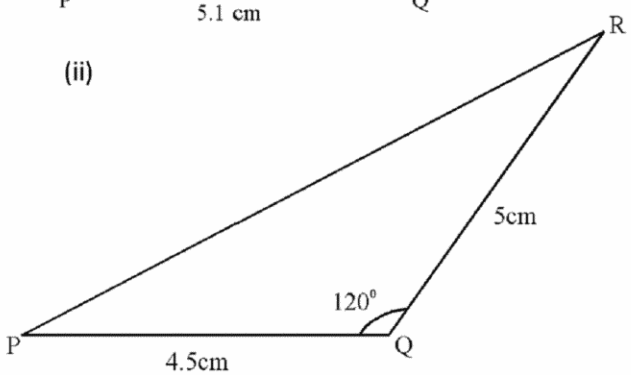
(i) QR = 5.7 cm, PR = 5.1 cm, $\angle P = 45^0$ **(ii) PQ = 5cm, QR = 4.5 cm, and $\angle Q = 120^0$.**

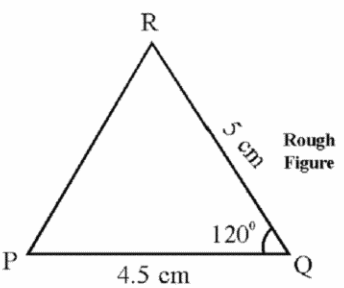
(i)



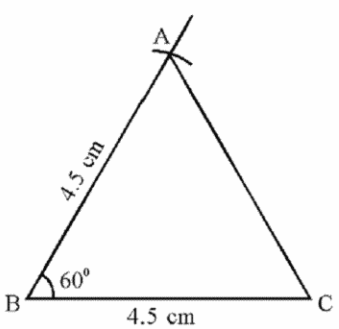


(ii)

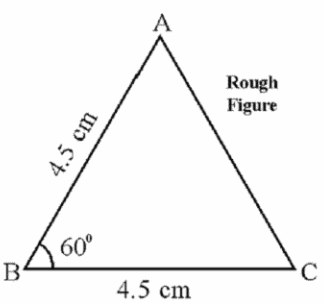




Q. 4 **Construct a triangle ABC in which AB = 4.5 cm, BC = 4.5 cm and $\angle B = 60^0$. Measure AC. What type of triangle is it?**

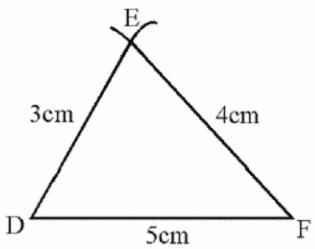


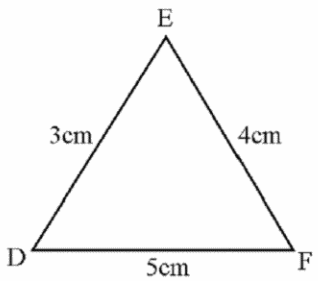
Equilateral Triangle



Exercise : 11.4

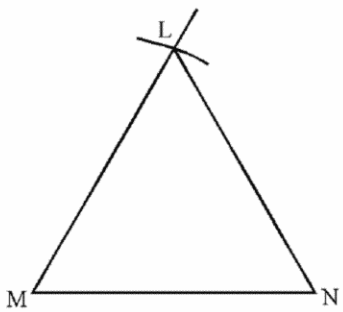
Q. 1 **Construct a $\triangle DEF$ in which DE = 3cm, EF = 4cm and DF = 5cm. Measure $\angle E$. What type of triangle is this?**





$\angle E = 90^\circ$

Q. 2 **Construct an equilateral triangle LMN with each side of length 6cm. Measure each angle.**



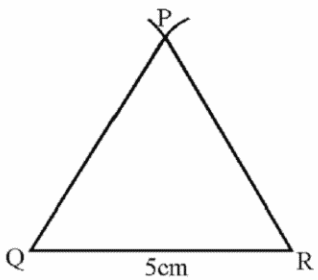
$\angle L = \angle M = \angle N = 60^\circ$

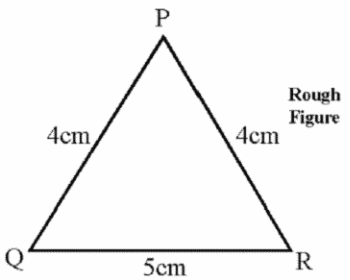
Q. 3 **Is it possible to construct a triangle whose sides are 4cm, 3cm and 8cm? If not, why?**

Ans. Sum of two side = 3 + 4 = 7cm is less than the third side.

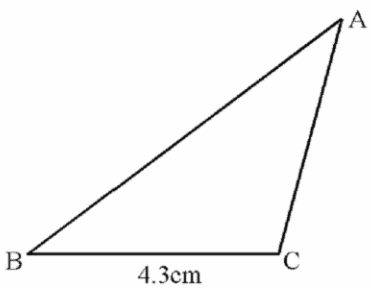
$\therefore$ Triangle is not possible.

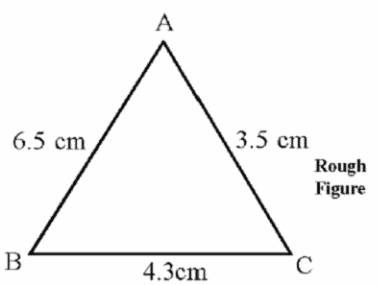
Q. 4 **Construct an isosceles triangle PQR with base QR = 5cm and each of other sides is 4cm.**





Q. 5 **Construct a $\triangle ABC$, in which AB = 6.5 cm, BC = 4.3 cm and AC = 3.5 cm.**





Exercise : 11.5

Q. 1 Construct an isosceles right-angled triangle PQR, where $\angle PQR = 90^0$ and PR = 6cm.

Ans. PQR is isosceles triangle.

$\therefore \angle P = \angle R$

In Δ PQR,

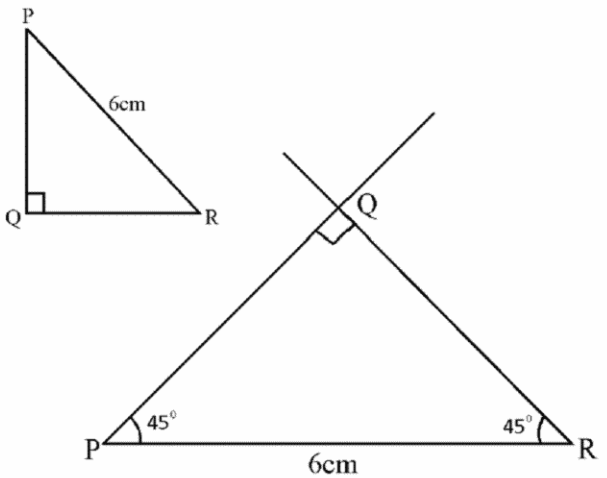
$\angle P + \angle Q + \angle R = 180^0$

$\angle P + \angle P + \angle R = 180$

$2\angle P = 180 - 90$

$\therefore \angle P = \frac{90}{2} = 45^0$

$\angle P = \angle Q = 45^0$

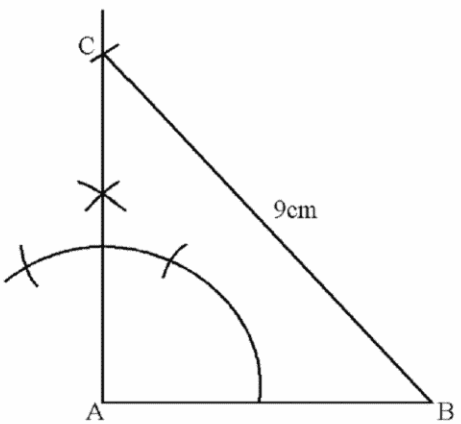


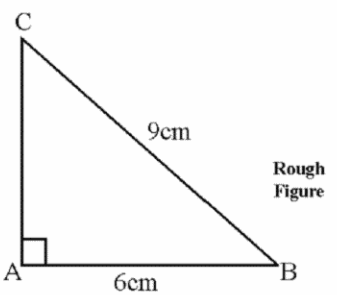
Q. 2 Construct the following right angled triangles :

(i) ΔABC in which AB = 6cm and hypotenuse BC = 9cm.

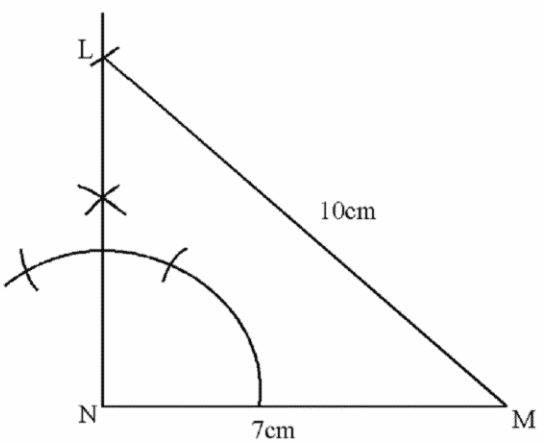
(ii) ΔLMN in which hypotenuse LM = 10cm and side LN = 7cm.

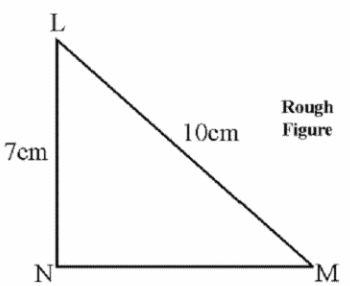
(i)



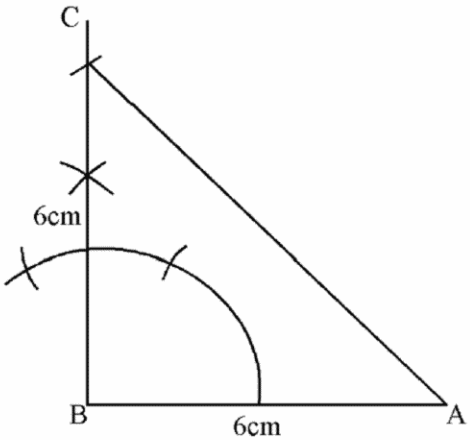


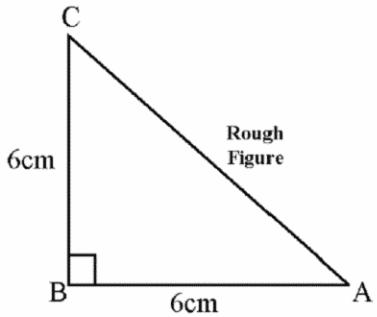
(ii)



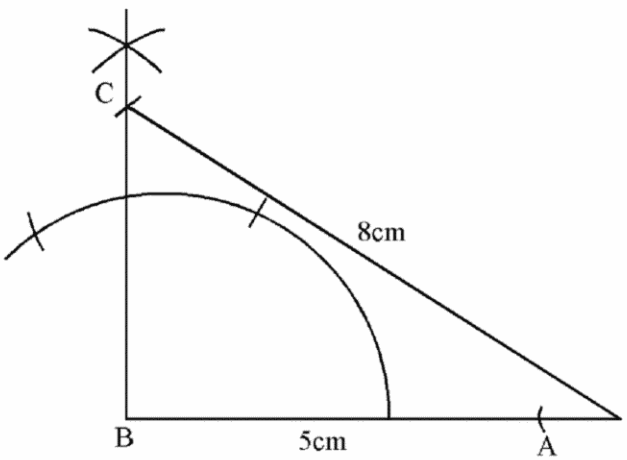


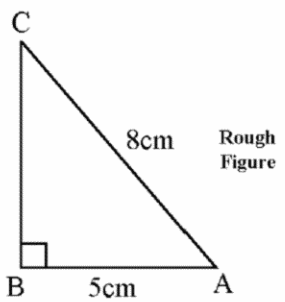
Q. 3 **Construct an isosceles right angled triangle ABC in which AB = BC = 6cm and $\angle B = 90^{\circ}$.**



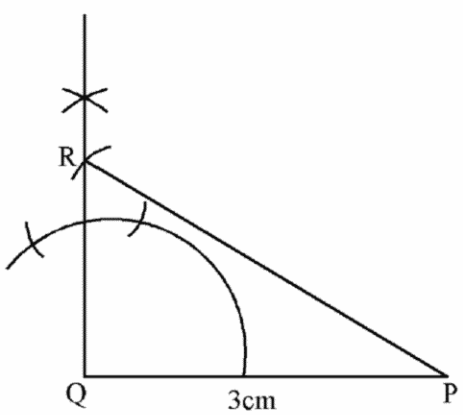


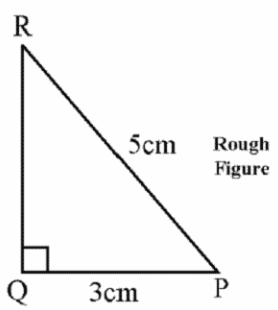
Q. 4 **Construct a right angled triangle ABC in which AB = 5cm, $\angle B = 90^{\circ}$ and hypotenuse AC = 13 cm. Measure the side BC.**





Q. 5 **Construct a right angled triangle PQR in which the hypotenuse PR = 5cm and one leg PQ = 3cm. Name the vertex at which the angle is a right angle.**





$\angle Q = 90^{\circ}$

TEST YOUR PROGRESS

Q. 1 Below are given the measure of some sides and angles of triangles. Identify those which cannot be constructed and say why you cannot construct them. Construct rest of the triangles.

	Triangle	Given Measurement
(i)	**$\triangle$ PQR**	**$\angle P = 75^0$, $\angle Q = 110^0$, PQ = 6cm**
(ii)	**$\triangle$ LMN**	**$\angle L = 35^0$, $\angle M = 55^0$, LM = 5.2cm**
(iii)	**$\triangle$ ABC**	**AB = 5cm, BC = 3cm, AC = 9cm**
(iv)	**$\triangle$ XYZ**	**XY = 3cm, YZ = 4cm, XZ = 5cm**
(v)	**$\triangle$ PQR**	**$\angle P = 60^0$, $\angle R = 120^0$, PQ = 4cm**

Ans. (i) $\angle P + \angle Q = 110^0 + 75^0 = 185^0 > 180^0$

$\therefore$ Triangle can not make.

(iii) $AB + BC = 5 + 3 = 8cm$

$AB + BC < AC$

$\therefore$ $\triangle ABC$ can not make.

(v) $\angle P + \angle R = 120 + 60^0 = 180^0$

$\therefore \angle Q = 0^0$

Hence $\triangle PQR$ can not make.

Q. 2 Draw a line parallel to a given lien l at a distance of 5cm from it. How many such lines can be drawn?

Ans. Two lines are drawn parallel to given line.

Q. 3 Draw any line *l* and from a point P not on *l*, draw a line M || L using the property of equal corresponding angles.

Ans. Do yourself::-

Q. 4 The lengths of the three line segments are 4 cm, 5 cm and 9 cm. Is it possible to construct a triangle with this data?

Ans. Sum of two sides is not greater than the third side 4 + 5 = 9

$\therefore$ Triangle cannot make.

Q. 5 What should be the relation between the three sides of a triangle to construct a triangle?

Ans. (i) The sum of the length of any two side is always. Than third side.

(ii) The difference of the length of any two side is always less than the third side.

Q. 6 How many lines can be drawn parallel to a given line and through a given point outside the given line?

Ans. Only one line can be drawn from parallel to the given line to the given point.

Q. 7 If length of a side and length of hypotenuse is given, then what type of triangle can be constructed?

Ans. Right angle triangle.

Chapter 12. SYMMETRY Exercise 12.1

Select the correct answer from the alternative given against each of the following: (1 – 3)

Question 1. The number of lines symmetry is an isosceles triangle is.

(a) 0 **(b) 1** **(c) 2** **(d) 3**

Ans. 1 (b)

Question 2. The number of lines of symmetry is an equilateral triangle is.

(a) 0 **(b) 1** **(c) 2** **(d) 3**

Ans. 3 (d)

Question 3. The number of lines of symmetry in a square is.

Ans. 4 (d)

Question 4. Give three examples of shapes with no line of symmetry.

Ans. The three examples are :-

Quadrilateral

Scalene Triangle

Parallelogram

Question 5. State the number of lines of symmetry in the letter W is.

(a) a parallelogram **(b) a regular pantagon** **(c) a quadrilateral** **(d) a circle**

Ans.

(a) No

(b) 5 lines

(c) No lines

(d) Infinite line of symmetry

Question 6. What letter of English alphabet has

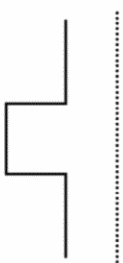
(a) a vertical line **(b) a horizontal line, as line of symmetry**

Ans. (a) a vertical line

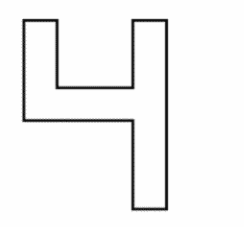
(b) a horizontal line, as line of symmetry

Question 7. Trace each figure on a squared paper and using dotted line (s) as line (&) of symmetry complete each shape to a symmetry figure.

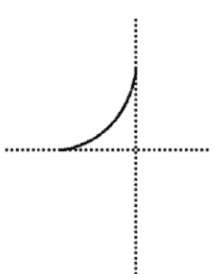
(a)



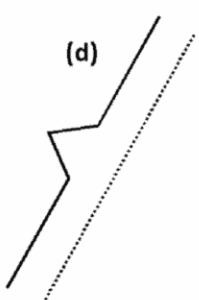
(b)



(c)



(d)



Ans. Students will do themself.

Exercise 12.2

Select the correct answer from the alternative given against each of the following : (1 – 3)

Question 1. A rectangle has a rotational symmetry of order.

(a) 2 **(b) 3** **(c) 4** **(d) 1**

Ans. (a) 2

Question 2. A square has a rotational symmetry of order.

(a) 1 **(b) 2** **(c) 3** **(d) 4**

Ans. 4 (d)

Question 3. The letter 'H' has rotational symmetry of order.

(a) 1 **(b) 2** **(c) 3** **(d) 4**

Ans. 2 (b)

Question 4. Name any two figures that have both line symmetry and rotational symmetry.

Ans. Equilateral triangle and regular hexagon are that two figures which have both lines of symmetry and rotational symmetry.

Question 5. Name the quadrilateral which have line and rotational symmetry of order more than 1.

Ans. Square has both time and rotational symmetry of order more than 1.

Question 6. After rotating by 120^0 about the centre, a figure looks exactly the same as its original position. At what other angles will this happen again for the figure?

Ans. It will rotate three times.

Question 7. If a figure has two or more lines of symmetry should it have rotational symmetry of order more than 1?

Ans. Yes, because every line through the centre forms a line of symmetry and it has rotational symmetry around the centre for every angle.

Question 8. State the number of lines of symmetry in the letter W is.

(a) a parallelogram **(b) a regular pantagon** **(c) a quadrilateral** **(d) a circle**

Ans.
(a) No
(b) 5 lines
(c) No lines
(d) Infinite line of symmetry

Chapter 13. VISUALISING SOLID SHAPES Exercise 13.1

Select the correct answer from the alternative given against each of the following : (1 – 3)

Question 1. Which of the following is a 3-D figure?

(a) rectangle **(b) cone** **(c) tetrahedron** **(d) circle**

Ans. (b) cone

Question 2. Which of the following is a 2-D figure?

(a)cylinder **(b) pyramid** **(c) tetrahedron** **(d) circle**

Ans. (d) circle

Question 3. Write down the number of vertices in each of the following 3-D solids:

(a) cuboid **(b) triangular pyramid** **(c) sphere** **(d) cone**

Ans. Cuboid vertices - 8

Triangular pyramid - 4

Sphere - 0

A circle does not have any vertices

Question 4. Fill in the blanks:

(a) Each _____ of a cuboid is a rectangle.

(b) A cube has _____ faces _____ edges and _____ vertices.

(c) Two faces of a solid meet at an _____.

Ans. (a) face (b) 6, 12, 8 (c) edge

Question 5. Write (T) for true and (F) for false:

(a) A cylinder has no vertex.

(b) A sphere has one vertex.

(c) A sphere has one vertex.

Ans. (a) True (b) False (c) False

Question 6. Write down the number of edges in each of the following solids:

(a) sphere **(b) cube** **(c) tetrahedron** **(d) cylinder**

Ans. Sphere - 0

Cube - 12

Tetrahedron - 6

Cylinder - 2

Exercise 13.2

Students will do by themselves.

Exercise 13.3

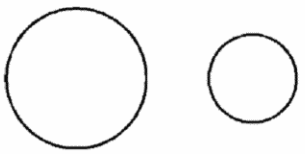
Students will do by themselves.

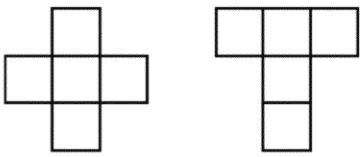
Exercise 13.4

Students will do by themselves.

Chapter 14. CONGRUENCE OF TRIANGLES Exercise 14.1

Question 1. Which of the following pairs of figures are congruent to find the correct answer.

(a) 

(b) 

(a) These are not congruent figures

(b) These are congruent figures

Question 2. IF ∠LMN = ∠PQR and m ∠PQR = 30°, then m ∠LMN is

(a) 30° **(b) 60°** **(c) 90°**

∠LMN = ∠PQR

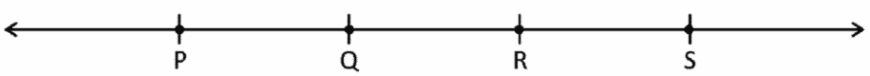
30° = ∠PQR Ans. (a)

Question 3. ΔABC and ΔDEF are congruent under the correspondence ABC □ EDF. Write the pairs of ΔDEF that correspond to. **(a) ∠C** **(b) BC** **(c) AC**

ΔABC ≅ ΔEDF

(a) LC = LF (b) BC = DF (c) AC = EF

Question 4. If in fig. PQ ? RS, PQ = 2 cm and QR = 3 cm, then length of QS is



(a) 3cm **(b) 8 cm** **(c) 2 cm** **(d) 5 cm**

QS = QR + RS

= QR + RQ

= 2 + 3

∴ QS = 5 cm Ans. (d)

Question 5. Which of the following statements are true?

(a) Two congruent rectangles must be of equal area. (True)

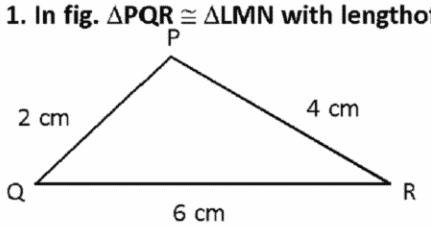
(b) All circles are congruent. (False)

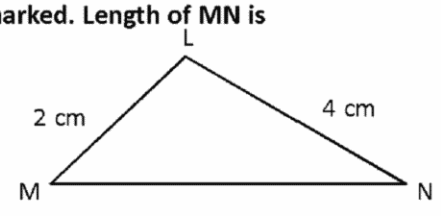
(c) Two rectangles of equal area must be congruent. (False)

(d) If two triangles are congruent, their corresponding angles are congruent. (True)

Exercise 14.2

Question 1. In fig. ΔPQR ≅ ΔLMN with lengthof sides marked. Length of MN is





(a) 2 cm **(b) 6 cm** **(c) 4 cm** **(d) None of these**

$\Delta PQR \cong \Delta LMN$

$MN = QR$

$\therefore = 6$ cm Ans. (b)

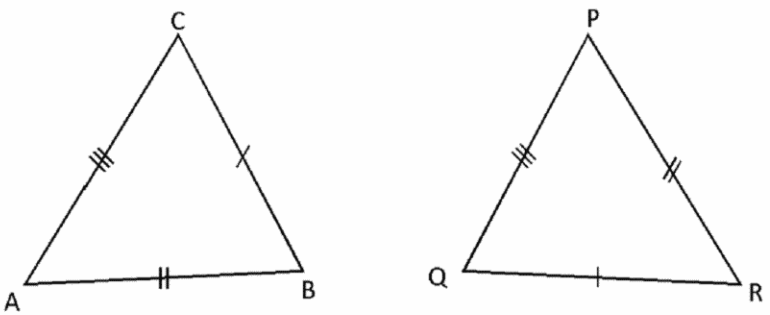
Question 2. If $\Delta PQR \cong \Delta MLN$, then the length of side MN is equal to the length of the side.

(a) LM (b) PQ (c) PR (d) None of these

$\Delta PQR \cong \Delta MLN$

$MN = PR$ Ans. (c)

Question 3. In fig. BC = QR, AB = PR and AC = PQ then the correct statement is.



(a) $ABC \cong \Delta PQR$ **(b) $\Delta ABC = \Delta PRQ$**

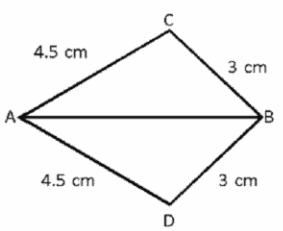
(c) $\Delta ABC \cong \Delta RPQ$ **(d) $\Delta ABC \cong \Delta RQP$**

$BC = QR$

$AB = PR$, And, $AC = PQ$

$\Delta ABC \cong \Delta PRQ$ Ans. (b)

Question 4. In fig. length of sides are given. Is $\Delta ABC \cong \Delta ABD$.



Given reason in support of your answer.

$AB = AD = 4.5$ cm

$BC = BD = 3$ cm

$AB = AB$ ...(Common)

$\therefore$ Triangles are congruent by SSS congruent rule

Question 5. ΔABC is an isosceles triangle with AB = BC. Prove that $\Delta ABC \cong \Delta CBA$.

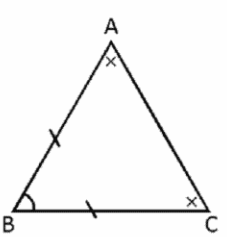
In ΔABC and ΔCBA

$AB = BC$ ...(Given)

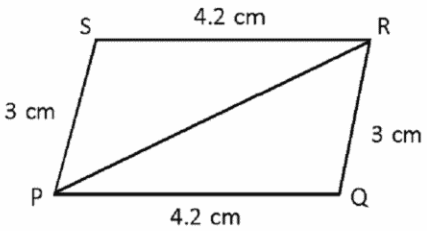
$BC = BA$ ...(Given)

$\angle B = \angle B$ ...(Common)

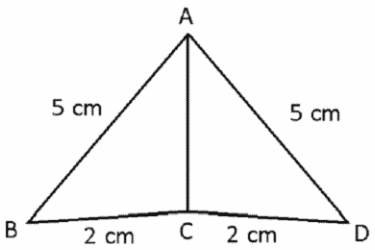
$\therefore \Delta ABC \cong \Delta CBA$ by (SAS congruence rule)



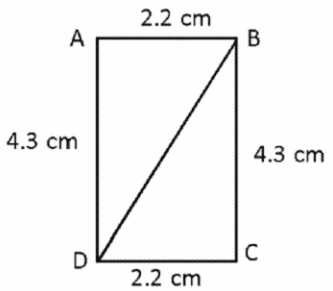
Question 6. In fig. by applying SSS congruence criterion, in the following pairs of triangles, state which are congruent and write the congruent triangles according to correspondence.



(i)



(ii)



(iii)

(i) In ΔPQR and ΔPSR

$PQ = SR = 4.2$ cm

$QR = PS = 3.0$ cm

$PR = PR$ ...(Common)

$\therefore \Delta PQR \cong \Delta RSP$ (SSS congruency rule)

(ii) In ΔABC and ΔACD

$BC = CD = 2$ cm

$AC = AC$ ...(Common)

$AB = AD = 5$ cm

$\therefore \Delta ABC \cong \Delta ACD$ (SSS congruency rule)

(iii) ΔBCD and ΔABD

$BD = BD$ ...(Common)

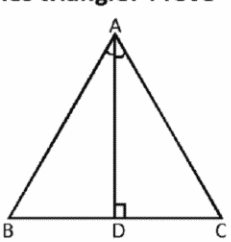
$BC = AD = 4.3$ cm

$DC = AB = 2.2$ cm

$\therefore \Delta BCD \cong \Delta DAB$ (SSS congruency rule)

Exercise 14.3

Question 1. In fig., AD is the bisector of $\angle A$ such that $AD \perp BC$. Is ΔABC on isosceles triangle? Prove



In ΔABD and ΔADC

$\angle BAD = \angle DAC$ ...(Given)

$\angle BDA = \angle ADC = 90^0$

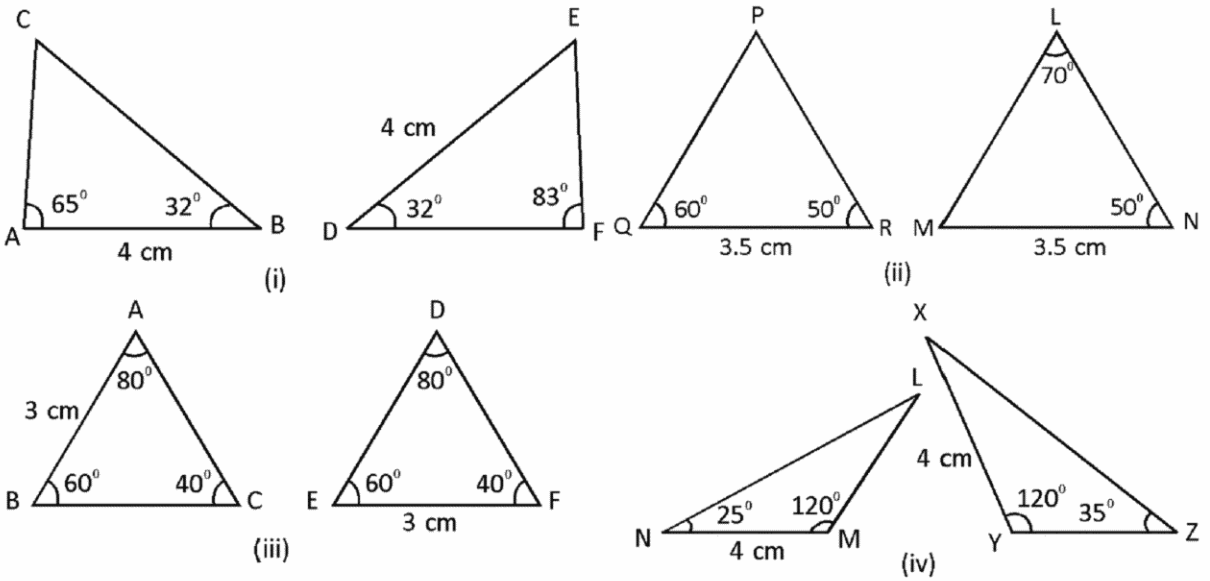
$AD = AD$ ...(Common)

$\Delta ABD \cong \Delta ACD$ (ASA congruency rule)

$AB = AC$ (C.P.C.T.)

Hence ΔABC is an isosceles triangle.

Question 2. Which of the following pair of triangles is not congruent?



(i) $\angle A = \angle E = \angle 65^0$

$\angle B = \angle D = 32^0$

AB = DE = 4 cm

$\Delta ABC \cong \Delta EDF$ (ASA congruency rule)

(ii) $\angle Q = \angle M = 60^0$

$\angle R = \angle N = 50^0$

QR = MN = 3.5 cm

PQR $\cong$ LMN (ASA congruency rule)

(iii) $\angle A = \angle D = 80^0$

$\angle B = \angle E = 60^0$

AB = 3 cm but DE is not given.

So ΔABC and ΔDEF are not congruent.

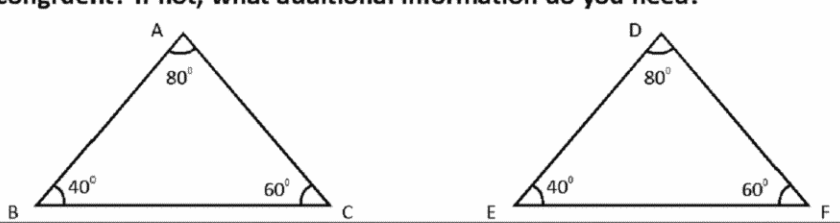
(iv) LN = LX = 25^0

LM = LY = 120^0

NM = XY = 4 cm

$\therefore$ $\Delta NML \cong \Delta XYZ$ (ASA congruency rule)

Question 3. In fig. the measurements of angles in two triangles are given. Can you say that the two triangles are congruent? If not, what additional information do you need?



$\Delta ABC \cong DEF$

If AB = DE or BC = EF or AC = DF

Question 4. Given below are measurements of some parts of two triangle. Examine whether the two triangles are congruent not? In case of congruence, write it in symbolic form.

(i) ΔABC with $\angle A = 70^0$, $\angle C = 80^0$, AC = 5cm and $\triangle DEF$ with $\angle D = 70^0$, $\angle F = 80^0$, DF = 5cm

(ii) ΔABC with $\angle A = 80^0$, $\angle B = 60^0$, AB = 4cm and $\triangle DEF$ with $\angle A = 80^0$, $\angle E = 60^0$, EF = 4cm

(i) $\angle A = \angle D = 70^0$

$\angle C = \angle F = 80^0$

AC = DF = 5 cm

$\therefore$ $\Delta ABC \cong \Delta DEF$ (ASA congruency rule)

(ii) $\angle A = \angle D = 80^0$

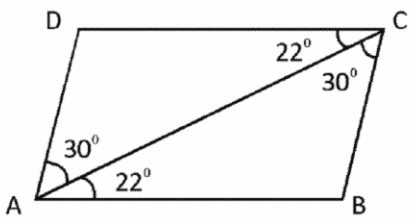
$\angle B = \angle E = 60^0$

AB = DF = 4 cm

Side DE is not given

$\therefore$ ΔABC and ΔDEF is not congruent

Question 5. In fig., the measurement of some angles are given. Is $\Delta ABC \cong \Delta CDA$? Given reasons.



In ΔABC and ΔCDA

$\angle DAC = \angle ACB = 30^0$

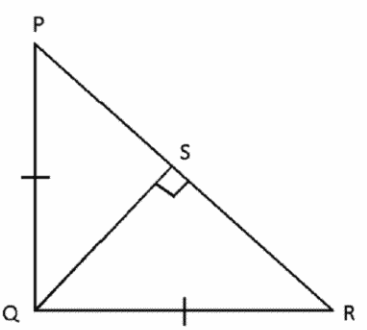
$\angle DCA = \angle CAB = 22^0$

AC = AC ...(Common)

$\Delta ACB \cong \Delta CAD$ (ASA congruency rule)

Exercise 14.4

Question 1. In fig. QS $\perp$ PR and PQ = QR, show that $\Delta PQS \cong \Delta RQS$.



In ΔPQS and ΔRQS

PQ = RQ ...(Given)

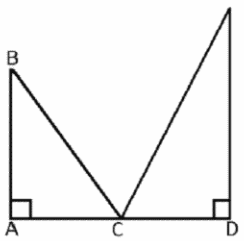
QS = QS ...(Common)

$\angle PSQ = \angle RSQ = 90^0$ (QS $\perp$ PR)

$\Delta PQS \cong \Delta RQS$

(R.H.S. congruency rule)

Question 2. In fig. $\angle A = \angle D = 90^0$ and AB = CD. Is $\Delta ACB \cong \Delta BED$? Give reason?



In ΔACB and ΔCED

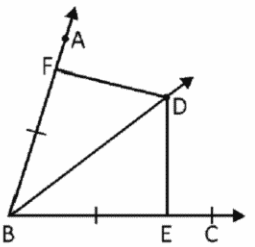
AB	=	CD			...(Given)
$\angle A$	=	$\angle D$	=	90^0	...(Given)

Triangles are not congruent

Question 3. In fig. DE $\perp$ BC, DF $\perp$ AB and BE = BF.

(a) Is $\Delta DBE \cong \Delta DBF$? Give reason

(b) Which angle is equal to $\angle DBF$?

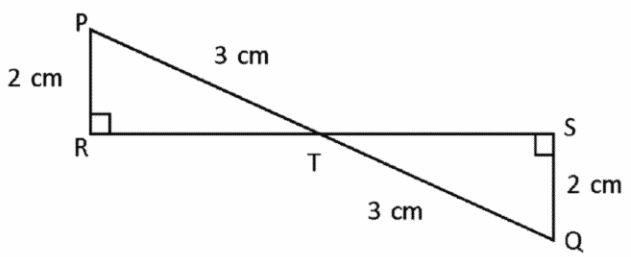


(i) In ΔDBE and ΔDBF

BD	=	BD			...(Common)
BE	=	BF			...(Given)
$\angle E$	=	$\angle F$	=	90^0	
ΔDBE	$\cong$	DBF			(R.H.S. congruency rule)

(ii) $\angle DBF = \angle DBE$ (C.P.C.T.)

Question 4. In fig. the measures of some sides and angles are indicated. Show that PQ bisects RS.



To prove PQ bisects RS

In ΔPRT and ΔTSQ

PR	=	SQ	=	2 cm	
PT	=	TQ	=	3 cm	
$\angle R$	=	$\angle S$	=	90^0	
ΔPRT	$\cong$	ΔQST			(R.H.S. congruency rule)
$\therefore$ RT	=	ST			(C.P.C.T.) Hence Proved

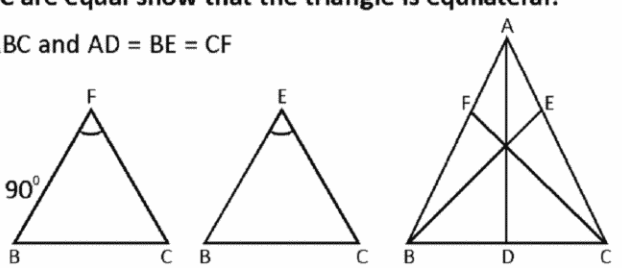
Question 5. If the three altitudes of a triangle ABC are equal show that the triangle is equilateral?

Given : AD, BE and CF are altitudes of ΔABC and AD = BE = CF

To prove, ABC is equilateral triangle

Proof, ΔBFC and ΔBEC

F	=	E	=	90^0



	BC	=	BC		...(Common)
	CF	=	BE		...(Given)
∴	ΔBFC	≅	ΔCEB		(R.H.S. congruency rule)
	∠ABC	=	∠CBA		(C.P.C.T.)

Similarly we can prove ∠ABC = ∠BAC

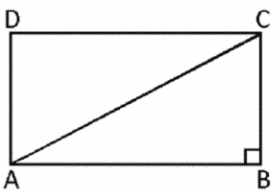
∴ ∠ABC = ∠BCA = ∠BAC

∴ ΔABC is equilateral triangle.

Question 6. Show that a diagonal divides a rectangles into two congruence triangles.

SAS Congruence :

Recall that we can construct a unique triangle ABC if AB = 4 cm, BC = 5cm and ∠B = 60°



Given : ABCD is a rectangle.

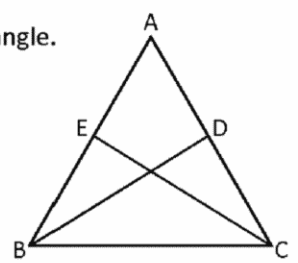
To prove, ΔABC ≅ ΔADC

Proof, In ΔABC and ΔADC

AB	=	CD	(Opposite side of rectangle)	
BC	=	AD	(Opposite side of rectangle)	
AC	=	AC	...(Common)	
ΔABC	≅	ΔADC	(SSS congruency rule)	Hence proved

Exercise 14.5

Question 1. In fig. ABC is an equilateral triangle. BD and CE are medians show that BD = CE.



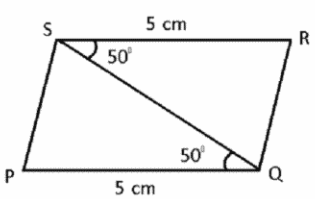
Given : ΔABC is an equilateral triangle BD and CE are medians of triangle.

To prove, BD = CE

Proof, In ΔBCD and ΔBCE

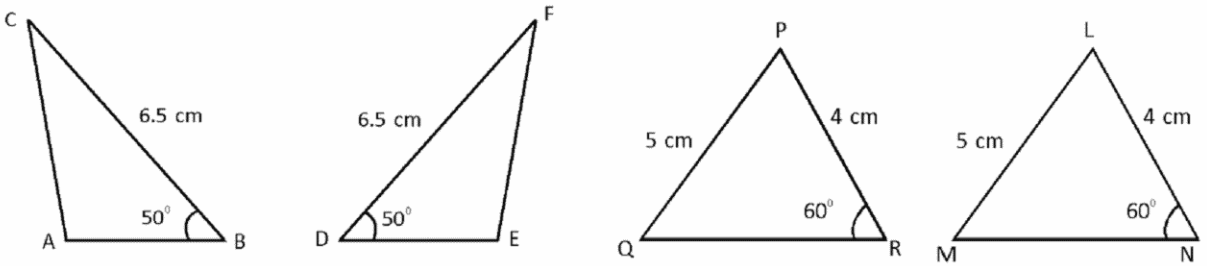
	∠BCD	=	∠EBC	=	60^0	
	BC	=	BC			...(Common)
	CD	=	BE			...(Given)
∴	ΔBCD	≅	ΔCBE			(SAS congruency rule)
	BD	=	CE			(C.P.C.T.) Hence Proved

Question 2. In fig. the measurement of sides and angles of the triangles are given. Which pair of triangle are congruent? Write the result in symbolic form.



PQ	=	RS	=	5 cm	
PQS	=	QSR	=	50^0	
∠QS	=	∠QS			...(Common)
ΔPSQ	≅	ΔRSQ			(SAS congruency rule)

Question 3. In fig. measurement of some elements in the following pairs of triangle are given. State which pair of triangles is not congruent.



(a) (b)

(i) BC = DF = 6.5 cm

$\angle B = \angle D = 50^0$

Information is incomplete

$\therefore$ Triangles are not congruent.

(ii) LR = LN = 60^0

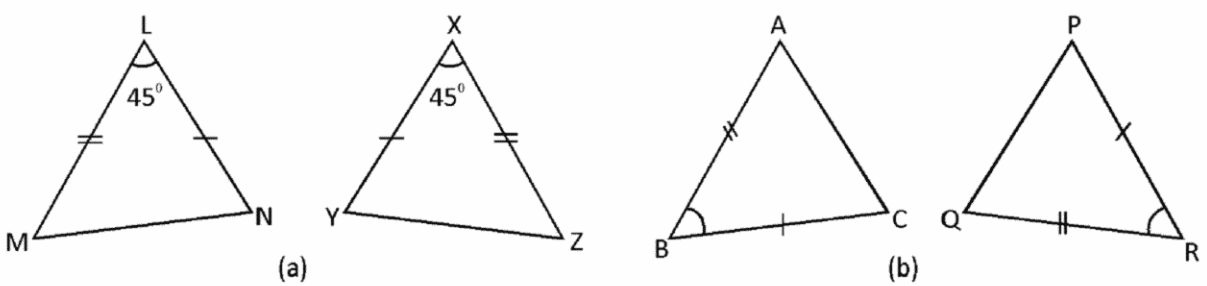
. PQ = LM = 5 cm

PR = LN = 4 cm

LR is not included angle of equal sides i.e., PQ and PR

$\therefore\therefore$ Triangles are not congruent.

Question 4. In fig. two pairs of triangles are given. State the congruency between the triangles in symbolic form. Where equal sides are marked with the same mark.



(a) (b)

(a) LM = XZ

LN = XY

LL = LX

$\Delta LMN \cong \Delta XZY$ (SAS congruency rule)

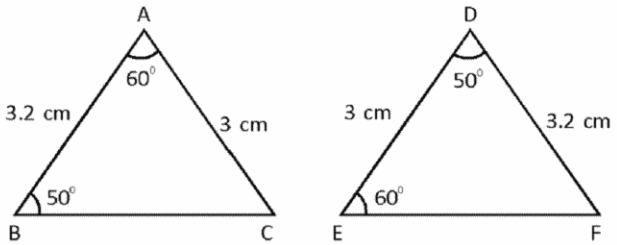
(b) $\angle B = \angle R$

AB = QR

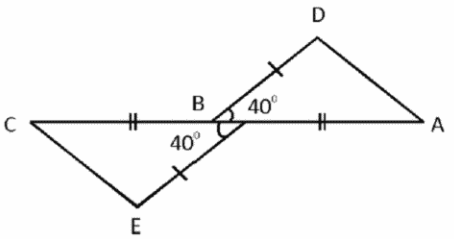
BC = PR

$\therefore$ $\Delta ABC \cong QRP$ (SAS congruency rule)

Question 5. In fig. measures of some parts of the triangle are triangle are indicated by applying SAS congruence, state the pairs of congruent triangles and write them is symbolic form.



(a)



(b)

(a) AB = DF = 5.2 cm

AC = DE = 3.0 cm

$\angle A \neq \angle D$

$\therefore$ ΔABC and ΔDEF are not congruent.

(b) AB = BC

BD = BE

$\angle ABD = \angle CBE = 40^0$

$\Delta ABD \cong \Delta CBE$ (SAS congruency rule)

Test Your Progress

Question 1. ΔPQR in an equilateral triangle. Is $\Delta PQR \cong \Delta PRQ$? Why?

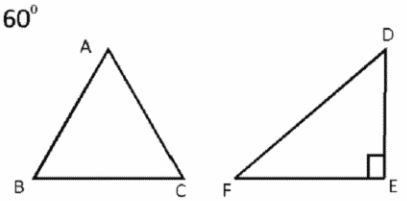
Yes,

PQR $\cong$ PRQ

$\therefore$ PQ = QR = PR

and $\angle P = \angle Q = \angle R = 60^0$

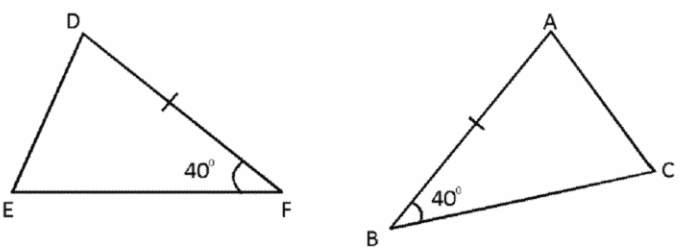
Question 2. In fig. are the two triangles congruent? Give reasons.



No,

Information is not given about sides.

Question 3. Which other pairs of angles should be equal to make the triangles in fig. congruent?



$\angle B = \angle F = 40^0$ ...(Given)

AB = DF ...(Given)

$\therefore$ $\angle D = \angle A$ To make the triangle are congruent.

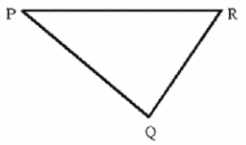
Question 4. In $\Delta ACB \cong \Delta EDF$, name the corresponding sides and the corresponding angles.

$\Delta ACB \cong \Delta EDF$

$AC = ED$, $CB = DF$ and $AB = EF$

$\angle A = \angle E$, $\angle C = \angle D$ and $\angle B = \angle F$

Question 5. In ΔPQR (fig.) which is the included angle of PQ and PR?



Included angle between PQ and PR is LP.

Question 6. In $\Delta PQR \cong \Delta LMN$, name the corresponding sides and the corresponding angles.

$\Delta PQR \cong \Delta LMN$

$PQ = LM$, $QR = MN$ and $PR = LN$

$\angle P = \angle L$, $\angle Q = \angle M$ and $\angle R = \angle N$

Question 7. If $\Delta CAB \cong \Delta EDF$, then write the equalities among the sides of the two triangles.

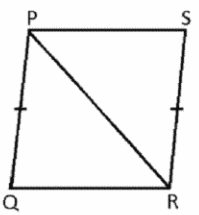
$\Delta CAB \cong \Delta EDF$

$CA = ED$, $AB = DF$ and $CB = EF$

Question 8. In fig., PQ || SR and PQ = SR

(i) Is $\angle QPR = \angle PRS$? Give reasons.

(ii) Is $\Delta PQR = \Delta RSP$ by SAS?



(i) PQ || SR

$\therefore$ $\angle QPR = \angle PRS$ (Alternative angles)

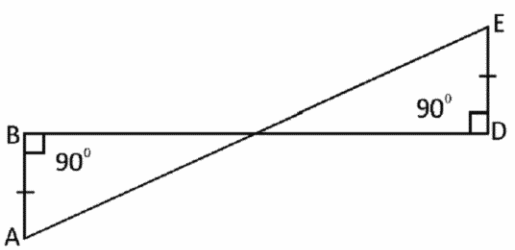
(ii) $\angle QPR = \angle PRS$ (Proved)

$QP = RS$ ...(Given)

$PR = PR$ ...(Common)

$\therefore$ $\Delta PQR = \Delta RSP$ (SAS congruency rule) Hence Proved

Question 9. In fig. $\angle B = \angle D = 90^0$ and AB = DE. Show that CD = BC.



$\angle B = \angle D = 90^0$ ...(Given)

$\angle BCA = \angle DCE$ (Vertically opposite angle)

$\therefore$ $\angle A = \angle E$

$AB = DE$ ...(Given)

$\therefore$ $\Delta ABC \cong \Delta EDC$ (ASA congruency rule)

$\therefore$ $BC = CD$ (C.P.C.T.) Hence Proved

Question 10. ABC and ADC are two triangles in Fig. Also AB = CD and AD = BC. Which of the following statements is true?

(a) $\Delta BAC = \Delta DAC$ **(b) $\Delta BAC = \Delta DCA$** **(c) $\Delta BAC = \Delta CAB$**

Ans. (b)

Chapter 15. MENSURATION Exercise 15.1

Question 1. Select the correct answer from the alternative given against each of the following : (1-3) The perimeter of a square with side 6.7 cm is –

(a) 26.8 cm **(b) 26.8 cm^2** **(c) 44.89 cm** **(d) 13.4 cm**

Perimeter of square = 4 × side

= 4 × 6.7

= 26.8 cm Ans. (a)

Question 2. A square and a rectangle are a equal area. If the perimeter of rectangle is p and that of square is q, then –

(a) p = q **(b) p < q** **(c) $p \leq q$** **(d) p > q**

p > q Ans. (d)

Question 3. The perimeter of a rectangle of length 40m and breadth 20.5m is –

(a) 60.5 m **(b) 120 m** **(c) 121 m** **(d) 125 m**

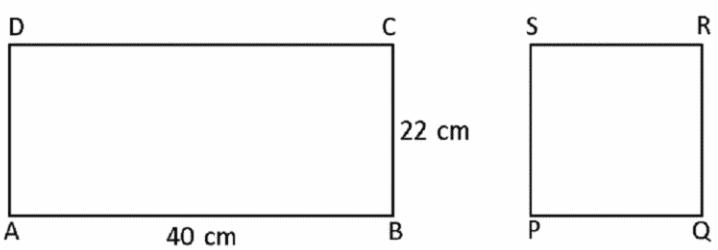
Perimeter of rectangle = 2(l + b)

= 2(40 + 20.5)

= 2 × 60.5

= 121 m Ans. (c)

Question 4. A wire is in the shape of a rectangle of length 40cm and breadth 22cm. If the same wire again bent in the shape of a square, what will be the measure of each side? Also find which shape enclose more area?



Area of rectangle (ABCD) = l × b

= 40 × 22 = 880 cm^2 .....(i)

Perimeter of rectangle (ABCD) = 2(l + b)

= 2(40 + 22)

= 2 × 62

= 124 cm

Perimeter of square = 124 cm

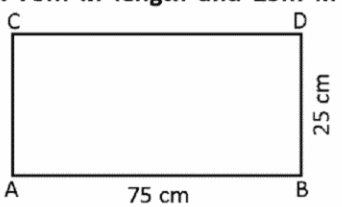
$4 \times$ side = 124

Side = $\frac{124}{4}$ = 31 cm

Area of square (PQRS) = $(31)^2$ = 961 cm^2

Area of square > Area of rectangle

Question 5. How many times a runner has to run around racing track 75m in length and 25m in breadth to cover a distance of 800 m?



Perimeter of racing track = 2(l + b)

= 2(75 + 25)

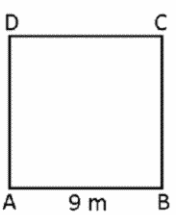
= 200 m

Number of round to cover 800 m = $\frac{\text{Total distance}}{\text{Perimeter of track}}$

= $\frac{800\text{ m}}{200}$ = 4 round

∴ 4 round required to cover 800 m.

Question 6. The boundary of a square kitchen garden, of side 9m is to be laid by barbed wire. If the costs of barbed wire is ₹ 12 per metre find the cost of fencing the boundary of kitchen garden with four round of wire.



Perimeter of square = $4 \times$ side

= 4×9

∴ Length of wire in one round = 36 m

∴ Length of wire in 4 round = 36×4

= 144 m

Cost of wire = Rate × length of wire

= ₹ 12×144

∴ Total cost of wire = ₹ 1728

Question 7. A door of lengths 2 m and breadth 1m and a window of length 1 m and breadth 0.5 m are fitted in a wall 4.5 m in length and 4m in breadth. Find the cost of washing the wall at the rate of ₹ 20 per m^2.

Area of the wall = l × b

= 4.5×4

= 18 m^2

Area of the door = l × b

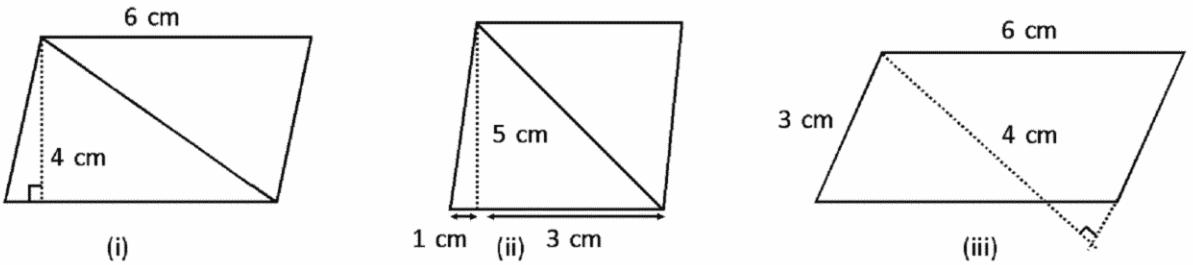
= 2×1 = 2 m^2

Area of whit washing = $18 - 2 - 0.5$ = 15.5

		=	15.5 m^2
	Cost of whit washing	=	Rate × Area
		=	₹ 20 × 15.50
		=	₹ 310.00
∴	Cost of whit washing	=	₹ 310.00

Exercise 15.2

Question 1. Find the area of each of the following triangles. (fig. 15.10)



(fig. 15.10)

(i)	Area of parallelogram	=	base × height
		=	6 × 4
		=	24 cm^2
(ii)	Area of parallelogram	=	base × height
		=	(3 + 1) × 5
		=	20 cm^2
(iii)	Area of parallelogram	=	base × height
		=	3 × 4
		=	12 cm^2

Question 2. Find the area of each of the following parallelogram (fig. 15.11)

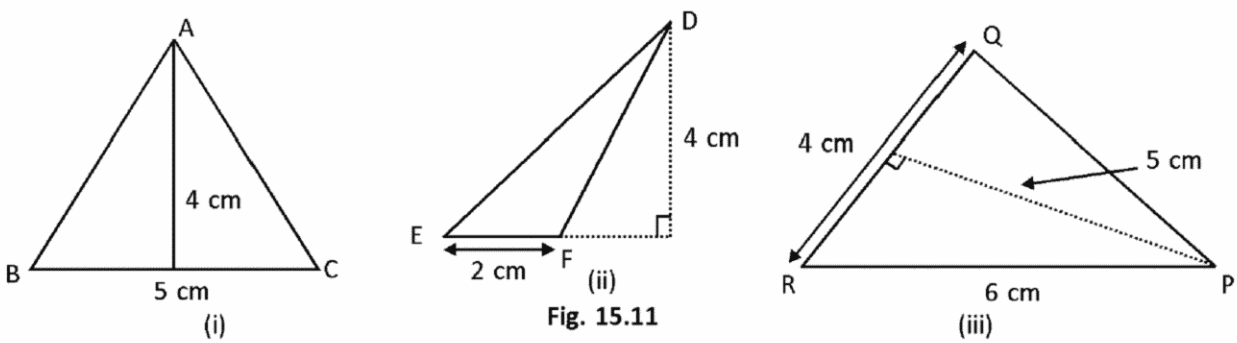


Fig. 15.11

(i)	Area of triangle	=	$\frac{1}{2}$ × base × height
		=	$\frac{1}{2}$ × 5 × 4 = 10 cm^2
(ii)	Area of triangle	=	$\frac{1}{2}$ × base × height

$= \frac{1}{2} \times 2 \times 4 = 4\ cm^2$

(ii) Area of triangle $= \frac{1}{2} \times$ base $\times$ height

$= \frac{1}{2} \times 4 \times 5 = 10\ cm^2$

Question 3. Complete the tables:

Figure	Base	Height	Area
Parallelogram	30 cm	—	600 cm^2
Parallelogram	—	21 cm	32.76 cm
ΔABC	BC = 15 cm	AD = 11.6	—
ΔABC	—	31.4 cm	1256 cm^2

Parallelogram

Area = base $\times$ height

600 = 30 $\times$ height

$\therefore$ Height $= \frac{600}{30} = 20$ cm

Parallelogram

Base $\times$ height = Area

Base $\times$ 21 = 32.76

$\therefore$ Base $= \frac{32.76}{21} = 1.56$ cm

Or Δ ABC Area $= \frac{1}{2} \times$ base $\times$ height

Area Δ ABC Area $= \frac{1}{2} \times 15 \times 11.6$

$= 15 \times 5.8$

Area Δ ABC $= 87.0\ cm^2$

Area Δ ABC $= \frac{1}{2}$ base $\times$ height = Area

Area Δ ABC $= \frac{1}{2}$ base $\times$ 31.4 = 1256

$=$ base $\times$ 15.7 = 1256

$\therefore$ Base $= \frac{1256}{15.7} = 80$

$\therefore$ Base $= 80$ cm

Question 4. In fig. 15.12, ABCD is a parallelogram with AD = 8 cm BM $\perp$ AD and BM = 11.4 cm. Find

(i) area of parallelogram ABCD **(ii) height DL, if AB = 12 cm**

Area of parallelogram

ABCD = base × height

$\therefore$ AB × DL = AD × BM = Area of parallelogram

(i) 8 × 11.4 = 91.2 cm^2

Area of parallelogram = 91.2 cm^2

(ii) AB × DL = 91.2

12 × DL = 91.2

DL = $\frac{91.2}{12}$ = 7.6

$\therefore$ DL = 7.6 cm

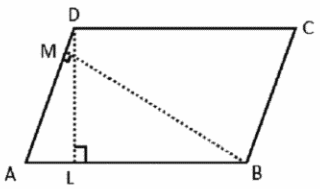


Fig. 15.12

Question 5. Area of parallelogram is 625 m^2. Find the length of sides of the parallelogram if the attitudes corresponding to sides are 20m and 25m.

Area of parallelogram = base × height

Area of parallelogram = 625 m^2

AB × DP = 625 m^2

AB × 20 = 625 m^2

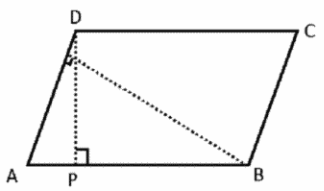
AB = $\frac{625}{20}$ = 31.25

AB = 31.25 m

AD × BQ = 625

AD × 25 = 625

AD = $\frac{625}{20}$ = 25 $\therefore$ AD = 25 m



Question 6. In fig. 15.13, PQR is a triangle right angled at P with PQ = 6 cm and PR = 8 cm. Find the area of ΔPQR. Also find the length of perpendicular PS on QR.

Area Δ PQR = $\frac{1}{2}$ base × height

= $\frac{1}{2}$ × 6 × 8

Area Δ PQR = 24 cm2

In Δ PQR, LP = 900

$PQ^2 + PR^2 = QR^2$

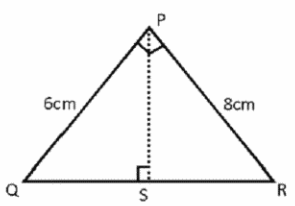
$6^2 + 8^2 = QR^2$

36 + 64 = QR2

QR = $\sqrt{100}$ = 10

Area Δ PQR = 24 cm^2

$\frac{1}{2}$ base × height = 24



$\frac{1}{2} \times 10 \times PS = 24$

$5 \times PC = 24$

$PS = \frac{24}{5} = 4.8$

$\therefore$ PS = 4.8 cm

Question 7. In fig. 15.14 LMN is an isosceles triangles with LM = MN = 15cm and MN = 18 cm. The height LP from L to MN is 12 cm. Find the area of ΔLMN. What will be the length of perpendicular MQ from M to LN?

Given LM = LN = 15 cm

MN = 18 cm

LP = 12 cm

Area Δ LMN = $\frac{1}{2}$ base × height

$= \frac{1}{2} \times MN \times LP$

$= \frac{1}{2} \times 18 \times 12$

$= 9 \times 12 = 108$

$\therefore$ Area Δ LMN = 108 cm^2

Area Δ LMN = 108 cm^2

$\frac{1}{2} \times LN \times MQ = 108\ cm^2$

$\frac{1}{2} \times 15 \times MQ = 108\ cm^2$

$\therefore$ $MQ = \frac{108 \times 2}{15} = \frac{72}{5}$

$\therefore$ MQ = 14.4 cm

Question 8. The perimeter of a rhombus is 16 cm. Its area 12 cm^2. Find the altitude.

$\therefore$ Area f rhombus = base × height

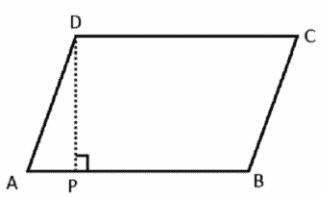
$12 = AB \times DP$

$12 = \frac{\text{Perimeter}}{4} \times DP$

$12 = \frac{16}{4} \times DP$

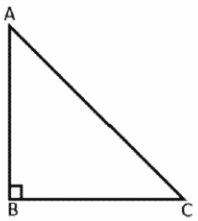
$\therefore$ $DP = \frac{12}{4} = 3$

DP = 3 cm



Attitude of rhombus is 3 cm.

Question 9. The area of a right triangle is 24 cm^2. If one of the sides containing the right angle is 8 cm. Find the length of its hypotenuse.



Area of right triangle = 24 cm^2

$\frac{1}{2} \times AB \times BC = 24$

$\frac{1}{2} \times 8 \times BC = 24$

$\therefore \quad BC = \frac{24}{4} = 6$ cm

In ΔABC, $\angle B = 90^0$

$AC^2 = AB^2 + BC^2$

$= 8^2 + 6^2$

$= 64 + 36$

$AC^2 = 100$

$AC = \sqrt{100} = 10$

$\therefore \quad AC = 10$ cm

$\therefore$ Hypotenuse of Δ is 10 cm.

Exercise 15.3

Select the correct answer from the alternatives given against each of the following (1-3)

[Take $\pi = \frac{22}{7}$, unless other wise stated]

Question 1. The area of a circle of radius 4.9 cm is –

(a) 7546 cm^2 (b) 754.6 cm^2 (c) 75.46 cm^2 (d) 7.546 cm^2

Area of circle $= \pi r^2$

$= \frac{22}{7} \times 4.9 \times 4.9$

$= 22 \times 0.7 \times 4.9$

$= 22 \times 3.43$

$= 73.46\ cm^2$ Ans. (c)

Question 2. The radii of two concentric circles are 8.4 cm and 7 cm. The area enclosed between them is : (a) 67.76 cm^2 (b) 221.76 cm^2 (c) 154 cm^2 (d) 6.16 cm^2

Area of between two concentric circle $= \pi(R^2 - r^2)$

$= \frac{22}{7}(8.4^2 - 7)^2$

Area of ring $= \frac{22}{7}(70.56 - 49)$

Area of ring $= \frac{22}{7} \times 21.56$

$= 22 \times 3.08$

$= 67.76 \text{ cm}^2$

Ans. (a)

Question 3. The circumference of a circle of diameter 7 cm is

(a) 44 cm **(b) 22 cm** **(c) 38.5 cm** **(d) 77 cm**

Circumference of circle $= 2\pi r$

$= \pi d$ $(d = 2r)$

$= \frac{22}{7} \times 7$

$\therefore \quad = 22 \text{ cm}$

Ans. (b)

Question 4. Find the radii of circles whose circumference are

(i) 308 m **(ii) 880 cm**

(i) Circumference of circle $= 2\pi r$

$\therefore \quad 2\pi r = 308$

$2 \times \frac{22}{7} \times r = 308$

$r = \frac{308 \times 7}{2 \times 22} = 49$

$r = 49 \text{ m}$

(ii) Circumference of circle $= 880 \text{ cm}$

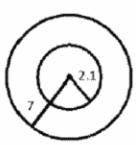
$2\pi r = 880$

$2 \times \frac{22}{7} \times r = 880$

$r = \frac{880 \times 7}{2 \times 22} = 140$

$\therefore$ Radius of circle = 140 cm

Question 5. From a circular sheet of radius 7cm, a circle of radius 2.1 cm is removed. Find the area of the remaining sheet.



Area of remaining sheet = Area of sheet − Area of removing circular sheet

$= R\pi^2 - r\pi^2$

$= \frac{22}{7} \times 7 \times 7 - \frac{22}{7} \times 2.1 \times 2.1$

$= 154 - 13.86$

Area of remaining sheet $= 140.14 \text{ cm}^2$

Question 6. A circle of radius 2.1 cm is cutout from a square piece of plastic sheet of side 7 cm. What is the area of the left over plastic sheet?

Area of square sheet = $(\text{side})^2$

= $(7)^2 = 49\ \text{cm}^2$

Area of circular sheet = πr^2

= $\frac{22}{7} \times 2.1 \times 2.1 = 13.86$

= $13.86\ \text{cm}^2$

Area of remaining sheet = $49 - 13.86$

= $35.14\ \text{cm}^2$

Question 7. The minute hand of a circular clock is 14 cm long. How for does the tip of minute hand move in 45 minutes?

Tip of minute hand cover 1 round in 60 minute

Tip of minute hand cover $\frac{45}{60} = \frac{3}{4}$ round in 45 minutes

1 Round = Circumference of circle

$\frac{3}{4}$ Round = $\frac{3}{4} \times 2 \times \frac{22}{7} \times 14$

= 3×22

$\therefore$ Tip of minute hand cover = 66 cm

Question 8. Fig. 15.20 shows the innermost lane of a running track. At each end of the rectangle is a semicircle. How much distance would Nikita cover in running twice round the track?

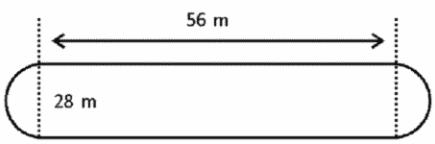


Fig. 15.20

One round of track = length of rectangle × 2 + 2 × circumference of semicircle

= $56 \times 2 + 2 \times \frac{1}{2} \times 2\pi r$

= $112 + 2 \times \frac{22}{7} \times \frac{28}{2}$

= $112 + 44 \times 2$

One round of track = $112 + 88 = 200$ m

Two round of track = $200 \times 2 = 400$ m

Question 9. From a circular sheet of radius 7 cm, two circle of radii 1.4 cm each, a triangle of base 3 cm and height 2 cm and a rectangle of length 4 cm and breadth 2 cm are removed (Fig. 15.21), find the remaining area.

Fig. 15.21

Area of circular sheet = πr^2

= $\frac{22}{7} \times 7 \times 7$

= $154\ \text{cm}^2$

Area of 2 circles = $2 \times \pi r^2$

$= 2 \times \frac{22}{7} \times 1.4 \times 1.4$

$= 44 \times 0.28$

$= 12.32 \text{ cm}^2$

Area of triangle $= \frac{1}{2} \text{ base} \times \text{height}$

$= \frac{1}{2} \times 3 \times 2$

$= 3 \text{ cm}^2$

Area of rectangle $= l \times b$

$= 4 \times 2 \quad = 8 \text{ cm}^2$

Area of remaining circular sheet $= 154 - 12.32 - 3 - 8$

$= 154 - 23.32$

$= 130.68 \text{ cm}^2$

Question 10. Find the area of the shaded region in Fig. 15.22.

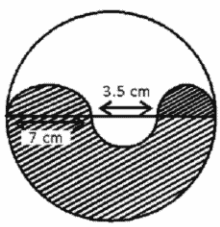


Fig. 15.22

Area of big semicircle $= \frac{1}{2} \pi r^2$

$= \frac{1}{2} \times \pi \times 7 \times 7$

$= \frac{49}{2} \pi \text{ cm}^2$

Area of medium semi circle $= \frac{1}{2} \pi r_1^2$

$= \frac{1}{2} \pi (3.5)^2$

$= \frac{1}{2} \pi \times \left(\frac{3.5}{2}\right)^2$

$= \frac{1}{2} \pi \times \frac{49}{16}$

$= \frac{49}{32} \pi \text{ cm}^2$

Area of white semicircle = Area of smaller semicircle

Area of shaded region $= \frac{49\pi}{2} + \frac{49\pi}{8} + \frac{49\pi}{32} - \frac{49\pi}{32}$

Area of shaded region $= 49\pi \left(\frac{1}{2} + \frac{1}{8}\right)$

Area of shaded region $= 49\pi \left(\frac{4+1}{8}\right)$

$= 49 \times \frac{22}{7} \times \frac{5}{8}$

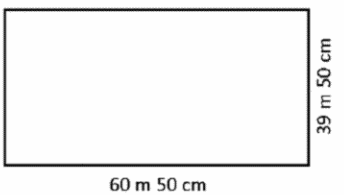
$= \frac{385}{4} \quad = 96.25 \text{ cm}^2$

Exercise 15.4

Question 1. A playground is 60m 50cm long and 39m 50cm wide. Find

(i) The number of rounds about the ground a runner should lake to run a race of 1 km?

(ii) The cost of levelling it at ₹ 2.20 per square metre.



(i) Primeter of the ground $= 2(l + b)$

$= 2(60.5 + 39.5)$

$= 2 \times 100$

$= 200$ m

Number of round in 1 km $= \frac{\text{Distance of 1 km}}{\text{Perimeter of ground}}$

$= \frac{1 \times 1000 \text{ m}}{200}$

$= 5$

5 rounds of the ground in 1 km

(ii) Area of the field $= l \times b$

$= 60.5 \times 39.5$

$= \frac{605 \times 395}{10 \times 10}$

$= \frac{121 \times 79}{2 \times 2}$ m^2

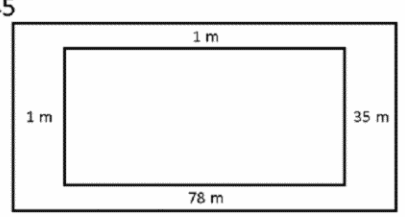
Cost of levelling at 2.20 /m^2 $=$ Area × Rate

$= \frac{121 \times 79}{2 \times 2} \times 2.20$

$= \frac{121 \times 79 \times 220}{4 \times 100}$

$=$ ₹ 5257.45

Question 2. A rectangle garden 78 metres long and 35 metres broad has a uniform path 1 metre wide all around it on the outside. Find the area of the path.



Area of the garden $= l \times b$

$= 78 \times 35$

$= 2730$ m^2

Area of the garden + path $= (78 + 2)(35 + 2)$

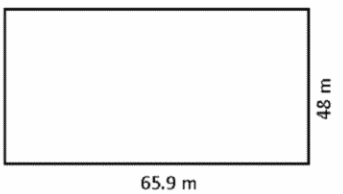
$= 80 \times 37$

$= 2960$ m^2

$\therefore$ Area of the path $= 2960 - 2730 = 230$

$= 230$ m^2

Question 3. A rectangle is 65.9 m long and 48 m wide. By how many square metres does it area fall short of a hectare? [1 hectare = 10000 m2]



Area of rectangle = l × b

= 65.9 × 48

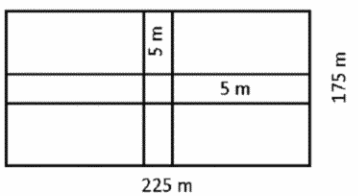
= 3163.20 m^2

1 ha = 10000 m^2

Area required to get 1 ha = 10000 – 3163.20

= 6836.80 m^2

Question 4. A field is 225 m long and 175 m wide. It has two roads, in its centre, of uniform width of 5m, one parallel to its length and other parallel to its breadth. Find the cost of gravelling the roads at ₹ 3 per square metre.



Area of the horizontal road = 225 × 5

= 1125 m^2

Area of the vertical road = 175 × 5

= 875 m^2

Total area of road = Area of horizontal road + Area vertical road – Area of squared road

= 1125 + 875 – 25

= 2000 – 25

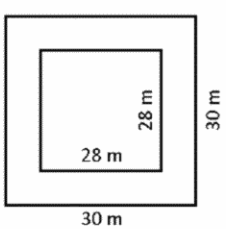
= 1975 m^2

Cost of gravelling = Rate × Area

= ₹ 3 × 1975

= ₹ 5925

Question 5. A 1 m wide path is built inside a square park of side 30m along to sides. Find the area of the path. Also, calculate the cost of constructing the path at the rate of ₹ 70 per m^2.



Area of park including path = $(side)^2$

= $(30)^2$

= 900 m^2

Area of park excluding path = $(side)^2$

= $(28)^2$

= 784 m^2

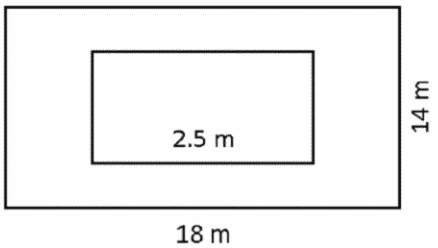
Area of the path = 900 – 784 = 116 m^2

Cost of constructing path = Area × Rate

= 116 × 70

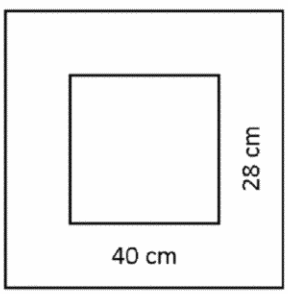
= ₹ 8120

Question 6. A rectangular lawn is 18 m long and 14 m wide. If there is a square flower bed at the centre of the lawn which is 2.5 m long, what area of the lawn is covered with grass?



Area of lawn	=	$l \times b$
	=	18×14
	=	$252\ m^2$
Area of flowerbed	=	$(side)^2$
	=	$(2.5)^2$
	=	$6.25\ m^2$
Area of grass field	=	$252 - 6.25$
	=	$245.75\ m^2$

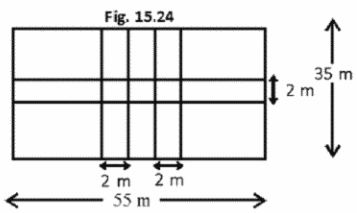
Question 7. A painting 40 m long and 28 cm wide is painting on a card board such that there is a margin of 2 cm along each of its sides. Find the total area of the margin.



Area of painting	=	$l \times b$	
	=	40×28	
	=	$1120\ cm^2$	
Area of painting + area of margin	=	$(40 + 4)\ (28 + 4)$	
	=	44×32	
	=	$1408\ cm^2$	
∴ Area of margin	=	$1408 - 1120$	
	=	$288\ cm^2$	

Question 8. Three paths pass through a park, as shown in fig. 15.24. How much would it cost to prove the paths with tiles, paving a square metre costs ₹ 65?

Fig. 15.24



Area of horizontal road	=	55×2	$= 110\ m^2$
Area of 2 vertical road	=	$2 \times 35 \times 2$	$= 140\ m^2$
Area of 2 square	=	2×2^2	$= 8\ m^2$
Total area of path	=	$110 + 140 - 8$	$= 242\ m^2$
Total area of path	=	$110 + 140 - 8$	$= 242\ m^2$
Total cost of paving tiles	=	Rate × Area	
	=	₹ 65 × 242	
	=	₹ 15730	

Question 9. The dimensions of the floor of a hall are 20 m × 18 m. Its floor has to be paved by square marble tiles of side 50 cm. Find the number of tiles required.

Area of the floor	=	$l \times b$

$= 20 \times 18$

$= 360\ m^2$

Area of the 1 tile $= (side)^2$

$= 50 \times 50$

$= 2500\ cm^2$

Number of tiles $= \frac{\text{Area of the floor}}{\text{Area of the 1 tile}}$

$= \frac{360\ m^2}{2500\ cm^2}$

$= \frac{360 \times 1000\ cm^2}{2500}$

$\therefore$ Number of tiles $= 1440$

Test Your Progress

Question 1. The perimeter of a rectangular sheet is 100 cm. If the length is 35 cm, find its breadth.

Perimeter of sheet $= 100$ cm

$2(l + b) = 100$

$l + b = \frac{100}{2} = 50$

$35 + b = 50$

$b = 50 - 35 = 15$

$\therefore$ Breadth = 15 cm

Question 2. In length and breadth of a rectangular park are in the ratio 4:3. If its perimeter is 420m find its area.

$l : b = 4 : 3$ ...(Given)

$\therefore$ Length of park $= 4x$ m

And breadth of park $= 3x$ m

Perimeter $= 420$ m

$2(4x + 3x) = 420$

$14x = 420$

$x = \frac{420}{14} = 30$

Area of the park $= l \times b$

$= 4x \times 3x$

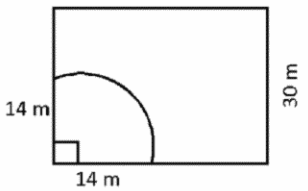
$= 12x2$

$= 12(30)^2$

$= 12 \times 900$

$\therefore$ Area of the park $= 10800\ m^2$

Question 3. A horse is tied with a rope in the centre of a square field of side 30 m. If the length of rope is 14 m, find the area of the field where horse cannot graze.



Area of the $= (\text{side})^2$

Square field $= (30)^2$

$= 900\ m^2$

Area of the field where horse is graze $= \frac{1}{2} \times$ Area of circle

$= \frac{1}{2} \times \pi r^2$

$= \frac{1}{2} \times \frac{22}{7} \times 14 \times 14$

$= 154\ m^2$

Area of the field $= 900 - 154$

Can not be graze $= 746\ m^2$

Question 4. What will be the cost of laminating a table top of dimensions. 9 dm and 6 dm 5 cm at ₹ 50 per square metre.

Area of the top $= l \times b$

$= 96 \times 65\ cm2$ [9 dm 6 cm = 96 cm]

[6 dm 5 cm = 65 cm]

$= \frac{96 \times 65}{100 \times 100}\ m^2$

$= \frac{48 \times 13}{1000}\ m^2$

Cost of laminating $=$ Rate × Area

$= \frac{50 \times 48 \times 13}{1000}$

$= ₹\ \frac{24 \times 13}{10} = 31.2$

$= ₹\ 31.2$

Question 5. The length and breadth of a rectangle are in the ratio 3 : 2. If the perimeter is 100 cm, What is the area of the rectangle.

Ratio in length and breadth $=$ 3 : 2

Length is 3x cm and breadth is 2x cm

Perimeter $=$ 100 cm

$2(l + b) = 100$

$2(3x + 2x) = 100$

$10x = 100$

$x = \frac{100}{10} = 10$

Area of rectangle = $3x \times 2x$

= $6x^2$

= $6(10)^2$

Area of rectangle = 600 cm^2

Question 6. ABCD is a square of side 14 cm (fig. 15.25). Find the area of ΔAOB.

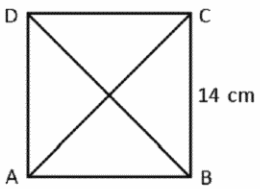


Fig. 15.25

Area of square = (14)2 = 196 cm2

Area of ΔAOB = $\frac{1}{4}$ × Area pf square

Area of ΔAOB = $\frac{1}{4} \times 196 = 49\ cm^2$

∴ Area ΔAOB = 49 cm^2

Question 7. Out of a rectangular sheet of paper, a strip is cut, as shown in Fig. 15.26. Find the area of the remaining (shaded) portion.

Area of paper sheet = l × b

= 25 × 20

= 500 cm2

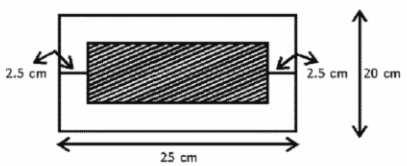


Fig. 15.26

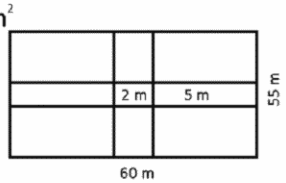
Area of strip = $(25 - 5)\ (20 - 5)\ cm^2$

(Shaded port) = 20 × 15

= 300 cm^2

Area of remaining paper sheet = 500 – 300 = 200 cm^2

Question 8. A garden measures 60 m by 55 m from the centre of each side, a path 2 m wide goes across to the centre of the opposite side. Find the area of the paths.



Area of horizontal path = 60 × 2 = 120 m^2

Area of vertical path = 55 × 2 = 110 m^2

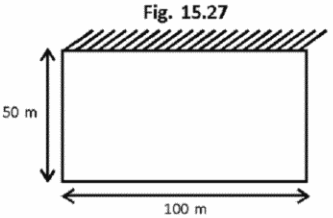
Area of square at the centre = 2 × 2 = 4 m^2

∴ Total area of the path = 120 + 110 – 4

= 226 m^2

Question 9. A rectangular ground (fig. 15.27) needs fencing on 3 sides as a wall of length 100 m will act as fence on the fourth side. Find cost of fencing at the rate of ₹ 15 per metre.

Fig. 15.27



Length of fencing = (50 + 100 + 50) m

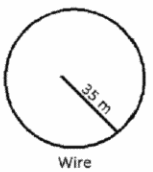
= 200 m

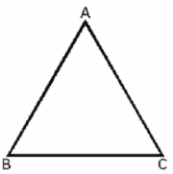
Cost of wire = Rate × Length

$= \quad 15 \times 200 = 3000$

$\therefore$ Cost of wire $= \quad ₹\ 3000$

Question 10. A wire is in the form of a circle of radius 35 m. It is then bent in the form of an equilateral triangle. Find the side of the triangle.





Circumference $= \quad 2\pi r$

$= \quad 2 \times \frac{22}{7} \times 35$

$= \quad 220$ m

Length of wire $= \quad 220$ m

Perimeter of equilateral triangle $=$ length of wire

$3 \times$ side $= \quad 220$

Side $= \quad \frac{220}{3} = 73\frac{1}{3}$ m

Question 11. The base of a triangular field is three times to height. If the cost of cultivating the field at ₹ 36 per hectare is ₹ 486, find its base and height. [1 hectare = 10000 m^2]

Let the height of triangle be x m

$\therefore$ base = 3x m

Cost of cultivating field @ ₹ 36/ha $= \quad ₹\ 486$

Area of cultivating field $= \quad \frac{27}{2}$ ha

$= \quad \frac{27}{2} \times 10000\ m^2$

$= \quad 135000\ m^2$

Area of triangle $= \quad 135000$

$\frac{1}{2}$ base $\times$ height $= \quad 135000$

$\frac{1}{2} \times 3x \times x = \quad 135000$

$x^2 = \quad 135000 \times \frac{2}{3}$

$x^2 = \quad 90000$

$x = \quad \sqrt{90000} = 300$ m

$\therefore$ Height of triangle $= \quad 300$ m

Base of triangle $= \quad 3x = 900$ m

Question 12. The sum of the circumference of four small circles of same radius is equal to the circumference of a bigger circle. Find the ratio of the bigger circle to that of the smaller circle.

Let the radius of small circle be x m

Circumference of smaller circle $= 2\pi r$

Let the radius of small circle be x m

Circumference of smaller circle = $2\pi r$

Circumference of 4 smaller circles = $4 \times 2\pi r$

= $8\pi x$ m

Circumference of bigger circle = $8\pi x$ m

$2\pi R = 8\pi x$

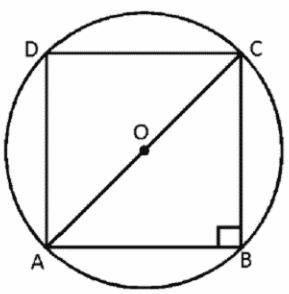
$R = \frac{8\pi x}{2\pi} = 4x$ m

Ratio of radius of bigger circle to smaller circle

$4x : x$

$4 : 1$ Ans.

Question 13. Find the area of the square that can be inscribed in circle of radius 8 cm.



Radius of circle = 8 cm

Diameter of circle = 16 cm

Diameter of circle = diagonal of square

16 = AC

In ΔABC, $\angle B = 90^0$

$AB^2 + BC^2 = AC^2$

$AB^2 + AB^2 = AC^2$ [AB = BC = CA = AD]

$2AB^2 = 16^2$

$AB^2 = \frac{16 \times 16}{2} = 128\ cm^2$

$(side)^2 = 128\ cm^2$

$\therefore$ Area of square = $128\ cm^2$

Chapter 16. DATA HANDING Exercise 16.1

Select the correct answer from the alternatives given against each of the following (1-2)

Question 1. The mean of first five primes is – (a) 5 (b) 3 (c) 9 (d) 5.6

First five prime number is 2, 3, 5, 7, 11

Mean of first five prime numbers is = $\frac{2 + 3 + 5 + 7 + 11}{5}$

Mean of first five prime numbers is = $\frac{28}{5} = 5.6$

Ans. (d)

Question 2. The range for the data 42, 43.3, 36, 37, 45.1, 44.5, 46.2 is –

(a) 4.2 (b) 10.2 (c) 9.1 (d) 1.7

Range of the data = 46.2 – 36 = 10.2 Ans. (b)

Calculate the mean of each of the following: (3-4)

Question 3. The ages (in year) of 10 teachers of a school are : 30, 27, 37, 42, 44, 39, 58, 32, 45, 36.

(i) What is the age of oldest and the youngest teacher?

(ii) What is the mean age of these teachers?

(i) Oldest teacher = 58 year

Younger teacher = 27 year

(ii) Avg. mean age of teacher = $30 + 27 + 37 + 42 + 44 + 39 + 58 + 52 + 45 + 36$

$= \frac{390}{10}$ = 39 years

Question 4. The marks (out of 50) obtained by a group of students in a test in Mathematic are 35, 36, 40, 35, 9, 18, 6, 45, 31, 25. Find

(i) The highest and the lowest marks obtained by students.

(ii) The range of the marks obtained.

(i) Highest score = 45

Lowest score = 6

(ii) Range = $45 - 6 = 39$

Question 5. The rainfall (in mm) in Mumbai on 7 days in the month of July was recorded as follow:

Day	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.
Rainfall (in mm)	15.3	0.0	12.7	22.2	20.5	12.5	14.0

(i) Find the mean rainfall for the week.

(ii) Find the range of the rainfall for above data:

(i) Mean rainfall for the week = $\frac{15.3 + 0.0 + 12.7 + 22.2 + 20.5 + 12.5 + 14.0}{7}$

$= \frac{97.2}{7}$

= 13.88 mm (Approx)

(ii) Range = $22.2 - 0.0$ = 22.2

= 22.2 **Ans.**

Question 6. Calculate the mean for the following data:

Weight (in cm)	138	140	137	143	135	145
No. of boys	10	15	6	4	2	3

The mean of 10 numbers is 47. If one number is included, mean of the remaining numbers become 46. Find the included numbers.

Wt. in cm (x)	No. of boys (f)	F×x
138	10	1380
140	15	2100
137	6	822
143	4	572
135	2	270
145	3	435
	40	**5579**

Mean Weight $= \frac{5579}{40} =$ 139.475 kg

(ii) Mean of 10 numbers = 47

$\therefore$ Sum of 10 numbers = $47 \times 10 = 470$

Mean of 11 number = 46

Sum of 11 numbers = $46 \times 11 = 506$

= 506

Included new number = Sum of 11 numbers – Sum of 10 number

= $506 - 470 = 36$

$\therefore$ Included number = 36

Question 7. The following table shows the points scored by each player in for games:

Player	Game I	Game II	Game III	Game IV
A	12	12	15	16
B	2	6	8	4
C	12	8	Did not play	13

Find the mean of each player to determine average number of points scored by each per game.

Player A $= \frac{12 + 12 + 15 + 16}{4}$

$= \frac{55}{4} = 13.75$

Player B $= \frac{2 + 6 + 8 + 4}{4}$

$= \frac{20}{4} = 5$

Player C $= \frac{12 + 8 + 13}{3} = \frac{33}{3} = 11$

Exercise 16.2

Select the correct answer from the alternatives given against each of the following(1-2)

Q. 1 The mode of 7, 8, 5, 8, 6, 10, 7, 8, 7, 11, 7 is –

(a) 5 **(b) 11** **(c) 7** **(d) 10**

7 has most frequency i.e., 4 times

$\therefore$ Mode = 7 Ans. (c)

Q.2 The median of 13, 17, 7, 9, 11, 10, 15 is

(a) 11 **(b) 17** **(c) 13** **(d) 10**

7, 9, 10, 11, 13, 15, 17

Median $= \frac{7+1}{2}$ = 4th term i.e. 11 Ans. (a)

Q. 3 Find the median of :

(a) First 10 even numbers **(b) First fifty whole numbers** **(c) First 45 natural numbers**

(a) 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Median $= \frac{5\text{th} + 6\text{th}}{2}$ term $= \frac{10+12}{2} = 11$

(b) First fifty whole number

0, 1, 2, ... 47, 48 and 49

Median = 25th number = 24

(c) First 45 natural number

Medial is 23rd number = 23

Q. 4 Find the median of each of the following :

(a) 9, 16, 7, 19, 12, 15, 10, 13, 11, 8

(b) 23, 23, 19, 25, 21, 17, 18, 16, 20, 23, 21, 22, 20, 17, 24, 25.

(a) 7, 8, 9, 10, 11, 12, 13, 15, 16, 19

Median $= \frac{5\text{th} + 6\text{th}}{2}$ term $= \frac{11+12}{2} = \frac{23}{2} = 11.5$

(b) 16, 17, 17, 18, 19, 20, 20, 21, 21, 22, 23, 23, 23, 24, 25, 25

Median $= \frac{8\text{th} + 9\text{th}}{2}$ term $= \frac{21+21}{2} = 21$

Q. 5 Find the mode of the following frequency distribution:

(a)

Weight (in kg)	44	49	51	54	58
No. of students	6	4	8	5	7

(b)

Marks	34	35	38	39	43	45	47	48
No. of students	8	7	10	19	22	17	14	7

(a) 51 has occurs most frequencies i.e. 8

$\therefore$ Mode = 51 kg.

(b) 43 has occurs most frequencies i.e. 22

$\therefore$ Mode = 43

Q. 6 Find the mean median and mode for each of the following data.

(a) 22, 24, 23, 20, 19, 36, 24 **(b) 24, 25, 26, 26, 23, 28, 26, 30**

(a) 19, 20, 22, 23, 24, 24, 36

$$\text{Mean} = \frac{19 + 20 + 22 + 23 + 24 + 24 + 36}{7}$$

$$= \frac{168}{7} = 24$$

$$\text{Median} = \frac{7\text{th} + 1\text{st}}{2} \text{ term} = 4\text{th term} = 23$$

Mode = 24 (2 times occurs)

(b) 23, 24, 25, 26, 26, 26, 28, 30

$$\text{Mean} = \frac{23 + 24 + 25 + 26 + 26 + 26 + 28 + 30}{8}$$

$$= \frac{208}{8} = 26$$

$$\text{Median} = \frac{4\text{th} + 5\text{th}}{2} \text{ term} = \frac{26 + 26}{2} = 26$$

Mode = 26 (3 times occurs)

Exercise : 16.3

Do yourself::-

Exercise : 16.4

Do yourself::-

Chapter-2. EXPONENTS :– A quality representing the power to which a given number or expression is to be raised symbol beside the number or expression. Ex. $7 \times 7 \times 7 \times 7 \times 7 = 7^5$. The "exponent" being 5 in this example, stands for how many times the value is being multiplied. The thing that's being multiplied being 7 in this example is called the "base".

Laws of Exponents for Real Numbers :- Let a > 0 be a real number and p and d be rational numbers, then

(i) $a^p \times a^q = a^{p+q}$ (ii) $(a^p)^q = a^{pq}$ (iii) $\frac{a^p}{a^q} = a^{p-d}$ (iv) $a^p b^p - (a^b)^p$

A negative exponent means divide because the opposite of multiplying is dividing i.e., $a^{-n} = \frac{1}{a^n}$

A fractional exponent like $\frac{1}{n}$ i.e., $x^{\frac{1}{n}} = \sqrt[n]{x}$ means to take the n^{th} root of x.

Any thing except 0 to the power zero is just "1" 0^0 is in determinate when the power of (–1) is any even natural number, the product is 1 $(1-)^{2n} = (-1)$ Even natural number = 1. When the power of (–1) is any odd natural number, the product is –1 $(-1)^{2n+1} = (-1)$ odd natural number = –1. The number is said to be in the scientific notation if it is expressed as a product of a number between 1 and 10 and integral power of 10. **Exercise : 2 (A) Question 1. Express each of the following in exponential form (i) to (iv) :-**

(i) $\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} = \left(\frac{2}{3}\right)^5$ (ii) $\frac{-3}{8} \times \frac{-3}{8} \times \frac{-3}{8} \times \frac{-3}{8} \times \frac{-3}{8} \times \frac{-3}{8} = \left(\frac{-3}{8}\right)^6$

(iii) $\frac{-5}{7} \times \frac{-5}{7} \times \frac{-5}{7} \times \frac{-5}{7} = \left(\frac{-5}{7}\right)^4$ (iv) $\frac{-11}{81} \times \frac{-11}{81} \times \frac{-11}{81} \times \frac{-11}{81} \times \frac{-11}{81} \times \frac{-11}{81} \times \frac{-11}{81} \times \frac{-11}{81} = \left(\frac{-11}{81}\right)^6$

Question 2. Express each of the following as a rational number of the form $\frac{p}{q}$: (i) to (iv)

(i) $\left(\frac{5}{9}\right)^2 = \frac{5 \times 5}{9 \times 9} = \frac{25}{81}$ (ii) $\left(\frac{4}{7}\right)^3 = \frac{4 \times 4 \times 4}{7 \times 7 \times 7} = \frac{64}{343}$

(iii) $\left(\frac{-2}{3}\right)^7 = \frac{-2}{3} \times \frac{-2}{3} \times \frac{-2}{3} \times \frac{-2}{3} \times \frac{-2}{3} \times \frac{-2}{3} \times \frac{-2}{3} = \frac{-128}{2187}$

(iv) $\left(\frac{-1}{2}\right)^8 = \frac{-1}{2} \times \frac{-1}{2} \times \frac{-1}{2} \times \frac{-1}{2} \times \frac{-1}{2} \times \frac{-1}{2} \times \frac{-1}{2} \times \frac{-1}{2} = \frac{1}{256}$

Question 3. Find the reciprocal of : (i) to (viii)

(i) $\frac{-16}{125} = \frac{-125}{16}$ (ii) $\frac{-27}{64} = \frac{-64}{27}$ (iii) $\left(\frac{-5}{9}\right)^{17} = \left(\frac{-9}{5}\right)^{17}$ (iv) $\left(\frac{-3}{7}\right)^2 = \left(\frac{-7}{3}\right)^2$

(v) $\left(-\frac{11}{4}\right)^3 = \left(\frac{-4}{11}\right)^3$ (vi) $\left(\frac{-7}{4}\right)^{208} = \left(\frac{-4}{7}\right)^{208}$ (vii) $\left(-\frac{1}{10}\right)^{47} = (-10)^{47}$ (viii) $\left(-\frac{3}{17}\right)^{89} = \left(\frac{-17}{3}\right)^{89}$

Question 4. Find the absolute value of : (i) to (iv)

(i) $\left(\frac{3}{4}\right)^3 = \frac{3 \times 3 \times 3}{4 \times 4 \times 4} = \frac{27}{64}$ (ii) $\left(-\frac{7}{8}\right)^2 = \left(-\frac{7 \times 7}{8 \times 8}\right) = \frac{-49}{64}$

(iii) $\left(-\frac{2}{3}\right)^4 = \frac{-2}{3} = \frac{-2}{3} = \frac{-2}{3} = \frac{-2}{3} = \frac{16}{81}$ (iv) $\left(\frac{-3}{2}\right)^2 = \frac{-3}{5} = \frac{-3}{5} = \frac{-3}{5} = \frac{-3}{5} = \frac{-3}{5} = \frac{-243}{3125}$

Question 5. Find the value of : (i) to (vi)

(i) $\left(\frac{1}{3}\right)^3 \times \left(\frac{3}{2}\right)^2 = \frac{1}{3^3} = \frac{3^2}{2^2} = \frac{1}{3^{3-2} \times 2^2} = \frac{1}{3 \times 2^2} = \frac{1}{12}$

(ii) $\left(\frac{-2}{3}\right)^4 \times \left(\frac{-3}{4}\right)^3 = \frac{(-2)^4}{3^4} \times \frac{(-3)^3}{4^3} = \frac{2^4}{3^4} \times \frac{-3^3}{(2^2)^3} = \frac{-2^4 \times 3^3}{3^4 \times 2^6} = -\frac{1}{3^{4-3} \times 2^{6-4}} = \frac{-1}{3 \times 2^2} = \frac{-1}{12}$

(iii) $\left(\frac{-1}{5}\right)^3 \times \left(\frac{-1}{5}\right)^2 = \left(\frac{-1}{5}\right)^{3+2} = \left(\frac{-1}{5}\right)^5 = \frac{-1}{3125}$

(iv) $\left(\frac{4}{-5}\right)^2 \times (-5)^3 = \left(\frac{4}{-5}\right)^2 \times (-5)^3 = (4)^2 \times (-5)^{3-2} = 16 \times (-5) = 80$

(iv) $\left(\frac{-1}{3}\right)^5 \div \left(\frac{2}{3}\right)^3 = \frac{-1}{3^5} \times \left(\frac{3}{2}\right)^3 = \frac{-1 \times 3^3}{3^5 \times 2^3} = \frac{-1}{3^{5-3} \times 2^3} = \frac{-1}{3^2 \times 2^3} = \frac{-1}{9} \times \frac{1}{8} = \frac{-1}{72}$

(iv) $\left(\frac{-1}{5}\right)^3 \times (1)^{85} \times \left(\frac{2}{5}\right)^2 = \frac{-1}{5^3} \times (-1) \times \frac{2^2}{5^2} = \frac{2^2}{5^{3+2}} = \frac{4}{3125}$

Question 6. Find the value of : (i) to (vi)

(i) $\frac{9}{64} = \frac{3 \times 3}{8 \times 8} = \frac{3^2}{8^2} = \left(\frac{3}{8}\right)^2$ (ii) $\frac{49}{25} = \frac{7 \times 7}{5 \times 5} = \left(\frac{7}{5}\right)^2$ (iii) $\frac{-8}{27} = \frac{-2 \times -2 \times -2}{3 \times 3 \times 3} = \left(\frac{-2}{3}\right)^3$

(iv) $\frac{-1}{216} = \frac{-1}{6} \times \frac{-1}{6} \times \frac{-1}{6} = \left(\frac{-1}{6}\right)^3$ (v) $\frac{-32}{243} = \frac{-2 \times -2 \times -2 \times -2 \times -2}{3 \times 3 \times 3 \times 3 \times 3} = \left(\frac{-2}{3}\right)^5$

(vi) $\frac{81}{625} = \frac{3 \times 3 \times 3 \times 3}{5 \times 5 \times 5 \times 5} = \left(\frac{3}{5}\right)^4$

Questions 7. Evaluate : $a^3 - 9\left(b^2 - \frac{3}{5}\right) + b^3$; $b = \frac{2}{3}$ and $a = \frac{1}{2}$

$= \left(\frac{1}{2}\right)^3 - 9\left\{\left(\frac{2}{3}\right)^2 - \frac{4}{5}\right\} + \left(\frac{2}{3}\right)^3$

$= \frac{1}{2^3} - 9\left\{\frac{4}{9} - \frac{4}{5}\right\} + \frac{2^3}{3^3}$

$= \frac{1}{8} - 9 \times \frac{4}{9} + \frac{9 \times 4}{5} + \frac{8}{27}$

$= \frac{1}{8} - 4 + \frac{36}{5} + \frac{8}{27}$

$= \frac{1}{8} - 4 + 7 + \frac{1}{5} + \frac{8}{27}$

$= 3 + \frac{1}{8} + \frac{1}{5} + \frac{8}{27}$ L.C.M. of 8,5,27 = 1080

$= 3 + \frac{135 + 216 + 320}{1080} = 3 + \frac{671}{1080} = 3\frac{671}{1080} = \frac{3911}{1080}$

MULTIPLE CHOICE QUESTIONS (MCQs) : Questions 8. $(12^2 - 5^3) \times \frac{(-1^{20})}{19}$ equal (a) 0 (b) 1 (c) –1 (d) 2

$(12^2 - 5^3) \times \left(\frac{-1}{19}\right)^{20} = (144 - 125) \times \frac{1}{19} = \frac{19}{19} = 1$ (b)

Questions 9. The multiplicative inverse of $\left(\frac{1}{2}\right)^4 \times \left(\frac{1}{3}\right)^4 + \left(\frac{-1}{2}\right)^3$ (a) $\frac{79}{17}$ (b) $\frac{-79}{16}$ (c) $\frac{-16}{79}$ (d) $\frac{-17}{79}$

$= \left(\frac{1}{2}\right)^4 - \left(\frac{3}{2}\right)^4 + \left(\frac{-1}{2}\right)^3 = \frac{1}{4} - \frac{81}{16} - \frac{-1}{8} = \frac{4 - 81 - 2}{16} = \frac{79}{16}$

$\therefore$ Multiplicative inverse of $= \frac{-79}{16}$ is $\frac{-16}{79}$ (c)

HIGH ORDER THINKING SKILLS (HOTS) :

Question 10. Find the reciprocal of $\frac{-1296}{625}$ and express it in exponential notation.

$$\frac{-1296}{625} = \left(\frac{2\times2\times2\times2\times3\times3\times3\times3}{5\times5\times5\times5}\right)$$

$$= -\frac{2^4\times3^4}{5^4}$$

$$= -\left(\frac{2\times3}{5}\right)^4$$

$$= -\left(\frac{-6}{5}\right)^4$$

2	1296
2	648
2	324
2	162
3	81
3	27
3	9
3	3
	1

5	625
5	125
5	25
5	5
	1

Exercise 2 (B) Question 1. Express as a rational number :

(i) $4^{-2} = \frac{1}{4^2} = \frac{1}{4\times4} = \frac{1}{16}$

(ii) $\left(\frac{1}{3}\right)^{-5} = \left(\frac{1}{3}\right)^{-5} = \frac{3\times3\times3\times3\times3}{1} = \frac{243}{1}$

(iii) $\left(\frac{-3}{5}\right)^{-3} = \left(\frac{-5}{3}\right)^{3} = \frac{-5\times-5\times-5}{3\times3\times3} = \frac{-125}{27}$

(iv) $\left(\frac{3}{4}\right)^{-4} = \left(\frac{4}{3}\right)^{4} = \frac{4\times4\times4\times4}{3\times3\times3\times3} = \frac{256}{81}$

Question 2. Evaluate : (i), (ii)

(i) $\left(\frac{-2}{3}\right)\times\left(\frac{-4}{5}\right)^{-2} = \left(\frac{-2}{3}\right)\times\left(\frac{-5}{4}\right)^{2} = \frac{-2}{3}\times\frac{25}{16} = \frac{-25}{24} = -1\frac{1}{24}$

(ii) $\left(\frac{12}{5}\right)^{3}\times\left(\frac{5}{20}\right)^{3} = \left(\frac{2\times2\times3}{5}\right)^{3} = \left(\frac{5}{2\times2\times5}\right)^{3} = \frac{2^6\times3^3}{5^3}\times\left(\frac{1}{2^2}\right)^{3} = \left(\frac{2^6\times3^3}{5^3\times2^6}\right) = \frac{3^3}{5^3} = \frac{27}{125}$

Question 3. Evaluate : (i) to (iv)

(i) $\left(\frac{-3}{5}\right)^{-5}\div\left(\frac{-3}{5}\right)^{-3} = \left(\frac{-3}{5}\right)^{-5-(-3)} = \left(\frac{-3}{5}\right)^{-5+3} = \left(\frac{-3}{5}\right)^{-2} = \left(\frac{-5}{3}\right)^{2} = \frac{25}{9} = 2\frac{2}{7}$

(ii) $\left[\left\{\left(\frac{-3}{4}\right)^{-3}\right\}^{-4}\right]^{-2} = \left[\left\{\frac{-3}{4}\right\}^{-3\times-4}\right]^{-2} = \left[\left\{\frac{-3}{4}\right\}^{12}\right]^{-2} = \left(\frac{-3}{4}\right)^{12\times-2} = \left(\frac{-3}{4}\right)^{-24} = \left(\frac{-4}{3}\right)^{24}$

(iii) $\left(\frac{2}{3}\right)^{-2}\times\left(\frac{2}{3}\right)^{-3}\times\left(\frac{2}{3}\right)^{-5} = \left(\frac{2}{3}\right)^{-2+(-3)+(-5)} = \left(\frac{2}{3}\right)^{-10} = \left(\frac{3}{2}\right)^{10}$

(iv) $\left(\frac{-5}{7}\right)^{-3}\div\left(\frac{-5}{7}\right)^{4} = \left(\frac{-5}{7}\right)^{-3-4} = \left(\frac{-5}{7}\right)^{-7} = \left(\frac{-7}{5}\right)^{7}$

Question 4. Find the reciprocal of the following rational numbers: (i) to (iii)

(i) $\left(\frac{-2}{5}\right)^{-2}\div\left(\frac{-2}{5}\right)^{-3} = \left(\frac{-2}{5}\right)^{-2-(-3)} = \left(\frac{-2}{5}\right)^{-2+3} = \left(\frac{-2}{5}\right)^{-1} = \left(\frac{-5}{3}\right)^{2}$

Reciprocal of the given number $\left(\frac{-2}{5}\right)^{2}$ is $\frac{-5}{2}$

(ii) $\left\{\left(\frac{-2}{5}\right)^{2}\right\}^{-3}\times\left(\frac{9}{4}\right)^{-12} = \left(\frac{4}{9}\right)^{2\times-3}\times\left(\frac{9}{4}\right)^{-12} = \left(\frac{4}{9}\right)^{-6}\times\left(\frac{9}{4}\right)^{-12}$

$= \left(\frac{4}{9}\right)^{-6}\times\left(\frac{4}{9}\right)^{12} = \left(\frac{4}{9}\right)^{12-6} = \left(\frac{4}{9}\right)^{6}$

$= \left(\frac{2^2}{3^2}\right)^{6} = \left(\frac{2}{3}\right)^{6\times2} = \left(\frac{2}{3}\right)^{12}$

Question 5. Evaluate : (i) to (iii)

(i) $\left(\frac{2}{3}\right)^{-2} \times \left(\frac{3}{4}\right)^{-3} \times \left(\frac{-4}{5}\right)^{1} = \left(\frac{3}{2}\right)^{2} \times \left(\frac{4}{3}\right)^{3} \times \left(\frac{-4}{5}\right) = \frac{3^2}{3^2} \times \frac{(2^2)^3}{3^3} \times \left(\frac{-2^2}{5}\right)$

$= \frac{-3^2}{3^3} \times \frac{2^6 \times 2^2}{2^2 \times 5} = \frac{-2^{6+2-2}}{3^{3-2} \times 5} = \frac{-2^6}{3 \times 5} = \frac{-64}{15} = -4\frac{4}{15}$

(ii) $(2^{-1} + 3^{-1}) \div \left(\frac{1}{6}\right)^{+2} = \left(\frac{1}{2} + \frac{1}{3}\right) \div \left(\frac{1}{6}\right)^2 = \left(\frac{3+2}{6}\right) \div \left(\frac{1}{6}\right)^2 = \frac{5}{6} \times (6)^2 = 5 \times 6 = 30$

(iii) $(2^{-1} \div 3^{-1})^{-1} = \left(\frac{1}{2} + \frac{1}{3}\right)^{-1} = \left(\frac{1}{2} \times \frac{3}{1}\right)^{-1} = \left(\frac{3}{2}\right)^{-1} = \frac{2}{3}$

Question 6. Find x such that : (i) to (iii)

(i) $\left(\frac{3}{5}\right)^{4} \times \left(\frac{3}{5}\right)^{-2} = \left(\frac{3}{5}\right)^{x-2} = \left(\frac{3}{5}\right)^{4+(-2)} = \left(\frac{3}{5}\right)^{x-2} = \left(\frac{3}{5}\right)^{2} = \left(\frac{3}{5}\right)^{x-2}$

Compose the exponent : $2 = x - 2$ $\therefore$ $x = 2 + 2 = 4$ $x = 4$

(ii) $\left(\frac{25}{8}\right)^{3} \times \left(\frac{8}{5}\right)^{3} = 5x = \left(\frac{25 \times 8}{8 \times 5}\right)^{3} = 5x = 5^3 = 5x$

$\therefore$ $= 5x$ $\frac{5^3}{5} = 5^{3-1} = 5^2 = 25$ $x = 25$

(iii) $\left\{\left(\frac{-2}{9}\right)^{+2} \times \left(\frac{-2}{9}\right)^{4}\right\}^{2} = \left\{\left(\frac{-2}{9}\right) \times \left(\frac{-2}{9}\right)^{5}\right\}^{x}$

$= \left\{\left(\frac{-2}{9}\right)^{2+4}\right\}^{2} = \left\{\left(\frac{-2}{9}\right)^{1+5}\right\}^{x} = \left(\frac{-2}{9}\right)^{6 \times x}$

$= \left(\frac{-2}{9}\right)^{6 \times 2} = \left(\frac{-2}{9}\right)^{6 \times x}$

Compare the exponents $6 \times 2 = 6x$

$\therefore$ $x = \frac{6 \times 2}{6} = 2$ $x = 2$

Question 7. By what number should $\left(\frac{1}{2}\right)^{-1}$ be multiplied, so that the product is $\left(\frac{-3}{8}\right)^{-1}$?

Let the number be x

$x \times \left(\frac{1}{3}\right)^{-1} = \left(\frac{-3}{8}\right)^{-1}$ $\left(a^{-1} = \frac{1}{a}\right)$

$x \times 3 = \frac{-8}{3}$ $x = \frac{-8}{3 \times 3}$

$\therefore$ $x = \frac{-8}{9}$ Multiplied by $\frac{-8}{9}$ to the number to get $\left(\frac{-8}{9}\right)^{-1}$

Question 8. By what number should $(-7)^{-1}$ be divided, so that the quotient (5^{-1})?

Let the number be x

$\therefore$ $(-7)^{-1} \div x = 5^{-1}$

$= \frac{-1}{7} \div x = \frac{1}{5}$

$= \frac{-1}{7} \div \frac{1}{x} = \frac{1}{5}$

$= -7x = 5$ $= x = \frac{-5}{7}$

To get quotient 5–1, number divided by $\frac{-5}{7}$

Question 9. If $2^{(3x+1)} \times 4 = 64$, find x?

$2^{3x+1} \times 4 = 64$

$2^{3x+1} \times 2^2 = 2^6$

$2^{3x+1+2} = 2^6$

Compare the exponents

$3x + 1 + 2 = 6$

$3x = 6 - 3$

$\therefore \quad x = \frac{3}{2} = 1 \qquad x = 1$

2	64
2	32
2	16
2	8
2	4
2	2
	1

$(a^m \times a^n = a^{m+n})$

Question 10. Find $\frac{a}{b}$, if $\left(\frac{2}{3}\right)^{-5} \times \left(\frac{9}{11}\right)^{-5} = \left(\frac{a}{b}\right)^{-5}$

$\left(\frac{2}{3}\right)^{-5} \times \left(\frac{9}{11}\right)^{-5} = \left(\frac{a}{b}\right)^{-5}$ $\qquad [a^m \times b^m = (ab)^m]$

$\left(\frac{2 \times 9}{3 \times 11}\right)^{-5} = \left(\frac{a}{b}\right)^{-5}$

Compare the base $\frac{2 \times 9}{3 \times 11} = \frac{a}{b}$

$\therefore \quad \frac{a}{b} = \frac{6}{11}$

Question 11. Simplify : $(3^{-4} \times 10^{-5} \times 25) \div (5^{-7} \times 6^{-4})$

$= (3^{-4} \times 10^{-5} \times 25) \div (5^{-7} \times 6^{-4})$

$= \left(\frac{1}{3^4} \times \frac{1}{10^5} \times 25\right) \div \left(\frac{1}{5^7} \times \frac{1}{6^4}\right)$

$= \frac{5^2}{3^4 \times (2 \times 5)^2} \div \frac{1}{5^7 \times 2^4 \times 3^4}$

$= \frac{5^2}{3^4 \times 2^2} \times 5^7 \times 2^4 \times 3^4$

$= 5^7 \times 2^2 \times 3^0$

$= 5^7 \times 2^2 \qquad [a^0 = 1]$

$= 5^5 \times (5 \times 2)^2 \qquad [5^7 = 5^5 \times 5^2]$

$= 312500$

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 12. If $x = \left(\frac{5}{8}\right)^{-2} \times \left(\frac{12}{15}\right)^{-2}$, then the value of x^{-3} is (a) 64 (b) 8 (c) $\frac{1}{64}$ (d) $\frac{1}{8}$

$x = \left(\frac{5}{8}\right)^{-2} \times \left(\frac{12}{15}\right)^{-2}$

$x = \left(\frac{5}{8} \times \frac{12}{15}\right)^{-2} = \left(\frac{5 \times 4 \times 3}{4 \times 2 \times 5 \times 3}\right)^{-2} = \left(\frac{1}{2}\right)^{-2} = 2^2 = 4$

$x = 4 \qquad (x)^3 = (4)^3 = 64$

$x = \frac{1}{x^3} \times \frac{1}{64} \qquad \left[\frac{-1}{a} = \frac{1}{a}\right]$

$x^{-3} = \frac{1}{64}$ **Ans. (c)**

Question 13. If $x = \left[\frac{4^{-3}+4^{-4}}{4^{-3}-4^{-4}}\right]$ is equal to (a) $\frac{1}{64}$ (b) 0 (c) $\frac{5}{3}$ (d) $\frac{-3}{5}$

$= \left[\frac{4^{-3}+4^{-4}}{4^{-3}-4^{-4}}\right] = \frac{\frac{1}{4^3}+\frac{1}{4^4}}{\frac{1}{4^3}+\frac{1}{4^4}}$ **[In the book option (a) and (d) are identical so change]**

$= \frac{\frac{4+1}{4^4}}{\frac{4-1}{4^4}} = \frac{5}{4^4} \times \frac{4^4}{3}$

$= \frac{5}{3}$ **Ans. (c)**

Question 14. $[4^{-1}+6^{-1}+8^{-1}]^0$ equals (a) 1 (b) $\frac{-13}{24}$ (c) 0 (d) $1\frac{11}{13}$

Any thing except 0 to the power zero is just 1.

$\therefore$ **Ans. (a)**

Question 15. Solve for x : $81^{-2} \div 729^{1-x} = 9^{2x}$ (a) –2 (b) 3 (c) –7 (d) 7

$= (9^2)^{-2} \div (9^3)^{1-x} = 9^{2x}$

$= 9^{-4} \div 9^{3-3x} = 9^{2x}$

$= 9^{-4-(3\ 3x)} = 9^{2x}$

$= 9^{-7+3x} = 9^{2x}$

Comparing the exponents

$= -7 + 3x = 2x$

$= 3x - 2x = 7$

$\therefore$ $x = 7$ **Ans. (d)**

Question 16. Simplify $\frac{10^{-1} \times 5^{x-3} \times 4^{x-1}}{10 \times 5^{x-5} \times 4^{x-2}}$ (a) 20 (b) 1 (c) 100 (d) 0

$= \frac{10^{-1} \times 5^{x-3} \times 4^{x-1}}{10 \times 5^{x-5} \times 4^{x-2}}$ $\left[\frac{a^m}{a^n} = a^{m-n}\right]$

$= 10^{-1-1} \times 5^{x-3-(x-5)} \times 4^{x-1-(x-2)}$

$= 10^{-2} \times 5^{x-3-x+5} \times 4^{x-1-x+2}$

$= 10^{-2} \times 5^2 \times 4^1$

$= \frac{1}{10^2} \times 5^2 \times 4 = \frac{25 \times 4}{100} = 1$

$\therefore$ **Ans. (b)**

HIGH ORDER THINKING SKILLS (HOTS)

Question 17. Simplify : (i) and (ii)

(i) $\frac{1}{1+a^{n-m}} + \frac{1}{1+a^{m-n}}$

$= \frac{1}{1+\frac{a^n}{a^m}} + \frac{1}{1+\frac{a^m}{a^n}}$

$$= \frac{1}{\frac{a^m + a^n}{a^m}} + \frac{1}{\frac{a^n + a^m}{a^n}}$$

$$= \frac{a^m}{a^m + a^n} + \frac{a^n}{a^n + a^m}$$

$$= \frac{a^m + a^n}{a^m + a^n} = 1$$

(ii) $$\frac{(x^{a+b})^2 \times (x^{b+c})^2 \times (x^{c+a})^2}{x^a x^b x^c}$$

$$= \frac{x^{2a+2b} \times x^{2b+2c} \times x^{2c+2a}}{x^a x^b x^c} \qquad [(x^a)^b = x^{ab}]$$

$$= \frac{x^{2a+2b+2b+2c+2c+2a}}{x^{a+b+c}}$$

$$= \frac{x^{4a+4b+4c}}{x^{a+b+c}}$$

$$= x^{4a+4b+4c-a-b-c}$$

$$= x^{3(a+b+c)}$$

Exercise 2 (C) Question 1. Write the following numbers in scientific notation :

(a) 0.0000243 = 2.43×10^{-5}

(b) 0.00000625 = 6.25×10^{-6}

(c) 0.000000000753 = 7.53×10^{-10}

Question 2. Write the following numbers is standard form.

(a) 9368 = 9.368×10^3

(b) 170000 = 1.70×10^5

(c) 863500 = 8.635×10^5

Question 3. Compare : Fill in the blanks <, > or =.

(i) 9×10^{-18} ....>.... 25×10^{-20}

(ii) 3.8×10^{-7} .....<..... 4.79×10^{-6}

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 4. ($6 \times 10^{-2} + 4.9 \times 10^{-4}$) equals. (a) 6.049×10^{-2} (b) 0.006049 (c) 0.06049 (d) 6.049×10^{-1}

$6 \times 10^{-2} + 4.9 \times 10^{-4}$

$$= \frac{6}{10^2}^3 + \frac{4.9}{10^4}$$

$= 0.06 + 0.00049$ = 0.06049

$= 6.049 \times 10^{-2}$ **Ans. (c)**

Question 5. The thickness of ta soap bubble is about 0.0004 metres. Write the thickness in scientific notation.

(a) 4×10^{-5} (b) 4×10^{-7}m (c) 0.4×10^{-5}m (d) 4×10^{-6}

Ans. 4.0×10^{-5} (a)

Question 6. Which of the following set of numbers is ordered from least to greatest?

(a) 5.37 × 10–5, 3.56 × 10–4, 0.00543, 0.00006

(b) 3.56 × 10–4, 5.37 × 10–5, 0.000543, 0.00006

(c) 0.006, 0.000543, 3.56 × 10–4, 5.37 × 10–5

(d) 5.37 × 10–5, 0.00006, 3.56 × 10–4, 0.000543

$0.000543 = 5.43 \times 10^{-4}$, $0.0006 = 6.0 \times 10^{-5}$

$5.37 \times 10^{-5} < 6.0 \times 10^{-5} < 3.56 \times 10^{-4} < 5.43 \times 10^{-4}$

Ans. (d)

HIGH ORDER THINKING SKILLS (HOTS)

Question 7. The radius of a proton is about 1.2 Fermis. One Fermi is equal to 10^{-15} metre. How many centimeters is the radius of the proton. Write your answer in scientific notation.

1 Fermis = 10^{-15} metre

= $10^{-15} \times 10^{2}$ cm (1m = 100cm)

$\therefore$ 1 Fermis = 10^{-13} cm

Hence 1.2 Fermis = 1.2×10^{-13} cm

Mental Maths

Question 1. Express is power notation $\left(\frac{-2}{7}\right)^{-3} \times \left(\frac{-2}{7}\right)^{-3} \times \left(\frac{-2}{7}\right)^{-3}$

$= \left(\frac{-2}{7}\right)^{-3+(-3)+(-3)}$ $[a^m \times a^n = a^{m+n}]$

$= \left(\frac{-2}{7}\right)^{-9} \times \left(\frac{-7}{2}\right)^{9}$

Question 2. Express $\left(\frac{-3}{4}\right)^{-2}$ **as a rational number.**

$= \left(\frac{-2}{7}\right)^{-2} = \left(\frac{-3}{4}\right)^{-2} = \left(\frac{4}{3}\right)^{2} = \frac{16}{9}$

Question 3. Express $\frac{-1}{216}$ **as an exponent of a rational number.**

$= \frac{-1}{216} = \frac{-1}{2 \times 2 \times 2 \times 3 \times 3 \times 3} = \frac{-1}{(2 \times 3)^3} = \frac{-1}{6^3} = \left(\frac{-1}{6}\right)^{2}$

Question 4. Simplify $\left(\frac{2}{3}\right)^{2} \times \left(\frac{-7}{8}\right)^{0}$

$= \left(\frac{-1}{6}\right)^{2} \times 1$ $[a^0 = 1]$

$= \left(\frac{3}{2}\right)^{2} \times \frac{4}{9}$

Question 5. Find the value of $\left(\frac{1}{3}\right)^{-1} + \left(\frac{1}{5}\right)^{-1} + \left(\frac{1}{6}\right)^{-1}$

$= \left(\frac{1}{3}\right)^{-1} + \left(\frac{1}{5}\right)^{-1} + \left(\frac{1}{6}\right)^{-1}$

$= (3)^1 + (5)^1 - (6)^1$ $\left(a^{-1} = \frac{1}{3}\right)$ $= 3 + 5 - 6 = -2$

Question 6. If $\frac{a}{b} + \left(\frac{2}{3}\right)^{-3}$, find the value of $\left(\frac{a}{b}\right)^{-3}$

$= \frac{a}{b} \times \left(\frac{2}{3}\right)^{-3} \quad \left[\frac{a}{b}\right]^{-3} = \left[\left(\frac{2}{3}\right)^{-3}\right]^{-3} = \left(\frac{2}{3}\right)^{9}$

$\therefore \left(\frac{a}{b}\right)^{-3} = \left(\frac{2}{3}\right)^{9}$

Question 7. Find value of x if $\left(\frac{5}{6}\right)^{7} \times \left(\frac{5}{6}\right)^{-9} \times \left(\frac{5}{6}\right)^{2x}$

$= \left(\frac{5}{6}\right)^{7} \times \left(\frac{5}{6}\right)^{-9} \times \left(\frac{5}{6}\right)^{2x}$

$= \left(\frac{5}{6}\right)^{7-9} \times \left(\frac{5}{6}\right)^{2x} \qquad [a^m \times a^n = a^{m+n}]$

$= \left(\frac{5}{6}\right)^{-2} = \left(\frac{5}{6}\right)^{2x}$

Compare the exponents

$\therefore \quad -2 = 2x$

$\therefore \quad x = -1$

Question 8. By what number should $(3)^7$ be divided so that the quotient is 3^2.

Let the number be x

$\therefore \quad 3^7 \div x = 3^2$

$= \quad \frac{3^7}{x} = 3^2$

$\therefore \quad x = \frac{3^7}{3^2} = 3^{7-2} = 3^5$

$\therefore \quad x = 3^5 = 243$

Hence number should be divided by 243.

Question 9. Find the reciprocal of $\left(\frac{2}{5}\right)^{-3}$

$= \left(\frac{2}{5}\right)^{-3} = \left(\frac{5}{2}\right)^{3} \qquad \left[a^{-m} = \frac{1}{a^m}\right]$

Reciprocal of $\left(\frac{5}{2}\right)^{3}$ is $\left(\frac{2}{5}\right)^{3} = \frac{8}{125}$

Question 10. Express $\left\{\left(\frac{-3}{7}\right)^{-3}\right\}^{2}$ with a positive exponent.

$= \left\{\left(\frac{-3}{7}\right)^{-3}\right\}^{2} = \left(\frac{-3}{7}\right)^{-3\times 2} \qquad [(a^m)^n = a^{m\times n}]$

$= \left(\frac{-3}{7}\right)^{-6} = \left(\frac{-7}{3}\right)^{6} = \left(\frac{7}{3}\right)^{6}$

CHAPTER ASSESSMENT / CONCEPT REVIEW

Question 1. Fill in the blanks :

(i) $3^{-4} = \frac{1}{3^4} = \frac{1}{81}$

(ii) A negative rational number raised to the power zero equals = 1.

(iii) $[(-2)^{-1}]^{-1}$ equals = $(-2)^{-1} \times^{-1} = (-2)^{1} = -2$

(iv) 0.000543 in scientific notation is 5.43×10^{-4}

(v) $\frac{x^{-2}}{x} = \frac{1}{x^{12}} = \frac{x^{-2} \times x^{12}}{x} = 1$

= $x^{10-1} = 1$

= $x^{9} = 1$ $\therefore$ $x = 1$

Question 2. Answer True (T) or False (F) :

(i) $5^{-3} = -125$ $5^{-3} = \frac{1}{5^{3}} = \frac{1}{25}$

$\therefore$ $5^{-3} \neq -125$ (F)

(ii) The reciprocal of $\left(\frac{2}{3}\right)^{-2} = \left(\frac{2}{3}\right)^{2}$

$\left(\frac{2}{3}\right)^{-2} = \left(\frac{3}{2}\right)^{2}$

Reciprocal of $\left(\frac{3}{2}\right)^{-2}$ is $\left(\frac{2}{3}\right)^{2}$

Hence the reciprocal of $\left(\frac{2}{3}\right)^{-2}$ is $\left(\frac{2}{3}\right)^{2}$ (T)

(iii) If $(3y^{7})^{x} = 1$ then $x = -7$

$(3y^{7})^{x} = 1$

$3^{x}y^{7x} = 1$ y is not given : it is False (F)

(iv) $\left[\left(\frac{1}{2}\right)^{-1} + \frac{2}{3} = \left(\frac{3}{4}\right)^{-1}\right]^{0} = 1$

Any thing concept (0) to the power zero is just 1.

$\therefore$ It is the (T)

(v) $4.3 \times 10{-}4 < 0.00045$

$0.00045 = 4.5 \times 10{-}4$

$\therefore$ It is true (T).

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 3. The value of $(8^{-1} - 9^{-1})^{-1} \div (4^{-1} \times 9^{-1})^{-1}$ (a) 5 (b) 10 (c) 25 (d) 14

$(8^{-1} - 9^{-1})^{-1} \div (4^{-1} \times 9^{-1})^{-1}$

$\left(\frac{1}{8} - \frac{1}{9}\right)^{-1} \div \left(\frac{1}{4} \times \frac{1}{9}\right)^{-1}$

$\left(\frac{9-8}{9 \times 8}\right)^{-1} \div \left(\frac{1}{36}\right)^{-1}$

$\left(\frac{1}{72}\right)^{-1} \div \left(\frac{1}{36}\right)^{-1}$

$72 \div \left(\frac{1}{36}\right)^{-1}$

$72 \div 36$

$72 \times \left(\frac{1}{36}\right)^{-1} = 2$

Question 4. $(16)^{0.16} \times (16)^{0.04} \times (2)^{0.2}$ **is equal to : (a) 1 (b) 2 (c) 4 (d) 16**

$(16)^{0.16} \times (16)^{0.04} \times (2)^{0.2}$

$= (16)^{0.16+0.04} \times (2)^{0.2}$

$= (16)^{0.2} \times (2)^{0.2}$

$= (2^4)^{0.2} \times (2)^{0.2}$

$= 2^{0.8} \times 2^{0.2} = 2^{0.8+0.2}$

$= 2^1 = 2$

Ans. (a)

Question 5. If $\left(\frac{4}{11}\right)^{x-1} = \left(\frac{11}{4}\right)^{x-5}$**, then x is equal to : (a) 3 (b) 0 (c) 1 (d) 2**

$\left(\frac{4}{11}\right)^{x-1} = \left(\frac{11}{4}\right)^{x-5}$

$\left[\left(\frac{11}{4}\right)^{-1}\right]^{x-1} = \left(\frac{11}{4}\right)^{x-5}$

$\left(\frac{11}{4}\right)^{-x-1} = \left(\frac{11}{4}\right)^{x-5}$

Compare the exponents

$-x + 1 = x - 5$

$-x - x = -5 - 1$

$-2x = -6$

$x = \frac{-6}{-2} = 3$ Ans. (a)

Question 6. What is the area of a rectangle with length 3 metres and width 9^{-2} metres?

(a) $\frac{1}{9}$ **metres (b) 3 metres^2 (c)** $\frac{1}{3}$ **metres^2 (d)** $\frac{1}{27}$ **metres**

Area of rectangle = length × weight

$= 3^3 \times 9^{-2}$

$= 33 \times \frac{1}{9^2} = \frac{27}{81} = \frac{1}{3}$

$\therefore$ Area of rectangle $= \frac{1}{3}\ m^2$ Ans. (c)

Question 7. Size of a plant cell is 0.00001275m Expressed in scientific notation in centimeters it is :

(a) 1.275×10^{-5} **cm (b)** 1.275×10^{-3} **cm (c)** 1.275×10^{-7} **cm (d)** 1.275×10^{-8} **cm**

0.00001275m

0.00001275×100 cm

0.001275 cm

1.275×10^{-3} cm

Ans. (b)

HIGH ORDER THINKING SKILLS (HOTS)

Question 8. If $\left(\frac{3}{8}\right)^{-5} \times \left(\frac{16}{21}\right)^{-5} \times \left(\frac{2}{7}\right)^{x}$, find x^3

$$\left(\frac{3}{8}\right)^{-5} \times \left(\frac{16}{21}\right)^{-5} \times \left(\frac{2}{7}\right)^{x}$$

$$\left(\frac{3 \times 16}{8 \times 21}\right)^{-5} \times \left(\frac{2}{7}\right)^{x}$$

$$\left(\frac{2}{7}\right)^{-5} = \left(\frac{2}{7}\right)^{x}$$

Compare the exponents

$-5 = x$

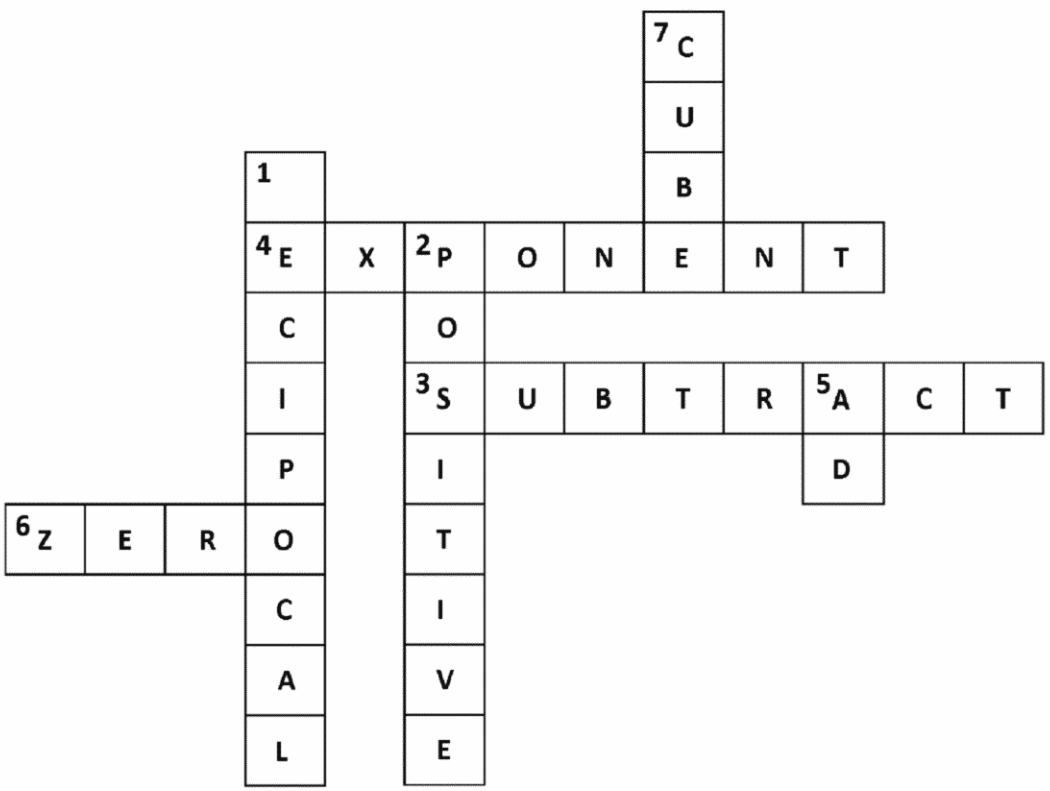
$\therefore \quad x^3 = (-5)^3 = -125$

WORK SHEET

(A). Complete the magic square given below :

$\sqrt{36}$		3^2
8^0	$\sqrt{9}$	
	$3^2 - 2$	

(B). Can you fill in the exponential grid given below with the help of the given clues.



Chapter-3. SQUARES AND SQUARE ROOTS :- A number is multiplied by itself, the product so obtained is called the square of that number.

It is a number raised to the power 2.

The square of a natural number is called a perfect square.

The square of an even number is also even number.

The square of an odd number is also odd number.

The number of zeroes at the end of a perfect square is always even.

For any natural number n, n^2 = sum of first n odd natural numbers.

A perfect square is never negative integer.

A square number never ends 2, 3, 7 or 8.

If a number ends in an odd number of zero, then it does not have a square root.

The square root of an even number is also even number.

The square root of an odd number is also odd number.

NOTE :– If n is not a perfect square, then n is not a rational number. Numbers ending in an even number of zeros are not necessarily perfect squares.

Prime factorization method :

(i) The square root of a perfect square, square number can be obtained by finding the prime factorization of the square number; pairing equal factors and picking out one prime factor our of each pair.

Exercise : 3 (A) Question 1. Using the prime factorization method show that the following numbers are perfect squares? Find the number whose square is the given number. (i) to (iv)

(i) $100 = 2 \times 2 \times 5 \times 5 = (2 \times 2) \times (5 \times 5)$

$\therefore$ 100 is the square of $2 \times 5 = 10$

(ii) $121 = 11 \times 11$

$\therefore$ 121 is the square of 11.

(iii) $1600 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5$

$= (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (5 \times 5)$

$\therefore$ 1600 is the square of $2 \times 2 \times 2 \times 5 = 40$

(iv) $8100 = 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5$

$\therefore$ 8100 is the square of $2 \times 3 \times 3 \times 5 = 90$

Question 2. Find which of the following numbers are not perfect square (i) to (iv).

(i) $400 = 2 \times 2 \times 2 \times 2 \times 5 \times 5$

It is a perfect square of number $2 \times 2 \times 5 = 20$.

(ii) $768 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3$

Grouping the factors in to pairs of equal factors we find that 3 is left so 768 is not a perfect square number.

(iii) 1296 = $2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3$

It is a perfect square of number $2 \times 2 \times 3 \times 3 = 36$

(iv) 10,000 = $2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3$

It is a perfect square of number $2 \times 2 \times 5 \times 5 = 100$

Alter : We know that square number never ends 8. So by observation 768 is not square number.

Question 3. Find the smallest number by which each of the given numbers should be divided so that the result is a perfect square : (i) to (iv)

(i) 225 = $\underline{3 \times 3} \times \underline{5 \times 5}$

It is a perfect square number of $3 \times 5 = 15$.

(ii) 1024 = $\underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2}$

It is a perfect square number of $2 \times 2 \times 2 \times 2 \times 2 = 32$

(iii) 3267 = $\underline{3 \times 3} \times 3 \times \underline{11 \times 11}$

Grouping the factors into pairs of equal factors, we find that 3 is left.

So we divide 3267 by the factor 3.

$\therefore$ Perfect square number $= \frac{3267}{3} = 1089$

5	3267
5	1089
5	363
5	121
11	11
	1

(iv) 19200 = $\underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times 3 \times \underline{5 \times 5}$

Grouping the factors into the pairs of equal factors, we find that 3 is left.

So we divide 19200 by the factors 3.

$\therefore$ Perfect square number $= \frac{19200}{3} = 6400$

2	19200
2	9600
2	4800
2	2400
2	1200
2	600
2	300
2	150
3	75
5	25
5	5

Question 4. Find the smallest number by which each of the given numbers must be multiplied so that the product is a perfect square. (i) to (iv)

(i) 256 = $\underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2}$

It is a perfect square number of $2 \times 2 \times 2 \times 2 = 16$

(ii) 700 = $2 \times 2 \times 5 \times 5 \times 7$

Grouping the factors into the pairs of equal factors, we find that 7 is left.

So, we multiply 700 by the factors 7.

$\therefore$ Perfect square number = $700 \times 7 = 4900$

2	700
2	350
5	175
5	35
	7

(iii) 1323 = $3 \times 3 \times 3 \times 7 \times 7$

Grouping the factors is to the pairs of equal factors, we find that 3 is left.

So we multiply 1323 by the factors 3.

$\therefore$ Perfect square number = $1323 \times 3 = 3969$

3	1323
3	441
3	147
7	49
	7

(iv) 1922 = $2 \times 31 \times 31$

Grouping the factors in to the pairs of equal factors, we find that 2 is left.

So we multiply 1922 by the factors = 2.

$\therefore$ Perfect square number = $1922 \times 2 = 3844$

2	1922
31	961
31	31
	1

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 5. The smallest number by which 980 must be multiplied so that the product is a perfect square is.

(a) 6 (b) 3 (c) 5 (d) 7

2	980
2	490
5	245
7	49
7	7
	1

980 = $2 \times 2 \times 5 \times 7 \times 7$

$\therefore$ (c) Ans.

Question 6. Which number is not a perfect square.

(a) 169 (b) 64 (c) 400 (d) 288

169 = 13×13

64 = $2 \times 2 \times 2 \times 2 \times 2 \times 2$

400 = $2 \times 2 \times 2 \times 2 \times 5 \times 5$

288 = $2 \times 2\times 2 \times 2 \times 2 \times 3 \times 3$

$\therefore$ (d) Ans.

Exercise : 3(B) Question 1. Answer True (T) or False (F) :

(i) No, Square number is negative. (T)

(ii) 4000 is a square number. (F)

(Zeroes is odd numbers)

(iii) The numbers of digits in a square numbers are always even. (F)

(The numbers of digit in a square numbers are not always even. (Ex. 9)

(iv) The square of a prime number is prime. (F)

(Square numbers are always composite number except one.)

(v) The difference of two square numbers is a square number. (F)

(Difference of two consecutive square numbers is not a perfect square number.

Question 2. Fill in the blanks.

(i) Squares of odd numbers are always odd number.

(ii) A square number never ends in 2, 3, 7 or 8.

(iii) The sun of first n natural odd numbers n^2.

(iv) The number of square numbers up to 100 are 10.

(v) The units digit of the square of 729 will be 7.

Question 3. The following numbers are not perfect squares. Give reasons.

(i) 1008 = A square number never ends in 8.

(ii) 64000 = A square number does not zero in odd number.

(iii) 42237 = A square number never ends in 7.

(iv) 15059 = $3 \times 5019 + 2$

If a number when divided by 3 leave remainder 2, then it is not a perfect square number.

(v) 375380 = $3 \times 125126 + 2$

If a number when divided by 3-leave remainder 2, then it is not a perfect square number.

Question 4. Fill in the blanks :

(i) $22^2 - 21^2$ = $22 + 21 = 43$

(ii) $40^2 - 39^2$ = $40 + 39 = 79$

(iii) $97^2 - 96^2$ = $97 + 96 = 193$

[The difference of squares of two consecutive natural number is equal to their sum.]

Question 5. What will be unit digit of the square of the following numbers?

(i) 79 = $9 \times 9 = 81$ $\therefore$ Unit digit to square number is 1.

(ii) 123 = $3 \times 3 = 9$ $\therefore$ Unit digit of square number is 9.

(iii) 1257 = $7 \times 7 = 49$ $\therefore$ Unit digit to square number is 9.

(iv) 9876 = $6 \times 6 = 36$ $\therefore$ Unit digit to square number is 6.

(v) 12580 = $0 \times 0 = 0$ $\therefore$ Unit digit to square number is 0.

(vi) 46704 = $4 \times 4 = 16$ $\therefore$ Unit digit to square number is 6.

(vii) 8378 = $8 \times 8 = 64$ $\therefore$ Unit digit to square number is 4.

(viii) 4265 = $5 \times 5 = 25$ $\therefore$ Unit digit to square number is 5.

Question 6. Which of the following triplets are Pythagorean?

(ii) (14, 48, 50) = $2m = 14 \Rightarrow m = 7$

= $m^2 - 1 = (7)^2 - 1 = 49 - 1 = 48$

= $m^2 + 1 = (7)^2 + 1 = 49 + 1 = 50$

Numbers are $2m$, $(m^2 - 1)$ and $(m^2 + 1)$ form

$\therefore$ (14, 48, 50) is a Pythagorean triplet.

(ii) (19, 78, 85) = $2m = 78 \Rightarrow 39$

$m^2 - 1 = (39)^2 - 1 = 1520$

$\therefore$ (19, 78, 85) is not a Pythagorean triplet.

(iii) (10, 24, 26) = $2m = 10 \Rightarrow m = 5$

$m^2 - 1 = (5)^2 - 1 = 25 - 1 = 24$

$m^2 + 1 = (5)^2 + 1 = 25 + 1 = 26$

$\therefore$ (10, 24, 26) is a Pythagorean triplet.

(iv) (32, 98, 126) = $2m = 32 \Rightarrow m = 16$

= $m^2 - 1 = (16)^2 - 1 = 256 - 1 = 255$

$\therefore$ (32, 98, 126) is not a Pythagorean triplet.

Question 7. Without adding, match the sum in Column A with the perfect square in Column B.

	Column A		Column B
(i)	36	(a)	1 + 3 + 5
(ii)	100	(b)	1 + 3 + 5 + 7 + 9
(iii)	25	(c)	1 + 3 + 5 + 7 + 9 + 11
(iv)	64	(d)	1 + 3 + 5 + 7 + 8 + 9 + 11 + 13 + 15
(v)	9	(e)	1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19

Ans.

(a) $1 + 3 + 5 = 3^2 = 9$ (v)

(b) $1 + 3 + 5 + 7 + 9 = 5^2 = 25$ (iii)

(c) $1 + 3 + 5 + 7 + 9 + 11 = 6^2 = 36$ (i)

(d) $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 = 8^2 = 62$ (iv)

(e) $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 = 10^2 = 100$ (ii)

[The sum of first n natural number = n^2]

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 8. For every natural number n, (n + 1)2 – n2 equals.

(a) (n – 1) + n **(b) (n + 1) + n** **(c) n – (n + 1)** **(d) (n + 1) – n**

Ans. (n + 1) + n (b)

[The different of squares of two consecutive natural number is equal to their sum.]

Question 9. The digit in the unit place in the square of 3296 is.

(a) 9 **(b) 4** **(c) 6** **(d)**

6 × 6 = 36 $\therefore$ Unit digit of square number = 6.

Ans. (c)

HIGH ORDER THINKING SKILLS (HOTS)

Question 10. If a square number ends in 9, the proceeding number is.

(a) prime number **(b) a multiple of 8** **(c) a multiple of 6** **(d) an odd number**

The place of bing square number end with 4.

$\therefore$ **Ans.** (b)

Exercise : 3 (C) Question 1. Find by prime factorization the square root of the following numbers : (i) to (ix).

(i) 196 = 2 × 2 × 7 × 7

$\sqrt{196}$ = $\sqrt{\underline{2 \times 2} \times \underline{7 \times 7}}$ = 2 × 7 = 14

(ii) 289 = 17 × 17

$\sqrt{289}$ = $\sqrt{17 \times 17}$ = 17

(iii) $1936 = 2 \times 2 \times 2 \times 2 \times 11 \times 11$

$\sqrt{1936} = \sqrt{\underline{2 \times 2} \times \underline{2 \times 2} \times \underline{11 \times 11}}$

$= 2 \times 2 \times 11 = 44$

2	1936
2	968
2	484
2	242
11	121
	11

(iv) $2500 = 2 \times 2 \times 5 \times 5 \times 5 \times 5$

$\sqrt{2500} = \sqrt{\underline{2 \times 2} \times \underline{5 \times 5} \times \underline{5 \times 5}}$

$= 2 \times 5 \times 5 = 50$

2	2116
2	1058
23	529
	23

(v) $2116 = 2 \times 2 \times 23 \times 23$

$\sqrt{2116} = \sqrt{2 \times 2 \times 23 \times 23}$

$= 2 \times 23 = 46$

2	6084
2	3042
3	1521
3	507
13	169
	13

(vi) $4900 = 2 \times 2 \times 5 \times 5 \times 7 \times 7$

$\sqrt{4900} = \sqrt{\underline{2 \times 2} \times \underline{5 \times 5} \times \underline{7 \times 7}}$

$= 2 \times 5 \times 7 = 70$

2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
	3

(vii) $6084 = 2 \times 2 \times 3 \times 3 \times 13 \times 13$

$\sqrt{6084} = \sqrt{2 \times 2 \times 3 \times 3 \times 13 \times 13}$

$6084 = 2 \times 3 \times 13 = 78$

3	8649
3	2883
31	961
	31

(viii) $2916 = 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$

$\sqrt{2916} = \sqrt{2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3}$

$= 2 \times 3 \times 3 \times 3$

$= 54$

(ix) $8649 = 3 \times 3 \times 31 \times 31$

$\sqrt{8649} = \sqrt{\underline{3 \times 3} \times \underline{31 \times 31}}$

$= 3 \times 31$

$= 93$

2	7056
2	3528
2	1764
2	882
3	441
3	147
7	49
	7

(x) $7056 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 7 \times 7$

$\sqrt{7056} = \sqrt{\underline{2 \times 2} \times \underline{2 \times 2} \times \underline{3 \times 3} \times \underline{7 \times 7}}$

$= 2 \times 2 \times 3 \times 7$

$= 84$

Question 2. Find the square root of the following fractions.

(i) $\frac{64}{81} = \frac{2 \times 2 \times 2 \times 2 \times 2 \times 2}{3 \times 3 \times 3 \times 3}$

$\sqrt{\frac{64}{81}} = \sqrt{\frac{\underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2}}{\underline{3 \times 3} \times \underline{3 \times 3}}}$

$= \frac{2 \times 2 \times 2}{3 \times 3}$

$\therefore \sqrt{\frac{64}{81}} = \frac{8}{9}$

(ii) $\frac{169}{625} = \frac{13 \times 13}{5 \times 5 \times 5 \times 5}$

$\sqrt{\frac{169}{625}} = \sqrt{\frac{13 \times 13}{5 \times 5 \times 5 \times 5}}$

$\sqrt{\frac{169}{625}} = \frac{13}{25}$

(iii) $1\frac{396}{9604} = \frac{9604 + 396}{9604} = \frac{10000}{9604}$

$\sqrt{1\frac{396}{9604}} = \sqrt{\frac{10000}{9604}}$

$= \sqrt{\frac{100 \times 00}{2 \times 2 \times 7 \times 7 \times 7 \times 7}}$

$= \frac{100}{2 \times 7 \times 7} = \frac{100}{98}$

2	9604
2	4802
7	2401
7	343
7	49
	7

$\therefore \sqrt{1\frac{396}{9604}} = \frac{50}{49} = 1\frac{1}{49}$

(iv) $\frac{1369}{1849} = \frac{37 \times 37}{43 \times 43}$

$\sqrt{\frac{1369}{1849}} = \sqrt{\frac{37 \times 37}{43 \times 43}} = \frac{37}{43}$

37	1369
	37

43	1849
	43

(v) $0.00000064 = \frac{64}{100000000} = \frac{2 \times 2 \times 2 \times 2 \times 2 \times 2}{1000 \times 1000}$

$\sqrt{0.00000064} = \sqrt{\frac{2 \times 2 \times 2 \times 2 \times 2 \times 2}{1000 \times 1000}} = \frac{2 \times 2 \times 2}{1000}$

$= 0.0008$

(vi) $\sqrt{0.00000081} = \sqrt{\frac{81}{100000000}} = \sqrt{\frac{9 \times 9}{1000 \times 1000}}$

$= \frac{9}{10000} = 0.0009$

(vii) $0.000025 = \frac{25}{1000000}$

$\sqrt{0.000025} = \sqrt{\frac{25}{1000000}} = \sqrt{\frac{5 \times 5}{1000 \times 1000}} = \frac{5}{1000 \times 1000} = \frac{5}{1000} = 0.005$

(viii) $0.00000121 = \frac{121}{100000000}$

$\sqrt{0.00000121} = \sqrt{\frac{121}{100000000}} = \sqrt{\frac{11 \times 11}{10000 \times 10000}} = \frac{11}{10000} = 0.0011$

[(v) & (vii) one wrong in the text book]

Question 3. Simplify : (i) to (v)

(i) $\sqrt{(10^2 - 6^2)} = \sqrt{(100 - 36)} = \sqrt{64}$

$= \sqrt{8 \times 8} = 8$

$\therefore \sqrt{10^2 - 6^2} = 8$

(ii) $\sqrt{(6^2 - 8^2)}$ = (36 + 34) = 100 = 10^2

(iii) $(-9)^2 - \sqrt{81}$ = $81 - \sqrt{9 \times 9}$ = 81 − 9 = 72

(iv) $\left(\frac{1}{3}\right)^2 + \sqrt{0.36}$ = $\frac{1}{9} + \sqrt{0.6 \times 0.6}$ = $\frac{1}{9} + 0.6$

= $\frac{1}{9} + \frac{6}{10} = \frac{10 + 54}{90} = \frac{64}{90} = \frac{32}{45}$

(v) $\left(-\sqrt{\frac{16}{25}}\right)\left(-\sqrt{\frac{100}{64}}\right)$

$\left(-\sqrt{\frac{4 \times 4}{5 \times 5}}\right)\left(-\sqrt{\frac{10 \times 10}{8 \times 8}}\right)$

= $\left(\frac{-4}{5}\right)\left(\frac{-10}{8}\right)$ = 1

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 4. Of the numbers 0.25, $\sqrt{0.25}$, $(0.25)^2$ and 0.025, the number is

(a) $\sqrt{0.25}$ (b) $(0.25)^2$ (c) 0.25 (d) 0.025

$\sqrt{0.25} = \sqrt{0.5 \times 0.5} = 0.5$, $(0.25)^2 = 0.25 \times 0.25 = 0.0625$

∴ Least number is 0.025 **Ans.** (d)

Question 5. $\left(\sqrt{\frac{225}{729}} - \sqrt{\frac{25}{144}}\right) \div \sqrt{\frac{61}{81}}$ **equals.**

(a) $\frac{5}{16}$ (b) $\frac{1}{48}$ (c) $\frac{5}{81}$ (d) None of these

$\left(\sqrt{\frac{225}{729}} - \sqrt{\frac{25}{144}}\right) \div \sqrt{\frac{61}{81}}$

$\left(\sqrt{\frac{15 \times 15}{27 \times 27}} - \sqrt{\frac{5 \times 5}{12 \times 12}}\right) \div \sqrt{\frac{61}{9 \times 9}}$

$\left(\frac{15}{27} - \frac{5}{12}\right) \div \sqrt{\frac{61}{9}}$

$\left(\frac{15 \times 12 - 5 \times 27}{27 \times 12}\right) \div \sqrt{\frac{61}{9}}$

$\left(\frac{180 - 135}{27 \times 12}\right) \div \sqrt{\frac{61}{9}}$

$\left(\frac{45}{27 \times 12}\right) \div \sqrt{\frac{9}{61}}$

$\left(\frac{5}{4\sqrt{16}}\right)$ **Ans.** (d) None of these

Question 6. Which of the following is not correct.

(a) $\sqrt{0.04096} = 0.064$ (b) $\sqrt{4096} = 64$ (c) $\sqrt{0.4096} = 0.64$ (d) $\sqrt{40.96} = 6.4$

(b) $\sqrt{4096} = \sqrt{64 \times 64} = 64$

(c) $\sqrt{0.4096} = \sqrt{\frac{4096}{10000}} = \sqrt{\frac{64 \times 64}{100 \times 100}} = \frac{64}{100} = 0.64$

(d) $\sqrt{40.96} = \sqrt{\frac{4096}{100}} = \sqrt{\frac{64 \times 64}{10 \times 10}} = \frac{64}{10} = 6.4$

$\therefore$ (a) is not correct.

Question 7. The value of $\frac{7}{\sqrt{0.49}}$ is :

(a) 1 **(b) 10** **(c) $\frac{1}{10}$** **(d) $\frac{3}{10}$**

$\frac{7}{\sqrt{0.49}} = \frac{7}{\sqrt{0.7 \times 0.7}} = \frac{7}{0.7} = \frac{70}{7} = 10$ **Ans.** (b)

Question 8. The are of a square field is $1\frac{17}{64}$ cm^2. The length of each side is :

(a) $1\frac{1}{8}$ **(b) $2\frac{1}{8}$** **(c) $2\frac{3}{8}$** **(d) $1\frac{3}{8}$**

Area of square field = Side^2

$\therefore$ Side^2 $= 1\frac{17}{64} = \frac{64 + 17}{64} = \frac{81}{64}$

Side $= \sqrt{1\frac{81}{64}} = \sqrt{\frac{9 \times 9}{8 \times 8}} = \frac{9}{8} = 1\frac{1}{8}$ cm

Question 9. $\sqrt{0.0016} \times \sqrt{3.24} \times \sqrt{0.0001}$ equals :

(a) 0.072 **(b) 0.00072** **(c) 0.0072** **(d) 0.000072**

$\sqrt{0.04 \times 0.04} \times \sqrt{1.8 \times 1.8} \times \sqrt{0.01 \times 0.01}$

$= 0.04 \times 1.8 \times 0.01$

0.00072

Ans. (b)

HIGH ORDER THINKING SKILLS (HOTS)

Question 10. $\sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{154 + \sqrt{225}}}}}$

$= \sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{154 + \sqrt{15 \times 15}}}}}$

$= \sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{154 + 15}}}}$

$= \sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{169}}}}$

$= \sqrt{10 + \sqrt{25 + \sqrt{108 + 13}}}$

$= \sqrt{10 + \sqrt{25 + \sqrt{121}}}$

$= \sqrt{10 + \sqrt{25 + 11}}$

$= \sqrt{10 + \sqrt{36}}$

$= \sqrt{10 + 6}$

$= \sqrt{16}$

$= 4$

Find the square root by long division method :

Step 1. Group the digits in pairs, starting with the digit in the unit place.
Each pair and the remaining digit (It any(is called a period.

Step 2. Think of the largest number whose square is equal to or just less than the first period.
Take this number as the divisor and also as a quotient.

Step 3. Subtract the product of the divisor and also as a quotient first period and bring down the next period to the right remainder. This becomes the new dividend.

Step 4. Now the new divisor is obtained by taking two times the quotient and annexing with it a suitable digit which is also taken as the next digit of the quotient chosen in such a way that the product of the new divisor.

Step 5. Repeat steps (2), (3) and (5) till all the periods have been taken up.
Now, the quotient so obtained is the required square rot of the given number.

Exercise 3 (D) Question 1. Evaluate : (i) to (iii)

(i) $\sqrt{1\frac{869}{1156}} = \sqrt{\frac{1156+869}{1156}} = \sqrt{\frac{2025}{1156}}$

$= \sqrt{\frac{2025}{1156}} = \sqrt{\frac{3\times3\times3\times3\times5\times5}{2\times2\times17\times17}}$

$= \frac{3\times3\times5}{2\times17}$

$= \frac{45}{34} = 1\frac{11}{34}$

3	2025
3	675
3	225
3	75
5	25
	5

2	1156
2	578
17	289
	17

(ii) $\sqrt{\frac{3969}{5625}}$

$= \sqrt{\frac{3\times3\times3\times3\times7\times7}{3\times3\times5\times5\times5\times5}}$

$= \frac{3\times3\times7}{3\times5\times5} = \frac{21}{25}$

3	3969
3	1323
3	441
3	147
7	49
	7

3	5625
3	1875
5	625
5	125
5	25
	5

(iii) $\sqrt{\frac{1444}{8281}}$

$= \sqrt{\frac{2\times2\times19\times19}{7\times7\times13\times13}}$

$= \frac{2\times19}{7\times13} = \frac{38}{91}$

7	8281
7	1783
13	169
	13

2	1444
2	722
19	361
	19

Question 2. Find the square root of each of the following numbers by long division : (i) to (x)

(i) 2304

	4	8
4	23	04
+4	16	↓
88	7	04
	7	04
		×

$\therefore \sqrt{2304} = 48$

(ii) 1225

	3	5
3	12	25
+3	9	↓
65	3	25
	3	25
		x

$\therefore \sqrt{1225} = 35$

(iii) 2209

	4	7
4	22	09
+4	16	↓
87	6	09
	6	09
	x	

$\therefore \quad \sqrt{2209} = 47$

(iv) 3481

	5	9
5	34	81
+5	25	↓
109	9	81
	9	81
	x	

$\therefore \quad \sqrt{3481} = 59$

(v) 4225

	6	5
6	42	25
+6	36	↓
125	6	25
	6	25
	x	

$\therefore \quad \sqrt{4225} = 65$

(vi) 6724

	8	2
8	67	24
+8	64	↓
162	3	24
	3	24
	x	

$\therefore \quad \sqrt{6724} = 82$

(vii) 7921

	8	9
8	79	21
+8	64	↓
169	15	21
	15	21
	x	

$\therefore \quad \sqrt{7921} = 89$

(viii) 8349

	9	3
9	86	49
+9	81	↓
183	5	49
	5	49
	x	

$\therefore \quad \sqrt{8649} = 93$

(ix) 9801

	9	9
8	98	01
+8	81	↓
169	17	01
	17	01
	x	

$\therefore \quad \sqrt{9801} = 99$

(x) 8349

	1	2	3
1	1	51	29
+1	1	↓	↓
22	×	51	
+2		44	↓
243		7	29
		7	29
		×	

$\therefore \quad \sqrt{15129} = 123$

Question 3. Find the square root of each of following decimal numbers by long division : (i) to (viii).

(i) 655.36

	2	5 .	6
2	6	55 .	36
+2	4	↓	↓
45	2	55	
+5	2	25	↓
506		30	36
		30	36
		x	

$\therefore \quad \sqrt{655.36} = 25.6$

(ii) 1324.96

	3	6 . 4
3	13	24 . 96
+3	9	↓
66	4	24
+6	3	96 ↓
724		28 96
		28 96
		00

∴ $\sqrt{1324.96}$ = 36.4

(iii) 1831.84

	4	2 . 8
4	18	31 . 84
+4	16	↓
82	2	31
+2	1	64 ↓
848		67 84
		67 84
		00

∴ $\sqrt{1831.84}$ = 42.8

(iv) 3564.09

	5	9 . 7
5	35	64 . 09
+5	25	↓
109	10	64
+9	9	81 ↓
1187		83 09
		09
		00

∴ $\sqrt{3564.09}$ = 59.7

(v) 4556.25

	6	7 . 5
6	45	56 . 25
+6	36	↓
127	9	56
+7	8	89 ↓
1345		67 25
		67 25
		00

∴ $\sqrt{4556.25}$ = 67.5

(vi) 6099.61

	7	8 . 1
6	60	99 . 61
+6	49	↓
127	11	99
+7	11	84 ↓
1345		15 61
		15 61
		00

∴ $\sqrt{6099.61}$ = 78.1

(vii) 7903.21

	8	8 . 9
8	79	03 . 21
+8	64	↓
168	15	03
+8	13	44 ↓
1769	1	59 21
	1	59 21
		00

∴ $\sqrt{7903.21}$ = 88.9

(viii) 9273.69

	9	6 . 3
8	92	73 . 69
+8	81	↓
168	11	73
+8	11	16 ↓
1769		57 69
		57 69
		00

∴ $\sqrt{9273.69}$ = 96.3

Question 4. Find the value of $\sqrt{1400}$ and from this value calculate $\sqrt{144}$ + 1.44.

14400 = 2 × 2 × 2 × 2 × 3 × 3 × 10 × 10

= 2 × 2 × 3 × 3 × 10 = 120

144 = 12 × 12 = 12

144 + 1.44 = 12 + 1.44 = 13.44

Question 5. Find the square roots of 1521 and 2209 and hence find the value of : $\dfrac{\sqrt{0.1521 + 0.2209}}{\sqrt{0.2209 - 0.1521}}$

$$\frac{\sqrt{0.1521 + 0.2209}}{\sqrt{0.2209 - 0.1521}}$$

$$= \frac{0.39 + 0.47}{0.47 - 0.39}$$

$$= \frac{0.86}{0.08} = \frac{43}{4}$$

$= 10.75$ **Ans.**

	0 . 3	9
3	0 . 15	21
+3	9	↓
69	6	21
	6	21
		00

$\therefore \quad \sqrt{0.1521} = 0.39$

	0 . 4	7
3	0 . 22	09
+3	16	↓
69	6	09
	6	09

$\therefore \quad \sqrt{0.2209} = 0.47$

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 6. $\dfrac{\sqrt{56.25 + 6.25}}{\sqrt{56.25 - 6.25}}$ **equals : (a) 0.40 (b) 2 (c) 0.60 (d) 0.50**

$$\frac{\sqrt{56.25 + 6.25}}{\sqrt{56.25 - 6.25}}$$

$$= \frac{7.5 + 2.5}{7.5 - 2.5}$$

$$= \frac{10}{5} = 2$$

$\therefore$ **Ans.** (b)

	7 . 5
7	56 . 25
+7	49 ↓
145	7 25
	7 25
	00

	2 . 5
2	6 . 25
+2	4 ↓
45	2 25
	2 25
	00

Question 7. The square root of $\sqrt{1\dfrac{1337}{3844}}$ **is : (a)** $1\dfrac{17}{62}$ **(b)** $1\dfrac{23}{62}$ **(c)** $2\dfrac{35}{64}$ **(d)** $1\dfrac{33}{62}$

$$\sqrt{2\frac{1337}{3844}} = \sqrt{\frac{7688 + 1337}{3844}} = \sqrt{\frac{9025}{3844}}$$

$$\therefore \quad \sqrt{\frac{9025}{3844}} = \frac{95}{62} = 1\frac{33}{62}$$

Ans. (d)

	9	5
9	90 .	25
+9	81	↓
185	9	25
	9	25
		00

	6	2
6	38 .	44
+5	36	↓
122	24	44
	24	44
		00

HIGH ORDER THINKING SKILLS (HOTS)

Question 8. Find the value of $\sqrt{1191.16 + 70\sqrt{129.96}}$

$$= \sqrt{1191.16 + 70\sqrt{129.96}}$$

$$= \sqrt{1191.16 + 70 \times 11.4}$$

$$= \sqrt{1191.16 + 798}$$

$$= \sqrt{1989.16}$$

$$= 44.6$$

	1	1 . 4
1	1	29 . 96
+1	1	↓
21	0	29
+1		21
224		89 96
		89 96
		00

	4	4 . 6
4	19	89 . 16
+4	16	↓
84	3	89
+4	3	36
886		53 16
		53 16
		00

Exercise : 3 (E) Question 1. 3600 soldiers are asked to stand in different rows. Every rows has many soldiers as their rows. Find the number of rows.

Number of rows = Number soldiers in each row = $\sqrt{3600}$

$= \sqrt{6 \times 6 \times 10 \times 10}$

$= 6 \times 10 = 60$

$\therefore$ Number of rows = 60

Question 2. find the perimeter of square whose area is 6889 m^2.

	8	3
8	$\overline{68}$	$\overline{89}$
+8	64	↓
163	48	89
	48	89
		00

Area of square = 6889 m^2

$Side^2$ = 6889

Side = $\sqrt{6889}$

Side = 83 m

Perimeter of Square = 4 × side = 4 × 83 = 332 m.

Question 3. A society collected ₹ 8836 each member contributing as many rupees as these were members. Find the number of members of the society.

	9	4
9	$\overline{88}$	$\overline{36}$
+9	81	↓
184	7	36
	7	36
		00

Number of members of the society = $\sqrt{8836}$

$= 94$

$\therefore$ Number of members of the society = 94

Question 4. In a basket these are 1250 flowers. A man goes for worship and puts as many flowers as there are temples in the city. Thus he needs 8 buckets of flowers. Find the number of temples in the city.

Number of flowers = 8 baskets of flowers

$= 8 \times 1250$ flowers

$= 10000$

Number of temples in the city = $\sqrt{1000} = \sqrt{100} \times \sqrt{100} = 100$

Question 5. What world be added to 7912 to make the sum a perfect square?

	8	9
9	$\overline{79}$	$\overline{12}$
+9	64	↓
184	15	12
	15	21

To get perfect square number 1521 – 1512 = 9 is added in the given number.

Question 6. A general arranges his soldiers in rows to form a perfect square. He finds that in doings so, 60 soldiers are left out. if the total soldiers be 8341, find the number of soldiers in each rows.

	9	1
9	$\overline{82}$	$\overline{81}$
+9	81	↓
181	1	81
	1	81
		00

Number of soldiers in a perfect square = $\sqrt{8341} - 60 = 8281$

Number of soldiers in each row = 8282 = 91

$\therefore$ Number of soldiers in each row = 91

Question 7. What should be subtracted from 6249 to get a perfect square number? What is this perfect square number? Also, find its square root.

To get perfect square number we subtract 8 from the given number.

Perfect square number 6249 – 8 = 6241

Square root of this number = 79

	7	9
7	62	49
+7	49	↓
149	13	49
	13	41
		8

Question 8. What least number must be added to 594 to make the sum a perfect square?

To get a perfect square we add 225 – 194 = 31 in the given number.

	2	2
2	5	94
+2	4	↓
45	1	94
	2	25

Question 9. Find the least number of six digits which is a perfect square.

Least number of six digits = 100000

To get a six digits perfect square number,

we add 4389 – 3900 = 489

Smallest six digits = 100000 + 489

Perfect square number = 100489

	3	1	7
3	10	00	00
+3	9	↓	↓
61	1	00	
+1		01	↓
627		39	00
		43	89

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 10. The greatest number of five digits that is a perfect square is : (a) 998565 (b) 99916 (c) 99999 (d) 99900

Greatest five digits number = 99999

Greatest five digits number = 99999 – 143 = 99856

Which is perfect square.

∴ **Ans.** (a)

	3	1	6
3	9	99	99
+3	9	↓	↓
+61		99	
+1		61	↓
626		38	99
		37	56
		1	43

Question 11. The least number which must be subtracted from 4494 to make it a perfect square is : (a) 10 (b) 5 (c) 7 (d) 4

To get a perfect square we must subtract 5 from the given number

∴ **Ans.** (b)

	7	9
7	62	49
+7	49	↓
149	13	49
	13	41
		8

HIGH ORDER THINKING SKILLS (HOTS)

Question 12. One-third of the square root of which number is 0.001?

Let the number be x

$\frac{1}{3} \times \sqrt{x} = 0.001$ $\sqrt{x} = 0.001 \times 3 = 0.003$

Squaring both side $x = (0.003)^2 = 0.000009$

∴ Number is 0.000009

Exercise : 3 (F) Question 1. Find the square root each of the following fractional numbers correct to 2 places decimal : (i) to (v)

(i) $\frac{2}{5}$

$\frac{2}{5} = 0.1$

$\sqrt{0.4} = 0.632$ to 3dp

$\therefore \quad \sqrt{0.4} = 0.632$ to 2dp

	0 . 6	3	2
6	0 . 40	00	00
+6	36	↓	
123	4	00	
+3	3	69	↓
1263		31	00
		25	26
		5	74

(ii) $\frac{15}{12}$

$\frac{15}{12} = 1.25$

$\sqrt{1.25} = 1.118$ to 3dp

$= 1.12$ to 2dp

	1 . 1	1	8
1	1 . 25	00	00
+1	1 ↓	↓	
21	25		
+1	21	↓	
221	4	00	
+1	2	21	↓
2228	1	79	00
	1	78	24
			76

(iii) $12\frac{15}{12}$

$12\frac{15}{12} = = 12 + 0.886 \qquad = 12.866$

$\sqrt{12\frac{13}{15}} = \sqrt{12.866} = 3.587$ upto 3dp

$= 3.59$ upto 2dp

	3 . 5	7	7
3	12 . 86	66	66
+3	9 ↓	↓	
65	3 86		
+5	3 25	↓	
707	6	66	
+7	5	64	↓
7167	5	02	66
	5	01	69
			97

(iv) $1\frac{8}{7} = 1.1142857$

$\sqrt{1\frac{8}{7}} = \sqrt{1.114285} = 1.114$ upto 3dp

$= 1.11$ upto 2dp

	1 . 0	5	5
1	1 . 11	42	85
+1	1 ↓	↓	
21	11		
+1	00	↓	
221	11	42	
+1	10	25	↓
2228	1	17	85
	1	05	25
		12	60

(v) $697\frac{1}{2}$

$697\frac{1}{2} = 697 + 0.5 = 697.5$

$\sqrt{697\frac{1}{2}} = \sqrt{697.5}$

= 26.372 upto 3dp

= 26.37 upto 2dp

	2	6 .	3	7	2
2	6	97 .	50	00	00
+2	4				
46	2	97			
+6	2	76			
523		19	50		
+3		15	69		
5267		3	81	00	
+7		3	68	69	
52742		1	23	31	00
		1	05	54	84
			1	76	16

Question 2. Find the square root of each of the following numbers correct to two decimal places : (i) to (viii)

(i) 7 =

$\sqrt{7}$ = 2.645 upto 3dp

= 2.65 upto 2dp

	2 .	6	4	5
2	7 .	00	00	00
+2	4			
46	3	00		
+6	2	76		
524		24	00	
+4		20	96	
5285		30	40	00
		26	42	25
			39	75

(ii) 10

$\sqrt{10}$ = 3.162 upto 3dp

= 3.16 upto 2dp

	3 .	1	6	2
3	10 .	00	00	00
+3	9			
+61	10	00		
+1	6	61		
626	3	39	00	
+6	3	37	56	
6322		1	44	00
		1	26	44
			17	56

(iii) 19

$\sqrt{19}$ = 4.358 upto 3dp

= 4.36 upto 2dp

	4 .	3	5	8
4	7 .	00	00	00
+4	4			
83	3	00		
+3	2	49		
865		51	00	
+5		43	25	
8708		7	75	00
		6	96	64
			98	36

(iv) 27

$\sqrt{27}$ = 5.196 upto 3dp

= 5.20 upto 2 dp

	4 .	3	5	8
5	27 .	00	00	00
+5	25			
101	20	00		
+1	1	01		
1029		99	00	
+9		92	61	
10386		6	39	00
		6	23	16
			15	84

(v) 75

$\sqrt{75}$ = 8.660 upto 3dp

= 8.66 upto 2dp

	8 .	6	6	0
8	75 .	00	00	00
+8	64			
166	11	00		
+6	9	96		
1726	1	04	00	
+6	1	03	56	
1732			44	00
			00	00
			44	00

(vi) 480

$\sqrt{480}$ = 21.908 upto 3dp

= 21.91 upto 2dp

	2	1 .	9	0	8
2	4	80 .	00	00	00
+2	4				
41		80			
+1		41			
429		39	00		
+9		38	61		
4380			39	00	
+0			00	00	
43808			39	00	00
			35	04	64
			3	53	36

(vii) 830 $\sqrt{830}$ = 28.809 upto 3 dp

= 28.81 upto 2dp

	2	8 .	8	0	9
7	8	30 .	00	00	00
+7	4				
149	4	30			
+9	3	84			
1580		46	00		
+0		45	44		
15805			56	00	
5			00	00	
158106			56	00	00
			51	84	81
			4	15	19

(viii) 6250 $\sqrt{6050}$ = 79.056 upto 3dp

= 79.06 upto 2dp

	7	9 .	0	5	6
7	62	50 .	00	00	00
+7	49				
149	13	50			
+9	13	41			
1580		90	00		
+0		00	00		
15805		9	00	00	
5		7	90	25	
158106		1	19	75	00
			94	86	35
				88	64

Question 3. Find square root of the each of the following numbers correct to 2 places of decimals : (i) to (viii)

(i) 75

$\sqrt{75}$ = 8.660 upto 3dp

= 8.66 upto 2dp

	1 .	0	4	8
20	1 .	10	00	00
1	1			
20	0	10		
+0		00		
204		10	00	
+4		8	16	
2088		1	84	00
		1	67	04
			16	96

(ii) 7.83

$\sqrt{7.83}$ = 2.798 upto 3dp

= 2.80 upto 2dp

	2 .	7	9	8
2	7 .	83	00	00
+2	4			
47	3	83		
+7	3	29		
549		54	00	
+9		49	41	
5588		4	59	00
		4	47	04
			11	96

(iii) 13.26

$\sqrt{13.26}$ = 3.641 upto 3dp

= 3.64 upto 2dp

	3 .	6	4	1
3	13 .	26	00	00
+3	9			
66	4	26		
+6	3	96		
724		30	00	
+4		28	96	
7281		1	04	00
		1	72	81
			31	19

(iv) 74.9

$\sqrt{74.9}$ = 8.654 upto 3do

= 8.65 upto 2dp

	8 .	6	5	4
8	74 .	90	00	00
+8	64			
166	10	90		
+6	9	96		
1725		94	00	
+5		86	25	
17304		7	75	00
		6	92	16
			82	84

(v) 175.01

$\sqrt{175.01}$ = 13.228 upto 3dp

= 13.23 upto 2dp

	2	1 .	9	0	8
1	1	75 .	01	00	00
+1	1				
23		75			
+3		69			
262		6	01		
+2		5	24		
2642			77	00	
+2			52	84	
26448			24	16	00
			21	15	84
				30	16

(vi) 423.74

$\sqrt{423.74}$

= 20.584 upto 3dp

= 20.58 upto 2dp

	2	0 .	5	8	4
1	4	23 .	74	00	00
+1	4				
23	0	23			
+3		00			
262		23	74		
+2		20	25		
2642		3	49	00	
+2		3	28	64	
26448			20	36	00
			16	46	56
			3	89	44

(vii) 5893.27

$\sqrt{5893.27}$

= 76.767 upto 3dp

= 76.77 upto 2dp

	7	6 .	7	6	7
7	58	93 .	27	00	00
+7	49				
146	9	93			
+6	8	76			
1527	1	17	27		
+7	1	06	89		
15346		10	38	00	
+6		9	20	76	
153527		1	17	24	00
		1	07	46	89
				77	11

(viii) 7136.8

$\sqrt{7136.8}$

= 84.479 upto 3dp

= 84.48 upto 2dp

	8	4 .	4	7	9
7	71	36 .	80	00	00
+7	64				
146	7	36			
+6	6	56			
1527		80	80		
+7		67	36		
15346		13	44	00	
+6		11	82	09	
153527		1	61	91	00
		1	52	05	41
			9	85	59

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 4. The value of 2 + 3 correct upto 2 place of decimals : (a) 3.73 (b) 3.20 (c) 3.41 (d) 3.15

$\sqrt{2}$ = 1.414 upto 3dp

$\sqrt{3}$ = 1.732 upto 3dp

$\sqrt{2} + \sqrt{3}$ = 1.414 + 1.732 = 3.146

= 3.15

Ans. (d)

	1 . 4 1 4
1	2 . 00 00 00
+1	1
24	1 00
+4	96
281	4 00
+1	2 81
2824	1 19 00
	1 12 96
	7 04

	1 . 7 3 2
1	3 . 00 00 00
+1	1
27	2 00
+7	1 89
343	11 00
+3	10 29
3462	71 00
	69 24
	1 76

Question 5. To find the square root of a number, correct to 2-decimal places, the number of digits after the decimal point in the number should be. (a) 4 (b) 6 (c) 3 (d) None of these

Ans. (b)

To get the square root of a number upto two decimal places, we calculate the square root upto these decimal places of decimal, i.e., after the decimal point we should have six digits (3 periods).

HIGH ORDER THINKING SKILLS (HOTS)

Question 6. Which is greater? $\sqrt{5} - \sqrt{3}$ or $\sqrt{7} - \sqrt{5}$?

$\sqrt{5} - \sqrt{3}$ = 2.2 – 1.7 = 0.5

$\sqrt{7} - \sqrt{5}$ = 2.6 – 2.2 = 0.4

0.5 > 0.4

$\therefore \quad \sqrt{5} - \sqrt{3} > \sqrt{7} - \sqrt{5}$

Hence $(\sqrt{5} - \sqrt{3})$ is greater than $\sqrt{7} - \sqrt{5}$

	9 . 4
2	5 . 00
+2	4
42	1 00
	84
	16

	9 . 4
2	5 . 00
+2	4
42	1 00
	84
	16

	9 . 4
2	5 . 00
+2	4
42	1 00
	84
	16

Mental Maths : Find. Question 1. Square of 16 = 16 × 16 = 256 **Question 2. Square of** $\frac{5}{9} = \frac{5 \times 5}{9 \times 9} = \frac{25}{81}$

Question 3. Square of 0.3 is = 0.3 × 0.3 = 0.09 **Question 4. Square of 0.07 is** = 0.07 × 0.07 = 0.0049

Question 5. $99^2 - 98^2$ = 99 + 98 = 197 **Question 6.** $\sqrt{0.0081} = \sqrt{\frac{81}{10000}} = \sqrt{\frac{9 \times 9}{100 \times 100}} = \frac{9}{100} = 0.09$

Question 7. Without adding, find the sum of 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 = 9^2 = 81

Question 8. Find the square root of 10000000000 = $\sqrt{10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10}$

= 10 × 10 × 10 × 10 × 10 = 100000 **Question 9. Find the least number which should be subtracted from 18 to make it a perfect square.**

	4
4	18
	16
	2

To make perfect square

2 should be subtracted from the given number

Question 10. $\sqrt{625} = \sqrt{5^x}$ **then x equals.**

$\sqrt{625} = \sqrt{5^x}$ squaring both side

$625 = 5x$

$5^4 = 5x$ Compare the exponent

$\therefore \quad x = 4$

CHAPTER ASSESSMENT CONCEPT REVIEW

Question 1. Fill in the blanks :

(i) The smallest number by which 50 should be divided to make the quotient a perfect square is 2. $(50 = 5 \times 5 \times 2)$

(ii) The number of zeros at the end of a perfect square is always even.

(iii) $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 + 25 = 13^2 = 169.$

(iv) The units digit of the square root of 66564 will be either 2 or 8. $\begin{bmatrix} 2 \times 2 = 4 \\ 8 \times 8 = 64 \end{bmatrix}$

Question 2. Answer True (T) or False (F) :

(i) All numbers ending with even number of zeros are always perfect square. (F)

(ii) The square of an even number contains even number of digits. (T)

(iii) The product of two square number is always a square number. (T)

(iv) There is no square number between 50 and 60. (T)

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 3. $\frac{2707}{\sqrt{x}} = 27.07$, **x equals. (a) 10 (b) 100 (c) 1000 (d) 10000**

$\frac{2707}{\sqrt{x}} = \frac{2707}{100} =$

$\sqrt{x} = 100 \Rightarrow x = (100)^2 = 10000$ **Ans.** (d)

Question 4. $\sqrt{1 + \frac{x}{144}} = \frac{13}{12}$, **then x equals to : (a) 1 (b) 12 (c) 25 (d) 15**

$\sqrt{1 + \frac{x}{144}} = \frac{13}{12}$ squaring both side

$1 + \frac{x}{144} = \frac{169}{144}$

$\frac{x}{144} = \frac{169}{144} - 1 = \frac{169 - 144}{144}$

$x = 25$ Ans. (c)

Question 5. If 15625 = 125, then $\sqrt{15625} + \sqrt{156.25} + \sqrt{1.5625}$ equals :

(a) 1.3875 (b) 13.875 (c) 138.75 (d) 156.25

$\sqrt{15625} = 125$

$\sqrt{156.25} = \sqrt{\frac{15625}{100}} = \frac{125}{10} = 12.5$

$$\sqrt{1.5625} = \sqrt{\frac{15625}{100}} = \frac{125}{100} = 1.25$$

$$\sqrt{15625} = \sqrt{156.25} + \sqrt{1.5625}$$

$$125 + 12.5 + 1.25$$

$$= 138.75 \text{ Ans. (c)}$$

Question 6. If $\frac{x}{\sqrt{2.25}} = 550$ then the value of x is : (a) 825 (b) 82.5 (c) 3666.66 (d) 2

$$\frac{x}{\sqrt{2.25}} = 550$$

$$x = 550 \times \sqrt{2.25}$$

$$x = 550 \times \sqrt{\frac{225}{100}}$$

$$x = 550 \times \sqrt{\frac{15 \times 15}{10 \times 10}} \Rightarrow x = \frac{550 \times 15}{10} = 825$$ **Ans.** (a)

Question 7. $\sqrt{\frac{0.85 \times (0.105 + 0.224 + 0.001)}{0.022 \times 0.25 \times 1.7}}$ simplifies to : (a) $\sqrt{11}$ (b) $\sqrt{1.1}$ (c) $\sqrt{11}$ (d) $\sqrt{0.11}$

$$= \sqrt{\frac{0.85 \times (0.329 + 0.001)}{0.022 \times 0.25 \times 1.7}}$$

$$= \sqrt{\frac{0.85 \times 0.330}{0.022 \times 0.25 \times 1.7}}$$

$$= \sqrt{\frac{85 \times 330 \times 10}{22 \times 25 \times 17}}$$

$$= \sqrt{\frac{17 \times 5 \times 3 \times 10 \times 10}{22 \times 25 \times 17}}$$

$$= \sqrt{\frac{3 \times 110}{11}} = \sqrt{30}$$

$$= \sqrt{30}$$

LONG ANSWER TYPES QUESTIONS

Question 8. Find the least number that must be added to 9598 to make it a perfect square.

	9	8
9	95	98
+9	81	↓
188	14	98
	15	24

To get a perfect square number

We must add 1524 – 1498 = 26 in the given number.

Question 9. Find the square root of 683.95 correct to 2 decimal places.

$\sqrt{683.95}$ = 26.152 upto 3dp

= 26.15 upto 2dp

	2	6 .	1	5	2
2	6	83	95	00	00
+2	4				
46	2	83			
+6	2	76			
521		7	95		
+1		5	21		
5225		2	74	00	
+1		2	61	25	
52302			12	75	00
			10	46	04
			2	28	96

Question 10. Find x If $\sqrt{1369} + \sqrt{0.0625} + x = \sqrt{37.25}$

$\sqrt{1369} + \sqrt{0.0625} + x = 37.25$

$37 + 0.25 + x = 37.25$

$x = 37.25 - 37.25$

$\therefore \quad x = 0$

	3	7
3	13	69
+3	9	
67	4	69
	4	69
		00

	0 .	2	5
2	0	06	25
+2	0	04	
45		2	25
		2	25
			00

Chapter-4. CUBES AND CUBE ROOTS

- A number which can be expressed as a product of triplets of equal factors is known as a perfect cube.
- The symbol of cube root is $\sqrt[3]{\ }$.
- Cubes of all odd numbers are odd numbers. The sum of the cubes of first natural numbers is equal to the square of their sum. Cubes of the numbers ending in digit 0, 1, 4, 5, 6 and 9 are the numbers ending in the same. Cubes of the numbers ending in "2" end in "8" and cubes of numbers ending in "8" end in "2".
- Cubes of the numbers ending in "3" end in "7" and cubes of numbers ending in "7" end in "3". The difference of cubes of two consecutive numbers $(n + 1)^3 - n^3 = 3n(n + 1) + 1$.
- Cube roots of negative number is negative number. Cube roots of positive number is positive number.

Estimating cube root – This method will work only if the given number is a perfect cube. The following are the steps to estimate the cube root.

Step 1 : Make groups of 3-digits from unit place. This the 1st group. The remaining number makes 2nd group. **Step 2 :** The unit's digit of the 1st group will decide the unit digit of the cube root. If the unit digit is 0, 1, 4, 5, 6 and 9 respectively. If the unit digit of cube number is 3 then unit digit of cube root

number is 7. If the unit digit of cube number is 7 then unit digit of cube root number is 3. If the unit digit of cube number is 2 then unit digit of cube root number is 8. If the unit digit of cube number is 8 then unit digit of cube root number is 2. **Step 3 :** Find the cube of number between which the 2nd group lie. **Step 4 :** Take the smaller number as its ten's digit.

Cube Root of a perfect cube using a pattern.

$\mathbf{1^3} = 1$, $\mathbf{2^3} = 1 + 7$, $\mathbf{3^3} = 1 + 7 + 19$, $\mathbf{4^3} = 1 + 7 + 19 + 37$, $\mathbf{5^3} = 1 + 7 + 19 + 37 + 61$, $\mathbf{6^3} = 1 + 7 + 19 + 37 + 61 + 91$, $\mathbf{7^3} = 1 + 7 + 19 + 37 + 61 + 91 + 127$

2nd order to find the cube root of a perfect cube, subtract 1, 7, 19, 37, 61, 91, ... till the remainder is zero. The number of times subtraction is carried out gives the cube root.

Exercise : 4A – Q. 1 Find the cubes of the following numbers (i) to (v).

(i) $8 = 8 \times 8 \times 8 = 512$ (ii) $17 = 17 \times 17 \times 17 = 4913$ (iii) $25 = 25 \times 25 \times 25 = 15625$

(iv) $31 = 31 \times 31 \times 31 = 29791$ (v) $60 = 60 \times 60 \times 60 = 216000$

Q. 2 Find the ones digit of the cubes of each of the following. (i) to (v)

(i) 387 = unit digit of the cube number is 3. (ii) 412 = unit digit of the cube number is 8.

(iii) 525 = unit digit of the cube number is 5. (iv) 624 = unit digit of the cube number is 4.

(v) 1729 = unit digit of the cube number is 9.

Q. 3 Which of the following are cubes of even numbers.

(i) 512 = cube is number so cube root also even number.

(ii) 1331 = cube number is odd number so cube root are not even number.

(iii) 5832 = cube number even number so cube root also even number.

(iv) 64000 = cube number is even number so cube root also even number.

Q. 4 Which of the following numbers are cubes of odd numbers. (i) 125 (ii) 6859 (iii) 343 (iv) 12167

(All are odd numbers ∴ Cube roots of given number also odd number.)

Q. 5 Which of the following are perfect cube? In case of perfect cube, find the number whose cube is the given number.

(i) 64 = $4 \times 4 \times 4$ (∴ 64 is the cube of 4)

(ii) 729 = $\underline{3 \times 3 \times 3} \times \underline{3 \times 3 \times 3}$ (∴ 729 is the cube of 9)

(iii) 1728 = $\underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times \underline{3 \times 3 \times 3}$ (∴ 1728 is the cube of 12)

(iv) 128 = $\underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times 2$ (it is not a perfect cube number.)

(v) 9261 = $\underline{3 \times 3 \times 3} \times \underline{7 \times 7 \times 7}$ (it is the cube of $3 \times 7 = 21$)

(vi) 460 = $2 \times 2 \times 5 \times 23$ (it is not the perfect cube number.)

Q. 6 Evaluate the following (i) to (v)

(i) $(0.5)^3$ = $0.5 \times 0.5 \times 0.5 + 0.125$

(ii) $(0.07)^3 = \left(\frac{7}{10}\right)^3 = \frac{7 \times 7 \times 7}{100 \times 100 \times 100} = \frac{343}{1000000} = 0.000343$

(iii) $(4.3)^3 = \left(\frac{43}{10}\right)^3 = \frac{43 \times 43 \times 43}{10 \times 10 \times 10} = \frac{79,507}{1000} = 79.507$

(iv) $(14)^3 = 14 \times 14 \times 14 = 2744$

(v) $\left(\frac{5}{7}\right)^3 = \frac{5 \times 7 \times 7}{7 \times 7 \times 7} = \frac{125}{343}$

Q. 7 What is the smallest number by which 8788 must be multiplied to obtain a perfect cube?

2	8788
2	4394
13	2197
13	169
13	13
	1

8788 = $2 \times 2 \times 13 \times 13 \times 13$

To get a perfect cube number, we must be multiplied by 2.

(ii) What is the smallest number by which 14379 must be divided so that quotient is perfect cube?

3	14739
17	4913
17	289
17	17
	1

14379 = $3 \times 17 \times 17 \times 17$

To get a perfect cube number, we must be divided by 3.

Q. 8 The volume of a cube is 729 cm^3. Find the length of its edge?

Volume of cube = 729 cm^3

$(Edge)^3 = 729 = 9 \times 9 \times 9$

$\therefore$ (Edge) = $\sqrt[3]{9 \times 9 \times 9}$

Q. 9 How many pencil boxes of dimensions 12cm × 4 cm × 3 cm can be packed in a cartoon each of whose edge is 24 cm.

Number of pencil box = $\frac{\text{Volume of cartoon}}{\text{Volume of 1 box}}$

$= \frac{(Edge)^3}{\text{Length} \times \text{Breadth} \times \text{Height}}$

$= \frac{24 \times 24 \times 24}{12 \times 4 \times 3}$

$= 96$

96 boxes can be packed in a cartoon.

Q. 10 Observe the following pattern.

$2^3 - 1^3 = 1 + 2 \times 1 \times 3$

$3^3 - 2^3 = 1 + 3 \times 2 \times 3$

$4^3 - 3^3 = 1 + 4 \times 3 \times 3$

Using the pattern, find the value of each of the following. (i) to (ii)

(i) $79^3 - 78^3 = 1 + 79 + 78 + 3$

$= 1 + 18,486$

$\therefore 79^3 - 78^3 = 18,487$

(ii) $30^3 - 29^3 = 1 + 30 + 29 + 3$

$= 1 + 2610$

$\therefore 30^3 - 29^3 = 2611$

Exercise : 4B – Q. 1 Find the cube root of the following numbers by prime factorization. (i) to (v)

(i) $64 = 4 \times 4 \times 4$

$\sqrt[3]{64} = \sqrt[3]{4 \times 4 \times 4} = 4$

$\therefore$ Cube root of 64 is 4.

(ii) $1000 = 2 \times 2 \times 2 \times 5 \times 5 \times 5$

$\sqrt[3]{1000} = \sqrt[3]{2 \times 2 \times 2 \times 5 \times 5 \times 5}$

$= 2 \times 5 = 10$

$\therefore$ Cube root of 1000 is 10.

(iii) $2197 = 13 \times 13 \times 13$

$\sqrt[3]{2139} = \sqrt[3]{13 \times 13 \times 13}$

$\therefore$ Cube root of 2197 is 13.

(iv) $3375 = 3 \times 3 \times 3 \times 5 \times 5 \times 5$

$\sqrt[3]{3375} = \sqrt[3]{3 \times 3 \times 3 \times 5 \times 5 \times 5}$

$= 3 \times 5 = 15$

$\therefore$ Cube root of 3375 is 15.

3	3375
3	1125
3	375
5	125
5	25
5	5
	1

(v) $2744 = 2 \times 2 \times 2 \times 7 \times 7 \times 7$

$\sqrt[3]{2744} = \sqrt[3]{2 \times 2 \times 2 \times 7 \times 7 \times 7}$

$= 2 \times 7 = 14$

$\therefore$ Cube root of 2744 is 14.

2	2744
2	1372
2	686
7	343
7	49
7	7
	1

Q. 2 Find the cube root of the following through estimation (i) & (ii).

(i) 2700

1st group = 0 0 0 and 2nd group 27

$\therefore$ unit digit = 0 and $27 = 3^3$

Hence cuberoot of 2700 = 30

(ii) 148877

1st group = 8 7 7 and 2nd group = 148

$\therefore$ unit digit = 3 and $125 < 148 < 216$

$53 < 148 < 63$ $\therefore$ Ten digit of cube root = 5

Hence cuberoot of 148877 is 53

Q. 3 Evaluate the following (i) to (iii)

(i) $\sqrt[3]{2744} = \sqrt[3]{2 \times 2 \times 2 \times 7 \times 7 \times 7}$

$= 2 \times 7 = 14$

$\sqrt[3]{2744} = 14$

(ii) $\sqrt[3]{\frac{-729}{216}} = \sqrt[3]{\frac{-27 \times 27}{27 \times 8}} = \sqrt[3]{\frac{-27}{8}}$

$$= \sqrt[3]{\frac{-3 \times -3 \times -3}{2 \times 2 \times 2}}$$

$$\therefore \quad \sqrt[3]{\frac{-729}{216}} = \frac{-3}{2}$$

(iii) $$\sqrt[3]{\frac{-8000}{9261}} = \sqrt[3]{\frac{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5}{21 \times 21 \times 21}}$$

$$\therefore \quad \sqrt[3]{\frac{2 \times 2 \times 5}{21}} = \frac{-20}{21}$$

Q. 4 Find the cube root of each of the following by successive subtraction (i) & (ii)

(i) $64 = 64 - 1 = 63, \quad 63 - 7 = 56, \quad 56 - 19 = 37$

$37 - 37 = 0$

Number of subtraction carried out to get remainder zero = 4

$$\therefore \quad \sqrt[3]{64} = 4$$

(ii) $216 = 216 - 1 = 215, \quad 215 - 7 = 208, \quad 208 - 19 = 189$

$189 - 37 = 152, \quad 152 - 61 = 91, \quad 91 - 91 = 0$

Number of subtraction carried out it get remainder zero = 6

$$\therefore \quad \sqrt[3]{216} = 6$$

Q. 5 The volume of a cubical box is $\frac{50653}{512}$ m^3. Find its side

Volume of cubical box $= \frac{50653}{512}\ m^3$

Side $= \sqrt[3]{\frac{50653}{512}}$

$$= \sqrt[3]{\frac{37 \times 37 \times 37}{8 \times 8 \times 8}}$$

Side $= \frac{37}{8}$ m Side = 4.625 m

Q. 6 Find the smallest number that must be subtracted from 812 to make it a perfect cube? Also find the cube root of its perfect cube.

$812 - 1 = 811, \quad 811 - 7 = 804, \quad 804 - 19 = 785,$

$785 - 37 = 748, \quad 748 - 61 = 687, \quad 687 - 91 = 596,$

$596 - 127 = 469, \quad 469 - 169 = 300, \quad 300 - 217 = 83$

The next number to be subtracted from 83 is 271. But 271 is greater than 83. So we 83 must be subtracted form 812 to make a perfect cube.

Perfect cube number = 812 – 83 = 729

Number of subtraction carried out to get the remainder is zero = 9

$$\therefore \quad \sqrt[3]{729} = 9$$

Q. 7 Find the smallest number that must be added to 400 to make it a perfect cube. Also find the cuberoot of this perfect cube.

$400 - 1 = 399$, $399 - 7 = 392$, $392 - 19 = 373$,

$373 - 37 = 336$, $336 - 61 = 275$, $275 - 91 = 184$,

$184 - 127 = 57$

Next number to be subtracted from 57 is 169. But 169 is greater than 57.

So, $169 - 57 = 112$ must be added to get a perfect cube.

$\therefore$ Perfect cube number = 400 + 112 = 512

Number of subtraction carried out to get the remainder as zero = 8

$\therefore \quad \sqrt[3]{512} = 8$

Q. 8 The volume of a cubical box is 6.859 m^3. Find the length of the side of the box.

Volume of cubical box = 6.859

$(\text{Side})^3 = 6.859 = \frac{6859}{1000}$

$= \frac{19 \times 19 \times 19}{10 \times 10 \times 10}$

19	6859
19	361
19	19
	1

$\text{Side} = \sqrt[3]{\frac{19 \times 19 \times 19}{10 \times 10 \times 10}}$

$\text{Side} = \frac{19}{10} = 1.9 \text{ m}$

HIGH ORDER THINKING SKILLS (HOTS)

Q. 9 Three numbers are in the ratio 2 : 3 : 4. The sum of their cubes is 72171. Find the numbers.

Number are in the ratio 2 : 3 : 4

$\therefore$ Numbers are 2x, 3x and 4x Where $x \neq 0$

According the question

$(2x)^3 + (3x)^3 + (4x)^3 = 72171 \qquad 8x^3 + 27x^3 + 64x^3 = 72171$

$99x^3 = 72171$

$x^3 = \frac{72171}{99} = \sqrt[3]{9 \times 9 \times 9}$

$x = 9$

Numbers are $2 \times 9 = 18$, $3 \times 9 = 27$, $4 \times 9 = 36$

Hence (18, 27, 36)

Chapter-5. FACTORISATION OF ALGEBRAIC EXPRESSIONS

- An expression is a mathematical phrase that combines numbers and/or variables using mathematical operations.
- When an expression is the product of two or more expression then each of these expression is called a factor of the given expression.
- The greatest common factor of two or more monomials is the product of the greatest common factors of the numerical coefficients and the variables with smallest powers.

- It is given expression is a complete square, we use the formulas :
  (i) $a^2 + 2ab + b^2 = (a + b)^2$ (ii) $a^2 - 2ab + b^2 = (a - b)^2$
- If the given expression is the difference of two $a^2 - b^2 = (a + b)(a - b)$
- Sum of two square can not be factor is by the given above formulas.
- Factorising trinomials of the form $ax^2 + bx + c$
  In quadratic factorisation using splitting of middle term which is x term is the sum of the factors and product equal to last term.

	To Factor The Form $ax^2 + bx + c$	Factor $2x^2 + 11x + 12$
1.	Find the product of 1st and last term (a × c = ac)	2 × 1 2 = 24
2.	Find the factors of ac = 24 in such a way that addition of that factor is the middle term b = 11	2 × 1 2 = 24 8 × 3 = 24 and 8 + 3 = 11
3.	Write the centre term using the sum of the two new factors, 8x + 3x	$2x^2 + 8x + 3x + 12$
4.	Group the terms to form pairs – the first two terms and last two terms factor each pair by finding common factors.	2x (x + 4) + 3 (x + 4)
5.	Factor out the shared binomial parenthesis.	(x + 4) (2x + 3)

Exercise : 5A – Factorise the following polynomials. (1 - 18)

1. $5x - 15 = 5(x - 3)$
2. $a^2 + 7a = a(a + 7)$
3. $3x - 6y = 3(x - 2y)$
4. $11x + 33 = 11(x + 3)$
5. $80 + 16y = 16(5 + y)$
6. $12a - ab = a(12 - b)$
7. $9x^2 - 27x = 9x(x - 3)$
8. $5a^2 - 3a = a(5a - 3)$
9. $5x - 7x^2 = x(5 - 7x)$
10. $a^2b^2 - a^2b = a^2b(b - 1)$
11. $18c - 27d^2 = 9(2c - 3d^2)$
12. $28f + 49fg = 7f(4 + 7g)$
13. $10xy - 12x^2y = 2xy(5 - 6x)$
14. $x^3 - x^2 - 7x = x(x^2 - x - 7)$
15. $20x^2y^3 - 25x^3y^4 + 40x^2y^2 = 5x^2y^2(4y - 5xy^2 + 8)$
16. $36y^3z + 48y^2z^2 = 12y^2z(3y + 4z)$
17. $6a + 8a^2 - 4a^3 = 2a(3 + 4a - 2a^2)$
18. $21a^5b^4c^2 - 35a^6b^3c^4 - 49a^7b^2c^6 = 7a^5b^2c^2(3b^2 - 5abc^2 - 7a^2c^4)$

Exercise : 5B – Factorise the following polynomials. (1 - 16)

1. $p(p - 1) + 3(p - 1) = (p - 1)(p + 3)$
2. $8(2 + x) + x(x + 2) = (2 + x)(8 + x)$
3. $3a(a + 3) - 4(a + 3) = (a + 3)(3a - 4)$
4. $2x(x + 5) - 6(x + 5) = (x + 5)(2x - 6)$
   $= (x + 5)\{2(x - 3)\}$
   $= 2(x + 5)(x - 3)$

5. $(x-2)^2 - 3(n-2) = 5(x+2y) - 7(x+2y)^2 = (x+2y)\{5 - 7(x+2y)\}$
$= (x+2y)(5 - 7x - 14y)$

6. $(n-2)^2 - 3(n-2) = (n-2)(n-2-3) = (n-2)(n-5)$

7. $14(3x-5y)^3 + 7(3x-5y)^2 = 7(3x-5y)^2\{2(3x-5y)+1\}$
$= 7(3x-5y)^2(6x-10y+1)$

8. $x(x-9) + 7(9-x) = x(x-9) - 7(x-9) = (x-9)(x-7)$

9. $(b+3)^2 + 2(b+3) = (b+3)(b+3+2) = (b+3)(b+5)$

10. $y(y+7) + (y+7) = (y+7)(y+1)$

11. $x(7-x) - (7-x) = (7-x)(x-7)$

12. $(3x-1)2 - 6x + 2 = (3x-1)2 - 2(3x-1)$
$= (3x-1)(3x-1-2) = (3x-1)(3x-3)$
$= (3x-1)\{3(x-1)\} = 3(3x-1)(x-1)$

13. $5(z-1) - 6z(z-1) = (z-1)(5-6z)$

14. $(a+b)(3a-7) - (a+b)(2a+11)$
$= (a+b)\{(3a-7) - (2a-11)\}$
$= (a+b)(3a-7-2a+11)$
$= (a+b)(a+4)$

15. $(a-10)^2 + (10-a) = (a-10)^2 - (a-10) = (a-10)\{(a-10)-1\}$
$= (a-10)(a-11)$

16. $a(a-2b) + c(a-2b) + (2b+a)$
$= a(a-2b) + c(a-2b) - (a-2b)$
$= (a-2b)(a+c-1)$

Exercise : 5C – Factorise : (1 to 15)

1. $mx^2 + ny^2 + nx^2 + my^2$
$= mx^2 + my^2 + nx^2 + ny^2$
$= m(x^2+y^2) + n(n^2+y^2)$
$= (x^2+y^2)(m+n)$

2. $p^2 + 2p + 2q + pq$
$= p^2 + pq + 2p + 2q$
$= p(p+q) + 2(p+q)$
$= (p+q)(p+2)$

3. $5ab + 8cd + 5ad + 8bc$
$= 5ab + 5ad + 8cd + 8bc$
$= 5a(b+d) + 8c(d+b)$
$= (b+d)(5a+8c)$

4. $y^3 + 6y^2 + 12y + 72$
$= y^2(y+6) + 12(y+6)$
$= (y+6)(y^2+12)$

5. $mx + nx + my + ny$
$= mx + nx + my + ny$
$= x(m+n) + y(m+n)$
$= (m+n)(x+y)$

6. $8pq - 7rq - 8qs + 7rs$
$= 8pq - 8ps - 7rq + 7rs$
$= 8p(q-s) - 7r(q-s)$
$= (q-s)(8p-7r)$

7. $p^2q - r^2p - pq + r^2$

$= p^2q - pq - r^2p + r^2$

$= pq(p - 1) - r^2(p - 1)$

$= (p - 1)(pq - r^2)$

8. $p^2 - ap - bp + ab$

$= p^2 - ap - bp + ab$

$= p(p - a) - b(p + a)$

$= (p - a)(p - b)$

9. $2ab + 3bx + 2ay + 3xy$

$= 2ab + 2ay + 3bx + 3xy$

$= 2a(b + y) + 3x(b + y)$

$= (b + y)(2a + 3x)$

10. $3y^2 + 12xy + 4xz + yz$

$= 3y^2 + 12xy + 4xz + yz$

$= 3y(y + 4x) + z(4x + y)$

$= (y + 4x)(3y + z)$

11. $16ac + 8bc + 10ad + 5bd$

$= 16ac + 8bc + 10ad + 5bd$

$= 8c(2a + b) + 5d(2a + b)$

$= (2a + b)(8a + 5d)$

12. $3xz + 2yz + 3xw + 2yw$

$= 3xz + 2yz + 3xw + 2yw$

$= 3(3x + 2y) + w(3x + 2y)$

$= (3x + 2y)(z + w)$

13. $14am + 21mb + 10an + 15bn$

$= 14am + 21mb + 10an + 15bn$

$= 7m(2a + 3b) + 5n(2a + 3b)$

$= (2a + 3b)(7m + 5n)$

14. $axy^2 + 3x + 2a^2y^2 + 6a$

$= axy^2 + 3x + 2a^2y^2 + 6a$

$= x(ay^2 + 3) + 2a(ay^2 + 3)$

$= (ay^2 + 3)(x + 2a)$

15. $4axy^2 + 20x + 6ay^2 + 30$

$= 4axy^2 + 20x + 6ay^2 + 30$ $= 2\{2axy^2 + 10x + 3ay^2 + 15\}$

$= 2\{2x(ay^2 + 5) + 3(ay^2 + 5)\}$ $= 2\{(ay^2 + 5)(2x + 3)\}$

$= 2(ay^2 + 5)(2x + 3)$ $= (ay^2 + 5)(4x + 6)$

MULTIPLE CHOICE QUESTIONS (MCQ's)

16. The polynomial $p^2 - q + pq - p$ on factorisation reduces to

(a) $(p + q)(p - 1)$ (b) $(p + q)(p^2 + q^2)$

(c) $(p + q)(p + 1)$ (d) $(p - q)(q + p)$

p2 – q + pq – p

$= p2 - q + pq - p$ $= p2 - p + pq - q$

$= p(p - 1) + q(p - 1)$ $= (p - 1)(p + q)$

Ans. (a)

17. $ab(c^2 + 1) + c(a^2 + b^2)$ can be factorised as

(a) $(a^2 + b^2)(c + a)$ (b) $(bc + a)(ac + b)$

(c) $(ab + c)(bc + a)$ (d) $(ac + b)(ab + c)$

$ab(c^2 + 1) + c(a^2 + b^2)$

$= abc^2 + ab + a^2c + b^2c$ $= abc^2 + a^2c + b^2c + ab$

$= ac(bc + a) + b(bc + a)$ $= (bc + a)(ac + b)$

Ans. (b)

Exercise : 5D – (A) Which are perfect trinomial squares? Write yes or no (1 to 11)

1. $4x^2 + 4x + 1 = (2x)^2 + 2(2x)(1) + (1)^2 = (2x + 1)^2$ = Yes
2. $a^2 - 5a + 4 = (a)^2 - 2(a)\left(\frac{5}{2}\right) + (2)^2$ = No
3. $a^2 - 18a + 81 = (a)^2 - 2(a)(9) + (9)^2 = (a - 9)^2$ = Yes
4. $y^2 + 10y + 16 = (y)^2 + 2(y)(5) + (4)^2$ = Yes
5. $a^2 - 2ba + 6^2 = (a)^2 - 2(a)(b) + (b)^2 = (a - b)^2$ = Yes
6. $25x^4 - 60x^2y^2 + 36y^4 = (5x^2)^2 - 2(5x^2)(6y^2) + (6y^2)^2 = (5x^2 - 6y^2)$ = Yes
7. $25x^2 - 60xt + 36t^2 = (5x)^2 - 2(5x)(6t) + (6t)^2 = (5x - 6t)^2$ = Yes
8. $x^2 + 8x + 16 = (x)^2 + 2(x)(4) + (4)^2 = (x + 4)^2$ = Yes
9. $36p^2 + 96pq + 64q^2 = (6p)^2 + 2(6p)(8q) + (8q)^2 = (6p + 8q)^2$ = Yes
10. $25m^2 + 10mx + x^2 = (5m)^2 + 2(5m)(x) + (x)^2 = (5m + x)^2$ = Yes
11. $81a^2 - 72ab + 16b^2 = (9a)^2 - 2(9a)(4b)^2 + (4b)^2 = (9a - 4b)^2$ = Yes

(B) Find in the missing term, making a perfect trinomial square. (12 to 17)

12. $x^2 + ? + 64 = (x)^2 + (8)^2 + 2(x)(8) = \therefore ? = 16x$
13. $a^2 - ? + 36 = (a)^2 + (6)^2 - 2(a)(b) = \therefore ? = 12a$
14. $p^2 - ? + 16 = (p)^2 + (4)^2 - 2(p)(4) = \therefore ? = 8p$
15. $? - 16n + 16 = (4)^2 - (4)(2n) + (2n)^2 = \therefore ? = (2n)^2 = 4n^2$
16. $b^2 - 8bc + ? = (b)^2 - 2(b)(4) + (4)^2 = \therefore ? = (4)^2 = 16$
17. $? + 16x + 64 = (8)^2 + 2(8)(x) + (x)^2 = \therefore ? = x^2$

(C) Factorise the following trinomials. (18 to 29)

18. $m^2 + 10m + 25 = (m)^2 + 2(m)(5) + (5)^2 = (m + 5)^2$
19. $x^2 + 6x + 9 = (x)^2 + 2(x)(3) + (3)^2 = (x + 3)^2$
20. $a^2 - 2a + 1 = (a)^2 - 2(a)(1) + (1)^2 = (a - 1)^2$
21. $49 + n^2 - 14n = (7)^2 - 2(7)(n) + (n)^2 = (7 - n)^2$
22. $y^2 + 2xy + 144 = (y)^2 + 2(y)(12) + (12)^2 = (y + 12)^2$
23. $16x^2 - 40xy + 25y^2 = (4x)^2 - 2(4x)(5y) + (5y)^2 = (4x - 5y)^2$
24. $1 - 8ax + 15a^2x^2 = 1 - 5ax - 3ax + 15a^2x^2$
    $= 1(1 - 5ax)(-3ax)(1 - 5ax) = (1 - 5ax)(1 - 3ax)$
25. $16d^2 - 8d + 1 = 16d^2 - 4d - 4d + 1 = 4d(4d - 1) - 1(4d - 1)$
    $= (4d - 1)(4d - 1) = (4d - 1)^2$
26. $a2 + 5a + \frac{25}{4} = (a)^2 + 2(a)\left(\frac{5}{2}\right) + \left(\frac{5}{2}\right)^2 = \left(a + \frac{5}{2}\right)^2$
27. $\frac{x^2}{4y^2} - \frac{1}{5} + \frac{y^2}{25x^2} = \left(\frac{x}{2y}\right)^2 - 2\left(\frac{x}{2y}\right)\left(\frac{y}{5x}\right) + \left(\frac{y}{5x}\right)^2 = \left(\frac{x}{2y} - \frac{y}{5x}\right)^2$
28. $a^2 + a + \frac{1}{4} = (a)^2 + 2(a)\left(\frac{1}{2}\right) + \left(\frac{1}{2}\right)^2 = \left(a + \frac{1}{2}\right)^2$
29. $169a^6 - 78a^3b^3 + 9b^6 = (13a^3)^2 - 2(13a^3)(3b^3) + (3b^3)^2 = (13a^3 - 3b^3)^2$

(D) Find the square root of the following trinomials. (30 to 34)

30. $36 - 12x + x^2 = (6)^2 - 2(6)(x) + (x)^2 = (6 - x)^2$

square root of $36 - 12x + x^2$ is $\pm (6 - x)$

31. $\frac{m^2}{n^2} + 2 + \frac{m^2}{n^2} = \left(\frac{m}{n}\right)^2 + 2\left(\frac{m}{n}\right)\left(\frac{n}{m}\right) + \left(\frac{n}{m}\right)^2 = \left(\frac{m}{n} + \frac{n}{m}\right)^2$

Square root of $\frac{m^2}{n^2} + 2 + \frac{m^2}{n^2}$ is $\pm \left(\frac{m}{n} + \frac{n}{m}\right)$

32. $169 + 26p + p^2 = (13)^2 + 2(13)(p) + (p)^2 = (13 + p)^2$

Square root of $169 + 26p + p^2$ is $\pm (13 + p)$

33. $25 - 100a + 100a^2 = (5)^2 - 2(5)(10a) + (10a)^2 = (5 + 10a)^2$

Square root of $25 - 100a + 100a^2$ is $\pm (5 + 10a)$ or $\pm 5(1 + 2a)$

34. $9y^2 + 30y + 25 = (3y)^2 + 2(3y)(5) + (5)^2 = (3y + 5)^2$

Square root of $9y^2 + 30y + 25$ is $\pm (3y + 5)$

MULTIPLE CHOICE QUESTIONS (MCQ's)

35. The area of square is $9a^2 + 36a + 36$ which expression represents a side of the square?

(a) $(3a + 6)$ (b) $3a^2 + 6$ (c) $3a - 6$ (d) $6 - 3a$

$9a^2 + 36a + 36 = (3a)^2 + 2(3a)(b) + (6)^2$

$= (3a + 6)^2$

Side of square $= \sqrt{\text{Area of square}} = \sqrt{(3a + b)^2} = 3a + 6$

Ans. (a)

HIGH ORDER THINKING SKILLS (HOTS)

36. For what value of c are the factors of $x^2 - cx + \frac{64}{9}$ the same?

$\left(x^2 - cx + \frac{64}{9}\right)$ is a perfect square for the same factor

$x^2 - cx + \frac{64}{9} = (x)^2 + \left(\frac{8}{3}\right)^3 - 2(x)\left(\frac{8}{3}\right)$

Comparing the terms $-cx = -2(x)\left(\frac{8}{3}\right)$

$-c = \frac{-2 \times 8}{3} \quad \therefore c = \frac{16}{3}$

Exercise : 5E – Factorise the following expressions. (1 to 32)

1. $x^2 - 25 = (x)^2 - (5)^2 = (x - 5)(x + 5)$

2. $16 - a^2 = (4)^2 - (a)^2 = (4 - a)(4 + a)$

3. $64n^2 - 25 = (8n)^2 - (5)^2 = (8n - 5)(8n + 5)$

4. $64c^2 - 49d^2 = (8c)^2 - (7d)^2 = (8c - 7d)(8c + 7d)$

5. $49a^2 - 1 = (7a)^2 - (1)^2 = (7a - 1)(7a + 1)$

6. $b^4 - a^2 = (b^2)^2 - (a)^2 = (b^2 - a)(b^2 + a)$

7. $9b^2 - 4 = (3b)^2 - (2)^2 = (3b - 2)(3b + 2)$

8. $100 - y^2 = (10)^2 - (y)^2 = (10 - y)(10 + y)$

9. $x^2 - y^2 = (x)^2 - (y)^2 = (x - y)(x + y)$

10. $81b^2 - 64 = (9b)^2 - (8)^2 = (9b - 8)(9b + 8)$

11. $m^2 n^2 - 9 = (mn)^2 - (3)^2 = (mn - 3)(mn + 3)$

12. $1 - y^2 = (1)^2 - (y)^2 = (1 - y)(1 + y)$

13. $b^4 - 121 = (b^2)^2 - (11)^2 = (b^2 - 11)(b^2 + 11)$

14. $a^2 - \frac{1}{9} = (a)^2 - \left(\frac{1}{3}\right)^2 = \left(a - \frac{1}{3}\right)\left(a + \frac{1}{3}\right)$

15. $169 - b^4 = (13)^2 - (b^2)^2 = (13 - b^2)(13 + b^2)$

16. $a^2 x^2 - y^2 = (ax)^2 - (y)^2 = (ax - y)(ax + y)$

17. $x^2 y^2 - a^2 = (ny)^2 - (a)^2 = (xy - a)(xy + a)$

18. $a^4 - 81 = (a^2)^2 - (9)^2 = (a^2 - 9)(a^2 + 9)$
$= \{(a)^2 - (3)^2\}(a^2 + 9) = (a - 3)(a + 3)(a^2 + 9)$

19. $3x^3 - 243\,xy^2 = 3xy(x^2 - 81y^2) = 3xy\{(x)^2 - (9y)^2\}$
$= 3xy(x - 9y)(x + 9y)$

20. $36 - a^2 x^2 = (6)^2 - (ax)^2 = (6 - ax)(6 + ax)$

21. $18\,a^2 x^2 - 32 = 2(9a^2 x^2 - 16) = 2\{(3ax)^2 - (4)^2\}$
$= 2(3ax - 4)(3ax + 4)$

22. $\frac{x^2}{16} - \frac{y^2}{25} = \left(\frac{x}{4}\right)^2 - \left(\frac{y}{5}\right)^2 = \left(\frac{x}{4} - \frac{y}{5}\right)\left(\frac{x}{4} + \frac{y}{5}\right)$

23. $\frac{64}{p^2} - \frac{49}{q^2} = \left(\frac{8}{p}\right)^2 - \left(\frac{7}{q}\right)^2 = \left(\frac{8}{p} - \frac{7}{q}\right)\left(\frac{8}{p} + \frac{7}{q}\right)$

24. $x^2 - 0.04 = (x)^2 - (0.2)^2 = (x - 0.2)(x + 0.2)$

25. $100 - (m - 7)^2 = (10)^2 - (m - 7)^2 = \{10 - (m - 7)\}\{10 + (m - 7)\}$
$= (10 - m + 7)(10 + m - 7)$
$= (17 - m)(3 + m)$

26. $x^2 - y^2 + 2x + 1 = (x^2 + 2x + 1) - y^2 = \{(x)^2 + 2(x)(1) + (1)^2\} - y^2$
$= (x + 1)^2 - (y)^2 = (x + 1 + y)(x + 1 - y)$

27. $n^2 - 0.64 = (n)^2 - (0.8)^2 = (n - 0.8)(n + 0.8)$

28. $\frac{4}{9} m^2 - 36 = \left(\frac{2}{3} m\right)^2 - (6)^2 = \left(\frac{2}{3} m - 6\right)\left(\frac{2}{3} m + 6\right)$
$= \left\{2\left(\frac{1}{3} m - 3\right) 2\left(\frac{1}{3} m + 3\right)\right\}$
$= 4\left(\frac{1}{3} m - 3\right)\left(\frac{1}{3} m + 3\right)$

29. $\frac{1}{4} b^2 - 81 = \left(\frac{1}{2} b\right)^2 - (9)^2 = \left(\frac{1}{2} b - 9\right)\left(\frac{1}{2} b + 9\right)$

30. $x^2 + 4y^2 - z^2 - 4xy = (x^2 + 4y^2 - 4xy) - z^2 = \{(x)^2 + (2y)^2 - 2(x)(2y)\} - z^2$
$= (x - 2y)^2 - (z)^2 = (x - 2y - z)(x - 2y + z)$

31. $x^4 - 25y^4 = (x^2)^2 - (5y^2)^2 = (x^2 - 5y^2)(x^2 + 5y^2)$

32. $b^4 - b^2 = b^2(b^2 - 1) = b^2\{(b)^2 - (1)^2\} = b^2(b - 1)(b + 1)$

MULTIPLE CHOICE QUESTIONS (MCQ's)

33. One of the factors of $a^2 + b^2 + 2ab - c^2$ is

(a) $(a - b + c)$ (b) $(-a + b + c)$ (c) $(-a - b + c)$ (d) $(a + b - c)$

$a^2 + b^2 + 2ab - c^2$

$\{(a)^2 + (b)^2 + 2(a)(b)\} - c^2$

$(a + b)^2 - (c)^2 \quad = \quad (a + b - c)(a + b + c)$

Ans. (d)

34. $-36(a - 2b)^2 + 25(a + b)^2$ can be factorised as

(a) $(11a - 7b)(-a + 17b)$ (b) $(-11a + 7b)(a - 17b)$

(c) $(-5a + 12b)(6a - 5b)$ (d) $-(6a - 5b)(5a - 12b)$

$-36(a - 2b)^2 + 25(a + b)^2$

Let $a + b = x$ and $a - 2b = y$

$\therefore 25x^2 - 36y^2 = (5x)^2 - (6y)^2 = (5x - 6y)(5x + 6y)$

$= \{5(a + b) - 6(a - 2b)\}\{5(a + b) + 6(a - 2b)\}$

$= \{5a + 5b - 6a + 12b\}\{5a + 5b + 6a - 12b\}$

$= (-a + 17b)(11a - 7b)$

Ans. (a)

HIGH ORDER THINKING SKILLS (HOTS)

35. Factorised $1 - 64x^{12}$

$(1)^2 - (8x^6)^2 \quad (x^m)^n = x^{mn}$

$(1 - 8x^6)(1 + 8x^6)$

Exercise : 5F – Factorise. (1 to 23)

1. $x^2 + 7x + 10$

$= \underline{x^2 + 5x} + \underline{2x + 10}$

$= x(x + 5) + 2(x + 5)$

$= (x + 5)(x + 2)$

2. $m^2 + 13m + 42$

$= \underline{m^2 + 6m} + 7m + 42$

$= m(m + 6) + 7(m + 6)$

$= (m + 6)(m + 7)$

3. $p^2 + 5p + 6$

$= \underline{p^2 + 3p} + \underline{2p + 6}$

$= p(p + 3) + 2(p + 3)$

$= (p + 3)(p + 2)$

4. $b^2 + 14b - 32$

$= \underline{b^2 + 16b} - \underline{2b - 32}$

$= b(b + 16) - 2(b + 16)$

$= (b + 16)(b - 2)$

5. $x^2 + 15x + 54$

$= x^2 + \underline{9x + 6x} + 54$

$= x(x + 9) + 6(x + 9)$

$= (x + 9)(x + 6)$

6. $n^2 + 11n + 24$

$= n^2 + \underline{8n - 3n} + 24$

$= n(n - 8) - 3(n - 8)$

$= (n - 8)(n - 3)$

7. $x^2 - 4x - 5$

$= x^2 - \underline{5x + x} - 5$

$= x(x - 5) + 1(x - 5)$

$= (x - 5)(x + 1)$

8. $x^2 + 5x - 50$

$= \underline{x^2 + 10x} - \underline{5x - 50}$

$= x(x + 10) - 5(x + 10)$

$= (x + 10)(x - 5)$

9. $x^2 - 2x - 24$

$= x^2 + 6x + 4x - 24$

$= x(x - 6) + 4(x - 6)$

$= (x - 6)(x + 4)$

10. $a^2 + 2a - 63$

$= a^2 + 9a - 7a - 63$

$= a(a + 9) - 7(a + 9)$

$= (a + 9)(a - 7)$

11. $48 + 22x - x^2$

$= 48 + 24x - 2x - x^2$

$= 24(2 + x) - x(2 + x)$

$= (2 + x)(24 - x)$

12. $c^2 - 13c + 40$

$= c^2 - 8c - 5c + 40$

$= c(c - 8) - 5(c - 8)$

$= (c - 8)(c - 5)$

13. $k^2 - 3k - 40$

$= k^2 - 8k + 5k - 40$

$= k(k - 8) + 5(k - 8)$

$= (k - 8)(k + 5)$

14. $n^2 + 27n + 110$

$= n^2 + 22n + 5n + 110$

$= n(n + 22) + 5(n + 22)$

$= (n + 22)(n + 5)$

15. $2x^3 + 10x^2 - 28x$

$= 2x(x^2 + 5x - 14)$

$= 2x(x^2 + 7x - 2x - 14)$

$= 2x\{x(x + 7) - 2(x + 7)\}$

$= 2x\{(x + 7)(x - 2)\} = 2x(x + 7)(x - 2)$

16. $p^2 - 5p - 176$

$= p^2 + 16p + 11p - 176$

$= p(p - 16) + 11(p - 16)$

$= (p - 16)(p + 11)$

17. $z^2 + 16z - 105$

$= z^2 + 21z - 5z - 105$

$= z(z + 21) - 5(z + 21)$

$= (z + 21)(z - 5)$

18. $n^2 - 19n - 92$

$= n^2 - 23n + 4n - 92$

$= n(n - 23) + 4(n - 23)$

$= (n - 23)(n + 4)$

19. $b^2c^2 + 8bc^4 + 12c^5$

$= c^3(b^2 + 8bc + 12c^2)$

$= c^2(b^2 + 6bc + 2bc + 12c^2)$

$= c^2\{b(b + 6bc) + 2c(b + 6c)\}$

$= c^2\{(b + 6c)(b + 2c)\}$

$= c^2(b + 6c)(b + 2c)$

20. $3x^5 - 18x^4 - 48x^3$

$= 3x^3(x^2 - 6x - 16)$

$= 3x^3(x^2 - 8x + 2x - 16)$

$= 3x^3\{x(x - 8) + 2(x - 8)\}$

$= 3x^3\{(x - 8)(x + 2)\}$

$= 3x^3(x - 8)(x + 2)$

21. $15p - 14 - 4p^2$

$= -(4p^2 - 15p + 14)$

$= -(4p^2 - 8p - 7p + 14)$

$= -\{4p(p-2) - 7(p-2)\}$

$= -\{(p-2)(4p-7)\}$

$= -(p-2)(4p-7)$

$= (p-2)(7-4p)$

22. $m^4 + 16m^2 - 57$

$= m^4 + 19m^2 - 3m^2 - 57$

$= m^2(m^2 + 19) - 3(m^2 + 19)$

$= (m^2 + 19)(m^2 - 3)$

23. $y^4 + 4y^2 - 32$

$= y^4 + 8y - 4y^2 - 32$ $= y^2(y^2 + 8) - 4(y^2 + 8)$

$= (y^2 + 8)(y^2 - 4)$ $= \{(y)^2 - (2)^2\}(y^2 + 8)$

$= (y-2)(y+2)(y^2 + 8)$

MULTIPLE CHOICE QUESTIONS (MCQ's)

24. **Which is the correct factorization of $p^2 - 10p - 24$?**

(a) $(p+4)(p-6)$ (b) $(p-2)(p+12)$

(c) $(p+2)(p-12)$ (d) $(p-4)(p-6)$

$p^2 - 10p - 24$

$= p^2 - 12p + 2p - 24$ $= p(p-12) + 2(p-12)$

$= (p-12)(p+2)$

Ans. (c)

25. **One of the factors of $(m-n)^2 - 4(m-n) - 45$ is**

(a) $(m-n-9)$ (b) $(m+n+5)$

(c) $(m-n+9)$ (d) $(m-n-5)$

$(m-n)^2 - 4(m-n) - 45$

Let $m - n = x$

$x^2 - 4x - 45$

$= x^2 - 9x + 5x - 45$ $= x(x-9) + 5(x-9)$

$= (x-9)(x+5)$ $= (m-n-9)(m-n+5)$

Ans. (a)

HIGH ORDER THINKING SKILLS (HOTS)

26. **Which value of b would make $x^2 + bx + 24$ factorable?**

(a) 25 (b) 5 (c) 11 (d) 14

$6 \times 4 = 24 \Rightarrow 6 + 4 = 10$, $1 \times 24 = 24 \Rightarrow 24 + 1 = 25$

$2 \times 12 = 24 \Rightarrow 2 + 12 = 14$, $3 \times 8 = 24 \Rightarrow 3 + 8 = 11$

- $b = 25, 11, 14$

Ans. (a), (c), (d)

Exercise : 5G – Factorise. (1 to 16)

1. $2x^2 + 13x + 6$

$= 2x^2 + 12x + x + 6$

$= 2x(x + 6) + 1(x + 6)$

$= (x + 6)(2x + 1)$

2×6	$= 12$
12×1	$= 12$

2. $5x^2 + 13x + 6$

$= 5x^2 + 10x + 3x + 6$

$= 5x(x + 2) + 3(x + 2)$

$= (x + 2)(5x + 3)$

5×6	$= 30$
10×3	$= 30$
$10 + 3$	$= 13$

3. $4y^2 + 5y + 1$

$= 4y^2 + 4y + y + 1$

$= 4y(y + 1) + 1(y + 1)$

$= (y + 1)(4y + 1)$

4×1	$= 4$
$4 + 1$	$= 5$

4. $2a^2 + 11a + 12$

$= 2a^2 + 8a + 3a + 12$

$= 2a(a + 4) + 3(a + 4)$

$= (a + 4)(2a + 3)$

2×12	$= 24$
8×3	$= 24$
$8 + 3$	$= 11$

5. $4a^2 + 8a - 5$

$= 4a^2 + 10a - 2a - 5$

$= 2a(2a + 5) - 1(2a + 5)$

$= (2a + 5)(2a - 1)$

4×-5	$= -20$
10×-2	$= -20$
$10 - 2$	$= 8$

6. $6x^2 - 46x - 16$

$= 2(3x^2 - 23x - 8)$

$= 2(3x^2 - 24x + x - 8)$

$= 2\{3x(x - 8) + 1(x - 8)\}$

$= 2\{(x - 8)(3x + 1)\}$

$= 2(x - 8)(3x + 1) = (x - 8)(3x + 1)$

3×-8	$= -24$
-24×1	$= -24$
$-24 + 1$	$= -23$

7. $3x^2 - 7x - 6$

$= 3x^2 - 9x + 2x - 6$

$= 3x(x - 3) + 2(x - 3)$

$= (x - 3)(3x + 2)$

3×-6	$= -18$
-9×2	$= -18$
$-9 + 2$	$= -7$

8. $2 - 3p - 9p^2$

$= 2 - 6p + 3p - 9p^2$

$= 2(1 - 3p) + 3p(1 - 3p)$

$= (1 - 3p)(2 + 3p)$

2×-9	$= -18$
-6×3	$= -18$
$-6 + 3$	$= -3$

9. $4k^2 - 12k + 9$

$= 4k^2 - 6k - 6k + 9$

$= 2k(2k - 3) - 3(2k - 3)$

$= (2k - 3)(2k - 3)$

$= (2k - 3)^2$

4×9	$= 36$
-6×-6	$= 36$
$-6 + -6$	$= -12$

10. $40n^2 + n - 6$

$= 40n^2 + 16n - 15n - 6$

$= 8n(5n + 2) - 3(5n + 2)$

$= (5n + 2)(8n - 3)$

40×-6	$= -240$
16×-15	$= -240$
$16 - 15$	$= 1$

11. $2n^2 + 4mn - 16m^2$

$= 2[n^2 + 2mn - 8m^2)$

$= 2[n^2 + 4mn - 2mn - 8m^2]$

$= 2[n(n + 4m) - 2m(n + 4m)]$

$= 2(n + 4m)(n - 2m) = (n + 4m)(n - 2m)$

1×-8	$= -8$
4×-2	$= -8$
$4 - 2$	$= 2$

12. $x^2 + 6x + 5$

$= x^2 + 5x + x + 5$

$= x(x + 5) + 1(x + 5)$

$= (x + 5)(x + 1)$

5×1	$= 5$
$5 + 1$	$= 6$

13. $1 - x - 6x^2$

$= 1 - 3x + 2x - 6x^2$

$= 1(1 - 3x) + 2x(1 - 3x)$

$= (1 - 3x)(1 + 2x)$

1×-6	$= -6$
-3×2	$= -6$
$-3 + 2$	$= -1$

14. $6x^5 + 22x^3 - 8x$

$= 2x(3x^4 + 11x^2 - 4)$

$= 2x(3x^4 + 12x^2 - x^2 - 4)$

$= 2x\{3x^2(x^2 + 4) - 1(x^2 + 4)\}$

$= 2x(x^2 + 4)(3x^2 - 1)$

3×-4	$= -12$
12×-1	$= -12$
$12 - 1$	$= 11$

15. $12x^3 + 6x^2 - 6x$

$= 6x(2x^2 + x - 1)$

$= 6x(2x^2 + 2x - x - 1)$

$= 6x\{2x(x + 1) - 1(x + 1)\}$

$= 6x(x + 1)(2x - 1)$

2×-1	$=$	-2
$2 - 1$	$=$	1

16. $2y^6 - 7y^4 - 4y^2$

$= y^2(2y^4 - 7y^2 - 4)$

$= y^2\{2y^4 - 8y^2 + y^2 - 4\}$

$= y^2(2y^2 + 1)\{(y)^2 - (2)^2\}$

$= y^2(2y^2 + 1)(y - 2)(y + 2)$

2×-4	$=$	-8
-8×1	$=$	-8
$-8 + 1$	$=$	-7

MULTIPLE CHOICE QUESTIONS (MCQ's)

17. The complete factorisation of $x - x^3 - 12x^5$ is

(a) $x(2n - 1)(2n + 1)(1 + 3n^2)$ (b) $n(1 - 2n)(1 + 2n)(1 + 3n^2)$

(c) $-x(12x^4 + n^2 - 1)$ (d) $-n(4x^2 - 1)(3x^2 + 1)$

$x - x^3 - 12x^5$

$= x(1 - x2 - 12x4)$ $= x\{1 - 4x^2 + 3x^2 - 12x^4\}$

$= x\{1(1 - 4x^2) + 3x^2(1 - 4x^2)\}$ $= x(1 - 4x^2)(1 + 3x^2)$

$= x(1 + 3x^2)\{(1)^2 - (2x)^2\}$ $= x(1 + 3x^2)(1 - 2x)(1 + 2x)$

1×-12	$=$	-12
-4×3	$=$	-12
$-4 + 3$	$=$	-1

Ans. (b)

18. A rectangular parking lot has an area of $9x^2 + 22x + 8$ square units. One of its side is

(a) $(5x + 2)$ (b) $(5x + 6)$ (c) $(5x + 1)$ (d) $(x + 2)$

$9x^2 + 22x + 8$

$= 9x^2 + 18x + 4x + 8$

$= 9x(x + 2) + 4(x + 2) = (x + 2)(9x + 4)$

Ans. (d)

9×8	$= 72$
18×4	$= 72$
$18 + 4$	$= 22$

HIGH ORDER THINKING SKILLS (HOTS)

19. The binomial $(x - 3)$ is not a factor of which of the following trinomials.

(a) $2x^2 - 8x + 6$ **(b) $2x^2 - 7x - 3$**

(c) $2x^2 - n - 15$ **(d) $3x^2 - 13x + 12$**

(a) $2x^2 - 8x + 6 = 2(x^2 - 4x + 3)$

$= 2(x^2 - 3x - x + 3) = 2\{x(x - 3) - 1(x - 3)\}$

$= 2(x - 3)(x - 1)$

(b) $2x^2 - 7x - 3$ Factors are not possible.

(c) $2x^2 - x - 15$

$= 2x^2 - 6x + 5x - 15 = 2x(x - 3) + 5(x - 3)$

$= (x - 3)(2x + 5)$

(d) $3x^2 - 13x + 12$

$= 3x^2 - 9x - 4x + 12 = 3x(x - 3) - 4(x - 3)$

$= (x - 3)(3x - 4)$

Ans. (b)

MENTAL MATHS

Factorise. (1 to 14)

1. $x^3 + x = x(x^2 + 1)$

2. $6x^2 + 12x = 6x(x + 2)$

3. $x^2y - x^2y = x^2y - y^2x = xy(x - y)$

4. $5x + 35$ = questions is wrong.

5. $5(p + q) - 7q(p + q) = (p + q)(5 - 7q)$

6. $(x + 3)y + (x + 3)x = (x + 3)(y + x)$

7. $2p(y - x) + q(x - y) = 2p(y - x) - q(y - x) = (y - x)(2p - q)$

8. $9a^2 - 16b^2 = (3a)^2 - (4b)^2 = (3a + 4b)(3a - 4b)$

9. $100 - \frac{49}{16a^2} = (10)^2 - \left(\frac{7}{4a}\right)^2 = \left(10 + \frac{7}{4a}\right)\left(10 - \frac{7}{4a}\right)$

10. $3a^3 - 48a = 3a(a^2 - 16) = 3a\{(a)^2 - (4)^2\} = 3a(a + 4)(a - 4)$

11. $9x^2 + 30x + 25 = (3x)^2 + 2(3x)(5) + (5)^2 = (3x + 5)^2$

12. $81m^2 - 18m\ 1 = (9m)^2 - 2(9m)(1) + (1)^2 = (9m - 1)^2$

13. $x^2 + 16x + 63 = x^2 + 9x + 7x + 63 = x(x + 9) + 7(x + 9)$

$= (x + 9)(x + 7)$

14. $x^2 - 3x - 40 = x^2 - 8x + 5x - 40 = x(x - 8) + 5(x - 8)$

$= (x - 8)(x + 5)$

CHAPTER ASSESSMENT

CONCEPT REVIEW

1. Fill in the blanks. (i) to (iv)

(i) $-4x^2 - 12x = -4x(x + 3)$

(ii) $a(x - 3) + 2b(3 - x) = a(x - 3) - 2b(x - 3) = (x - 3)(a - 2b)$

(iii) $x^2 + 24x + 144 = (x)^2 + 2(x)(12) + (12)^2 = (x + 12)^2$

(iv) $16x^2 - 49 = (4x)^2 - (7)^2 = (4x - 7)(4x + 7)$

(v) $x^2 + 7x + 6 = x^2 + 6x + x + 6 = x(x + 6) + 1(x + 6)$

$= (x + 6)(x + 1)$

2. Answer True (T) or False (F).

(i) All the trinomials of the form $ax^2 + bx + c$ can be factorised. [FALSE]

(ii) $x^2 + 10x + 9$ is a perfect square trinomial.

$x2 + 10x + 9 = x2 + 9x + x + 9$

$= x(x + 9) + 1(x + 9)$

$= (x + 9)(x + 1)$

It is not a perfect square trinomial. [FALSE]

(iii) One of the factor of $x^2 + 14x - 32$ is $(x - 2)$

$x^2 + 14x - 32 = x^2 + 16x - 2x - 32$

$= x(x + 16) - 2(x + 16) = (x + 16)(x - 2)$ [TRUE]

(i) All the trinomials of the form $ax^2 + bx + c$ can be factorised. [FALSE]

(ii) $x^2 + 10x + 9$ is a perfect square trinomial.

$x2 + 10x + 9 = x2 + 9x + x + 9$

$= x(x + 9) + 1(x + 9)$

$= (x + 9)(x + 1)$

It is not a perfect square trinomial. [FALSE]

(iii) One of the factor of $x^2 + 14x - 32$ is $(x - 2)$

$x^2 + 14x - 32 = x^2 + 16x - 2x - 32$

$= x(x + 16) - 2(x + 16) = (x + 16)(x - 2)$ [TRUE]

(iv) To factorise $2x^2 + 11x + 12$, you have to find the factors of 12 whose sum is 11.

We have to find the factor of 24 whose sum is 11. [FALSE]

(v) We can factorise $25y^2 - 10$ by the difference of square method.

$25y^2 - 10 = (5y)^2 - (\sqrt{10})^2 = (5y - \sqrt{10})(5y + \sqrt{10})$ [TRUE]

MULTIPLE CHOICE QUESTIONS (MCQ's)

3. If one of the factors of the expression $x^2 - ax + 5x - 5a$ is $(x + 5)$, the other factor is

(a) $(x - a)$ (b) $(5 - a)$ (c) $(x^2 - 5)$ (d) $(x + a)$

$x^2 - ax + 5x - 5a$

$= x(x - a) + 5(x - a) = (x - a)(x + 5)$

Ans. (a)

4. The factors of x^2 $9x - 36$ are

(a) $(x + 12)$ and $(x + 3)$ (b) $(x - 12)$ and $(x - 3)$

(c) $(x + 12)$ and $(x - 3)$ (d) $(x - 12)$ and $(x + 3)$

$x^2 + 9x - 36$

$= x^2 + 12x - 3x - 36 = x(x + 12) - 3(x + 12)$

$= (x + 12)(x - 3)$

Ans. (c)

5. $1 - (a - b)^2 = (1 + a - b) \times$ .....

(a) $1 - a - b$ (b) $(-1 + a - b)$ (c) $(1 - a + b)$ (d) $(1 + a + b)$

$(1)^2 - (a - b)^2 = (1 + a - b)(1 - a + b)$

Ans. (c)

6. The factors of $3a^2 - 108b^2$ are

(a) $(3a - 12b)(3a + 9b)$ (b) $3(a - 6b)(a + 6b)$

(c) $(3a - 24b)(a + 6b)$ (d) $3(a - 9b)(a + 4b)$

$3a^2 - 108b^2 = 3(a^2 - 36b^2)$

$= 3\{(a)^2 - (6b)^2\}$

$= 3(a - 6b)(a + 6b)$

Ans. (b)

LONG ANSWER TYPE QUESTIONS

7. Factorse : $ab(x^2 + y^2) - xy(a^2 + b)$

$(x^2 + y^2) - xy(a^2 + b)$

$= abx^2 + aby^2 - xya^2 - xyb^2$

$= abx^2 - xya^2 + aby^2 - xyb^2$

$= ax(bx - ay) - by(bx - ay)$

$= (bx - ay)(ax - by)$

8. Factorise : $100 - a^2 - b^2 - 2ab$

$= 100 - (a^2 + b^2 + 2ab)$

$= (10)^2 - (a + b)^2$

$= (10 + a + b)(10 - a - b)$

HIGH ORDER THINKING SKILLS (HOTS

9. Simplify the expressions : $\frac{(x-1)(x-2)(x^2-9x+14}{(x-7)(x^2-3x+2)}$

$x^2 - 9x + 14 = x^2 - 7x - 2x + 14 = x(x-7) - 2(x-7) = (x-7)(x-2)$

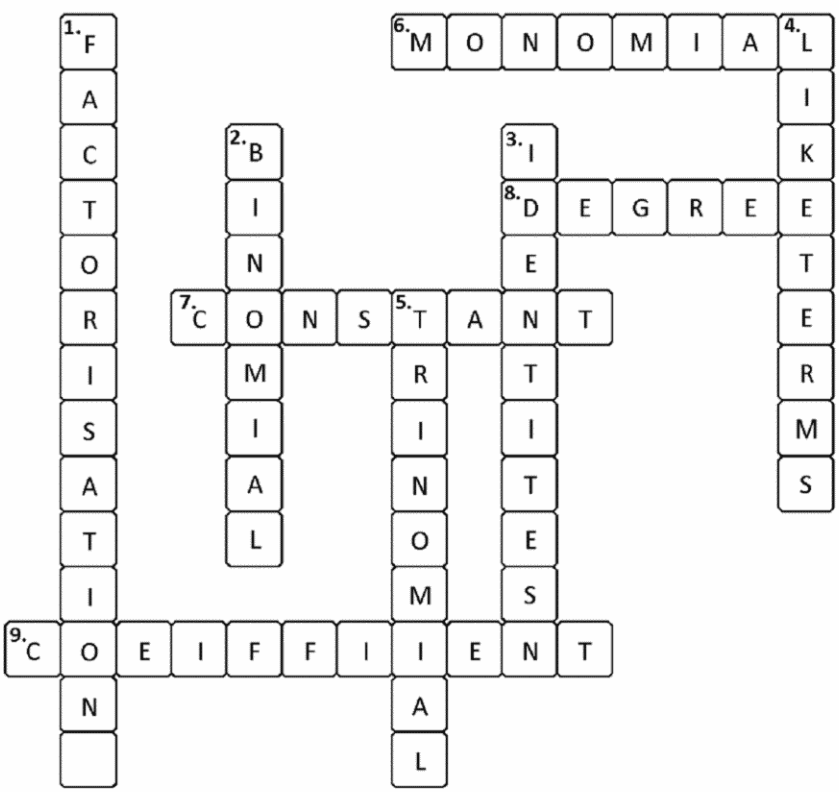
$x2 - 3x + 2$

$x2 - 2x - x + 2$

$x(x-2) - 1(x-2) = (x-2)(x+1)$

$$\frac{(x-1)(x-2)(x^2-9x+14}{(x-7)(x^2-3x+2)}$$

$$= \frac{(x-1)(x-2)(x-7)(x-2)}{(x-7)(x-2)(x-1)} = (x-2)$$



Exercise 6 (A) Solve the following equations and check your answer :

Question 1. (i) $7a - (2a - 5) = 3(a + 2) + 11$

$7a - 2a - 5 = 3a + 6 + 11$

$7a - 2a - 3a = 6 + 11 + 5$

$7a - 5a = 22$

$2a = 22$

$a = \frac{22}{2} = 11$ **Ans.**

(ii) $7(a + 2) - 3(a - 2) = 5a + 6$

$7a + 14 - 3a + 6 = 5a + 6$

$7a - 3a - 5a = 6 - 6 - 14$

$7a - 3a - 5a = 6 - 6 - 14$

$7a - 7a = 14$

$a = 14$ **Ans.**

(iii) $7 + 2(x + 1) - 3x = 5x$

$7 + 2(x + 1) - 3x = 5x$

$7 + 2 = 5x + 3x - 2x$

$9 = 6x$

$\frac{9}{6} = \frac{3}{2} = x$ **Ans.**

Question 2. (i) $\frac{t + 8}{3} = 3$ **Ans.**

$t + 8 = 3 \times 3$

$t + 8 = 9$

$t = 9 - 8$

$t = 1$

(ii) Do yourself::-

Question 3. (i) $\frac{2y}{3} + \frac{3y}{4} = 17$

$\frac{8y + 9y}{12} = 17$

$17y = 17 \times 12$

$17y = 204$

$y = \frac{204}{17} = y = 12$ **Ans.**

(ii) $3x + \frac{x}{7} = 44$

$\frac{21x + x}{7} = 44$

3	3 , 4
4	1 , 4
	1 , 1

$22x = 44 \times 7$

$22x = 308$

$x = \frac{308}{22} = 14$

$x = 14$ **Ans.**

Question 4. $\frac{3}{7}\left(a + \frac{2}{3}\right) = \frac{4}{5}$

$\frac{3}{7}\left(\frac{3a + 2}{3}\right) = \frac{4}{5}$

$\frac{9a + 6}{21} = \frac{4}{5}$

$5(9a + 6) = 21(4)$

$45a + 30 = 84$

$45a = 84 - 30$

$45a = 54$

$a = \frac{\cancel{54}}{\cancel{45}} = \frac{6}{5}$

$a = \frac{6}{5}$

Question 5. $\frac{P + 6}{7} - \frac{2P - 10}{3} = \frac{3P - 15}{5} - 25$

$\frac{3P + 12 - 14P - 70}{21} = \frac{3P - 15 - 125}{5}$

$\frac{3P + 14P + 12 - 70}{21} = \frac{3P - 15 - 125}{5}$

$\frac{-11P - 58}{21} = \frac{3P - 140}{5}$

$5(-11P - 58) = 21(3P - 140)$

$-55P - 290 = 63P - 2940$

$-290 + 2940 = 63P + 55P$

$2650 = 118P$

$P = \frac{\cancel{2650}}{\cancel{118}} = \frac{1325}{59}$

$P = \frac{1325}{59}$ **Ans.**

Question 6. $\frac{x - 3}{9} - \frac{2x + 1}{6} + 3x - 10 = 2x + 1$

$\frac{2(x - 3) - 2(2x + 1) + 18(3x) - 18(10)}{18} = 2x + 1$

$2x - 6 - 4x + 2 + 54x - 180 = 18(2x + 1)$

$2x - 4x + 54x - 6 + 2 - 180 = 36x + 18$

$2x - 4x + 54x - 36x = 18 + 6 - 2 + 180$

$2x + 54x - 4x - 36x = 202$

$2x + 54x - 40x = 202$

$56x - 40x = 202$

$16x = 202$

$x = \frac{\cancel{202}}{\cancel{16}} = \frac{101}{8}$

$x = \frac{101}{8}$ **Ans.**

Question 7. $u + 34 = 2.7u$

$34 = 2.7u - u$

$34 = 1.7u$

$\frac{34}{1.7} = u$

$u = \frac{340}{17} = 20$

$u = 20$ **Ans.**

Question 8. $1.07x + 0.20x = 5 - 0.37x$

$1.07x + 0.20x + 0.37 = 5$

$1.64x = 5$

$x = \frac{\cancel{500}}{\cancel{164}} = \frac{\cancel{250}}{\cancel{82}} = \frac{125}{41}$

Question 9. $\frac{1}{6}(4z + 5) - \frac{2}{3}(2z + 7) = \frac{3}{2}$

$\frac{4z}{6} + \frac{5}{6} - \frac{4z}{3} + \frac{14}{3} = \frac{3}{2}$

$\frac{4z}{6} - \frac{4z}{3} = \frac{3}{2} + \frac{5}{6} + \frac{14}{3}$

$\frac{4z - 8z}{6} = \frac{9 - 5 + 28}{6}$

$\frac{-4z}{6} = \frac{32}{6}$

$-4z \times 6 = 32 \times 6$

$24z = 192$

$z = -\frac{192}{24} = -8$

$z = -8$ **Ans.**

Solve the following equations :

Question 10. $\frac{2}{a+4} = \frac{3}{5a}$

$2 \times 5a = 3(a + 4)$

$10a = 3a + 12$

$10a - 3a = 12$

$7a = 12$

$a = \frac{12}{7}$ **Ans.**

Question 11. $\frac{6}{3x+1} = \frac{9}{5x-3}$

$6(5x - 3) = 9(3x + 1)$

$30x - 18 = 27x + 9$

$30x - 27x = 9 + 18$

$3x = 27$

$x = \frac{27}{3}$

$x = 9$ **Ans.**

Question 12. $\frac{3x+5}{2} = 4x + 7$

$3x + 5 = 2(4x + 7)$

$3x + 5 = 8x + 14$

$3x - 8x = 14 - 5$

$-5x = 9$

$x = -\frac{9}{5}$ **Ans.**

Question 13. $\frac{6x-9}{2x} = 4$

$6x - 9 = 4 \times 2x$

$6x - 8x = 9$

$-2x = 9$

$x = -\frac{9}{2}$ **Ans.**

Question 14. $\frac{0.4a-3}{1.5a+9} = \frac{3}{4}$

$4(a.4a - 3) = 3(1.5a + a)$

$1.6a - 12 = 4.5a + 27$

$1.6a - 4.5a = 27 + 12$

$-2.9a = 39$

$$a = \frac{39}{2.9}$$

$$a = \frac{390}{29}$$ **Ans.**

Question 15. $\frac{z-2}{z-4} = \frac{z+4}{z-2}$

$$(z-2)(z-2) = (z+4)(z-4)$$

$$z^2 - 2z - 2z - 4 = z^2 + 4z + 4z - 16$$

$$z^2 - z^2 - 2z - 2z - 4z - 4z = 16 + 4$$

$$12z = 20$$

$$z = \frac{\cancel{20}}{\cancel{12}} = \frac{\cancel{10}}{\cancel{6}} = \frac{5}{3}$$

$$z = \frac{5}{3}$$ **Ans.**

Question 16. $\frac{P-3}{P-4} = \frac{P+2}{P+4}$

$$(P-3)(P+4) = (P+2)(P-4)$$

$$P(P+4) - 3(P+4) = P(P-4)\,2(P-4)$$

$$P^2 + 4P - 3P - 12 = P^2 - 4P + 2P - 8$$

$$P^2 - P^2 + 4P + 4P - 3P - 2P = -8 + 12$$

$$8P - 5P = 4$$

$$3P = 4$$

$$P = \frac{4}{3}$$ **Ans.**

Question 17. $\frac{17(2-y) - 5(y+12)}{1-7y} = 8$

$$34 - 17y - 5y + 60 = 8(1 - 7y)$$

$$34 - 17y - 5y + 60 = 8 - 56y$$

$$34 - 22y - 60 = 8 - 56y$$

$$-22y + 56y = 8 + 60 - 34$$

$$34y = 34$$

$$y = \frac{\cancel{34}}{\cancel{34}} = 1$$ **Ans.**

Question 18. $\frac{(3m+4) - (7m-9)}{5m+9} = \frac{-9}{4}$

$$(4 \times 3m + 4 \times 4) - (4 \times 7m - 4x - 9) = -9 \times 5m + -9 \times 9$$

$$12m + 16 - 28m + 36 = -45m - 81$$

$12m + 45m - 28m = -81 - 16 - 36$

$29m = 133$

$m = 133$

Question 19. $\dfrac{\frac{a}{4} - \frac{3}{5}}{\frac{4}{3} - 7a} = \dfrac{4}{15}$

$\dfrac{15a}{4} - \dfrac{45}{5} = \dfrac{16}{3} - 28a$

$\dfrac{15a}{4} + 28a = \dfrac{16}{3} + \dfrac{45}{5}$

$\dfrac{15 + 112a}{4} = \dfrac{16}{3} + 9$

$\dfrac{15 + 112a}{4} = \dfrac{16 + 27}{3}$

$3(15a + 112a) = 4(16 + 27)$

$45a + 336a = 64 + 108$

$381a = 172$

$a = \dfrac{172}{381}$ **Ans.**

Question 20. $\dfrac{2x - 4}{3x + 2} = \dfrac{-4}{5}$

$5 \times 2x - 5x - 4 = -4x \times 3x + (-4 \times 2)$

$10x + 12x = -8 + 20$

$22x = 12$

$x = \dfrac{\cancel{12}}{\cancel{22}} = \dfrac{6}{11}$

$x = \dfrac{6}{11}$ **Ans.**

Question 21. $\dfrac{a2 - (a + 2)(a + 3)}{4a + 3} = \dfrac{4}{1}$

$a^2 - a \times a + a \times 3 + 2a + 6 = 16a + 12$

$a^2 - a^2 + 3a + 2a + 6 = 16a + 12$

$0 + 5a + 6 = 16a + 12$

$5a + 6 = 16a + 12$

$5a - 16a = 12 - 6$

$-11a = 6$

$a = \dfrac{-6}{11}$ **Ans.**

Exercise : 6 (B) Question 1. The difference between a number and its three fifth is 50. What is the number?

Let the number be x.

$\therefore \quad x - \frac{3}{5}x = 50$ (Given)

$\Rightarrow \quad \frac{5x - 3x}{5} = 50$

$\Rightarrow \quad \frac{2x}{5} = 50$

$\Rightarrow \quad x = \frac{50 \times 5}{2} = 125$

$\therefore$ Number is 125.

Question 2. If a number is decreased by 4 and divided by 6 the result is 8. What would be the result if 2 is subtracted from the number and then it is divided by 5?

Let the number be x.

$\Rightarrow \quad (x - 4) = 6 \times 8 + 0$ (Given)

$\Rightarrow \quad x = 48 + 4$

$\Rightarrow \quad x = 52$

$\therefore$ Number is 52.

2^{nd} part $(x - 2) \div 5 = (52 - 2) \div 5 = \frac{50}{5} = 10$

Question 3. When 24 is subtracted from a number it reduces to its four. Seventh what is the sum of the digits of that number?

Let the number be x.

$\Rightarrow \quad x - 24 = 4$ (Given)

$\Rightarrow \quad x = 24 + 4 = 28$

Hence number is 28.

Sum of the digit of the number = 2 + 8 = 10

Question 4. If 50 is subtracted from two third of a number. The result is equal to sum of 40 and one fourth of that number. What is the number?

Let the number be x.

$\Rightarrow \quad \frac{2}{3}x - 50 = 40 + \frac{x}{4}$ (Given)

$\Rightarrow \quad \frac{2}{3}x - \frac{x}{4} = 40 + 50$

$\Rightarrow \quad \frac{8x - 3x}{12} = 90$

$\Rightarrow \quad \frac{5x}{12} = \frac{90}{1}$

$\Rightarrow \quad x = \frac{90 \times 12}{5}$

$\Rightarrow \quad x = 18 \times 12 = 216$

Question 5. The product of two natural numbers is 17. Then, the sum of the reciprocals of their squares is:

$\Rightarrow$ $17 \times 1 = 17$

$\Rightarrow$ $\therefore$ Numbers are 17 and 1.

$\Rightarrow$ Sum of the reciprocal of their square

$\Rightarrow$ $\frac{1}{(1)^2} = \frac{1}{(17)^2} = \frac{1}{1} + \frac{1}{289}$

$\Rightarrow$ $\frac{289 + 1}{289} = \frac{290}{289}$

Question 6. The sum of two numbers is 22. Five times one number is equal to 6 times the other. The bigger of the two numbers is :

Let the bigger number be x.

$\therefore$ Smaller number is $22 - x$

$5x = 6\ (22 - x)$ (Given)

$\Rightarrow$ $5x = 132 - 6x$

$\Rightarrow$ $5x = 6x = 132$

$\Rightarrow$ $11x = 132$

$\therefore$ $x = \frac{132}{11} = 12$

Hence bigger number is 12.

Question 7. The difference between two numbers is 1365. When the larger number is divided by the smaller one the quotient is 6 and the remainder is 15. The smaller number is :

Let the bigger number be x.

$\therefore$ Larger number is $x + 1365$

Dividend = Divisor × Quotient + Remainder

$\Rightarrow$ $x + 1365 = x \times 6 + 15$

$\Rightarrow$ $x - 6x = 15 - 1365$

$\Rightarrow$ $-5x = -1350$

$\therefore$ $x = \frac{-1350}{-5} = 270$

Hence bigger number is 270.

Question 8. The sum of the squares of two numbers is 3341 and the difference of their squares is 891. The numbers are:

Let the bigger number be x and y

$\therefore$ $x^2 + y^2 = 3341$ ..... (i)
$x^2 - y^2 = 891$ ..... +(iv) } (Given)

Adding (i) 2 (ii)

$2x^2 = 14232$

$x^2 = \frac{4232}{2} = 2116$

$x = \sqrt{2116}$

$x = \sqrt{2 \times 2 \times 23 \times 23}$

$x = 23 \times 2 = 46$

2	2116
2	1058
23	529
23	23
	1

From aquiline (i) $2116 + y^2 = 3341$

$y^2 = 3341 - 2116$

$y^2 = 1225$

$y = \sqrt{1225}$

$y = \sqrt{5 \times 5 \times 7 \times 7}$

$y = 5 \times 7 = 35$

Hence numbers are 35 and 46.

Question 9. The product of three consecutive even numbers when divided by 8 is 720. The product of their square roots is:

$\Rightarrow \quad \frac{x(x+2)(x+4)]}{8} = 72$ (Given)

$\Rightarrow \quad x(x+2)(x+4) = 72 \times 8$

$\Rightarrow \quad \sqrt{x(x+2)(x+4)} = \sqrt{72 \times 8} = \sqrt{3 \times 3 \times 8 \times 8} = 3 \times 8 = 24$

Square root of even number is also even no $24\sqrt{10}$ is not even number i.e., irrational number so change 720 to 72.

Question 10. A man is 24 years older then his son. In two years his age will be twice the age of his son. The present age of the son is :

Let son's ago be x year

$\therefore$ Father's age is (x + 24) years

In 2 years

son's age = (x + 2) years and father's age = (x + 26) years

$x + 26 = 2(x + 2)$ (Given)

$\Rightarrow \quad x + 26 = 2x + 4$

$\Rightarrow \quad 26 - 4 = 2x - x$

$\Rightarrow \quad 22 = x$

$\therefore$ Son's age = 22 years

Father's age = x + 24 = 22 + 24 = 46 years

Question 11. A person's present age is two fifth of the age of his mother. After 8 years he will be one half of the age of his mother. How old is the mother at present?

Les the mother's age be x years.

$\therefore$ Person's age is $\frac{2}{5}$ x years

After 8 years

Mother's age = (x + 8) years

Person's age is $\left(\frac{2}{5}x + 8\right)$ years

(Given) :

$$\frac{1}{2}(x + 8) = \left(\frac{2}{5}x + 8\right)$$

$$\frac{x}{2} + 4 = \frac{2}{5}x + 8$$

$$\frac{x}{2} - \frac{2x}{5} = 8 - 4$$

$$\frac{5x - 4x}{10} = 4$$

$$x = 4 \times 10 = 40$$

$\therefore$ Mother age = 40 years

Question 12. Four years ago the father's age was three times the age of his son. The total of the ages of the father and the son after four years will be 64 years. What is the father's age at present?

x = Father's age today Now 4 years ago

Father's age x – 4

Son's age = (x – 4) 12

The total age of father's and the son after four years will be 64 years.

Son's age (x – 4) / 3 + 4

x + (x + 4) / 3 + 4) = 64

3x + x – 4 + 12 = 192 = 4x = 192 – 8

4x + 8 = 192 = x = 184

$$x = \frac{184}{4} = 46$$

$\therefore$ x = 46

Father's age = 42 Son's age = 14 **Ans.**

Question 13. The sum of the present age of a father and his son is 60 years. Six years ago father's age was five times the age of the son. After 6 years son's age will be.

Let the son's age be x years

$\therefore$ Father's age is (60 – x) years

6 years ago

Son's age = (x – 6) years

Father's age = (60 – x – 6) years = (54 – x) years

(Given) : 54 –x = 5 (x – 6)

$\Rightarrow$ 54 – x = 5x – 30

$\Rightarrow$ 54 + 30 = 5x + x

$\Rightarrow$ $84 = 6x$

$\therefore$ $x = \frac{84}{6} = 14$

After 6 years son's age $= (x + 6)$ years

$= 14 + 6$

$= 20$ years

Question 14. Of the three numbers the overage of the first and the second is greater than the overage of the second and the third by 15. What is the difference between the first and the third of the three numbers?

Let the three numbers be a, b and c

(Given) : $\frac{a + b}{2} = \frac{b + c}{2} + 15$

Multiply by 2 both side

$a + b = b + c + 30$

$a + b - b - c = 30$

$a - c = 30$

$\therefore$ Difference between first and third number is 30.

Question 15. A pupil's marks were wrongly entered as 83 Instead of 63. Due to that the average marks for the class got increased by half. The number of pupils in the class is.

Let the sum of marks $(x - 1)$ pupils be y

Avg. marks of class when marks 83 entered $\frac{y + 83}{x}$

Marks 63 entered $\frac{y + 83}{x}$

Given : $\frac{y + 83}{x} = \frac{x + 63}{x} = \frac{1}{2}$

$\frac{y + 83 - y - 63}{x} = \frac{1}{2}$

$\frac{20}{x} = \frac{1}{2}$

$\therefore$ $x = 40$

No. of pupils = 40

Question 16. The average weight of 45 students in a class is 52 kg. Five of them whose average weight is 48 kg leave the class and other 5 students whose average weight is 54 kg join the class. What is the new average weight (in kg) of the class?

Avg. wt. of 45 students = 52 kg

Total wt. of 45 students = $52 \times 45 = 2340$ kg

Avg. wt. of 5 students = 48 kg

Total wt. of 5 students = $48 \times 5 = 240$ kg

Total wt. of 40 students = $2340 - 240 = 2100$ kg.

Avg. wt. of 5 students = 54 kg

Total wt. of 5 students = 54 × 5 = 270 kg

Total wt. of 45 students = 2100 + 270 = 2370 kg

Avg. wt. of 455 students = $\frac{2370}{45}$

$= \frac{474}{9} = \frac{158}{3}$ = 52.6 years (Approx)

Question 17. The length of the bridge on which a train 130 metres long and travelling at 45km/hr can cross in 30 seconds is:

Let the length of bridge be x m.

Speed of train = 45 km/hr.

$= \frac{45 \times 1000}{60 \times 60}$ m/sec.

$= \frac{450}{36}$ = 12.5 m/sec.

Distance = Speed × Time

x + 130 = 12.5 × 30

x = 375 – 130

x = 245

∴ Length of the bridge = 245 m.

Question 18. A train moves past a telegraph post and a bridge 624 m long in 8 seconds and 20 seconds respectively. What is the speed of the train?

Let the length of train be x m.

Length of bridge = 624 m

Train passes in bridge is 20 sec.

∴ Speed of train = $\frac{x + 624}{20}$ m/sec.

Train passes the telegraph post in 8 sec.

∴ Speed of train = $\frac{x}{8}$ m/sec.

$\frac{x}{8} = \frac{x + 624}{20}$ = speed of train

$\Rightarrow$ 20x = 8x + 624 × 8

$\Rightarrow$ 20x – 8x = 624 × 8

$\Rightarrow$ 12x = 624 × 8

$\Rightarrow$ $x = \frac{624 \times 8}{12} = 52 \times 8$

$\Rightarrow$ $\frac{x}{8} = \frac{52 \times 8}{8} = 52$

∴ Speed of the train = 52 m/sec.

Question 19. Two trains are moving in opposite directions @ 60 km/hr and 90 km/hr. Their lengths are 1.10 km and 0.9 km respectively. The time taken by the slower train to cross the faster train in seconds is:

Speed of trains 60 km/hr and 90 km/hr

Relative sped when trains are = 60 + 90

Moving opposite side = 150 km/hr

Length of trains = 1.1 + 0.9 = 2 km

Time take to cross each other $= \frac{\text{Distance}}{\text{Speed}}$

$= \frac{2}{150} = \frac{1}{75}$ hour

$= \frac{1}{75} \times 3600 = 48$ seconds.

Question 20. A boat running downstream covers a distance of 16 km in 2 hours while for covering the same distance upstream. It takes 4 hours. What is the speed of the boat in still water?

Let the stream flow rate boat m/hr.

Then we have $\frac{16}{4}$ km/hr boat is given by the expression (8 – x) km/hr.

Same $\frac{16}{4}$ = 4 km/hr. gives (4 + x) km/hr.

Since the boat speed is the same we can equate expression for the value of stream flow rate

(8 – x) (4 + x)

8 – 4 = 4 km/hr.

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 21. The ratio of the present ages of two sisters is 1 : 2 and 5 years back the ratio was 1 : 3. What will be the ratio of their ages after 5 years? (a) 2 : 3 (b) 3 : 5 (c) 5 : 6 (d) 1 : 4

Let present age of sisters x and 2x years

$\frac{x-5}{2x-5} = \frac{1}{3}$ (Given)

$\Rightarrow$ 3x – 15 = 2x – 5

$\Rightarrow$ 3x – 2x = 15 – 5

$\Rightarrow$ x = 10

Present ages of sisters 10 years and 20 years.

After 5 years of sister 15 years and 25 years

Ratio of their ages = 15 : 25 = 3 : 5 **Ans.** (b)

Question 22. Two trains start from A and B respectively and travel towards each other at a speed of 50 km/hr and 40 km/hr respectively. By the time they meet, the first has travelled 100 km more than the second. The distances between A and B. (a) 900 km (b) 500 km (c) 630 km (d) 500 km

Let the distance cover by 1st train is x km

And distance cover by 2nd train is y km

$\therefore$ $x - y = 100$

$x = (100 + y)$ ..... (i)

Time taken by 1st train $= \frac{x}{50}$

Time taken by 2nd train $= \frac{y}{40}$

$\frac{x}{50} = \frac{y}{40}$

$\frac{100 + y}{50} = \frac{y}{40}$ By cross multiplication

$4000 + 40y = 50y$

$50y - 40y = 4000$

$y = 4000$

$y = \frac{4000}{10} = 400$

$x = 100 + y = 100 + 400$

$x = 500$

Distance between A and B $= x + y$

$= 400 + 500$

$= 900$ km **Ans.** (a)

Question 23. A two digit number becomes five-sixth of itself when its digits are reversed. The two digits differ by 1. The number is " (a) 65 (b) 45 (c) 54 (d) 56

Let the unit digit be x

Ten digit be x + 1

Number $= 10 (x + 1) + x$

$= 10x + 10 + x$

$= 11x + 10$

Reverse number $= 10x + x + 1$

$= 11x + 1$

$11x + 1 = \frac{5}{6}(11x + 10)$

Multiplying by 6 to both side

$66x + 6 = 55x + 50$

$66x - 55x = 50 - 6$

$11x = 44$

$x = \frac{44}{11} = 4$

Number $= 11x + 10$

$= 11x + 10$

Number $= 54$ Ans. (c)

Question 24. Nine friends went to restaurant for taking diner. Eight of them spent 8 more than the average expenditure of all the nine. What was the total money spent by them?

Let average be x.

Then $(64 + x + 8) = 9x$

$72 + x = 9x$

$72 + 9x - x$

$72 = 8x$

$x = \frac{72}{8} = 9$

Total money spent $= 9 \times 9 = 81$

CHAPTER ASSESSMENT

CONCEPT REVIEW : Question 1. Fill in the blanks :

(i) $10y + x$

(ii) $2x + 2 = x + 4$

$2x - x = 4 - 2$

$x = 2$

(iii) $\frac{x}{0.3} = 3.3$

$x = 3.3 \times 0.3 = 0.99$

$100x = 0.99 \times 100 = 99$

(iv) $5 \times$ Number $= 55$

Number $= \frac{55}{5} = 11$

(v) $\frac{b}{a}x = \frac{a}{b}$

$\Rightarrow \quad x = \frac{a \times a}{b \times b} = \frac{a^2}{b^2}$

Question 2. Answer True (T) or False (F) :

(i) $3 \times \frac{1}{x} \times 5\frac{1}{4} = 17\frac{1}{2}$ (T)

(ii) $3 \times \frac{1}{2} \times 5\frac{1}{4} = \frac{17}{2} \times \frac{21}{4} = \frac{147}{8} \neq 17\frac{1}{2}$ (F)

(iii) $\frac{x}{0.5} = \frac{2}{5}$ $\Rightarrow x = \frac{2}{5} \times 0.5 = 0.2$ $= x < 1$ (T)

(iv) Multiply by 24. (F)

(v) $4.4x = 5 + 3.8$

$x = \frac{8.8}{4.4} = 2$ (F)

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 3. If $5 = \frac{2}{3}(2x - 1)$, the value of x is : (a) $\frac{7}{2}$ (b) –1 (c) $\frac{17}{4}$ (d) 4

$\frac{5}{1} \quad \frac{2}{3} = (2x - 1)$ By cross multiplication

$5 \times 3 = 2(2x - 1)$

$15 = 4x - 2$

$15 + 2 = 4x$

$\therefore \quad x = \frac{17}{4}$ Ans. (c)

Question 4. The root of the equation : $\frac{(x + 3)(x + 7)}{(x - 5)(x + 3)}$: (a) $-\frac{1}{2}$ (b) $\frac{1}{2}$ (c) 3 (d) –3

$= \frac{(x + 3)(x + 7)}{(x - 5)(x + 3)}$

$= \frac{x + 7}{x - 5} = -5$ By cross multiplication

$= x + 7 = -5x + 25$

$= x + 5x = 25 - 7$

$= 6x = 18$

$= x = \frac{18}{6} \quad \therefore \quad x = 3$ Ans. (c)

Question 5. A boy gets 3 marks for each correct sum and loses 2 marks for each incorrect sum. He does 24 sums and obtains 37 marks. The number of correct sums were: (a) 20 (b) 17 (c) 31 (d) 19

Let the number of correct sum be x.

Then the number of incorrect sum is $24 - x$

$\therefore \quad 3(x) - 2(24 - x) = 37$

$= \quad 3x - 48 + 2x = 37$

$= \quad 5x = 37 + 48$

$= \quad 5x = 85$

$\therefore \quad = x = \frac{85}{5} = 17$ Ans. (b)

Question 6. The years ago, A's age was half of B's age. If the ratio of their present ages is 3 : 4, what will be the sum of their present ages? (a) 20 years (b) 30 years (c) 35 years (d) 32 years

Let the present 1

A's age be 3x years and B's age be 4 x years

And B's age be 4 x years

Given condition

$\frac{3x-10}{4x-10} = \frac{1}{2}$ By cross multiplication

$6x - 20 = 4x - 10$

$6x - 4x = 20 - 10$

$2x = 10$

$x = \frac{10}{2} = 5$

Sum of the age of A and B = 3x + 4x = 7x years

= 35 years Ans. (c)

Question 7. The ratio between the length and breadth of a rectangular field is 1 : 3. Its area is $\frac{3}{4}$ hectares. What is the perimeter of the field? (a) 1000 m (b) 40000 m (c) 400 m (d) 2000 m

Given : Area = $\frac{3}{4}$ ha [1 ha = $10000m^2$]

$= \frac{3}{4} \times 10000m^2$

$= l \times b = \frac{30000}{4} m^2$

$= x \times 3x = \frac{30000}{4}$

$x^2 = \frac{30000}{4 \times 3} = 2500$

$x = \sqrt{2500} = \sqrt{50 \times 50} = 8x$ m

Perimeter of = 2 (l + b)

Rectangle = 2 (3x + x) = 8x m

= 8 × 500 = 4000 m Ans. (c)

LONG ANSWER TYPE QUESTIONS

Question 8. Solve for x : $\frac{7x+14}{3} - \frac{17-3x}{5} = 6x - \frac{4x+2}{3} - 5$

$= \frac{7x+14}{3} - \frac{17-3x}{5} = 6x - \frac{4x+2}{3} - 5$

$= \frac{5(7x+14) - 3(17-3x)}{15} = \frac{18x - (4x+2) - 15}{3}$

$= \frac{35x + 70 - 51 + 9x}{15} = \frac{18x - 4x - 2 - 15}{3}$

$= \frac{44x + 19}{15} = \frac{14x - 17}{3}$

$= 132x + 57 = 210x - 255$

$= 57 + 255 = 210x - 132x$

$= \quad 312 = 78x$

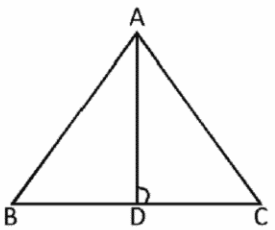
$\therefore \quad x = \frac{78}{312} = \frac{13}{52}$

HIGH ORDER THINKING SKILLS (HOTS)

Question 9. If the height of a triangle is decreased by 40% and its base is increased by 40%. What will be the percentage change in its area?

Let the base of triangle 100 m.

And height of triangle 100 m.



$\therefore$ Area of the triangle ABC $= \frac{1}{2} \times$ base $\times$ height

$= \frac{1}{2} \times 100 \times 100$

$= 5000\ m^2$

Height of triangle decreased by 40%

$\therefore$ New height = 100 – 40 = 60 m

Base of triangle decreased by 40%

$\therefore$ New base = 100 + 40 = 140 m

New area of triangle $= \frac{1}{2} \times 140 \times 60$

$= 4200\ m^2$

Area decrease = 5000 – 4200 = 800m2

% decrease are of triangle $= \frac{\text{Decrease Area}}{\text{Original Area}} \times 100$

$= \frac{800}{5000} \times 100$

$= 16\%$

Worksheet

Solve the equations given below and match the solution with the letters given besides each equation. Compute the statement given below:

1. $\frac{2}{3}x + \frac{1}{2} = \frac{3}{5}\ x = -\frac{5}{6}$

$\frac{2}{3}x - \frac{3}{5}x = -\frac{1}{2} - \frac{5}{6}$

$\frac{10x - 9x}{15} = \frac{-3-5}{6}$

$\frac{x}{15} = \frac{-8}{6}$

$x = \frac{-8}{6} \times 15 = -20$

2. $\frac{x-5}{3} = \frac{x-3}{5}$ [By cross multiplication]

$5x - 25 = 3x - 9$

$5x - 3x = 25 - 9$

$2x = 16 \quad \Rightarrow \quad x = 8$

3. $m - \frac{m-1}{2} = 1 - \frac{m-2}{2}$

$\frac{2m - m + 1}{2} = \frac{2 - m + 2}{2}$

$m + 1 = -m + 4$

$m + m = 4 - 1$

$2m = 3 \quad \Rightarrow \quad m = \frac{3}{2}$

4. $0.3(4x - 3) = 0.05(10x - 8)$

$1.2x - 0.9 = 0.5x - 0.4$

$1.2x - 0.5x = -0.4 + 0.9$

$0.7x = 0.5$

$x = \frac{5}{7}$

5. $7(x + 5) = -7(x + 5)$

$7x + 35 = -7x - 35$

$7x + 7x = -35 - 35$

$14x = -70$

$x = \frac{-70}{14} = -5$

Chapter-7. PERCENTAGE AND APPLICATION :- The words percent means in every hundred and symbolically written as %.

To change a percentage to fraction, write it as a fraction with a denominator 100 and simplify if possible.

To find a percentage of quantity, change the percentage and multiply it by the quantity.

To change the fraction to percentage multiply by 100.

$$\% \text{ change} = \frac{\text{Actual Change}}{\text{Original Quantity}} \times 100$$

$$\% \text{ error} = \frac{\text{Error}}{\text{Actual Value}} \times 100$$

Exercise 7 (A) Question 1. Write these percentages as fractions and decimals:

(i) $66\frac{1}{2} = \frac{133}{2}\% = \frac{133}{2} \times \frac{1}{100} = \frac{133}{200} = 0.665$

(ii) $80\% = 80 \times \frac{1}{100} = \frac{4}{5} = 0.8$

(iii) $175\% = 175 \times \frac{1}{100} = \frac{7}{4} = 1.75$

(iv) $12\frac{1}{2} = \frac{25}{2}\% = \frac{25}{2} \times \frac{1}{100} = \frac{1}{16} = 0.125$

Question 2. Write these numbers as percentages:

(i) $\frac{4}{5} = \frac{4}{5} \times 100\% = 80\%$

(ii) $\frac{25}{60} = \frac{25}{60} \times 100\% = \frac{25}{60}\% = 41\frac{2}{3}\%$

(iii) $0.010 = 0.010 \times 100\% = 1.00\%$

(iv) $0.125 = 0.125 \times 100\% = 12.5\%$

Question 3. Express the following percentage as ratios:

(i) $125\% = \frac{125}{100} = \frac{5}{4} = 1\frac{1}{4}$

(ii) $33\frac{1}{3}\% = \frac{100}{3}\% = \frac{100}{3} \times \frac{1}{100} = \frac{1}{3}$

(iii) $70\% = \frac{70}{100} = \frac{7}{10}$

(iv) $16\frac{2}{3}\% = \frac{50}{3}\% = \frac{50}{3} \times \frac{1}{100} = \frac{1}{6}$

Question 4. Express the following ratios as percentage:

(i) $\frac{1}{4} = \frac{1}{4} \times 100\% = 25\%$

(ii) $\frac{20}{40} \times 100\% = 50\%$

(iii) $\frac{13}{25} = \frac{13}{25} \times 100\% = 52\%$

(iv) $\frac{7}{10} = \frac{7}{10} \times 100\% = 70\%$

Question 5. Evaluate:

(i) 25% of 320 kg $= 25 \times \frac{1}{100} \times 320 = 80\text{kg}$

(ii) 10.5% of 420 m $= 10.5 \times \frac{1}{100} \times 420 = 44.1\text{ kg}$

(iii) 40% of 60 gm $= 40 \times \frac{1}{100} \times 60 = 24\text{ gm}$

(iv) 23% of ₹ 1500 $= 23 \times \frac{1}{100} \times 1500 =$ ₹ 345

Question 6. Express the first quantity as a percentage of the second:

(i) 250 g of 4 kg $= \frac{250}{4000} \times 100\% = \frac{25}{4}\% = 6\frac{1}{4} = 6.25\%$

(ii) 800 ml of 5 litre $= \frac{800}{5000} \times 100\% = 16\%$

(iii) 75 cm of 1 m $= \frac{75}{100} \times 100\% = 75\%$

(iv) $\frac{1}{4}$ of $\frac{1}{8}$ $= \frac{\frac{1}{4}}{\frac{1}{8}} \times 100\% = \frac{1}{8} \times 100\% = 200\%$

Question 7. (i) If $12\frac{1}{2}$ % of a certain quantity is 62.50, find the quantity.

Let the quantity be x.

$12\frac{1}{2}$ of x = 62.5

$\frac{25}{2} \times \frac{1}{100} \times x = 62.5$

$\frac{x}{8} = 62.5 \quad \Rightarrow \quad x = 62.5 \times 8 = 500.00$

$\therefore$ Quantity = 500

(ii) If 17% of a certain number is 68, find the number.

Let the number be x.

17% of x = 68

$17 \times \frac{1}{100} \times x = 68 \quad \Rightarrow \quad x = \frac{68 \times 100}{17} = 400$

$\therefore$ Number = 400

Question 8. The price of trouser has been reduced by 15% in a sale to ₹ 306. Find its original price.

Let the original price be ₹ x.

15% reduced.

$\therefore$ (100 – 15)% of original price = ₹ 306

85% of x = 306

$85 \times \frac{1}{100} \times x = 306$

$x = \frac{306 \times 100}{85} =$ ₹ 360

$\therefore$ Original price = ₹ 360

Question 9. A bike originally cost ₹ 60,000. Its cost has decreased by 18%. What is its cost now?

Cost after 18% decreased = (100 – 18)% of 60,000

$= 82 \times \frac{1}{100} \times 60{,}000 = 49{,}200$

Price after 18% decreased = ₹ 49,200

Question 10. There were 4800 spectators in a game and 1200 of these were female. What percentage were male?

No. of males = 4800 – 1200 = 3600

0% males $= \frac{\text{No. of males}}{\text{Total}} \times 100 = \frac{3600}{4800} \times 100 = 75\%$

No. of males = 75%

Question 11. The cost of toy increased by 40% on a special occasion. What is the new price if the normal price was ₹ 160.

New price $= (100 + 40)\% \times 160$

$= 140 \times \frac{1}{100} \times 160 = 224$

$\therefore$ New price $= ₹\ 224$

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 12. What per cent is 3% of 5%? (a) 30% (b) 50% (c) 60% (d) 15%

$\frac{3\%}{5\%} \times 100\% = \frac{3}{5} \times 100 = 60\%$ Ans. (c)

Question 13. A rubber part was stretched by 24% to a length of 31 m. Find its unscratched original length. (a) 20 m (b) 24 m (c) 26 m (d) 25 m

Let the original length be x m.

$(100 + 24)\%$ of $x = 31$

$124 \times \frac{1}{100} \times x = 31$

$x = \frac{31 \times 100}{124} = 25$

$\therefore$ Original length 25 m. Ans. (d)

Question 14. What per cent of 0.0169 is 0.0117? (a) 0.09 (b) 9 (c) 0.9 (d) 0.1

Let the percentage be x%

$\sqrt{0.0169} \times \frac{x}{100} = 0.0117 \quad = 0.13x = 0.0117 \times 100$

$x = \frac{1.17}{0.13} = x = \frac{117}{13} \quad = x = 9$ **Ans.** (b)

HIGH ORDER THINKING SKILLS (HOTS)

Question 15. The sum of two numbers is twice of the first number. The second number is what per cent of the first?

Let the first number be x.

$\therefore$ Second number is also x.

% of second number $= \frac{x}{x} \times 100 = 100\%$

Exercise 7 (B) Question 1. If 65% of the students in a class are boys. Find no. of boys in the class if there are 350 girls in the class.

No. of girls = 350

% of girls $= 100 - 65 = 35\%$

Let the total student be x.

$\therefore$ $35\%\ x = 350$

$35 \times \frac{1}{100} \times x = 350$

$$x = \frac{350 \times 100}{35} = 1000$$

No. of boys = 1000 – 350 = 650

Question 2. In a test, Upendra scored 85% marks. If he scored 5100 marks find maximum marks.

Let the maxim marks be x.

∴ 85% of total words = 5100

$$\frac{85}{100} \times x = 5100$$

$$x = \frac{5100 \times 100}{85} = 6000$$

∴ Maximum marks = 6000

Question 3. In a voting exam, Rahul got 65% of total valid votes and 8% of total votes were declined invalid?

If the total numbers of voles east was 6,00,000 find the number of valid votes polled in favour of the candidate

Number of valid votes = (100 – 8)/100 × 6,00,000 = 5,52,000

Total votes = 6,00,000

8% invalid

92% valid (65 – 8 = 57%)

Votes = 92 × 6,00,000/100 = 5,52,000

Candidate got 65% of the valid votes

So he Golu = 65 × 552000/100 = 358800

Question 4. In an interview 3200 candidates appeared out of which 2000 were boys. 40% of boys and 60% of girls passed the interview. What % of the candidates failed in the interview?

Total candidates = 3200

No. of boys = 2000

No. of girls = 3200 – 2000 = 1200

$$40\% \text{ of boys pass} = 2000 \times \frac{40}{100} = 800$$

$$60\% \text{ of girls pass} = 1200 \times \frac{60}{100} = 720$$

Total numbers of candidates fail = 3200 – (800 + 720)

= 3200 – 1520 = 1680

$$\% \text{ failed} = \frac{\text{Total No. of failed candidates}}{\text{Total candidates}} \times 100$$

$$= \frac{1680}{3200} \times 100$$

= 52.5%

Question 5. A lady saves ₹ 1250 a month while she earns ₹ 5000 per month. What percentage of her income does she spend?

Lady earns = ₹ 5000

Spend = 5000 – 1250 = ₹ 3750

$$\% \text{ spend money} = \frac{\text{Spend money}}{\text{Earn money}} \times 100$$

$$= \frac{3750}{5000} \times 100 \qquad = 75\%$$

Question 6. Water contains 40% of Hydrogen, 50% of oxygen and 10% of other gases. Find amount (in ml) of each in 1 l of water.

Content of Hydrogen = % of Hydrogen in 1 litre

$$= \frac{40}{100} \times 1000 = 400 \text{ ml}$$

Content of oxygen = % of oxygen in 1 litre

$$= \frac{50}{100} \times 1000 = 500 \text{ ml}$$

Content of other gases = 1000 – (400 + 500) = 100 ml

Question 7. The population of city increases 20% annually. If present population of city is 36,000. Find population of city after 2 years.

Population of city after 2 years = Preset population $(1 + \text{Rate})^{\text{Time}}$

$$= 36000 \left(1 + \frac{20}{100}\right)^2$$

$$= 36000 \left(\frac{5+1}{5}\right)^2$$

$$= 36000 \times \frac{6}{5} \times \frac{6}{5}$$

$$= 1440 \times 36 = 51840$$

$\therefore$ Population of city after 2 years = 51840

Question 8. The sides of a rectangle are 25cm and 30 cm. Find% increase in area if each side is increased by 20%.

Area of rectangle = length × breadth

$$= 25 \times 30 = 750 \text{ cm}^2$$

Increased length = (100 + 20)% of 25

Avg. wt. of 455 students = $\frac{120}{100} \times 25 = 30$ cm

Increased breadth = (100 + 20) of 30

$$= \frac{120}{100} \times 30 \qquad = 36 \text{ cm}$$

New Area = $30 \times 36 = 1080 \text{ cm}^2$

Increased in area = $1080 - 750 = 330 \text{ cm}^2$

$$\% \text{ increase in area} = \frac{\text{Increased area}}{\text{Original area}} \times 100$$

$$= \frac{330}{750} \times 100$$

$\therefore$ % increase in area = 44%

Question 9. Vikram's salary is increased by 25% then decreased by 25% What is total percentage change in Vikram's salary.

Let the Vikram's salary be ₹ 100.

Salary increased 25%.

$\therefore$ New salary = 100 + 25 = ₹ 125

Salary decreased 25%.

$\therefore$ New salary = (100 – 25)% of 125

$$= 75 \times \frac{1}{100} \times 125 \qquad = ₹\ 93.75$$

$\therefore$ Present salary = ₹ 93.75

Total present change in salary = ₹ 100 – 93.75 = ₹ 6.25

$\therefore$ Decreased 6.25%

Question 10. An angle of a triangle is $\frac{1}{3}$ of right angle. But measurement shows it 270. Find error percent.

Angle = $\frac{1}{3}$ of right angle

$$= \frac{1}{3} \times 90 = 90^0$$

Error = $270 - 30 = 240^0$

$$\% \text{ Error} = \frac{\text{Error}}{\text{Actual Value}} \times 100$$

$$= \frac{240}{30} \times 100 \qquad = 800\%$$

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 11. Shyam got 76% marks and Vinu got 480 marks in a Exam. The maximum marks of the exam is equal to the marks obtained by Shyam and Vinu together. How many marks did Shyam score in the exam? (a) 1540 (b) 2000 (c) 1450 (d) 1520

Let Shyam got x marks and

Total marks be (x + 480)

Shyam got 76%

$\therefore$ $\frac{76}{100} \times (x + 480) = x$

$76x + 76 \times 480 = 100x$

$76 \times 480 = 100x - 76x$

$24x = 76 \times 480$

$x = \frac{76 \times 480}{24} = 1520$

$\therefore$ Ans (d)

Question 12. Nikki invested 25% more than Ram. Ram invested 30% less than Suresh who invested ₹ 6000. What is the respective ratio between the amount that Nikki invested and the total amount invested by all of them together? (a) 13 : 29 (b) 35 : 104 (c) 35 : 103 (d) 35 : 104

Let Suresh be invested ₹ 100.

$\therefore$ Ram invested = ₹ (100 – 30) = ₹ 70

$\therefore$ Nikki invested = ₹ (100 + 25)% of Ram

$= 125 \times \frac{1}{100} \times 70$ = ₹ 87.50

Total amount = 100 + 70 + 87.50 = ₹ 257.50

Nikki total amount = 87.50 : 257.50

= 875 : 2575

= 35 : 103 Ans. (c)

HIGH ORDER THINKING SKILLS (HOTS)

Question 13. A girl gives 1% of his monthly income to her two friends as pocket money. The elder friend gets 80% of the total amount of money given and he spends 80% of his share. If he saves ₹ 20 per month, determine girl's monthly income. (a) ₹ 12,000 (b) ₹ 10,000 (c) ₹ 15,000 (d) ₹ 12,500

Let the monthly income of girl be ₹ x.

Total pocket money is given by two friends = 1% of $x = \frac{x}{100}$

Pocket money to elder friends = 80% of given money

$= \frac{80}{100} \times \frac{x}{100} = \frac{8x}{1000}$ 80% spend

$\therefore$ 20% Saving

20% of saving = ₹ 20

$20 \times \frac{1}{100} \times \frac{8x}{1000} = 20$

$x = \frac{20 \times 1000 \times 100}{20 \times 8}$ = ₹ 12500 Ans. (d)

Exercise 7 (C) Question 1. A person incurs 5% loss by selling a watch for ₹ 1140. At what price should the watch be sold to earn 5% profit?

Profit = S.P – C.P

Loss = C.P – S.P

$\%\ \text{Profit} = \frac{\text{Profit}}{\text{C.P}} \times 100$

$\%\ \text{Loss} = \frac{\text{Loss}}{\text{C.P}} \times 100$

S.P. of watch = ₹ 1140, Loss = 5%

Let the cost price be ₹ x ∴ Loss = x – 1140

$$\% \text{ loss} = \frac{\text{Loss}}{\text{C.P.}} \times 100$$

$$5 = \frac{x - 1140}{x} \times 100$$

$$5x = 100x - 114000$$

$$100x - 5x = 114000$$

$$95x = 114000$$

$$x = \frac{114000}{95} = \frac{22800}{19} \qquad X = 1200$$

C.P. of watch = ₹ 1200

$$5\% \text{ Profit on watch} = 1200 \times \frac{5}{100} = ₹\ 60$$

S.P. on 5% Profit = C.P. + Profit

= 1200 + 60 = ₹ 1260

Question 2. A book was sold for ₹ 27.50 with a profit of 10%. If it were sold for ₹ 25.75 then what would have been the percentage of profit or loss?

S.P. = ₹ 27.50 with a 10% profit

Let the cost price be x

S.P. = C.P. + Profit

$$27.50 = x + \frac{10}{100}x$$

$$27.50 = \frac{100x + 10x}{100}$$

$$\therefore \quad x = \frac{27.50 \times 100}{110} = \frac{275}{11} = ₹\ 25$$

∴ C.P. = ₹ 25 and S.P. = 25.75 (given)

Profit = S.P. – C.P. = 25.75 – 25 = ₹ 0.75

$$\% \text{ Profit} = \frac{\text{Profit}}{\text{C.P.}} \times 100 = \frac{0.75}{25} \times 100 = 3\%$$

Question 3. If the cost price is 96% of the selling price, then what is the profit percent?

C.P. = 96% of S.P.

Let the S.P. be ₹ 100

∴ C.P. = ₹ 96

Profit = S.P. – C.P. = 100 – 96 = ₹ 4

$$\% \text{ Profit} = \frac{\text{Profit}}{\text{C.P.}} \times 100$$

$$= \frac{4}{96} \times 100 \qquad = 4\frac{1}{6}\%$$

Question 4. The C.P. of 21 article is equal to S.P. of 18 articles. Find the gain or loss percent.

C.P. of 21 articles = S.P. of 18 articles

Let the C.P. of 1 articles be ₹ x.

S.P. of 18 articles = ₹ 21x

C.P. of 18 articles = ₹ 18x

Profit = S.P. – C.P. = 21x – 18x = ₹ 3x

$$\% \text{ Profit} = \frac{\text{Profit}}{\text{C.P.}} \times 100 = \frac{3x}{18x} \times 100$$

$$\% \text{ Profit} = 16\frac{2}{3}\%$$

Question 5. A vendor bought bananas at 6 for ₹ 10 and sold them at 4 for ₹ 6. Find his gain or loss percent.

Let he purchase 12 bananas (L.C.M. of 6, 4)

$$\text{C.P. of 12 bananas} = \frac{10}{6} \times 12 = ₹\ 20$$

$$\text{S.P. of 12 bananas} = \frac{6}{4} \times 12 = ₹\ 8$$

Loss = C.P. – S.P. = 20 – 185 = ₹ 2

$$\% \text{ Loss} = \frac{\text{Loss}}{\text{C.P.}} \times 100 = \frac{2}{20} \times 100 = 10\%$$

$\therefore$ % Loss = 10%

Question 6. A man bought toffees at 3 for a rupee. How many for a rupee must he sell to gain 50%?

C.P. of 3 toffees = ₹ 1

S.P. of 3 toffees at 50% profit = ₹ 1.50

$$\text{S.P. of 1 toffees} = \frac{1.50}{3} = ₹\ 0.50$$

So he sells toffees at 2 for a rupees.

Question 7. A grocer purchased 80kg of sugar at ₹ 13.50 per kg and mixed it with 120kg sugar at ₹ 16 per kg. At what rate should he sell the mixture to gain 16%?

C.P. of 80 kg sugar = ₹ 13.50 × 80

= ₹ 1080

C.P. of 120 kg sugar = ₹ 120 × 16

= ₹ 1920

C.P. of 200 kg sugar = ₹ 1080 + 1920 = ₹ 3000

$$\text{C.P. of 1 kg sugar} = ₹\ \frac{3000}{200} = ₹\ 15$$

S.P. on 16% profit = C.P. + Profit

$$= 15 + \frac{15}{100} \times 16$$

= 15 + 2.40 = ₹ 17.40

S.P. of 1 kg sugar = ₹ 17.40

Question 8. A dishonest dealer professes to sell his goods at cost price but uses a weight of 960 grams for a kg. weight. Find his gain percent?

S.P. of 960 grams = 1 kg of cost price

Let the C.P. of 1 kg be ₹ 1

S.P. of 1 kg = ₹ $\frac{1}{960} \times 1000$ = ₹ $\frac{25}{24}$

Profit = S.P. – C.P. = $\frac{25}{24} - 1 = \frac{25-24}{24} = \frac{1}{2}$

% Profit = $\frac{\text{Profit}}{\text{C.P.}} \times 100 = \frac{1}{2} \times 100 = 4\frac{1}{6}\%$

Question 9. If the manufacturer gains 10%, the wholesale dealer 15% and the retailer 25% then find the cost of production of a table, the retail price of which is ₹ 1265?

Let the C.P. of table be ₹ x.

Manufacture S.P. = $x + \frac{10}{100} \times x$

On 10% Profit = 1.1x

Whole sale dealer S.P. = C.P. + Profit

On 15% profit = $1.1\,x + \frac{15}{100} \times 1.1x$

= 1.1x + 0.165x

= 1.265 x

Retailer price on = C.P. + Profit

25% Profit = $1.265x + \frac{25}{100} \times 1.265x$

= 1.265 x + 0.31625

= 1.58125

Given 1.58125 = 1265

$x = \frac{1265}{158125}$ = ₹ 800

∴ C.P. of table = ₹ 800

Question 10. Sunita purchased a pressure cooker at $\frac{9}{10}$th of its selling price and sold it at 8% more than its S.P. find her gain percent.

Let the S.P. of cooker be ₹ 100

∴ C.P. of cooker = $100 \times \frac{9}{10}$ = ₹ 90

She sells 8% more than S.P. = 100 + 8 = ₹ 108

Profit = S.P. – C.P. = 108 – 90 = 18

% Profit = $\frac{\text{Profit}}{\text{C.P.}} \times 100 = \frac{18}{90} \times 100$

= 20% Profit

Question 11. A tradesman sold an article at a loss of 20%. It the selling price had been increased by ₹ 100. there would have been a gain of 5%. What was the cost price of the article?

Let the cost price be ₹ x.

S.P. on 20% loss = $x - \frac{20}{100}x$ = 0.8x

S.P. on 5% profit = $x + \frac{5}{100} \times x$ = 1.05x

Given $1.05x - 0.8x = 100$

$0.25x = 100$

$x = \frac{100}{0.25}$ = ₹ 400

∴ Cost price of the article = ₹ 400

Question 12. A dealer sold three-fourth of his articles at a gain of 20% and the remaining at cost price. Find the gain earned by him in the whole transaction.

Let the cost price be ₹ x.

C.P. of $\frac{3}{4}$ article = $\frac{3x}{4}$

S.P. of $\frac{3}{4}$ article on 20% profit $= \frac{3x}{4} + \frac{20}{100} \times \frac{3x}{4}$

$= \frac{3x}{4} + \frac{3x}{20}$

$= \frac{15x + 3x}{20} = \frac{18x}{20}$ = ₹ $\frac{9x}{10}$

S.P. of $\frac{1}{4}$ article = ₹ $\frac{x}{4}$

Total S.P. $= \frac{9x}{10} + \frac{x}{4}$

$= \frac{18x + 5x}{20} = \frac{23x}{20}$

Profit = S.P. – C.P.

$= \frac{23x}{20} - x = \frac{23x - 20x}{20} = \frac{3x}{20}$

% Profit = $\frac{\text{Profit}}{\text{C.P.}} \times 100$

$= \frac{3x}{20 \times x} \times 100 = 15\%$

Question 13. A shopkeeper purchased 70kg of potatoes for ₹ 420 and sold the whole lot at the rate of ₹ 6.50 per kg. What will be his gain percent?

C.P. of 70kg potatoes = ₹ 420

C.P. of 1 kg potatoes = $\frac{420}{70}$ = ₹ 6

S.P. of 1 kg potatoes = ₹ 6.50

Profit on 1 kg = S.P. – C.P.

Potatoes = 6.50 – 6.00 = ₹ 0.50

% Profit $= \frac{\text{Profit}}{\text{C.P.}} \times 100$

$= \frac{0.50}{6} \times 100 = 8\frac{1}{3}\%$

% Profit $= 8\frac{1}{3}\%$

Question 14. Sam purchased 20 dozens of toys at the rate of ₹ 375 per dozen. He hold each one of them at the rate of ₹ 33. What was his percentage profit?

C.P. of 1 dozen toys = ₹ 375

C.P. of 1 toy $= \frac{375}{12} =$ ₹ 31.25

S.P. of 1 toy = ₹ 33

Profit = S.P. – C.P. = 33 – 31.25 = ₹ 1.75

% Profit $= \frac{\text{Profit}}{\text{C.P.}} \times 100 = \frac{1.75}{31.25} \times 100$

$= \frac{17500}{3125} = 5.6\%$

% Profit = 5.6%

Question 15. Jacob bought a scooter for a certain sum of money. He spent 10% of the cost on repairs and sold the scooter for a profit of ₹ 1100. How much did he spend on repairs if he made a profit of 20%?

Let the cost price (total) be ₹ x.

20% Profit = ₹ 1100

$\frac{20}{100} \times x = 1100$

$\therefore \quad x = \frac{1100 \times 100}{20} =$ ₹ 5500

Now, Total cost price = Cost price + Repairing price

$5500 = y\ \frac{10}{100} \times y$

$5500 = \frac{10y + y}{10} = \frac{11y}{10}$

$\therefore \quad y = \frac{5500 \times 10}{11} =$ ₹ 5000

Cost price of scooter = ₹ 5000

Question 16. A manufactures undertakes to supply 2000 pieces of a particular component at ₹ 25 per piece. According to his estimation even if 5% fail to pass the quantity tests then he will make a profit of 25%. How ever as it turned out 50% of the components were rejected. What is the loss to the manufacturers?

Total number of pieces = 2000

5% rejected $= 2000 \times \frac{5}{100} = 100$

Not supply = 2000 – 100 = 1900

S.P. of 1900 pieces = 25 × 1900 = ₹ 47500

S.P. of 2000 pieces = ₹ 47500

On 25% Profit

S.P. = C.P. + 25% of C.P.

$47500 = \text{C.P.} + \frac{25}{100}$ of C.P.

$47500 = \left(\frac{4+1}{4}\right)$ C.P.

$\therefore$ $\text{C.P.} = \frac{47500}{5} \times 4 = 9500 \times 4 = ₹\ 38000$

S.P. of 2000 pieces = ₹ 25000

When 1000 pieces rejected.

Net loss when 1000 particles = 38000 – 25000 = 1300

$\%\ \text{loss} = \frac{13000}{38000} \times 100$

$= \frac{650}{19} = 34\frac{4}{19}\%$

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 17. If 5% more is gained by selling a book for ₹ 350 than by selling it for ₹ 340, then the cost of the book is: (a) ₹ 200 (b) ₹ 50 (c) ₹ 225 (d) ₹ 160

Difference is S.P. = 350 – 340 = ₹ 10

$\therefore$ 5% C.P. = ₹ 10

$\frac{5}{100} \times$ C.P. = ₹ 10

$\therefore$ $\text{C.P.} = \frac{10 \times 100}{5}$ = ₹ 200 Ans. (a)

Question 18. Jitu owns a plot worth ₹ 10,000. He sells it to Suraj at a profit of 10%. After sometime, Suraj sells it back to Jitu at a loss of 10%, then what is Jitu's total gain or loss?

(a) Gains ₹ 100 (b) Loses ₹ 100 (c) Gains ₹ 1100 (d) Loses ₹ 900

C.P. of plot = ₹ 10000

10% of plot $= 10000 \times \frac{10}{100}$ = ₹ 1000

S.P. of plot = ₹ 10000 + 1000 = ₹ 11000

(For Suraj) C.P. of plot = ₹ 11000

S.P. of plot at 10% $= 11000 - \frac{10}{100} \times 11000$

Loss = 11000 – 1100 = ₹ 9900

Jeet's ;gain = 1000 + 100 = ₹ 1100

= Ans. (c)

HIGH ORDER THINKING SKILLS (HOTS)

Question 19. Some chocolates are bought at the rate of 11 for ₹ 10 and the same number at the rate of 9 for ₹ 10. If the whole lot is sold at one rupee per toffee, find the gain or loss in the whole transaction.

[Hint. Let the number of chocolates bought be the LCM of 11 and 9.]

Let the number of chocolates bought = 99 each

C.P. of 99 chocolates at 11 for ₹ 10 $= \frac{10}{11} \times 99$ = ₹ 90

C.P. of 99 chocolates at 9222 for ₹ 10 $= \frac{10}{9} \times 99$ = ₹ 110

Total cost price = 90 + 110 = ₹ 200

Total sell price = 198 × 1 = ₹ 198

Net loss = C.P. – S.P. = 200 – 198 = ₹ 2

% loss $= \frac{\text{Loss}}{\text{C.P.}} \times 100$ $= \frac{2}{200} \times 100$ = 1%

= 1% Loss

Exercise 7 (D) Question 1. Find the discount and amount actually paid if a bat toy is having a price of 3000 and sold at 18% discount?

Mark price ₹ 3000

Discount = Rate × M.P.

$= \frac{18}{100} \times 3000 =$ ₹ 540

Sell price = Mark price – Discount

= 3000 – 540 = ₹ 2460

Question 2. An article is sold at ₹ 2700 with a discount of 10%. Find marked price.

Let the mark price be ₹ x.

Discount = 10% $= \frac{10}{100} x = \frac{x}{10}$

$\therefore \quad x - \frac{x}{10} = 2700$

$\frac{10x - x}{10} = 2700 \Rightarrow \frac{9x}{10} = 2700 \Rightarrow x = \frac{2700 \times 10}{9} =$ ₹ 3000

Mark price = ₹ 3000

Question 3. Find rate of discount when marked price is 3200 and selling price is 2800.

Mark price = ₹ 3200

Sell price = ₹ 2800

Discount = 3200 – 2800 = ₹ 400

% Discount $= \frac{\text{Discount}}{\text{M.P.}} \times 100$

$= \frac{400}{3200} \times 100 = 12.5\ \%$

$\therefore$ % Discount = 12.5 %

Question 4. A salesman gives a discount of $12\frac{1}{2}$% on a product. A buyer pays an amount of ₹ 875 for that product. What is the list price of product?

Let the list price be ₹ x.

S.P. $= x - \frac{25}{200}x = \frac{175x}{200} = \frac{7x}{8}$ $\left(\text{on } 12\frac{1}{2} \text{ discount}\right)$

Given $\frac{7x}{8} = 875$

$x = \frac{875 \times 8}{7} = 125 \times 8 = 1000$

∴ List price of product = ₹ 1000.00

Question 5. Ram earns a profit of 10% even after selling an article at a discount of 12.5%. Find marked price of the article when the profit earned by Ram ₹ 2940.

Let the mark price be ₹ x.

S.P. on 12.5% discount $= x - 12.5\%\ x$

$= x - \frac{12.5}{100}x$

$= x - \frac{x}{8} = \frac{7x}{8}$

Let the cost price be ₹ y.

10% of profit = 2940 ₹ (Given)

$\frac{x}{8} \times y = 2940 \Rightarrow y = \frac{2940 \times 100}{10} =$ ₹ 29400

∴ C.P. of an article = ₹ 29400

S.P. of an article = 29400 + 2940 = ₹ 32340

∴ $\frac{7x}{8} = 32340 \Rightarrow x = \frac{32340 \times 8}{7} = 4620 \times 8$ $x = 36960$

∴ Mark price of article ₹ 36960.

Question 6. When a water is sold for ₹ 3570 after a discount of 15%. Calculate:
(i) Marked price of watch.

Let the M.P. be ₹ x.

∴ $x - \frac{15}{100}x = 3570$

$\frac{100x - 15x}{100} = 3570$

$\frac{85x}{100} = 3570 \quad x = \frac{3570 \times 100}{85} =$ ₹ 4200

∴ Mark price be ₹ 4200.

(ii) If marked is 50% above cost price, then what is its cost price.

Let the M.P. be ₹ y.

∴ $y + \frac{50}{100}y = 4200$

$\frac{3}{2}y = 4200 \quad \Rightarrow \quad y = \frac{4200 \times 2}{3} = ₹\ 2800$

$\therefore$ Cost price is ₹ 2800.

Question 7. A businessman allows a rebate of 20% on his product and sold it for ₹ 896. Find marked price of product.

Let the mark price be ₹ x.

$x - \frac{20}{100}x = 896 \quad \Rightarrow \quad \frac{5x - x}{5} = 896$

$4x = 896 \times 5$

$x = \frac{896 \times 5}{4} = 1120$

Mark price is ₹ 1120.

Question 8. Pradeep sold a can priced at ₹ 36,000. The given discount of 8% on first ₹ 20,000 and 5% on remaining ₹ 16,000. Vaibhav also sold a car of some type priced at ₹ 36,000. The gave a discount of 7% on total price. Calculate actual prices changed by Pradeeep and Vaibhav for the cars.

Case I Pradeep sold at 8% on first ₹ 20000 and 5% on remaining amount

8% discount on ₹ 20000	$= \frac{8}{100} \times 20000 = ₹\ 1600$
5% discount on ₹ 16000	$= \frac{5}{100} \times 16000 = ₹\ 800$
Total discount	$= 1600 + 800 = ₹\ 2400$
S.P. of can	$= 36000 - 2400 = ₹\ 33600$

Case-II Vaibhav gave 7% discount

$\therefore$ Discount	$= \frac{7}{100} \times 36000 = ₹\ 2520$
S.P. of can	$= 36000 - 2520 = ₹\ 33480$
Change in S.P.	$= 33600 - 33480 = ₹\ 120$

Question 9. An electric appliance is marked at ₹ 7500. Shopkeepers allows successive discounts of 8%, 5% and 2% on it. What is net selling price?

Mark price	= ₹ 7500
Discount 8%, 5% and 2%	
I Discount	$= \frac{8}{100} \times 7500 = ₹\ 600$
Price after I Discount	$= 7500 - 600 = 6900$
II Discount	$= \frac{5}{100} \times 6900 = ₹\ 345$
Price after II Discount	$= 6900 - 345 = ₹\ 6555$
III Discount	$= \frac{2}{100} \times 6555 = ₹\ 131.10$
Total discount	$= 600 + 345 + 131.10 = ₹\ 1076.10$
Net sell price	$= 7500 - 1076.10 = ₹\ 6523.90$

Question 10. Peter England offers 20% off season discount to customers and still makes profit of 20%. What is the cost price of a shirt marked at ₹ 3000?

Mark price of short = ₹ 3000

20% discount $= 3000 \times \frac{20}{100} =$ ₹ 600

S.P. of shirt = 3000 – 600 = ₹ 2400

Let the cost price be ₹ x.

(Given) $x + 20\%\ x = 2400$

$x + \frac{20}{100} x = 2400$

$\frac{5x + x}{5} = 2400$

$6x = 2400 \times 5$

$x = \frac{2400 \times 5}{6} = 2000$

∴ Cost price of shirt = ₹ 2000

Question 11. After two successive discount of 20% and 10%, a cooler is sold for ₹ 2070. What is the marked price of cooler?

Let the mark price be ₹ x.

I Discount 20% $= x \times \frac{20}{100} =$ ₹ $\frac{x}{5}$

Price after discount $= x - \frac{x}{5} =$ ₹ $\frac{4x}{5}$

II Discount $= \frac{10}{100} \times \frac{4x}{5} =$ ₹ $\frac{2x}{25}$

Price after II discount $= \frac{4x}{5} - \frac{2x}{25}$

$= \frac{20x - 2x}{25} =$ ₹ $\frac{18x}{25}$

(Given) $\frac{18x}{25} = 2070 \Rightarrow x = \frac{2070 \times 25}{18} = 115 \times 25 \Rightarrow x = 2875$

Mark price of a cooler = ₹ 2875

Question 12. A shopkeeper gives 20% discount on marked price of items and still makes 25% profit. If he gains ₹ 150 on sale of an items. Find the marked price of the item.

Let the mark price be ₹ x.

S.P. after 20% discount $= x - \frac{20}{100} x = \frac{4x}{5}$

E.P. of the item $= \left(\frac{4x}{5} - 150\right)$

He gains 25% profit

25% profit = ₹ 150 $\frac{25}{100} \left(\frac{4x}{5} - 150\right) = 150$

$\frac{4x}{5} - 150 = 600$ Multiply by 4.

$\frac{4x}{5} = 600 + 150 = 750$

$\therefore \quad x = \frac{750 \times 5}{4} = \frac{3750}{4} = ₹\ 937.50$

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 13. Two successive discount of 10% and 5% are equal to a single discount of :

(a) $14\frac{1}{2}\%$ (b) 12% (c) 15% (d) $7\frac{1}{2}\%$

Let the mark price ₹ 100.

I discount = ₹ 10

II discount $= \frac{5}{100} \times 90 = ₹\ 4.5$

Total discount = 10 + 4.5 = 14.5

% discount = 14.5% Ans. (a)

Question 14. A salesman earns 15% profit on a product even after allowing 31% discount on the marked price. If the marked price is ₹ 1250, then the cost price of the product is :

(a) ₹ 800 (b) ₹ 690 (c) ₹ 870 (d) ₹ 750

Mark price ₹ 1250.

31% discount $= \frac{1250 \times 31}{100} = \frac{775}{2} = ₹\ 387.50$

Let the cost price be ₹ x.

$x + \frac{15}{100} x = 1250 - 387.50$

$x + \frac{3}{20} x = 862.50$

$\frac{23x}{20} = 862.50$

$x = \frac{862.50 \times 20}{23}$ $x = 750$

$\therefore$ Ans (d)

HIGH ORDER THINKING SKILLS (HOTS)

Question 15. Applied to a bill to ₹ 15000, what is the difference in rupees between a discount of 50% and two successive discount of 30% and 20%?

Bill = ₹ 15000

Case-I I discount 50% $= 15000 \times \frac{50}{100} = ₹\ 7500$

Case-II I discount 30% $= 15000 \times \frac{30}{100} = ₹\ 4500$

II discount $= \frac{20}{100} \times 10500 = ₹\ 2100$

Total discount = ₹ 4500 + 2100 = ₹ 6600

Difference in between two cases = ₹ 7500 – 6600 = ₹ 900

Exercise 7 (E) Question 1. Ankurita paid ₹ 9240 for a music player. If sales tax is charged at the rate of 10% on the list price of music player. Find list price of music player.

Let the list price be ₹ x.

Sales Tax @ 10% $= \frac{10}{100}x = \frac{x}{10}$

$x + \frac{x}{10} = 9240 \Rightarrow \frac{10x + x}{10} = 9240$

$x = \frac{9240 \times 10}{11} = ₹\ 8400$

∴ List price of music player = ₹ 8400

Question 2. Suman bought a washing machine for ₹ 22600 including sales tax. If rate of sales tax is 13%, find the list price of the washing machine.

Let the list price of washing machine be ₹ x.

Sales Tax @ 13% $= \frac{13x}{100}$

$x + \frac{13x}{100} = 22600$

$\frac{113x}{100} = 22600$

$x = \frac{22600 \times 100}{113} = ₹\ 20000$

∴ List price of washing machine ₹ 20000.

Question 3. Renu purchased a refrigerator for 16,500 including 10% VAT, find original price of refrigerator (without VAT) :

Let the refrigerator price be ₹ x.

Vat @ 10% $= \frac{10x}{100} = x\frac{x}{10}$

$x + \frac{x}{10} = 16500$

$\frac{10x + x}{10} = 16500 \Rightarrow 11x = 16500 \times 10$

$x = \frac{165000}{11} = 1500$

∴ Refrigerator price = ₹ 15000

Question 4. Kushal bought a motorcycle for ₹ 48,505 including a VAT of 9%. Find original price of motorcycle (without VAT)

Let the original price be ₹ x.

Vat @ 9% $= \frac{9x}{100}$

(Given) $x + \frac{9x}{100} = 48505$

$$\frac{100x + 9x}{100} = 48505$$

$$109x = 48505 \times 100$$

$$x = \frac{4850500}{109} \quad = ₹\ 44500$$

$\therefore$ Cost of motorcycle $= ₹\ 44500$

Question 5. Deepak bought a pair of shoes from Reebok shop worth ₹ 2775. The sales tax is 11%. Find the price of shoes.

Let the price of shoes be ₹ x.

Sales tax @ 11%.

(Given) $x + \frac{11}{100}x = 2775$

$$\frac{100x + 11x}{100} = 2775$$

$$11x = 2775 \times 100$$

$$x = \frac{2775 \times 100}{111} \quad = ₹\ 2500$$

$\therefore$ Price of shoes is ₹ 2500.

Question 6. Vijay purchased an article for ₹ 350 with ₹ 24.50 as sales tax. Find rate of sales tax.

Price of article sales tax $= ₹\ 350$

Sales tax @ $= ₹\ 24.50$

% Sales tax $= \frac{\text{Sales tax}}{\text{Price}} \times 100$

$$= \frac{24.50}{350} \times 100 \quad = 7\%$$

Sales tax = 7%

Question 7. A book rack is listed at ₹ 1200, sales tax is 9%. Find the total amount that buyer has to pay including sales tax.

Book rack list price $= ₹\ 1200$

Sales tax @ 9% $= 1200 \times \frac{9}{10} \quad = ₹\ 108$

Total amount $= 1200 + 108 \quad = ₹\ 1308$

Question 8. A TV is sold at ₹ 17655 after adding 7% VAT. Still shopkeeper makes a profit of 25% on a TV sale. Find manufacturing cost of TV.

Sales price of TV. including VAT @ 7%

Let the sales price be ₹ x.

$\therefore$ $x + \frac{7x}{100} = 17655$

$$\frac{100x + 7x}{100} = 17655$$

$$\frac{107x}{100} = 17655$$

$$x = \frac{17655 \times 100}{107} = ₹\ 16500$$

$\therefore$ S.P. of T.V. is ₹ 16500.

Shopkeeper makes 25% profit

$\therefore$ $$C.P. = \frac{100}{(100 + \text{Profit})} \times S.P.$$

$$C.P. = \frac{100}{100 + 25} \times 16500$$

$$C.P. = \frac{100}{125} \times 16500 = ₹\ 13200$$

$\therefore$ Cost price of T.V. is ₹ 13200.

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 9. Sonu bought clothes worth ₹ 6500. He get a rebate of 3% on the bill. If sales tax @ 5% is charged, find the amount he will have to pay for the bill.

(a) ₹ 6206.25 **(b) ₹ 6620.25** **(c) ₹ 6062.25** **(d) ₹ 6602.25**

Cloth worth ₹ 6500.

Rebate @ 3% $= 6500 \times \frac{3}{100} = ₹\ 195$

S.P. of cloth $= 6500 - 195 = ₹\ 6305$

Sales Tax @ 5% $= 6305 \times \frac{5}{100} = ₹\ 315.25$

Total amount paid $= 6305 + 315.25 = ₹6620.25$

Ans. (b)

Question 10. The total bill for a gift set is ₹ 872. If the shopkeeper charges 9% S.T. on the list price of the gift set find the list price of the gift set.

(a) ₹ 800 **(b) ₹ 840** **(c) ₹ 850** **(d) ₹ 750**

Let the list price be ₹ x.

S.T. @ 9% $= \frac{9}{100} \times x = \frac{9x}{100}$

$$\frac{x + 9x}{100} = 872$$

$$\frac{100x + 9x}{100} = 872$$

$$x = \frac{872 \times 100}{109} = ₹\ 800$$

Ans. (a)

Mental Meths

Question 1. Find 10% of 70.

10 % of 70 $= \frac{10}{100} \times 70 = 7$

Question 2. What is the number whose 7% is 28?

$$\text{Number} \times 7\% = 28$$

$$\text{Number} \times \frac{7}{100} = 28$$

$$\therefore \quad \text{Number} = \frac{28 \times 100}{7} = 400$$

Question 3. Convert 35% into a simple fraction.

$$35\% = 35 \times \frac{1}{100} = \frac{7}{20}$$

Question 4. Write $\frac{2}{5}$ as a per cent.

$$\frac{2}{5} = \frac{2}{5} \times 100\% = 40\%$$

Question 5. Convert 9% into a decimal.

$$9\% = \frac{9}{100} = 0.09$$

Question 6. What percentage of 50 is 8?

$$50 \times \frac{x}{100} = 8 \quad \Rightarrow \quad x = 8 \times 2 = 16$$

Question 7. Sammer saves 15% of his monthly income of ₹ 10,000. How much does he save every month?

$$\text{Every month saving} = \frac{15}{100} \times 10000 = ₹\ 1500$$

Question 8. A book was bought for ₹ 60 and sold for ₹ 50. What is the loss?

$$\text{Loss} = \text{C.P.} - \text{S.P.} = 60 - 50 = ₹\ 10$$

Question 9. Suyash bought an article for ₹ 800 and sold for ₹ 1000. Find his gain per cent.

$$\text{Grain} = \text{S.P.} = \text{C.P.} = 1000 - 800 = ₹\ 200$$

$$\%\ \text{Gain} = \frac{\text{Gain}}{\text{C.P.}} \times 100 = \frac{200}{1000} \times 100 = 20\%$$

Question 10. Find the C.P. when S.P. = ₹ 2200 and gain = 10%.

$$\text{C.P.} = \frac{100}{100 + \text{Gain}\%} \times \text{S.P.} = \frac{100}{100 + 10} \times 2200 = ₹\ 2000$$

Question 11. Toffees are bought at the rate of 5 for a rupee and sold at 4 for a rupee. Find the gain per cent. **[Hint. Think mentally** C.P. of 20 toffees = ... S.P. of 20 toffees = ..., etc.**]**

Let the number of toffees be 20.

$$\text{C.P. of 20 toffees} = \frac{1}{5} \times 20 = ₹\ 4$$

$$\%\ \text{gain} = \frac{\text{Gain}}{\text{C.P.}} \times 100 = \frac{5 - 4}{4} \times 100 = 25\%$$

Question 12. Find the discount in per cent when M.P. = ₹ 400 and S.P. = ₹ 360?

$$\text{Discount} = \text{M.P.} - \text{S.P.}$$

$$= 400 - 360 = ₹\ 40$$

$$\%\ \text{loss} = \frac{\text{Loss}}{\text{C.P.}} \times 100 = \frac{240}{1500} \times 100 = 16\%$$

CHAPTER ASSESSMENT

Question 1. Fill in the blanks :

(i) $\frac{3}{8} = \frac{3}{8} \times 100\% = 37.5\%$

(ii) Loss ₹ 240 and S.P. ₹ 1260

C.P. = S.P. + Loss = 1260 + 240 = ₹ 1500

$\%\ \text{Loss} = \frac{\text{Loss}}{\text{C.P.}} \times 100 = \frac{240}{1500} \times 100 = 16\%$

(iii) Discount = M.P. – S.P. = 1200 – 900 = 300

(iv) added

(v) value added tax, added

Question 2. Answer True (T) or False (F) :

(i) (F)

(ii) (F)

(iii) (F)

(iv) (F)

(v) (T)

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 3. At an election involving 2 candidates, 68. votes were declared invalid. The winning candidate scores 52% and wins by 98 votes. The total number of votes polled is:

(a) 2518 (b) 2450 (c) 2382 (d) 2400

Let the total number of valid votes be x.

$\therefore \quad \frac{52}{100}x - \frac{48}{100}x = 98$

$\frac{4x}{100} = 98$

$\therefore \quad x = \frac{98 \times 100}{4} = 2450$

Total votes 2450 + 6.8 = 2578 Ans. (a)

Question 4. A sells a bicycle to B at a profit of 20% and B sells it to C at a profit of 25%. If C pays ₹ 1500. What did A pay for it? (a) ₹ 825 (b) ₹ 1000 (c) ₹ 1100 (d) ₹ 1125

C pay ₹ 1500 $\therefore$ S.P. = ₹ 1500 @ Profit 25%

$\therefore \quad \text{C.P.} = \frac{100}{100 + 25} \times 1500 = ₹\ 1200$

$\therefore$ S.P. at the 20% profit is ₹ 1200

$\text{C.P.} = \frac{100}{100 + 20} \times 1200 = ₹\ 1000$

Ans. (b)

Question 5. A man sold an article at a loss of 20%. If he sold it for ₹ 12 more, he would have gained 10%. The cost price of the article is: (a) ₹ 60 (b) ₹ 40 (c) ₹ 30 (d) ₹ 22

Let the cost price be ₹ x.

S.P. on @ 20% loss $= x - \frac{20}{100}x = \frac{80}{100}x$

S.P. on 10% profit $= x + \frac{10}{100}x = \frac{110x}{100}$

(Given) $\frac{110x}{100} - \frac{80x}{100} = 12$

$\frac{30x}{100} = 12 \quad \therefore \quad x = \frac{12 \times 100}{30} = ₹ 40$ Ans. (b)

LONG ANSWER TYPE QUESTIONS

Question 6. A person gets electrical goods worth ₹ 7500. He gets a rebate of 5% on the bill. If the sales tax at the rate of 5% is charged, find the amount he will have to pay for the bill?

Electrical goods M.P. ₹ 7500

Discount @ 5% $= \frac{7500 \times 5}{100} = ₹ 375$

S.P. of goods $= 7500 - 3752 = ₹ 7125$

Sales Tax @ 5% = S.P. × Sales Tax %

$= 7125 \times \frac{5}{100} = ₹ 356.25$

Total price including Sales Tax = 7125 + 356.25 = ₹ 7481.25

Question 7. On selling each of the two radios for ₹ 5000, a person neither gained nor lost. If he had sold one radio at 25% gain, then at what loss per cent did he sell the other radio?

C.P. of 1 radio = ₹ 5000

S.P. of radio @ 25% gain $= \frac{100 + 25}{100} \times 5000 = ₹ 6250$

S.P. = ₹ 6250

S.P. of other radio = 10000 – 6250 = ₹ 3750

Loss = 5000 – 3750 = 1250

% loss $= \frac{1250}{5000} \times 100$

$= \frac{125}{5} = 25\%$

HIGH ORDER THINKING SKILLS (HOTS)

Question 8. A's height is more than B's height by 20%. By what per cent is B's height less than A's height?

Let B's height be = 1 m

$\therefore$ A's height is $= 1 + \frac{20}{100} \times 1 = 1.20$ m

% less then height of B $= \frac{1.20 - 1.00}{1.20} \times 100 = \frac{0.20}{1.20} \times 100 = 16\frac{2}{3}\%$

Chapter 8. COMPOUND INTEREST Exercise 8 (A) Find the compound interest on the following:

1. Amount after 1 year $= P + \frac{P \times R \times T}{100}$

$= 5000 + \frac{5000 \times 25 \times 1}{100}$

$= 5000 + 1250 = ₹\ 6250$

Amount after 2nd year $= 6250 + \frac{6250 \times 25 \times 1}{100}$

$= 6250 + 1562.50 = ₹\ 7812.50$

Compound interest after 2 years $= A - P = 7812.50 - 5000$

$= 2812.50$

2. Amount after 2 years $= P + \frac{P \times R \times T}{100}$

$= 20000 + \frac{20000 \times 10 \times 1}{100}$

$= 20000 + 2000 = ₹\ 22000$

Amount after 2 years $= P + \frac{P \times R \times T}{100}$

$= 22000 + \frac{22000 \times 10 \times 1}{100}$

$= 22000 + 2200 = ₹\ 24200$

Amount after 2 years $= ₹\ 24200$

C.I. after 2 years $= A - P = 24200 - 20000$

$= ₹\ 4200$

3. Amount after 1 year $= P + \frac{P \times R \times T}{100}$

$= 8000 + \frac{8000 \times 20 \times 1}{100}$

$= 8000 + 1600 = ₹\ 9600$

Amount after 2 years $= P + \frac{P \times R \times T}{100}$

$= 9600 + \frac{9600 \times 20}{100}$

$= 9600 + 1920 = ₹\ 11520$

C.I. after 2 years $= A - P = 11520 - 8000 = ₹\ 3520$

Question 4. To renovate the house Rajesh obtained a loan of ₹ 15625 from a bank. If the rate of interest at 4% per annum compounded annually, calculate the compound interest that Rajesh will have to pay after 3 years.

Loan amount ₹ 15625 @ 4% p.a. for 3 years

Amount after 2 years $= P + \frac{P \times R \times T}{100}$

$= 15625 + \frac{15625 \times 4 \times 1}{100}$

$= 15625 + 625 = ₹\ 16250$

Amount after 2 years $= 16250 + \frac{16250 \times 4}{100} = 650$

$= 16250 + 650$

$= ₹\ 16900$

Amount after 3 years $= 16900 + \frac{16900 \times 4 \times 1}{100}$

$= 16900 + 676$

∴ Amount after 3 years $= ₹\ 17576$

C.I. paid after 3 years $= A - P = 17576 - 15625$

$= ₹\ 1951$

Question 5. Find the amount and compound interest on a sum of ₹ 8000 at 5% per annum for 3 years compounded annually.

Principal amount ₹ 8000 @ 5% p.a. for 3 years

Amount after 1 year $= P + \frac{P \times R \times T}{100}$

$= 8000 + \frac{8000 \times 5 \times 1}{100}$

$= 8000 + 400 = ₹\ 8400$

Amount after 2 years $= 8400 + \frac{8400 \times 5 \times 1}{100}$

$= 8400 + 420 = ₹\ 8820$

Amount after 3 years $= 8820 + \frac{8820 \times 5 \times 1}{100}$

$= 8820 + 441 = ₹\ 2961$

∴ Amount after 3 years $= ₹\ 2961$

C.I. paid for 3 years $= ₹\ 9261 - 8000 = ₹\ 1261$

Question 6. Ramesh takes a loan of ₹ 20,000 at a compound interest rate of 10% per annum (p.a.)
(i) Find the sum of money required to clean the debt at the end of 2 years.

Amount after 1 year $= P + \frac{P \times R \times T}{100}$

$= 20000 + \frac{20000 \times 10 \times 1}{100}$

$= 20000 + 2000$

$= ₹\ 22000$

Amount after 2 years $= 22000 + \frac{22000 \times 10 \times 1}{100}$

Amount after 2 years $= 22000 + 2200 = ₹\ 24200$

(ii) Find the compound interest after one year.

Compound interest after 1 year = 22000 – 2000 = ₹ 20000

(iii) Find the difference between the compound interest and the simple interest at the same rate for 2 years.

Difference between C.I. and S.I. for 2 years = 2200 – 2000 = ₹ 200

(iv) Find the compound interest for 2 years.

Compound interest for 2 years = 2000 + 2200 = ₹ 4200

Question 7. A sum of ₹ 12,000 is invested for 3 years at 25% p.a. compound interest.

(i) Calculate compound interest enrned in the first 2 years.

Principle amount ₹ 12000 at the rate of 25% for 3 years

Amount after 1 year $= P + \frac{P \times R \times T}{100}$

$= 12000 + \frac{12000 \times 25 \times 1}{100}$

$= 12000 + 3000 = ₹\ 15000$

Amount after 2 years $= 15000 + \frac{15000 \times 25 \times 1}{100}$

$= 15000 + 3750 = ₹\ 18750$

Amount after 3 years $= 18750 + \frac{18750 \times 25 \times 1}{100}$

$= 18750 + 4687.50$

$= ₹\ 23437.50$

(i) Interest for first two years = 3000 + 3750 = ₹ 6750

(ii) Calculate the compound interest at the end of 3 years.

Interest that the end of 3 years = 3000 + 3750 + 4687.50 = ₹ 11437.50

(iii) What is the sum due at the end of the first year?

Amount after 1 years = ₹ 15000

(iv) What is the sum due at the end of the second year?

Amount after end pf 2nd years = ₹ 18750

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 8. What is the difference between the compound interest and simple interest on ₹ 8000 at 15% per annum for 2 years? (a) ₹ 100 (b) ₹ 280 (c) No difference (d) ₹ 280

Principle = ₹ 8000 Rate 15% Time 2 years

S.I. for two years $= \frac{P \times R \times T}{100} = \frac{8000 \times 15 \times 2}{100} = ₹\ 2400$

Amount after 1 year $= 8000 + \frac{8000 \times 15 \times 2}{100}$

$= 8000 + 1200 = ₹\ 9200$

Amount after 2 year $= 9200 + \frac{9200 \times 15 \times 1}{100} = ₹\ 10580$

C.I. for 2 years = A – P = 10580 – 8000 = 2580

Difference between = 2580 – 2400 = ₹ 180

C.I. and S.I. Ans. (b)

Question 9. If the simple interest on a sum at 4% per annum for 2 years is ₹ 80, then the compound interest on the same sum of the same period is : (a) ₹ 88.60 (b) ₹ 81.60 (c) ₹ 86.10 (d) ₹ 86.80

S.I. for 2 years = ₹ 80

S.P. for 1 years = ₹ 40

Interest on ₹ 40 for 1 year $= \frac{40 \times 4 \times 1}{100}$ = ₹ 1.60

C.I. interest for 2 years = 40 + 40 + 1.60

= ₹ 81.60 Ans. (b)

HIGH ORDER THINKING SKILLS (HOTS)

Question 10. The simple interest on a certain sum of money for 3 years at 8% per annum is half of the compound interest on ₹ 4000 for 2 years at 10% per annum. What is sum placed on simple interest?

Let the principle be ₹ x.

S.I. for 3 years $= \frac{P \times R \times T}{100} = \frac{x \times 8 \times 3}{100} = ₹ \frac{6x}{25}$

Amount after 1st year $= \frac{P \times R \times T}{100} = \frac{4000 \times 10 \times 1}{100}$ = ₹ 400

Amount after 2nd year $= 4400 + \frac{4400 \times 10 \times 1}{100}$

= 4400 + 440 = ₹ 4840

C.I. in two years = 4840 – 4000 = 840

(Given) : $\frac{6x}{25} = \frac{1}{2} \times 840$

$x = \frac{420 \times 25}{6}$ = ₹ 1750

∴ Principle amount for simple interest = ₹ 1750

Exercise 8 (B) Question 1. Albert invested an amount of ₹ 8000 in a fixed deposit scheme for 2 years at compound interest rate 5 p.c. p.a. How much amount will Albert get on maturity of the fixed deposit?

P = ₹ 8000 Time = 2 years Rate 5% p.a.

$A = P\left(1 + \frac{r}{100}\right)^T$

$= 8000\left(1 + \frac{5}{100}\right)^2$

$= 8000 \times \frac{21}{20} \times \frac{21}{20}$

= 20 × 441 = 8820

Amount after 2 years ₹ 8820

Question 2. What will be the compound Interest on a sum of ₹ 25,000 after 3 years at the rate of 12 p.c. p.a.?

P = ₹ 25000 Time = 3 years Rate 12% p.a.

$$A = P\left(1+\frac{r}{100}\right)^{T}$$

$$= 25000\left(1+\frac{12}{100}\right)^{3}$$

$$= 25000 \times \frac{28}{25} \times \frac{28}{25} \times \frac{28}{25}$$

$$= \frac{8}{5} \times 28 \times 28 \times 28$$

$$= \frac{8 \times 21952}{5} = \frac{175616}{5}$$

A = ₹ 35123.20 C.I. = A – P = 35123.20 – 25000

C.I. = ₹ 10123.20

Question 3. A man saves ₹ 200 at the end of each year and lends the money at 5% compound interest. How much will it become at the end of 3 years?

P = ₹ 200 Time = 3 years Rate 5% p.a.

$$A = P\left(1+\frac{r}{100}\right)^{T}$$

$$= 200\left(1+\frac{5}{100}\right)^{3}$$

$$= 200 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$$

$$A = \frac{9261}{40} = 231.52$$

Amount after 3 years ₹ 231.52.

Question 4. Sam invested ₹ 15000 @ 10% per annum for one year. If the interest is compounded half-yearly then the amount received by Sam at the end of the year will be.

Principle = ₹ 15000, @ 10% p.a. Time - 1 year Mode – Half-yearly

$$A = P\left(1+\frac{r}{100}\right)^{2t}$$

$$= 15000\left(1+\frac{10}{200}\right)^{2\times1}$$

$$= 15000 \times \frac{21}{20} \times \frac{21}{20}$$

$$= \frac{75 \times 441}{2}$$

$$= \frac{33075}{2}$$

Amount after 1 year ₹ 16537.50

Question 5. If the simple interest on a sum of money for 2 years at 5% per annum is ₹ 50. What is the compound Interest on the same sum at the same rate and for the same time.

S.I. for 2 years = ₹ 50

At the rate of 5%

S.I. = ₹ 50

$$\frac{P \times R \times T}{100} = 50$$

$$\frac{P \times 5 \times 2}{100} = 50$$

$P = 50 \times 10 = ₹\ 500$

$$A = P\left(1 + \frac{R}{100}\right)^T$$

$$A = 500\left(1 + \frac{5}{100}\right)^2$$

$$A = 500 \times \frac{21}{20} \times \frac{21}{20}$$

$$A = \frac{441 \times 5}{4} = \frac{2205}{4} = 551.25$$

Compound interest after 2 years = 551.25 – 500 = ₹ 51.25

Question 6. What will be the difference between simple and compound interest @ 10% per annum on a sum of ₹ 1000 after 4 years?

Principle = ₹ 1000 @ 10% p.a. for 4 years

$$\text{S.I. for 4 years} = \frac{P \times R \times T}{100} = \frac{1000 \times 10 \times 4}{100} = ₹\ 400$$

$$\text{Amount after 4 years} = P\left(1 + \frac{r}{100}\right)^t$$

$$A = 1000\left(1 + \frac{10}{100}\right)^4$$

$$A = 1000 + \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}$$

$$A = \frac{14641}{10} = 1464.10$$

C.I. = A – P = 1464.10 – 1000 = ₹ 464.10

C.I. = S.I. = 464.10 – 400 = ₹ 64.10

S.I. for 4 years = ₹ 64.10

Question 7. The difference between simple interest and compound interest on ₹ 1200 for one year at 10% per annum reckoned half-yearly.

P = ₹ 1200.00 @ 10% for one year

$$\text{S.I. for 1 year} = \frac{P \times R \times T}{100} = \frac{1200 \times 1 \times 10}{100} = ₹\ 120$$

Amount after 1 year interest reckoned half yearly $= P\left(1+\frac{r}{200}\right)^{2t}$

$= 1200\left(1+\frac{10}{200}\right)^{2\times t}$

$= 1200 \times \frac{21}{20} \times \frac{21}{20}$

$= 3 \times 441 = ₹\ 3123$

C.I. for 1 year $= 1323 - 1200$

$= ₹\ 123$

Difference between C.I. and S.I. $= 123 - 120 = ₹\ 3$

Question 8. What is the principal that amounts to ₹ 4913 in 3 years at $6\frac{1}{4}$% per annum compounded annually?

A = ₹ 4913 Time = 3 years $R = 6\frac{1}{4}\%$

$A = P\left(1+\frac{r}{100}\right)^{t}$

$4913 = P\left(1+\frac{25}{400}\right)^{3}$

$4913 = P\left(\frac{17}{16}\right)\left(\frac{17}{16}\right)\left(\frac{17}{16}\right)$

$\therefore \quad P = \frac{4913 \times 16 \times 16 \times 16}{17 \times 17 \times 17} = 16 \times 16 \times 16$

$\therefore$ Principle amount is ₹ 4096.

Question 9. Find out the present worth of ₹ 169 due in 2 years at 4% per annum compound interest.

A = ₹ 169 Time = 2 years Rate 4%

$A = P\left(1+\frac{r}{100}\right)^{t}$

$169 = P\left(1+\frac{4}{100}\right)^{2}$

$169 = P\left(1+\frac{25}{25}\right)^{2}$

$\therefore \quad P = \frac{169 \times 25 \times 25}{26 \times 26} = \frac{625}{4} = ₹\ 156.25$

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 10. A girl deposits ₹ 10,000 in a bank for a period of 3 years at 12% per annum compound interest. The interest approved to him rafter maturity will be :

(a) ₹ 4032 (b) ₹ 4049.28 (c) ₹ 3600 (d) ₹ 4029

A = ₹ 10000 Rate = 12% Time 3 years

$A = P\left(1+\frac{r}{100}\right)^{t}$

$= 10000\left(1 + \frac{12}{100}\right)^3$

A $= 10000 \times \frac{28}{25} \times \frac{28}{25} \times \frac{28}{25}$

A $= \frac{16 \times 28 \times 28 \times 28}{25} = \frac{16 \times 21952}{25}$

A $= \frac{351232}{25} = ₹\ 14049.28$

Compound interest after 3 years $= ₹\ 14049.28 - 10000$

$= ₹\ 4049.28$

∴ Ans. (b)

Question 11. The compound interest on ₹ 2,000 at the rate of 20% p.a. for $1\frac{1}{2}$ years compounded half yearly will be : (a) ₹ 760 (b) ₹ 662 (c) ₹ 762 (d) ₹ 664

P = ₹ 2000, R = 20% p.a. Time = $1\frac{1}{2}$ years Mode - Half-yearly

A $= P\left(1 + \frac{r}{100}\right)^{2t}$

A $= 2000\left(1 + \frac{20}{200}\right)^{2 \times \frac{3}{2}}$

A $= 2000\left(\frac{11}{10}\right)^3$

A $= 2000 \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10} = 2 \times 1331$

A $= ₹\ 2662$

Compound interest after $1\frac{1}{2}$ years $= 2662 - 2000 = ₹\ 662$

∴ Ans. (b)

HIGH ORDER THINKING SKILLS (HOTS)

Question 12. What is the difference between the simple interest and compound interest on ₹ 1,200 for one year at 10% per annum compounded interest being reckoned half yearly?

P = ₹ 1200.00 @ 10% for one year

S.I. for 1 year $= \frac{P \times R \times T}{100} = \frac{1200 \times 1 \times 10}{100} = ₹\ 120$

Amount after 1 year interest reckoned half yearly $= P\left(1 + \frac{r}{200}\right)^{2t}$

$= 1200\left(1 + \frac{10}{200}\right)^{2 \times t}$

$= 1200 \times \frac{21}{20} \times \frac{21}{20} = 3 \times 441 = ₹\ 3123$

C.I. for 1 year $= 1323 - 1200 = ₹\ 123$

Difference between C.I. and S.I. $= 123 - 120 = ₹\ 3$

Question 13. Pinki set up a small business by investing ₹ 40,000. During the first three successive years her profits were 5%, 10% and 15% respectively. If each year the profit was on previous years capital, calculate her total profit. (a) ₹ 11,330 (b) ₹ 35,900 (c) ₹ 33,110 (d) ₹ 13,130

P = ₹ 40,000 Rate 5%, 10% and 15%

$A = P\left(1+\frac{r_1}{100}\right)\left(1+\frac{r_2}{100}\right)\left(1+\frac{r_3}{100}\right)$

$= 40000\left(1+\frac{5}{100}\right)\left(1+\frac{10}{100}\right)\left(1+\frac{15}{100}\right)$

$= 40000 \times \frac{21}{20} \times \frac{11}{10} \times \frac{23}{20}$

A = 10 × 21 11 × 23 = 53130

∴ Amount after 3 years ₹ 53130.

Exercise 8 (C) Question 1. The value of a commercial shop constructed at a cost of ₹ 50,000 is depreciating at the rate of 10% per annum. What will be its value 2 years after construction?

Cost of commercial shop = ₹ 50000

Depreciating rate 10% p.a. time 2 years

Value of commercial shop after 2 years $= P\left(1-\frac{r}{100}\right)^t$

$= 50000\left(1-\frac{10}{100}\right)^2$

$= 50000 \times \frac{9}{10} \times \frac{9}{10}$

∴ Value of shop after 2 years = ₹ 40500

Question 2. The economic value of a nation increases by 5% of its value at the beginning of every year. Find the economic value of the nation in 2010, if it was estimated at ₹ 6.40 × 1014 in 2008.

Economic value of the nation at 2010 = ?

At 2008 = 6.40×10^{14} @ 5% increased

Economic value of the nation $= P\left(1+\frac{r}{100}\right)^t$

$= 6.40 \times 10^{14}\left(1+\frac{5}{100}\right)^2$

$= 6.40 \times 10^{14} \times \frac{21}{20} \times \frac{21}{20}$

$= \frac{6.40}{400} \times 441 \times 10^{14}$

Economic value of the nation at 2010 = ₹ 7.056×10^{14}

Question 3. The population of Rajasthan was 8.5 × 108 in 1994. If the population was growing at a constant rate of 2.4% per annum, what was the population in 2014 A.D. [Given that (1.024)20 = 1.60694]

Population of Rajasthan in 1994 = 8.5×10^8

Find 2014 at the growing rate 2.4% p.a.

Population of Rajasthan in 2014 $= P\left(1 + \frac{r}{100}\right)^t$

$= 8.5 \times 10^8 \left(1 + \frac{2.4}{100}\right)^t$

$= 8.5 \times 10^8 (1.024)^{20}$

$= 8.5 \times 1.60694 \times 10^8$

$= 13.65899 \times 10^8$

$= 1.365899 \times 10^9$

Question 4. A city contains 1,25,000 residents. If the population increase at the rate of 10% per annum, find the number of residents at the end of 3 years.

P = 1,25,000 Growth rate 10% p.a. Time 3 years

A $= P\left(1 + \frac{r}{100}\right)^t$

$= 125000 \left(1 + \frac{10}{100}\right)^3$

$= 125000 \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}$

$= 125 \times 1331 = 1,66,375$

$\therefore$ Number of residents at the end of 3 years = 1,66,375

Question 5. The net output of a car factory increases by 8% of what it had been in the beginning of every year. Find the production after 2 years if the factory turns out 62500 cars this year.

Out put of a car 62500

Production increases by 8% per year

Production of cars after 2 years $= P\left(1 + \frac{r}{100}\right)^t$

Production of cars after 2 years $= 62500\left(1 + \frac{8}{100}\right)^2$

Production of cars after 2 years $= 62500\left(\frac{27}{25}\right)^2$

$= 100 \times 729 = 72900$

Net output after 2 years = 72900

Question 6. The municipal corporation of a city started campaign to catch cows which numbered 640, in the city. As a result, the population of cows started decreasing at the rate of 25% per month. Calculate the number of cows in the city three months after the campaign started.

Number of cows = 640

Population of cows decreased @ 25% per month

Number of cows $= P\left(1 - \frac{r}{100}\right)^t$

Production of cars after 2 years $= 640\left(1-\frac{8}{100}\right)^2$

Production of cars after 2 years $= 640 \times \frac{3}{4} \times \frac{3}{4} \times \frac{3}{4}$

Number of cows $= 270$

Question 7. The value of a book depreciates each year by 10% of its value at the beginning of that year. Its value when new is ₹ 750; find its value when it is 2 years old.

Book value $= ₹\ 750$

Deprecation @ 10% time 2 years

Book value after 2 years $= P\left(1+\frac{r}{100}\right)^t$

$= 750\left(1-\frac{10}{100}\right)^2$

$= 750 \times \frac{9}{10} \times \frac{9}{10} = \frac{135 \times 9}{2}$

$= \frac{1215}{2} = ₹\ 607.50$

$\therefore$ Book value after 2 years $= ₹\ 607.50$

Question 8. 5120 social activities cows were registered with a charitable organization. Some student organization started mobilizing people for many noble causes. As a result, the number of social activities registered, increase at the rate of 25% per half year. Find the total number of new registrants during $1\frac{1}{2}$ years.

Number social activities $= 5120$

Rate of increasing = 25% per half year activities

Number of activities after $1\frac{1}{2}$ years $= P\left(1+\frac{r}{100}\right)^t$

$= 5120\ \left(1+\frac{25}{200}\right)^{\frac{2}{3}\times 2}$

$= 5120 \times \frac{9}{8} \times \frac{9}{8} \times \frac{9}{8} = 7290$

Number of activities after $\frac{3}{2}$ years $= 7290$

Question 9. The price of washing machine depreciates by 4% of its value at the beginning of each year. Find the sale value of the washing machine after 2 years, if its present sale value is ₹ 12500.

Present sale value of washing machine $= ₹\ 12500$

Depreciating rate $= 4\%$ p.a.

Price of washing machine after 2 years $= P\left(1-\frac{r}{100}\right)^t$

$= 12500\left(1-\frac{4}{100}\right)^2$

$$= 12500 \times \frac{24}{25} \times \frac{24}{25}$$

$$= 20 \times 576 = ₹\ 11520$$

$\therefore$ Price of washing machine after 2 years $= ₹\ 11520$

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 10. The present population of a town is 1,80,000. If it increases at the rate of 8% per annum, its population after 2 years will be : (a) 2,05,992 (b) 2,08,700 (c) 2,07,800 (d) 2,09,952

Present population a $= 1,80,000$

Growth rate $= 8\%$ p.a.

Population after 2 years $= P\left(1 + \frac{r}{100}\right)^t$

$$= 180000\left(1 + \frac{8}{100}\right)^2$$

$$= 1180000 \times \frac{27}{25} \times \frac{27}{25}$$

$$= 288 \times 27 \times 27$$

$$= 288 \times 729$$

Population after 2 years $= 2,09,952$ $\therefore$ And. (d)

Question 11. The population of a town is 7.26 lakh presently the population has been increasing at the rate of 10% per year, then two years ago the population would have been :

(a) 5.5 lakh (b) 6 lakh (c) 4.5 lakh (d) 6 lakh

Present population is 7.26 lakh

Growth rate 10% p.a.

Population 2 years ago = ?

$$A = P\left(1 + \frac{r}{100}\right)^t$$

$$7.26 = P\left(1 + \frac{10}{100}\right)^2$$

$$7.26 = P \times \frac{11}{10} \times \frac{11}{10}$$

$\therefore$ $$P = \frac{7.26 \times 10 \times 10}{11 \times 11} = 6$$

$\therefore$ Population 2 years, ago 6 lakh

Ans. (b)

HIGH ORDER THINKING SKILLS (HOTS)

Question 12. The price value of the share of a company increased at the rate of 15% in the first year, suffered a loss of 10% in the next year and again increased by 20% in the third year. If the present value of the share is ₹ 2000, what will be its value after 3 years?

Present value of share ₹ 2000

Price after 2 years $= P\left(1 \pm \frac{r_1}{100}\right)\left(1 \pm \frac{r_2}{100}\right)\left(1 \pm \frac{r_3}{100}\right)$

$= 2000\left(1 + \frac{15}{100}\right)\left(1 - \frac{10}{100}\right)\left(1 + \frac{20}{100}\right)$

$= 2000 \times \frac{23}{20} \times \frac{9}{10} \times \frac{6}{5}$

$= 2 \times 23 \times 9 \times 6 = ₹\ 2484$

$\therefore$ Price after 3 years $= ₹\ 2484$

Exercise 8 (D) Question 1. The difference between simple and compound interests compounded annually on a certain sum of money for 2 years at 4% per annum is Rs. 1. Find out the sum ((in Rs) is:

Let the principle amount be ₹ x.

S.I. @ 4% p.a. for 2 years $= \frac{P \times R \times T}{100} = \frac{x \times 4 \times 2}{100} = \frac{2x}{25}$

Amount after 2 years $= P\left(1 + \frac{r}{100}\right)^t$

$= x\left(1 + \frac{4}{100}\right)^2$

$= x \times \frac{26}{25} \times \frac{26}{25} = \frac{676}{625}x$

Compound interest after 2 years $= \frac{676}{625}x - x = \frac{676x - 625x}{625}$

$= \frac{51}{625}x$

Difference between C.I. & S.I. $= 1$

$= \frac{51x}{625} - \frac{2x}{25} = 1$

$= \frac{51x - 50x}{625} = 1$

$= x = 625$

$\therefore$ Principle amount is ₹ 625.

Question 2. The difference between the simple interest on a certain sum at the rate of 10% per annum for 2 years and compound interest which is compounded every 6 months is ₹ 124.05. What is the principal sum?

Let the principle amount be ₹ x.

S.I. for 2 years $= \frac{P \times R \times T}{100} = \frac{x \times 10 \times 2}{100} = \frac{x}{5}$

Amount after 2 years $= P\left(1 + \frac{r}{200}\right)^{2 \times 2}$

$= x\left(1 + \frac{10}{200}\right)^4$

$$= x \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$$

$$= \frac{194481}{160000} x$$

Compound interest after 2 years $= \frac{194481}{160000} x - x \qquad = \frac{34481}{160000} x$

$$\text{C.I} - \text{S.I.} \qquad = ₹\ 124.05$$

$$\frac{34481x}{160000} - \frac{x}{5} = 124.05$$

$$\frac{34481x - 32000x}{160000} = 124.05$$

$$\frac{2481x}{160000} = 124.05$$

$$x = \frac{19848000}{2481} \qquad x = ₹\ 8000$$

∴ Principle amount is ₹ 8000.

Question 3. A sum of money lent at compound interest for 2 years at 20% per annum would fetch ₹ 482 more. If the interest was payable half-yearly than if it was payable annually. What is the sum?

Let the principle be ₹ x.

Amount after 2 years $= P\left(1 + \frac{r}{100}\right)^t$

Amount after 2 years $= x\left(1 + \frac{20}{100}\right)^2$

$$= x \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}$$

$$= \frac{14641}{10000} x$$

C.I. after 2 years $= \frac{14641x}{10000} - x \qquad = \frac{4641x}{10000}$

$$= \frac{4641x}{10000} - \frac{11x}{25} = 482$$

$$= \frac{4641x - 4400}{10000} = 482$$

$$= \frac{241x}{10000} = 482$$

$$x = \frac{482 \times 10000}{240} = 20{,}000$$

∴ Principle amount is ₹ 20,000.

Question 4. A sum of money invested at compound interest amounts to ₹ 4624 in 2 years and to ₹ 4913 in 3 years. Calculate the sum of money.

Let the principle amount be ₹ x.

And rate of interest be r % p.a.

Amount after 2 years $= ₹\ 4624$

$$x\left(1+\frac{r}{100}\right)^2 = ₹\ 4624 \quad \ldots\ldots\ldots\ldots (1)$$

Amount after 3 years $= ₹\ 4913$

$$x\left(1+\frac{r}{100}\right)^3 = ₹\ 4913 \quad \ldots\ldots\ldots\ldots (2)$$

From equal (1) & (2)

$$= \frac{x\left(1+\frac{r}{100}\right)^3}{x\left(1+\frac{r}{100}\right)^2} = \frac{4913}{4624}$$

$$1\frac{r}{100} = \frac{4913}{4624} = \frac{17\times17\times17}{17\times17\times16} = \frac{17}{16}$$

From equal (ii) $x = \left(\frac{17}{16}\right)^2 = 4624$

$$x = \frac{4624\times16\times16}{17\times17} = 16\times16\times16$$

$x = ₹\ 4096$

$\therefore$ Principle amount is ₹ 4096.

Question 5. A sum of money becomes ₹ 13380 after 3 years and ₹ 20.070 after 6 years on Compound interest. Find out the sum.

Let the principle amount be ₹ x.

Amount after 3 years $= ₹\ 13380$

$$x\left(1+\frac{r}{100}\right)^3 = ₹\ 13380 \quad \ldots\ldots\ldots\ldots (1)$$

Amount after 6 years $= ₹\ 20070$

$$x\left(1+\frac{r}{100}\right)^6 = ₹\ 20070 \quad \ldots\ldots\ldots\ldots (2)$$

From equ. (1) & (2)

$$= \frac{x\left(1+\frac{r}{100}\right)^6}{x\left(1+\frac{r}{100}\right)^3} = \frac{20070}{13380}$$

$$\left(1\frac{r}{100}\right)^3 = \frac{2007}{1338} = \frac{669}{446}$$

From equ. (ii) $x \times \frac{669}{446} = 13380$

$$x = \frac{13380\times446}{669} = \frac{4460\times446}{223}$$

$x = 4460\times2 = ₹\ 8920$

$\therefore$ Principle amount is ₹ 8920.

Question 6. What annual payment will discharge a debt of ₹ 1025 due in 2 years at the rate of 5% compound interest?

Let the annual payment be ₹ P.

$\therefore \quad P = x_1\left(1+\frac{5}{100}\right)^1 \quad \Rightarrow \quad x_1 = \frac{20P}{21}$

And $\quad P = x_2\left(1+\frac{5}{100}\right)^2 \quad \Rightarrow \quad x_2 = \frac{400}{441}P$

$x_1 + x_2 = 1025$

$\frac{20P}{21} + \frac{400}{441}P = 1025$

$\frac{420P + 441P}{441} = 1025$

$\frac{861P}{441} = 1025$

$P = \frac{1025 \times 441}{861} = \frac{1025 \times 21}{41}$

$P = 25 \times 21 = 525$

$\therefore$ Annual payment is ₹ 525.

Question 7. A sum of money invested at compound interest amounts to ₹ 800 in 3 years and to ₹ 840 in 4 years. Calculate the rate of invested per annum.

Amount in 3 years ₹ 800.

Amount in 4 y years ₹ 840.

$\therefore \quad A = P\left(1+\frac{r}{100}\right)^t$

$840 = 800\left(1+\frac{r}{100}\right)^1$

$\frac{r}{100} = \frac{840}{800} - 1 = \frac{840-800}{800}$

$r = \frac{40}{800} \times 100 = 5$

$\therefore$ Rate of interest is 5% p.a.

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 8. At what rate of compound interest per annum will a sum of ₹ 2000 become ₹ 2332.80 in 2 years, interest compounded annually? (a) 6.5% (b) 8% (c) 10% (d) 6%

$\therefore \quad A = P\left(1+\frac{r}{100}\right)^t$

$2332.80 = 2000\left(1+\frac{r}{100}\right)^2$

$\frac{2332.80}{2000} = \left(1+\frac{r}{100}\right)^2$

$$\left(1+\frac{r}{100}\right)^2 = \frac{23328}{20000}$$

$$\left(1+\frac{r}{100}\right)^2 = \frac{11664}{10000} = \left(\frac{108}{100}\right)^2$$

$\therefore \quad 1+\frac{r}{100} = \frac{108}{100}$

$$\frac{r}{100} = \frac{108}{100} - 1 = \frac{8}{100}$$

$\therefore$ r = 8% Ans. (b)

Question 9. The difference between simple interest and compound interest (compounded annually) on a sum of money for 2 years at 10% per annum is ₹ 65. The sum is :

(a) ₹ 65065 (b) ₹ 65650 (c) ₹ 6500 (d) ₹ 6565

Let the principle amount be ₹ x.

Simple interest for 2 years $= \frac{x \times 10 \times 2}{100} = ₹ \frac{x}{5}$

Compounded interest for 2 years $= x\left(1+\frac{10}{100}\right)^2 - x$

$$= \frac{121x - 100x}{100} = \frac{21x}{100}$$

$$= \frac{21x}{100} - \frac{x}{5} = 65$$

$$= \frac{21x - 20x}{100} = 65$$

$\therefore$ x = ₹ 6500 Ans. (c)

HIGH ORDER THINKING SKILLS (HOTS)

Question 10. Ramu purchased an old bike for ₹ 8000. If its cost after 2 years is ₹ 6480, what is the rate of depreciation.

Present price be ₹ 8000.

Price after 2 years ₹ 6480.

$A = P\left(1-\frac{r}{100}\right)^t$

$6480 = 8000\left(1-\frac{r}{100}\right)^2$

$$\frac{6480}{8000} = \left(1-\frac{r}{100}\right)^2$$

$$\frac{81}{100} = \left(1-\frac{r}{100}\right)^2$$

$\therefore \quad 1-\frac{r}{100} = \frac{9}{10}$

$$\frac{r}{100} = 1 - \frac{9}{10} = \frac{1}{10}$$

$\therefore$ r = 10% **Ans.**

CHAPTER ASSESSMENT

CONCEPT REVIEW Question 1. Fill in the blanks :

(i) $\frac{500 \times 5 \times 1}{100} = ₹\ 25$

(ii) In case of compound interest, Principle is not constant.

(iii) 2n.

(iv) Principle + Interest of 1^{st} year

(v) B i.e., compound interest is more than simple interest one up first year.

Question 2. Answer True (T) or False (F) :

(i) (T)

(ii) (T)

(iii) (F)

(iv) (F)

(v) (F)

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 3. If the simple interest on a sum of money at 5% p.a. annum for 3 years is ₹ 1200, the compound interest for the same sum for the same period at the same rate is:

(a) ₹ 1260 (b) ₹ 1261 (c) ₹ 1264 (d) ₹ 1265

S.I. for 3 years $= ₹\ 1200$

$\frac{P \times R \times T}{100} = 1200$

$\frac{P \times 5 \times 3}{100} = 1200$

$P = \frac{1200 \times 100}{5 \times 3} = ₹\ 8000$

C.I. for 3 years $= P\left(1 + \frac{r}{100}\right)^t - P$

$= 8000\left(1 + \frac{r}{100}\right)^3 - 8000$

$= 8000\left[\left(\frac{21}{20}\right)^3 - 1\right]$

$= 8000\left(\frac{9261 - 8000}{8000}\right)$

C.I. for 3 years $= ₹\ 1261$

Ans. (b)

Question 4. If the difference between the compound interest and simple interest on a certain sum of money for 2 years at $12\frac{1}{2}$% per annum is ₹ 150. The sum is:

(a) ₹ 9000 (b) ₹ 9200 (c) ₹ 9500 (d) ₹ 9600

Let the principle be ₹ P.

S.I. for 2 years $= \frac{P \times R \times T}{100}$ $= ₹ \frac{P}{4}$

C.I. for 3 years $= P\left(1 + \frac{25}{200}\right)^2 - P$

$= \frac{81}{64} P - P = ₹ \frac{17}{64} P$

(Given) : $\frac{17P}{64} - \frac{P}{4} = 150$

$\frac{17P - 16P}{64} = 150 \Rightarrow P = 150 \times 65 \Rightarrow P = ₹ 9600$ Ans. (d)

Question 5. If the amount is $2\frac{1}{4}$ times the sum after 2 years at compound interest, the rate of interest per annum is: (a) 25% (b) 30% (c) 40% (d) 50%

Let the principle be ₹ P.

$\therefore$ Amount is $\frac{9}{4} P$

$A = P\left(1 + \frac{R}{100}\right)^t$

$\frac{9}{4}P = P\left(1 + \frac{R}{100}\right)^2$

$\left(\frac{3}{2}\right)^2 = P\left(1 + \frac{R}{100}\right)^2$ (Taking square root both side)

$\frac{3}{2} = 1 + \frac{R}{100}$

$\frac{3}{2} - 1 = \frac{R}{100}$

$\frac{1}{2} \times 100 = R = 50\%$ Ans. (d)

Question 6. The time in which ₹ 1800 amounts to ₹ 2178 at 10% per annum, compounded annually is: (a) 3 years (b) 2 years (c) 4 years (d) $1\frac{1}{2}$

$A = P\left(1 + \frac{r}{100}\right)^t$

$2178 = 1800\left(1 + \frac{10}{100}\right)^t$

$\frac{2178}{1800} = \left(1 + \frac{10}{100}\right)^t$

$\frac{1089}{900} = \left(\frac{11}{10}\right)^t$

$\frac{121}{100} = \left(\frac{11}{10}\right)^2 = \left(\frac{11}{10}\right)^2$

$\therefore$ t = 2 years

Ans. (b)

Question 7. The compound interest on a certain sum at 5% p.a. for 2 years is ₹ 328. The simple interest on that sum at the same rate and for the same period will be:]

(a) ₹ 320 **(b) ₹ 322** **(c) ₹ 325** **(d) ₹ 326**

$$\text{C.I.} = P\left(1+\frac{r}{100}\right)^t - P$$

$$328 = P\left(1+\frac{5}{100}\right)^2 - P$$

$$328 = \frac{441}{400} - P$$

$$\frac{441P - 400P}{400} = 328$$

$$\frac{41P}{400} = 328 \qquad P = \frac{328 \times 400}{41} = ₹\ 3200$$

$$\text{S.I. for 2 years} = \frac{P \times R \times T}{100}$$

$$= \frac{3200 \times 5 \times 2}{1000} = ₹\ 320 \qquad \text{Ans. (a)}$$

LONG ANSWER TYPE QUESTIONS

Question 8. Sudhir borrowed ₹ 16,000 from Ashok at 10% simple interest for $1\frac{1}{2}$ years. After 2 years when Sudhir was to clear the debt, Ashok insisted Sudhir to pay him compound interest (compounded half yearly). How much more must Sudhir pay?

$$\text{S.I. for 2 years} = \frac{P \times R \times T}{100} = \frac{16000 \times 10 \times 2}{100} = ₹\ 3200$$

$$\text{C.I. for 2 years when compounded half yearly} = P\left(1+\frac{R}{100}\right)^{2t} - P$$

$$= 16000\left(1+\frac{10}{200}\right)^{2\times 2} - 16000$$

$$= 16000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} - 16000$$

$$= \frac{9261 \times 21}{10} - 16000$$

$$= \frac{194481 - 160000}{10} = ₹\ 3448.10$$

Sudhir pay more interest ₹ 3448.10 – 3200 = ₹ 248.10

Question 9. A boy increases at the rate of 3% over the previous year's height. If his present height is 150 cm, what was his height after two years.

$$A = P\left(1+\frac{r}{100}\right)^t$$

$$= 150\left(1+\frac{3}{100}\right)^2$$

$$= \frac{150 \times 103 \times 103}{10000} = \frac{3 \times 103 \times 103}{200}$$

$$A = \frac{10609 \times 3}{200} = \frac{31827}{200} = 159.135$$

$\therefore$ Height after 2 years 159.135 cm.

HIGH ORDER THINKING SKILLS (HOTS)

Question 10. Find the rate of interest for a sum that becomes $\frac{729}{625}$ times of itself in 2 years, when comp-ounded annually.

$$A = P\left(1 + \frac{R}{100}\right)^t$$

$$\frac{729}{625}P = P\left(1 + \frac{R}{100}\right)^2$$

$$\left(\frac{27}{25}\right)^2 = P\left(1 + \frac{R}{100}\right)^2 \quad \text{[Talking square root both sides]}$$

$$\frac{27}{25} = 1 + \frac{R}{100}$$

$$\frac{27}{25} - 1 = \frac{27 - 25}{25} = \frac{R}{100}$$

$$\frac{2 \times 100}{25} = R = 16\%$$

$\therefore$ Rate of interest 16% p.a.

CHAPTER-9 VARIATION AND DIRECT AND INVERSE PROPORTIONS :- The quantities are indirect variation if with the increase in one of the quantities, the other quantities also increases and vice versa.

Two quantities x and y vary directly if the ratio $\frac{x}{y}$ remains constant.

$\frac{x}{y} = k$ where k is called the constant of variation.

In Inverse variation if when one quantity increases, the other quantity decreases proportionateley and vice versa.

Two quantity x and y vary inversely if the product xy remains constant.

$\therefore$ $xy = k$ Where K is called the constant of variation.

Exercise 9 (A) Question 1. In which of the following, x and y vary directly with each other. For each direct variation, state the constant of variation.

1. $x = -6y \Rightarrow \frac{x}{y} = -6$ Direct variation and constant of variation = – 6.
2. $x = \frac{6}{5}$ Not vary it is constant.
3. $8 = xy$ It is inverse variation and constant of inverse variation = 8.
4. $x = \frac{4}{y}$ $xy = 4$ It is inverse variation and constant of variation = 4.
5. $x + 6y = 0$, $x = -6y$, $\frac{x}{y} = -6$ It is direct variation and constant of variation is – 6.

6. $2x - y = 2$ Not variation

7. $\frac{x}{y} = \frac{1}{-3}$ and $\frac{x}{y} = \frac{1}{3}$ $\therefore$ It is not direct variation.

8. $\frac{x}{y} = \frac{1}{4}$ and $\frac{x}{y} = \frac{1}{-4}$ $\therefore$ It is not direct variation.

9. $\frac{x}{y} = \frac{1}{0}$ $\Rightarrow$ Not defined $\therefore$ It is not direct variation.

10. $\frac{x}{y} = \frac{0}{0}$ $\Rightarrow$ Meaning less $\therefore$ It is not direct variation.

Question 11. The height to which a balloon filled with hydrogen gas rises in the air varies directly as time. Given below are some observation about the time and the corresponding height of the balloon (in metres). Find the missing terms in the table.

Time (in school)	2	5	—	30	—
Height of the balloon (in metres)	—	50	150	—	900

$\frac{x}{y} = \frac{5}{50} = \frac{1}{10}$ $\therefore$ $k = \frac{1}{10}$

When $x = 2$ $\frac{2}{y} = \frac{1}{10}$ $\therefore$ $y = 20$

When $y = 150$ $\frac{x}{150} = \frac{1}{10}$ $\therefore$ $x = \frac{150}{10} = 15$

When $x = 30$ $\frac{30}{y} = \frac{1}{10}$ $\therefore$ $y = 300$

When $y = 900$ $\frac{x}{900} = \frac{1}{10}$ $\therefore$ $x = \frac{900}{10} = 90$

Question 12. Which of the following quantities vary directly with each other?

(a) Distance d and time t, speed remaining the same (Distance = Time × speed)

(b) Number of articles n and their price p.

(c) Wages and hours of work.

(d) Weight of articles w and their cost c.

$\frac{\text{Distance}}{\text{Time}}$ = Speed (Constant)

(i) $\therefore$ Vary directly each other.

(ii) Number of article increase then amount also increases. $\therefore$ Vary directly each other.

(iii) Vary directly each other as mention (ii).

(iv) Vary directly each other as mention (ii).

Question 13. If the thickness of 400 bundles of wood is 35 cm, what would be the thickness of 160 bundles of this paper?

$\frac{x}{y} = k$ $\therefore$ $\frac{x_1}{y_1} = \frac{x_2}{y_2} = k$

$$\frac{400}{35} = \frac{160}{y_2}$$

$$400 \times y_2 = 160 \times 35$$

$$y_2 = \frac{160 \times 35}{400} = 14 \text{ cm}$$

$\therefore$ Thickness of bundles = 14 cm.

Question 14. A dog with a mass of 5kg causes a round pole to bend 25 cm. If the amount of bending varies directly as the mass, how much will the pole bend for a 4 kg dog?

$$\frac{x_1}{y_1} = \frac{x_2}{y_2} = k$$

$$\frac{5}{25} = \frac{x_2}{y_2} \Rightarrow = 5 \times y_2 = 4 \times 25$$

$$y_2 = \frac{4 \times 25}{5} = 20 \text{ cm}$$

Question 15. Neha takes 130 steps in covering a distance of 250 metres. What distance would she cover in 260 steps?

$$\frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\frac{130}{250} = \frac{260}{y_2} \Rightarrow = 130 \times y_2 = 260 \times 250$$

$$y_2 = \frac{260 \times 250}{130} = 500$$

$\therefore$ She covered 500 m.

Question 16. The second AC railway fare for 308 km of journey is ₹ 107. What would be the fare for a journey of 123.2 km? Assume that the fare varies directly as the length of the journey.

$$\frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\frac{308}{107} = \frac{123.2}{y_2}$$

$$y_2 \times 308 = 123.2 \times 107$$

$$y_2 = \frac{123.2 \times 107}{308} = \frac{428}{10} = y_2 = 42.8$$

$\therefore$ Railway fare for 123.2 km is ₹ 42.80

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 17. If 3 bottles cost ₹ 112.50, then the number of bottles available for ₹ 487.50 is :

(a) 15 **(b) 17** **(c) 11** **(d) 13**

$$\frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\frac{3}{112.50} = \frac{x_2}{487.50}$$

$$112.50 \times x_2 = 3 \times 487.50$$

$$x_2 = \frac{3 \times 487.50}{112.50} = \frac{3 \times 4875}{1125}$$

$$x_2 = \frac{4875}{375} = 13 \qquad \therefore \quad \text{Ans. (d)}$$

Question 18. A worker makes an item every $\frac{2}{3}$ hour. If the worker works for $7\frac{1}{2}$ hours, then how many items will he make? (a) $11\frac{1}{4}$ toys (b) $13\frac{1}{4}$ toys (c) $13\frac{3}{4}$ toys (d) $11\frac{3}{4}$ toys

$$\frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\frac{1}{2/3} = \frac{x_2}{15/2}$$

$$15/2 \times 1 = \frac{2}{3} \times x_2$$

$$\therefore \quad x_2 = \frac{3 \times 15}{2 \times 2} = 11\frac{1}{4} \text{ toys} \qquad \text{Ans. (a)}$$

HIGH ORDER THINKING SKILLS (HOTS)

Question 19. One litre of water weight 1 kg. How many cubic millimeters of water will weight 0.1 gram. [Hint. 1 litre = 1000 × 1000 cubic mm]

1 kg = 1 litre

1 kg = 1000 cm^3

1 kg = 1000 × 1000 mm^3

1000 gm = $\frac{1000 \times 1000}{1000}$ mm^3

1 gm = 1000 mm^3

$\frac{1}{10}$ = 0.1 gm = 100 mm^3 $\left(0.1 \text{ gm} = \frac{1}{10} \text{ gm}\right)$

Exercise 9 (B) Question 1. In which of the following cases do x and y vary inversely as each other?

(i) Direct variation

(ii) Inverse variation

(iii) Inverse variation

(iv) Direct variation

(v) Inverse variation

} Definition of Direct and Inverse Variation

Question 2. State the relationship between the given variables as an equation, using k for the constant of variation.

(i) $f = \frac{1}{l}$

(ii) $h \times \frac{1}{A}$, $h = \frac{K}{A}$, $HA = K$

(iii) $V \times \frac{1}{P}$, $V = \frac{T}{P}$ $\Rightarrow$ $VP = T$

(iv) $I \times \frac{1}{R}$, $I = \frac{V}{R}$ $\Rightarrow$ $V = IR$

Question 3. It is given that 'p' varies inversely as 'q'. Complete the following table:

P	20	4	5	?	15	?	0.5
q	10			20		0.2	

$p_1q_1 = p_2q_2 = k$ for inverse variation

$20 \times 10 = k$

$200 = k$

When $p_1 = 4$ $\quad 4 \times q_1 = 200$

$q_1 = \frac{200}{4} = 50$

When $P_1 = 5$ $\quad 5 \times q_1 = 200 \Rightarrow q_1 = \frac{200}{5} = 40$

When $q_1 = 20$ $\quad p_1 \times 20 = 200 \Rightarrow p_1 = \frac{200}{20} = 10$

When $p_1 = 15$ $\quad 15 \times q_1 = 200 \Rightarrow q1 = \frac{200}{15} = 13\frac{1}{3}$

When $q_1 = 0.2$ $\quad p_1 \times 0.2 = 200 \Rightarrow p_1 = \frac{200}{0.2} = 2000$

When $p_1 = 0.5$ $\quad 0.5 \times q_1 = 200 \Rightarrow q_1 = \frac{200}{0.5} = 400$

Question 4. Fill in the blanks in the following tables by determining first whether x and y vary directly or inversely:

(a)

x	32	24	20	?	?
y	8	6	?	4	2

(b)

x	1	5	10	?	?
y	125	?	12.5	5	1

(a) $\frac{x_1}{y_1} = \frac{38}{8} = \frac{24}{6} = 4$ $\quad \therefore$ It is direct variation.

$\therefore \frac{x_1}{y_1} = \frac{x_2}{y_2} = k$ $\quad \frac{20}{y_1} = 4 \Rightarrow y_1 = \frac{20}{y_1} = 5$

$\frac{x_1}{y_1} = 4$, $\quad \frac{x_1}{4} = 4 \Rightarrow x_1 = 16$

$\frac{x_1}{y_1} = 2$, $\quad \frac{x_1}{2} = 4 \Rightarrow x_1 = 8$

(b) $x \times y = 1 \times 125 = 10 \times 12.5 = 125$

$\therefore$ It is inverse variation.

When $x = 5$, $\quad 5 \times y = 125 \Rightarrow y = \frac{125}{5} = 25$

When $y = 5$, $\quad 5 \times x = 125 \Rightarrow x = \frac{125}{5} = 25$

When $y = 1$, $\quad 1 \times x = 125 \Rightarrow x = 125$

Question 5. If u varies inversely as v and if u = –5 when $v = \frac{1}{2}$, find u when v = –1.

$u_1v_1 = u_2v_2 = k$

$(-5)\left(\frac{1}{2}\right) = u\,(-1)$

$\frac{-5}{2\,(-1)} = u \qquad \therefore \qquad u = \frac{5}{2}$

Question 6. (i) If a inversely proportional to b, and if a = 4 when v = 9, find u when v = 6.

(ii) If y varies inversely as x, and if y = 5 when x = 6, find y when x = 10.

(iii) If x in inversely proportional to y, and if x = 0.04 when y = 25, find x when y = 0.5

(iv) If a is inversely proportional to b, and if a = 18 when $b = \frac{2}{3}$, find b when $a = \frac{4}{3}$.

(i) $a_1 b_1 = a_2 b_2$

$4 \times 9 = u \times v$

$36 = u \times 6 \qquad \therefore \qquad u = \frac{36}{6} = 6$

(ii) $x_1 y_1 = x_2 y_2$

$6 \times 5 = 10 \times y$

$\therefore \qquad y = \frac{6 \times 5}{10} = 3$

(iii) $x_1 y_1 = x_2 y_2$

$0.004 \times 25 = x \times 0.5$

$\therefore \qquad x = \frac{0.04 \times 25}{0.5} = \frac{10}{5} = 2$

(iv) $x_1 y_1 = x_2 y_2$

$a \times b = b \times \frac{4}{3}$

$18 \times \frac{2}{3} = b \times \frac{4}{3}$

$\frac{6 \times 2 \times 3}{4} = b \qquad \therefore \qquad b = 9$

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 7. If x varies inversely as y + 2 and if x = 8 when y = 1.5, find x when y = 5.

(a) $4\frac{2}{5}$ **(b) 4** **(c) $2\frac{2}{5}$** **(d) $5\frac{3}{5}$**

(iv) $x_1 y_1 = x_2 y_2$

$8 \times 1.5 = x \times 5$

$\therefore \qquad x = \frac{8 \times 1.5}{5} = 2.4$

$x = 2.4 = \frac{24}{10} = 2\frac{2}{5}$

$\therefore$ Ans. (c)

Question 8. If v is inversely proportional to u, how does v change when u is double.

(a) a is halved **(b) The value of y is squared**

(c) y becomes 4 times **(d) d y is doubled**

$v_1u_1 = v_2u_2$

$v_1u_1 = v_2 \times 24_1$ $(u_2 = 24_1$ Given)

$\frac{v_1}{2} = v_2$ $\therefore$ Ans. (a)

Question 9. m and n vary inversely as each other. When m = 10, n = 6. Which of the following is not a possible pair of corresponding values of m and n.

(a) 20 and 3 **(b) 15 and 4** **(c) 0.6 and 100** **(d) 1.5 and 30**

$mn = k$

$1 \times 6 = k$ $\therefore$ $k = 60$

$1.5 \times 30 = 45$ $\neq 60$ $\therefore$ Ans. (d)

HIGH ORDER THINKING SKILLS (HOTS)

Question 10. If a varies inversely as t2, and if a = 2 when t = 0.3, write a formula for a in terms of t.

$a \times \frac{1}{t^2}$

$a = \frac{k}{t^2}$

Exercise 9 (C) Question 1. If $= \frac{1}{5} : \frac{1}{x} = \frac{1}{x} : \frac{1}{1.25}$ then the value of x is?

$\frac{1}{5} : \frac{1}{x} = \frac{1}{x} : \frac{1}{1.25}$

$\frac{1}{5} : \frac{1}{125} = \frac{1}{x} \times \frac{1}{x}$

$\frac{1}{6.25} = \frac{1}{x^2}$

$x^2 = 6.25$

$x^2 = \sqrt{6.25} = \sqrt{2.5 \times 2.5} = 2.5$

$\therefore$ $x = 2.5$

$\left[\begin{array}{l} \therefore \quad a : b :: c : \\ \quad\quad ad = bc \end{array}\right]$

Question 2. If ₹ 782 be divided into three parts, proportional to $\frac{1}{2} : \frac{2}{3} : \frac{3}{4}$. then the first part is:

$\frac{1}{2} : \frac{2}{3} : \frac{3}{4}$

Multiply by 12. (L.C.M. of 2, 3, 4)

$\therefore$ 6 : 8 : 9

Sumo f ratio $= 6 + 8 + 9 = 23$

1^{st} part $= \frac{6}{23} \times 782$

$= 6 \times 35$

1^{st} part $= 204$

Question 3. If 76 is divided into four parts proportional to 7, 5, 3, 4, then the smallest part is:

Four parts = 7, 5, 3 and 4.

Sum of 1 parts = 7 + 5 + 3 + 4 = 19

Smallest part $= \frac{3}{19} \times 76 = 3 \times 4 = 12$

$\therefore$ Smallest part = 12

Question 4. Two numbers are in the ratio 3 : 5 if 9 is subtracted from each the new numbers are in the ratio 12 : 23. The smaller number is:

Numbers are in ratio 3 : 5

$\therefore$ Numbers are 3x and 5x Where $x \neq 0$

$\frac{3x-9}{5x-9} = \frac{12}{23}$ (Given) By cross multiplication.

$69x - 207 = 60x - 108$

$69x \times 60x = 207 - 108$

$9x = 99$

$x = \frac{99}{9} = 11$

Smaller number = $3x = 3 \times 11 = 33$

Question 5. In a bag, there are coins of 25p. 10p and 5 p in the ratio of 1 : 2 : 3. If there are ₹ 30. In all how many 5 p coins are there?

Ratio in coins = 1 : 2 : 3

Number of 25p coins = x

Number of 10p coins = 2x Where $x \neq 0$

Number of 5p coins = 3x

Total amount = ₹ 30

$\therefore \quad \frac{x}{4} + \frac{2x}{10} + \frac{3x}{20} = 30$ [₹ 1 = 100 p]

$\frac{5x + 4x + 3x}{20} = 30 \quad = \frac{12x}{20} = 30$

$x = \frac{30 \times 20}{12} = 50$

Number of 5p coins = $3x = 3 \times 50 = 150$

Question 6. The ratio of three numbers is 3 : 4 : 5 and the sum of their squares is 1250. The sum of the number is:

Ratio of three numbers = 3 : 4 : 5

$\therefore$ Numbers are 3x, 4x and 5x

$(3x)^2 + (4x)^2 + (5x)^2 = 1250$

$50x^2 = 1250$

$x^2 = \frac{1250}{50} = 25$ $\quad x = \sqrt{25} = 5$

Sum of the numbers $= 3x + 4x + 5x = 12x$

$= 12 \times 5 = 60$

Question 7. A and B together have ₹ 1210. If $\frac{4}{15}$ of A's amount is equal to $\frac{2}{5}$ or B's amount how much mount does B have?

Given $A + B = 1210$ ..... (1)

$\frac{4}{15} A = \frac{2}{5} B$ ..... (2)

$A = \frac{2}{5} \times \frac{15}{4} B$ $\quad A = \frac{3}{2} B$

From equ. (i) $\frac{3}{2} B + B = 1210$

$\frac{5B}{2} = 1210$ $\quad B = \frac{1210 \times 2}{5} = 242 \times 2$

$\therefore$ $B = 484$

Question 8. Seats fro mathematics, physics and biology in a school are in the ratio 5 : 7 : 8. There is a proposal to increase these seats by 40%, 50% and 75% respectively. What will be the ratio of increased seats?

Ratio of seats 5 : 7 : 8

Number of seats in Mathematics $= 5x$

Number of seats in Physics $= 7x$

Number of seats in Biology $= 8x$

Total number of seats $= 5x + 7x + 8x = 20x$

4% seat increases in Mathematics $= \frac{40}{100} \times 5x = 20x$

Total seats in Mathematics $= 5x + 2x = 7x$

50% seats increases in Physics $= 7x + \frac{50}{100} \times 7x = 105x$

75% seats increase in Biology $= 8x + \frac{75}{100} \times 8x = 14x$

Ratio of after increased seats 7x : 10.5x : 14x

$\therefore$ 14 : 21 : 28

2 : 3 : 4

Ratio of only increment seats 2x : 3.5x : 6x

4 : 7 : 12

Question 9. The fourth proportional to 5, 8, 15 is:

Let the fourth proportion be x.

$\therefore$ 5 : 8 :: 15 : x

$5 \times x = 8 \times 15$

$x = \frac{8 \times 15}{5} = 24$

$\therefore$ Fourth proportion = 24.

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 10. A girl travels a certain distance by train in 4 hours and 12 minutes at the rate of 44.8 km per hour. How much time will it take to cover the same distance if the speed of the train is increased to 57.6 km per hour? (a) 3 hrs 24 min (b) 3 hrs 20 min (c) 3 hrs 12 min (d) 3 hrs 16 min

$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$ [Given distance is constant.]

Speed × Time = Distance

$\therefore$ It is inverse variation.

Speed 4 hr 12 minutes t 4 hr 12 minutes $= 4\frac{12}{60}$

Time 44.8 km/hr 57.6 km/hr $= \frac{21}{5}$ hr

$\frac{21}{5} \times 44.8 = t \times 57.6$

$\therefore$ $t = \frac{21 \times 44.8}{5 \times 57.6} = \frac{21 \times 7}{5 \times 9} = \frac{49}{15}$ hr = 3 hr 16 minutes.

$\therefore$ Ans. (d)

Question 11. The interest rate required to yield a given income in inversely proportional to the amount of money invested. Raju receives income from ₹ 16,000 that he has invested at an annual interest rate of 8%. How much money should he invested to receive the same income if the annual interest rate increase to 10%? (a) ₹ 10,000 (b) ₹ 12,000 (c) ₹ 12,800 (d) ₹ 20,000

Given : Interest rate is inversely proportion to the Invested many.

Interest Rate 8% 10%

Investment 16000 x

$\therefore$ $\frac{8}{100} \times 16000 = \frac{10}{100} \times x$

$\frac{8 \times 16000}{10} = x$ = ₹ 12,800 Ans. (c)

HIGH ORDER THINKING SKILLS (HOTS)

Question 12. A group of 210 men had provision for 60 days. After 10 days, 60 men left. How long will the remaining food last? [Hint. The remaining food would have lasted 50 days for 210 men. Find out how long will the food last for 150 men].

Provision of food for 210 men = 60 days

After 10 days 60 men left

$\therefore$ Provision of food for 210 men = 50 days

But 60 men left

$\therefore$ Remaining food for 210 – 60 = 150 men

It is the case of inverse variation

No. of days	50	x
No. of men	210	150

$\therefore$ $50 \times 210 = x \times 150$

$\therefore$ $x = \dfrac{50 \times 210}{150}$ = 70 days

Exercise 9 (D) Question 1. 4 men can make 4 cupboards in 4 days; how many cupboards can 14 men make in 14 days?

In 4 days 4 men make = 4 cupboards

In 1day 1 man make = $\dfrac{4}{4 \times 4}$ cupboards

In 25 days 14 men make = $\dfrac{4}{4 \times 4} \times 14 \times 14 = 49$

$\therefore$ 14 men make 49 cupboards in 14 days.

Question 2. In a hostel it costs ₹ 1800 to keep 50 children for 8 weeks. For what length of time did the cost of keeping 90 children amount to ₹ 21060?

The hostel cost for 50 children for 8 weeks = ₹ 1800

The hostel cost for 1 child for 8 weeks = 1800/50

The hostel cost for 1 child for 1 week = 1800/50 × 8

So the hostel cost for 90 children for 1 week = 1800 × 90 / 50 × 8

The cost of keeping 90 children for × number of weeks = ₹ 21060

Thus (1800 × 90 × x) / (50 × 8) = 21060 x = (21060 × 50 × 8) / (1800 × 90)

x = 8424000/162000 = 52 x = 52 Weeks **Ans.**

Question 3. In how many days of working 8 hours each day, can 12 men do the same work as 10 men working 9 hours a day do in 16 days?

10 men working 9 hrs complete the work = 16 days

10 men working 1 hrs complete the work = 16 × 9 days

10 men working 1 hrs complete the work = 16 × 9 × 10 days

12 men working 8 hrs complete the work = $\dfrac{16 \times 9 \times 10}{12 \times 8}$

$\therefore$ 12 men working 8 hrs complete the work = 15 days

Question 4. If 10 men, working 7 hours a day dig a trench 147 m long, how many men working 8 hours a day will dig a trench 168 m long (of the same breadth and depth as the first in the same number of days)?

147 m long trench complete 7 hr/day by = 10 men

1 m long trench complete 7 hr/day by = $\dfrac{10}{147}$ men

168 m long trench complete 7 hr/day by = $\dfrac{10}{147} \times 168$ men

168 m long trench complete 8 hr/day by = $\frac{10}{147} \times 168 \times \frac{7}{8}$ = 10 men

$\therefore$ 10 man working 8 hrs/day to complete 168 m long trench.

Question 5. Three pumps working 8 hours a day can empty a tank in 2 days. How many hours a day must 4 pumps work to empty the tank in 1 day?

3 pumps working 2 day empty the tank = 8 hours

4 pumps working 1 day empty the tank = 8 × 2 hours

4 pumps working 1 day empty the tank = $\frac{8 \times 2 \times 3}{4}$ = 12 hrs

Question 6. If a man travels 65 km in 3 days by walking hours a day, in how many days will he travel 156 km by walking 8 hours a day?

65 km travels 10 hrs in 3 days

1 km travels 10 hrs in $\frac{3}{65}$ days

1 km travels 1 hrs $\frac{3}{65} \times 10$ days

156 km travels 8 hrs = $\frac{3}{65} \times \frac{10 \times 156}{8}$ = 9 days

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 7. If 18 binders bind 900 books in 10 days, how many binders will be required to bind 660 books in 12 days? (a) 22 (b) 14 (c) 13 (d) 11

900 books bind in 10 days by 18 binders

900 books bind in 1 day by = 18 × 10 binders

660 books bind in 12 days by = $\frac{18 \times 10}{900} \times \frac{660}{12}$ = 11 days $\therefore$ Ans. (d)

Question 8. In a dairy farm, 40 cows eat 40 bags of husk in 40 days. In how many days one cow will eat one bag of husk? (a) 1 (b) $\frac{1}{40}$ (c) 40 (d) 80

Cows 1 : 40 Bags 40 : 1 40 : x

$\therefore$ 1 × 40 × x = 40 × 1 × 40

$\Rightarrow$ x = 40 Ans. (d)

HIGH ORDER THINKING SKILLS (HOTS)

Question 9. Some persons can do a piece of work in 12 days. Two times the number of such persons will do half of that work in : (a) 6 days (b) 4 days (c) 3 days (d) 12 days

x workers complete the work 12 days

1 workers complete the work 12 × x days

2x workers complete the work $\frac{12 \times x}{2x}$ = 24 days

Half of the work completed by two times the number of workers = $\frac{12}{2}$ = 12 days

$\therefore$ Ans. (d)

CHAPTER ASSESSMENT

CONCEPT REVIEW Question 1. Fill in the blanks :

(i) Inverse variation

(ii) Constant

(iii) $\frac{3}{4}$

(iv) Direct

(v) Direct

Question 2. Answer True (T) or False (F) :

(i) (T)

(ii) (T)

(iii (F)

(iv) (F)

(v) (T)

MULTIPLE CHOICE QUESTIONS (MCQs)

Question 3. Deepak bought 12 oranges for ₹ 7.20. Vimal bought x oranges more than Deepak's for ₹ 9.60. The value of x is: (a) 2 (b) 4 (c) 4 (d) 6

It is case of direct variation

$$\frac{12}{a} = \frac{7.20}{9.60}$$

$$a = \frac{12 \times 9.60}{7.20} = 16$$

$a = x + 12$ $\therefore$ $x = 16 - 12 = 4$ Ans. (c)

Question 4. On a scale of map 0.7 cm represents 8.4 km. If the distance between two points on the map is 4.65 cm, the actual distance between the points is:

(a) 56 km (b) 55.80 km (c) 62.80 km (d) 72 km

0.7 cm represents = 8.4 km

4.65 cm represents = $\frac{8.4}{0.7} \times 4.65 = 55.80$ km $\therefore$ Ans. (b)

Question 5. If 20 men working together can finish a job in 20 days, then the number of days taken by 25 men of the same capacity to finish the job is: (a) 25 (b) 20 (c) 16 (d) 12

20 men finish the job in 20 days

25 men finish the job $\frac{20 \times 20}{25} = 16$ days $\therefore$ Ans. (c)

Question 6. In a factory, 600 men had provision for 180 days. After 40 days, 100 men left the fort. The remaining food will last for : (a) 150 days (b) 142 days (c) 168 days (d) 200 days

Women provision of food 180 days

100 men left after 40 days.

$\therefore$ 600 men provision of food 140 days

500 men provision of food = $\frac{140 \times 600}{500}$ = 168 days

$\therefore$ Ans. (c)

Question 7. 14 pumps of equal capacity can fill a tank in 6 days. If the tank has to be filled in 4 days, the number of extra pumps needed is : (a) 7 (b) 14 (c) 21 (d) 28

Tank filled in 6 days by 14 pumps

Tank filled in 4 days be $\frac{14 \times 6}{4}$ 21 pumps

Extra pump needed 21 – 14 = 7 Ans. (a)

LONG ANSWER TYPE QUESTIONS

Question 8. Find the height of a flagpole which casts a shadow 20 m long at a time and place where the shadow of a stick 1 m long is 55 cm?

Let the height of flag pole be hm and it is the case of direct variation

$\therefore$ $\frac{x_1}{y_1} = \frac{x_2}{y_2}$

$\frac{h}{20} = \frac{1}{0.55}$ (1 m = 100 cm)

$h = \frac{20}{0.55} = \frac{400}{11} = 36\frac{4}{11}$ m

$\therefore$ Height of the pole is $36\frac{4}{11}$ m.

Question 9. Rajan has first enough money to buy 30 cycles worth ₹ 600each. How many cycles will he be able to buy if the cost of each cycle increases by ₹ 150.

It is the case of direct variation

$\frac{30}{600} = \frac{x}{600 + 150}$

$\therefore$ $x = \frac{30 \times 750}{600}$ 37.5

HIGH ORDER THINKING SKILLS (HOTS)

Question 10. 39 persons car repair a road in 12 days, working 5 hours a day. In how many days will 30 persons working 6 hours a day, complete the work?

39 persons work 5 hours/day complete the work = 12 day

39 person work 1 hours/day complete the work = 12 × 5 days

1 person works 1 hours/day complete the work = 12 × 5 × 39 days

30 person work 6 hours/day complete the work = $\frac{12 \times 5 \times 39}{30 \times 6}$ = 13 days

CHAPTER 10. QUADRILATERALS Exercise 10 (A) Question 1. Fill in the blanks.

(i) 3600 (ii) Less than (iii) 4 sides 4 vertices 4 angles 2 diagonals

Question 2. Check whether the given angles could be possible angles of a quadrilateral or not.

(i) 100^0, 60^0, 85^0, 115^0 (ii) 90^0, 50^0, 120^0, 100^0, (iii) 60^0, 100^0, 90^0, 45^0

(i) $100^0 + 60^0 + 85^0 + 115^0 = 360^0$ Yes it is a quadrilateral

(ii) $90^0 + 50^0 + 120^0 + 100^0 = 360^0$ Yes it is a quadrilateral

(iii) $60^0 + 100^0 + 90^0 + 45^0 = 295^0$ No it is not a quadrilateral

[Sum of all angles of quadrilateral is 360^0]

Question 3. In a quadrilateral ABCD, if $\angle A = 120^0$, $\angle B = 50^0$, $\angle C = 90^0$, then find $\angle D$.

$\angle A + \angle B + \angle C + \angle D = 360^0$

$120^0 + 50^0 + 90^0 + \angle D = 360^0$

$\angle D = 360^0 - 260^0$

$\therefore \quad \angle D = 100^0$

Question 4. Three angles of a quadrilateral are equal and its fourth angle is a right angle. Find the measure of each.

$\angle A + \angle B + \angle C + 90^0 = 360^0$ Given : $(\angle A = \angle B = \angle C)$

$\angle A + \angle A + \angle A = 360^0 - 90^0$

$\angle A = \frac{270}{3} = 90^0$

$\angle A = \angle B = \angle C = 90^0$

Question 5. The angles of a quadrilateral are in the ratio 2 : 4 : 9 : 3. Find the measure of the largest angle.

Ratio of angles 2 : 4 : 9 : 3

$\therefore$ Angles are 2x, 4x, 9x and 3x

$2x + 4x + 9x + 3x = 360^0$

$18x = 360^0$

$x = \frac{360^0}{18} = 20$

Longest angle = $9x = 9 \times 20 = 180^0$

Question 6. (i) A quadrilateral has three acuwte angles each measuring 65^0. Find the measure of the fourth angle.

(ii) The four angles of a quadrilateral are $2(x - 10)^0$, $(x + 30)^0$, $(x + 50)^0$ and $2x^0$. Find all the four angles.

(i) $\angle A + \angle B + \angle C + \angle D = 360^0$

$65^0 + 65^0 + 65^0 + \angle D = 360^0$

$\angle D = 360^0 - 195^0$

$\therefore \quad \angle D = 165^0$

(ii) $\angle A + \angle B + \angle C + \angle D = 360^0$

$2(x - 10)^0 + (x + 30)^0 + (x + 50)^0 + 2x = 360^0$

$2x - 20 + x + 30 + x + 50 + 2x = 360^0$

$6x = 360 - 60$

$$x = \frac{300}{6} = 50$$

$\angle A = 2(x - 10)^0 = 2(50 - 10) = 80^0$

$\angle B = (x + 30)^0 = 50 + 30 = 80^0$

$\angle C = (x + 50) = 50 + 50 = 100^0$

$\angle D = 2x = 50 \times 2 = 100^0$

Question 7. The measure of two adjacent angles of a quadrilateral are 85^0 and 95^0. The remaining two adjacent angles are equal. Find the measure of each of these equal angles.

Quadrilateral ABCD.

$\angle A + \angle B + \angle C + \angle D = 360^0$

$\angle A + \angle B + \angle 85^0 + \angle 95^0 = 360^0$

$\angle A + \angle B = 360^0 - 180^0$

$\angle A + \angle B = 180^0$

$\frac{1}{2} = 180^0 = 90^0$ Each angle will be equal.

Question 8. In Figure 1, the bisectors of $\angle A$ and $\angle B$ meet at point P. If $\angle C = 50^0$ and $\angle D = 100^0$, find the measure of $\angle APB$.

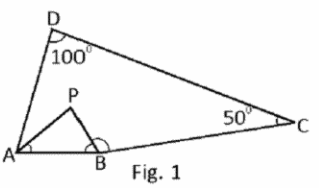


Fig. 1

Quadrilateral ABCD

$\angle A + \angle B + \angle C + \angle D = 360^0$

$\angle A + \angle B + 100^0 + 50^0 = 360^0$

$\angle A + \angle B + 100^0 + 50^0 = 360^0$

$\angle A + \angle B = 360^0 - 150^0 = 210^0$

$\frac{1}{2}(\angle A + \angle B) = (210)^0 = 105^0$

$\therefore \quad \angle PAB + PBA = 105^0$

In Δ APB $= \angle APB + \angle PAB + \angle PBA = 180^0$

$= \angle APB + 105^0 = 180^0 - 105^0$

$= \angle APB = 75^0$

Question 9. In Figure 2, find the measure of $\angle QPR$.

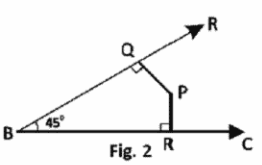


Fig. 2

In quadrilateral PQB

$\angle P + \angle Q + \angle B + \angle R = 360^0$

$\angle P + 90^0 + 45^0 + 90^0 = 360^0$

$\angle P = 360^0 - 225^0 = 135^0$

QPR $= 135^0$

Question 10. In a quadrilateral, CO and DO are the bisectors of ∠C and ∠D respectively. Prove that ∠A + ∠B = 2 ∠COD.

In ABCD be a quadrilateral in which OC and OD bisects ∠C and ∠D.

In quadrilateral ∠ABCD we have $\angle A + \angle B + \angle C + \angle D = 360^0$ (Angle sum prove)

$\Rightarrow$ $\angle A + \angle B + \angle OCD + \angle ODC = 360$ ..... (i)

Note:- As OC bisects ∠C

$\Rightarrow$ $\angle OCB = \angle OCD$ ..... (ii)

Also $\angle C = \angle OCB + \angle OCB = \angle OCD + \angle OCD = 2\angle OCD$

$\angle C = \angle OCD$ Similarly $\angle D = 2\angle ODC$

Nos in ΔDOC we have $\angle ODC + \angle COD + \angle OCD = 180^0$

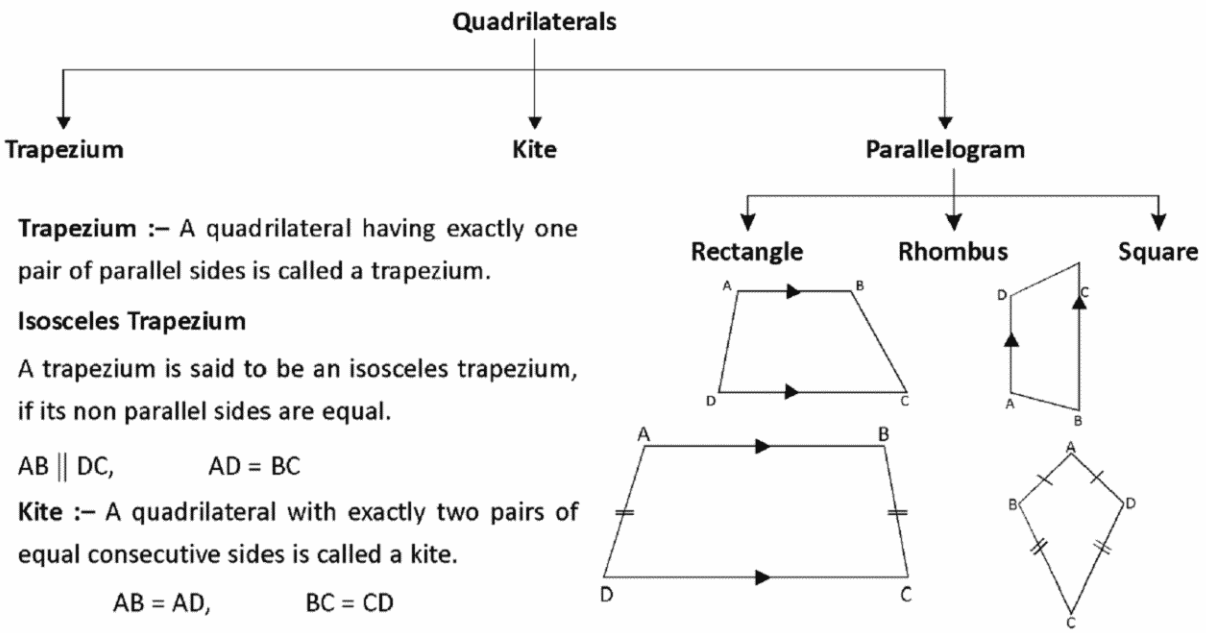
$\angle ODC + \angle OCD = 180^0 - \angle COD$

$2(\angle ODC + \angle OCD) = 2(180 - \angle COD)$ = $2\angle ODC + \angle OCD = 360 - 2\angle COD = 0$

By using equation (ii) and (i) $\Rightarrow$ $\angle A + \angle B + 360^0 - \angle COD = 360^0$

$\Rightarrow$ $\angle A + \angle B = 360^0 - 360^0 + 2COD$ $\Rightarrow$ $\angle A + \angle B = 2\angle COD$ Hence proved.

CHAPTER 11. SPECIAL TYPES OF QUADRILATERALS



Trapezium :– A quadrilateral having exactly one pair of parallel sides is called a trapezium.

Isosceles Trapezium

A trapezium is said to be an isosceles trapezium, if its non parallel sides are equal.

AB || DC, AD = BC

Kite :– A quadrilateral with exactly two pairs of equal consecutive sides is called a kite.

AB = AD, BC = CD

Parallelogram : A parallelogram is a quadrilateral in which both pairs of opposite sides are parallel.

Rectangle : A parallelogram in which four angles are right angles is called a rectangle.

Square : A rectangle with a pair of adjacent sides are equal is called a square.

Rhombus : A parallelogram in which all sides are equal is called rhombus.

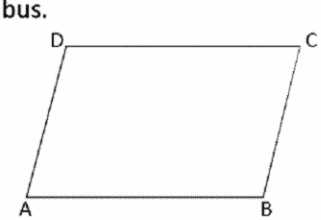
Properties of Parallelogram

(i) Opposite sides are parallel

AB || DC, AD || BC

(ii) Opposite sides are equal

AB = DC and AD = BC



Parallelogram : A parallelogram is a quadrilateral in which both pairs of opposite sides are parallel.

Rectangle : A parallelogram in which four angles are right angles is called a rectangle.

Square : A rectangle with a pair of adjacent sides are equal is called a square.

Rhombus : A parallelogram in which all sides are equal is called rhombus.

Properties of Parallelogram

(i) Opposite sides are parallel

AB || DC, AD || BC

(ii) Opposite sides are equal

AB = DC and AD = BC

(iii) Opposite angles are equal.

(iv) Consecutive angles are supplementary.

(v) Diagonals bisect each other.

Rectangle :– (i) Each angle is right angle.

(ii) Diagonals are equal.

(iii) Diagonals bisect at right angle.

Square :– (i) All sides are equal.

(ii) Each angle is right angle.

(iii) Diagonals are equal.

(iv) All properties of parallelogram.

Rhombus :– (i) All sides are equal.

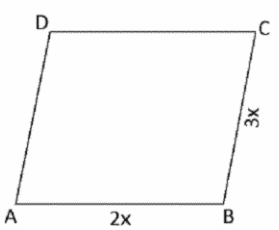
(ii) Diagonals bisect at right angle.

(iii) All properties of parallelogram.

Exercise 11 (A) Question 1. Two sides of a parallelogram are in the ratio 2 : 3 If its perimeter is 80 cm, find the lengths of its sides.

Ratio of two sides 2 : 3

$\therefore$ Sides are 2x and 3x cm



Perimeter of parallelogram = 80 cm

$2(l + b) = 80$

$l + b = \frac{80}{2}$

$2x + 3x = 40$

$5x = 40$

$\therefore \quad x = \frac{40}{5} = 8$

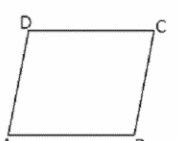
$\therefore$ Sides are 2x = 16cm and 3x = 24cm.

Question 2. An angle of a parallelogram is 20^0 less then its adjacent angle. Find the measure of all its angles.

$\angle A = \angle B - 20^0$ (Given)

$\angle A - \angle B = -20$

$\angle A + \angle B = 180$ (Property of 11gm)



$2\angle A = 160 \quad \Rightarrow \quad \angle A = 80^0, \quad \angle B = 80 + 20 = 100^0$

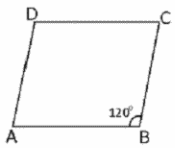
$\angle A = \angle C = 80^0 \quad$ and $\quad \angle B = \angle D = 100^0$

Question 3. ABCD is a parallelogram in which one angle is 120^0. Find the measure of all the angles.

$\angle A = \angle B = 180^0$

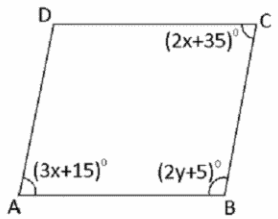
$\angle A + 120^0 = 180^0 \quad \therefore \quad \angle A = 180^0 - 120^0 = 60^0$

$\angle A = \angle C = 60^0 \quad \angle B = \angle D = 120^0$



Question 4. In Figure 1, ABCD is a parallelogram. Find the measure of x and y.

$\angle A$	=	$\angle C$	$\angle A + \angle B$	=	180
$3x + 15$	=	$2x + 35$	$3x + 15 + 2y + 5$	=	180
$3x - 2x$	=	$35 - 15$	$3x + 2y$	=	$180 - 20$
$\therefore \quad x$	=	20	$3 \times 20 + 2y$	=	160
			$2y$	=	$160 - 60$
$\therefore$	$x = 20$ and $y = 50$		$\therefore \quad y$	=	$\frac{100}{2} = 50$



Question 5. In Figure 2, find the values of a, b, c and d, given that ABCD is a parallelogram.

$a = 115^0$ Vertically opposite angle

$d = 50^0$ Alternative angle

$C + 140^0 = 180^0$ (Linear pair)

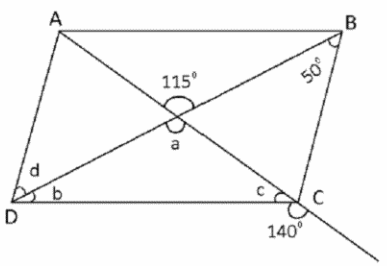
$\therefore \quad C = 180^0 - 140^0 = 40^0$

$b + a + c = 180^0$

$b + 115^0 + 40^0 = 180^0$

$b = 180^0 - 155^0 = 25^0$

$\therefore \quad a = 115^0$, $b = 25^0$, $c = 40^0$ and $d = 50^0$



Question 6. In Figure 3, ABCD is a trapezium in which AB || DC, $\angle A = 100^0$ and $\angle B = 120^0$. Find the value of a and b.

AB || CD

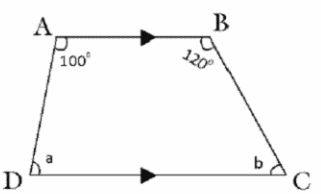
$100^0 + a = 180^0$

$a = 180^0 - 100^0 = 80^0$

And $\quad 120^0 + b = 180^0$

$b = 180^0 - 120^0 = 60^0$

$a = 80^0 \quad b = 60^0$

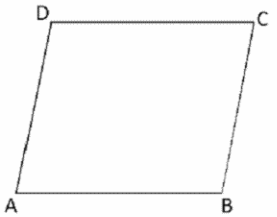


Question 7. Two adjacent angles of a parallelogram are $(3x - 20)^0$. and $(2x - 10)^0$. Find the measure of all angles of the parallelogram.

$\angle A = (3x - 20)^0$

$\angle B = (2x - 10)^0$

$\angle A + \angle B = 180$ (Properties of 11 gm)



$3x - 20 + 2x - 10 = 180$

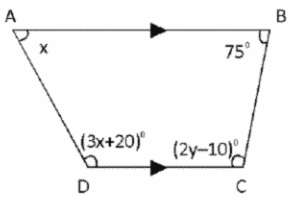
$5x = 180 + 30$

$x = \frac{210}{5} = 42$

$\angle A = \angle C \quad = 3x - 20 \quad = 3 \times 42 - 20 \quad = 106^0$

$\angle B = \angle D \quad = 2x - 10 \quad = 2 \times 42 - 10 \quad = 74^0$

Question 8. In Figure 4, ABCD is a trapezium in which AB || DC. Find the value of x and y.



AB || DC

$\angle A + \angle D = 180^0$

$\therefore \quad x + 3x + 20 = 180^0$

$4x = 180 - 20 = 160$

$x = \frac{160}{4} = 40$

$B + C = 180^0$

$2y - 10 + 75 = 180^0$

$2y = 180 - 65$

$y = \frac{115}{2} = 57.5$

$x = 40$ and $y = 57.5$

Question 9. In Figure 5, ABCD is a parallelogram. Find the values of a, b, c and d.

In Δ BCD,

$3x + 2x + 7x \quad = 180, 12x = 180 \quad \therefore \quad x = \frac{180}{12} = 15$

$\angle C = 7x \quad = 7 \times 15 = 105^0$

$z = 7x \quad = 105^0$

$3x = 15 \times 3 \quad = 45^0$

$y = 3x \quad$ Alternative angles

$y = 45^0$

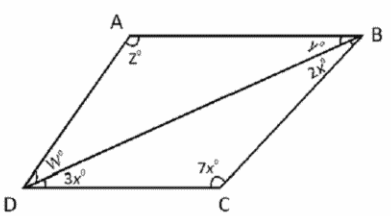
$\angle D = \angle B$

$3x + w = y + 2x$

$45 + w = 45 + 30$

$w = 30^0$

$x = 15, y = 45, z = 105, w = 30$



Question 10. The length of a parallelogram exceeds its breadth by 25 cm. If the perimeter of the parallelogram is 3 m 60 cm, find the length and breadth of the parallelogram.

Perimeter = 3m 60 cm = 360 cm (1 m = 100 cm)

2(length + breadth) = 360

length + breadth = $\frac{360}{2}$ = 180

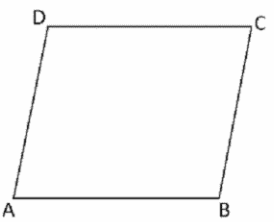
breadth + 25 + breadth = 180

2 × breadth = 180 − 25 = 155

$\therefore$ breadth = $\frac{155}{2}$ = 77.5 cm

length = 77.5 + 25 = 102.5 cm

Question 11. If the sum of two opposite angles of a parallelogram is 100^0, find the measure of each of its angles.



$\angle A = \angle C = 100^0$

$2\angle A = 100^0$ $(2A = \angle C)$

$\angle A = \frac{100}{2} = 50^0$

$\angle A + \angle B = 180^0$

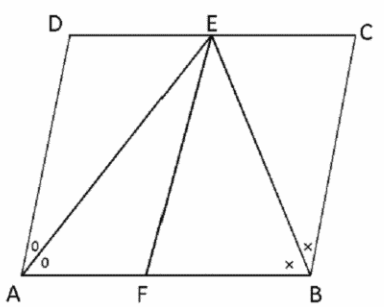
$50 + \angle B = 180^0$

$\angle B = 180^0 - 50^0 = 130^0$

$\angle A = \angle C = 50^0$ and $\angle B = \angle D = 130^0$

HIGH ORDER THINKING SKILLS (HOTS)

Question 12. ABCD is a parallelogram. The bisectors of $\angle A$ and $\angle B$ meet at E, which lies on DC. Prove that AD = $\frac{1}{2}$ AB.



Construction Draw EF || AD

Proof :

AD || EF

$\angle EAF = \angle DEA$ Alterative angles

$\angle EAF = \angle DAE$ (Given)

$\therefore$ $\angle DEA = \angle DAE$

$\therefore$ AD = DE ..... (i) (Opposite sides of equal angles)

EF || BC

$\therefore$ $\angle EBF = \angle BEC$ (Alterative angles)

$\angle EBF = \angle EBC$ (Given)

$\therefore$ BC = CE ..... (ii) (Opposite sides of equal angles)

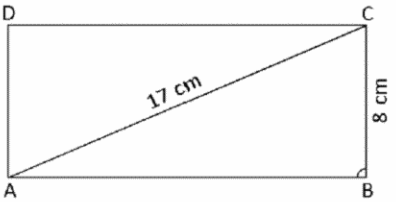
AD + BC = DE + CE (From (i) & (ii)

AD + AD = DC

2AD = AB (DC = AB)

$\therefore$ AD = $\frac{1}{2}$ AB

Exercise 11 (B) Question 1. Find length of rectangle whose diagonal is 17 cm and breadth 8 cm.



In Δ ABC, $\angle B = 90^0$

$\therefore$ $AC^2 = AB^2 + BC^2$

$(17)^2 = AB^2 + (8)^2$

$289 = AB^2 + 64$

$289 - 64 = 225 = AB^2$

$\therefore$ $AB = \sqrt{225} = 15$ cm

$\therefore$ Length of rectangle is 15 cm.

Question 2. The sides of a rectangle are in the ratio 4 : 5. Find its sides if its perimeter is 90 cm.

Ratio of the sides 4 : 5

$\therefore$ Sides are 4x wand 5x respectively

Perimeter = 90cm

$2(l + b) = 90$

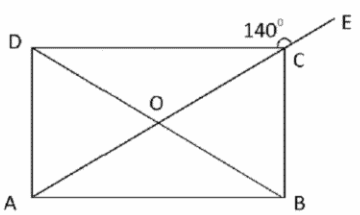
$l + b = \frac{90}{2} = 45$

$4x + 5x = 45$

$9x = 45 \quad \Rightarrow \quad x = \frac{45}{9} = 5$

Sides are 5x = 25 cm and 4x = 20 cm

Question 3. In Figure 1, ABCD is a rectangle. Its diagonals AC and BD intersect each other at O. AC is produced to E such that $\angle ECD$ is 140^0. Find the measure of the angles of DAOB.



$\angle OCD + \angle ECD = 180^0$

$\angle OCD + 140 = 180^0$ (Linear pair)

$\angle OCD = 180^0 - 140^0 = 40^0$

$\angle OAB = \angle OCD$ (Alternative angles)

$\angle OAB = 40^0$

$\angle OAB = \angle OBA$ (Diagonals are equal and bisect each other)

$\therefore$ $\angle OBA = 40^0$

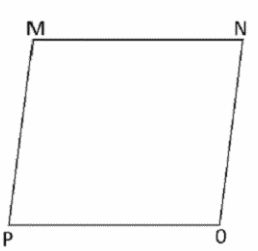
ΔAOB, $\angle AOB + \angle OBA + \angle OAB = 180^0$

$\angle AOB + 40^0 + 40^0 = 180^0$

$\angle AOB = 180^0 - 80^0 = 100^0$

$\therefore$ $\angle AOB = 100^0$

Question 4. In rhombus MNOP (Fig. 2), MP = 3x cm and MN = 2(x + 3) cm. Find the length of each of side the rhombus.



MP = MN = NO = PO

$3x = 2(n + 3)$

$3x = 2x + 6$

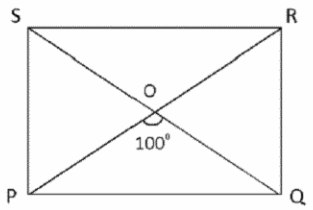
$3x - 2x = 6$

$x = 6$

$3x = 18$

Sides of rhombus = PO = ON = MN = MP = 18 cm

Question 5. ABCD is a rhombus whose diagonals intersect at 0. If AB = 10 cm, diagonal BD = 16 cm, find the length of diagonal AC.



AB = 10 cm

BD = 16 cm $\quad \therefore \quad BO = \frac{16}{2} = 8$ cm

Δ AOB

$AO^2 + BO^2 = AB^2$

$AO^2 + 8^2 = 10^2$

$AO^2 + 64 = 100$

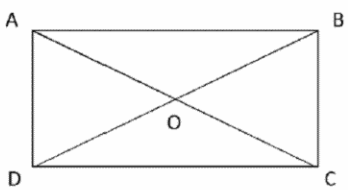
$AO^2 = 100 - 64 = 36$

$AO = \sqrt{36} = 6$

$AC = 2 \times AO = 12$ cm

Diagonal AC = 12 cm

Question 6. In Figure 3, ABCD is a rectangle whose diagonals meet at O. Find x if OB = 3x + 2 and OA = 4x – 3.



OB = 3x + 2

OA = 4x – 3

In rectangles diagonals are equal and bisect each other

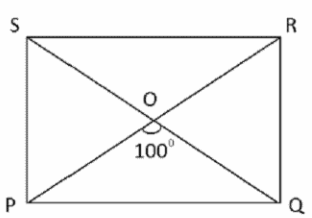
$\therefore$ OB = OA

$3x + 2 = 4x - 3$

$2 + 3 = 4x - 3x$

$\therefore \quad x = 5$

Question 7. In Figure 4, PQRS is a rectangle and its diagonal PR and QS intersect at O. If $\angle POQ = 100^0$, find the measure of i. $\angle PQO$ ii. $\angle ORS$



OP = OQ

$\therefore$ OPQ = OQP

Δ POQ

(i) $\angle OPQ + \angle OQP + \angle POQ = 180^0$

$\angle PQO + \angle PQO + 100 = 180^0$

$2\angle PQO = 180 - 100 = 80$

$\therefore \quad \angle PQO = 40^0$

$\angle ORS = \angle OPQ$ Alternative angles

$\angle ORS = 40^0$

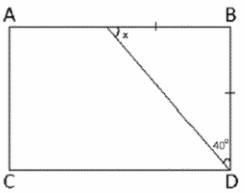
$\angle OAB : \angle OBA = 3 : 2$

Question 8. In the given rectangle ABCD (Fig. 5), BP = BC. What is the measure of $\angle PCD$?

$\angle x = \angle y = 45^0$ $\quad \frac{90}{2} = 45$

$\angle PCD + \angle y = 90^0$ (Right angle)

$\angle PCD = 90^0 - 45^0 = 45^0$ **Ans.**



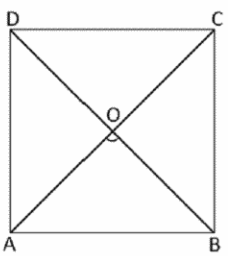
Question 9. In Figure 6, ABCD is a rhombus whose diagonals AC and BD intersect at O. If $\angle OAB : \angle OBA = 3:2$, find the measure of all the angles of ΔCOD.

$\angle OAB : \angle OBA = 3 : 2$

$\angle OAB = 3x$ and $\angle OBA = 2x$

$\angle OCD = \angle OAB = 3x$ (Alternative angles)

$\angle OBA = \angle ODC = 2x$ (Alternative angles)



$\Delta OCD, \angle COD = 90^0$

$\therefore \quad 3x + 2x = 90^0$

$\angle COD = 90^0, \angle ODC = 2x = 2 \times 18 = 36^0$

Question 10. One of the diagonals of a rhombus is equal to one of its sides. Find the angles of the rhombus.

All the sides rhombus are equal. So it one diagonals is equal to one side we have 2 equilateral triangle with common base. Let ABCD is rhombus in which

AB = BC = CD = DA = Diagonal CA.

In triangle ABC = AB = BC = CA therefore angle $B = 60^0$

$\angle D = \angle B = 60^0$

$\angle A = 180^0 - \angle B$

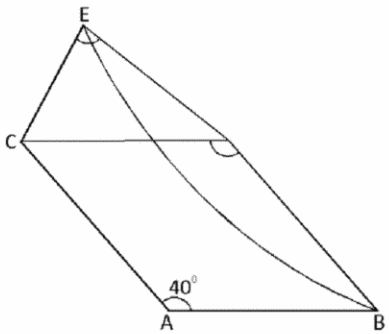
$= 180^0 - 60^0 = 120^0$

$\angle C = \angle A = 120^0$ **Ans.**

HIGH ORDER THINKING SKILLS (HOTS)

Question 11. In Figure 7, ABCD is a rhombus and CED is an equilateral triangle on side CD. If $\angle BAD = 46^0$, find : i. $\angle BEC$ ii. $\angle DEB$.

Ans.



Question 12. In figure 8, ABCD is a square. An equilateral triangle ABE is drawn on the side AB. Diagonal BD intersects AE at F. Find the value of x.

[Hint: $\angle DBE = \angle ABE - \angle ABE = 60^0 - 45^0 = 15^0$

$x = \angle FEB + \angle FBE = 60^0 + 15^0 = 75^0$]

Ans. **Do yourself::-**

CHAPTER 12. BAR GRAPHS AND HISTOGRAMS : BAR GRAPH :– A bar graph is a representation of the ungrouped numerical data in a bar graph. We take equal width of the bar and maintain equal gap between them.

Width of the bar has no significance bar graph is one dimensional.

Histogram :– A histogram is a graphical representation of a grouped frequency distribution of data.

A histogram consists of rectangles in which class intervals as bases and corresponding frequencies as height.

In a histogram the width as well as the height of each rectangle matters.

The area of the rectangle are proportional to the corresponding frequencies there fare width of class intervals of all intervals are equal.

Histogram is two dimensional.

Exercise 12 (A) Read and answer the following questions.

Question 1. The following data shows India's total population (in millions) from 1950 to 2010:

Year of Census	1950	1960	1970	1980	1990	2000	2010
Population (in millions)	250	300	340	500	580	660	700

Represent the above data by a bar graph.

On Graph Paper

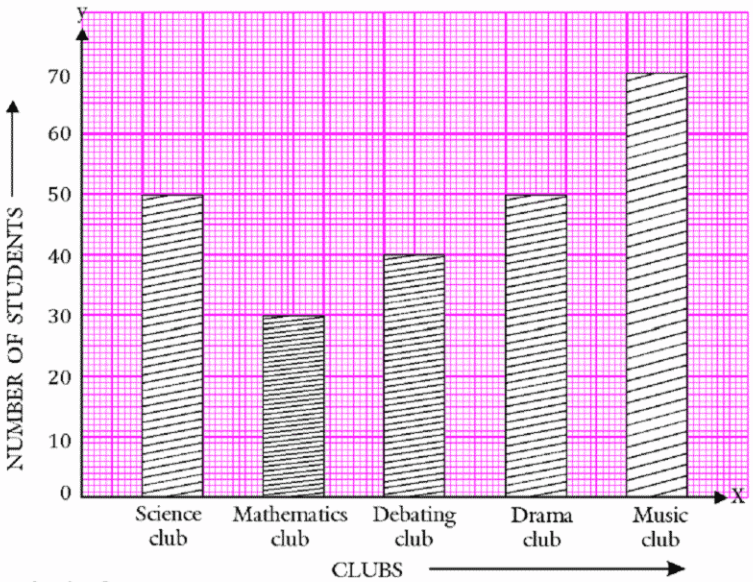
Question 2. Figure 1. is a bar graph showing the number of students in different clubs of the school:

Read the bar graph carefully and answer the following questions.

(i) Which club has the least number of members and how many?

(ii) How many students are the members of the Science club and the Music club put together?

(iii) What percentage of students are the members of the Mathematics club?



(iv) What information does the bar graph give?

(v) If the membership fee for each club is ₹ 50, then what is the total amount collected by the Drama club?

(vi) Which club is most popularamong the students?

(vii) What is the total number of members in various clubs?

(i) Mathematics club, 30 members

(ii) Science club = 50 members, Music Club = 70 members

Total members = 50 + 70 = 120 members

(iii) Mathematics club = 30 members

Total members = 50 + 30 + 40 + 50 + 70 = 240

% members of mathematics club $\frac{30}{240} \times 100$ = 12.5%

(iv) Bar graph gives the information, the number of students in different club of the school.

(v) Number of members in Drama club = 50

Total amount collection = 50 × 50 = ₹ 2500

(vi) Music club

(vii) 50 + 30 + 40 + 50 + 70 = 240

Question 3. Study the bar graph given in fig. 2.

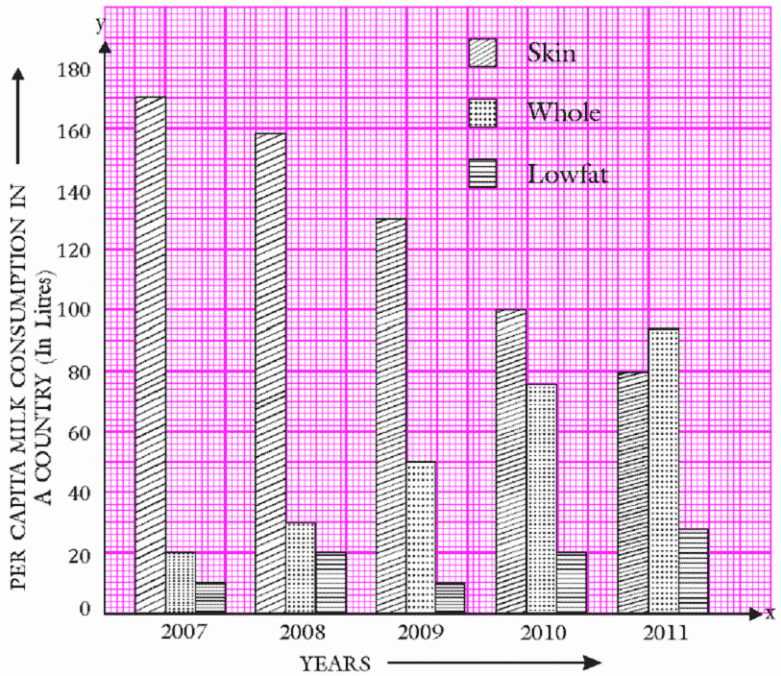
(i) What is the trend of per capita whole milk consumption in the country?

(ii) What is the trend of per capita low-fat milk consumption in the country?

(iii) In which year did whole milk consumption surpass skim consumption?

(iv) In which year is the difference between skim milk consumption and law-fat milk consumption maximum?

(v) In which years was the consumption of low fat milk same?



(i) Trend of per capita whole milk consumption is increasing.

(ii) The trend of per capita low fat milk consumption is minimum.

(iii) 2011

(iv) Difference between skim milk and low fat milk consumption.

2007 $\Rightarrow$ 170 – 10 = 160 litre 2009 $\Rightarrow$ 130 – 10 = 120 litre

2008 $\Rightarrow$ 158 – 20 = 138 litre 2010 $\Rightarrow$ 100 – 20 = 80 litre

2011 $\Rightarrow$ 80 – 38 = 42 litre

$\therefore$ Maximum difference in 2007.

(v) 2007 and 2009.

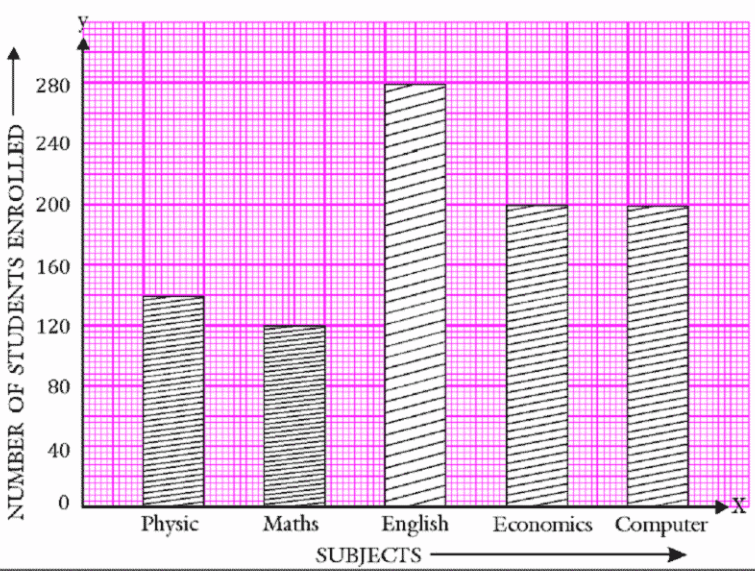
Question 4. Read the bar graph given in Figure 3 and answer the following questions.

(i) How many times the enrolment in Economics is more than the enrolment in Physics?

(ii) How many more students are enrolled for English than for Maths?

(iii) Which course has the most students enrolled in it?

(iv) Name the two subjects for which equal number of students are enrolled.



(v) How many students are enrolled in the course with most students?

(vi) Name the two subjects for which equal number of student are enrolled.

(i) Enrolment in Economics = 200

Enrolment in Physics = 140

More enrolment in economic than physics = 200 – 140 = 60

(ii) Number of students in English = 276

Number of students in Maths = 116

More student in English in Maths = 276 – 116 = 160 students

(iii) English

(iv) Economics and computer

(v) English 280 students

(vi) Economics and computer

Question 5. Read the double bar graph given in Figure 4 and answer the following questions.

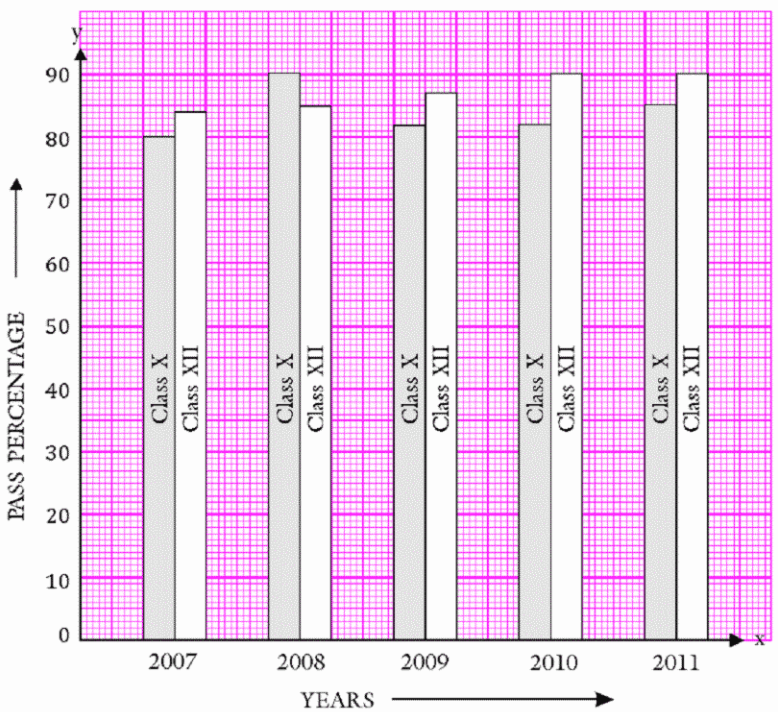
(i) What information is given by the double bar graph?

(ii) In which year is the pass percentage of Class XII maximum?

(iii) In which year is the pass percentage of Class X more as compared to Class XII?

(iv) In which year is the difference between the pass percentage of Class X and Class XII minimum?

(v) Find the average pass percentage of Class XII and Class X in five years. Which class has the higher average pass percentage?



(i) Pass percentage of class XII and Class X in five years (2007 – 2011)

(ii) 2010 and 2011

(iii) 2008

(iv) 2007 average

(v) Class X pass percentage $= \frac{80 + 90 + 82 + 82 + 85}{5} = \frac{419}{5} = 83.8\%$

Avg. class XII pass percentage $= \frac{84 + 90 + 87 + 90 + 90}{5} = \frac{441}{5} = 88.2\%$

$\therefore$ Class XII has the higher average pass percentage.

Exercise 12 (B) Question 1. Draw a histogram to represent the following data:

Monthly Income (in ₹)	5000-6000	6000-7000	7000-8000	8000-9000	9000-10,000
Number of workers	4	5	8	12	14

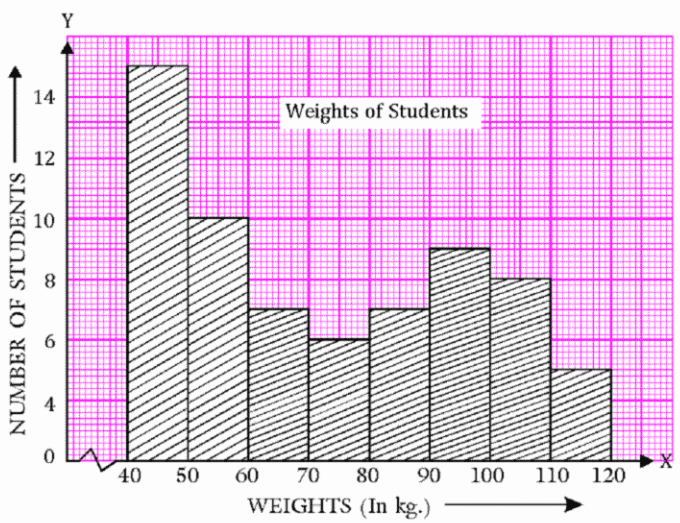
On Graph Paper

Question 2. Draw a histogram for the following frequency distribution:

Class Interval	30-60	60-90	90-120	120-150	180-210
Frequency	5	12	18	10	16

On Graph Paper

Question 3. The histogram of a frequency distribution is shown below. Read the histogram and answer the following questions. (i) Use the graph to construct a frequency distribution table. (ii) How many students weigh 80 kg or more? (iii) How many students weigh less than 60 kg? (iv) How many students are in the range 40-50 kg? (v) If one more student weight 92 kg joins this group, then how many students shall weigh 90 kg or more?



Weight (in kgs)	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120
Number of students	15	10	7	6	7	9	8	6

Question 4. A survey showed that the average daily expenditures (in ₹) of 24 households in a city were:

238, 230, 220, 211, 228, 225, 210, 225, 248, 215, 237, 240, 238, 215, 227, 214, 236, 244, 249, 232, 219, 221, 242, 216

Form a frequency distribution using class intervals 210-215, 215-220 and so on.

Draw a histogram for the above data.

Daily expenditure (in ₹)	Tally marks	Frequency
210 – 215	III	3
215 – 220	IIII	4
220 – 225	II	2
225 – 230	IIII	4
230 – 235	II	2
235 – 240	IIII	4
240 – 245	III	3
245 – 250	II	2

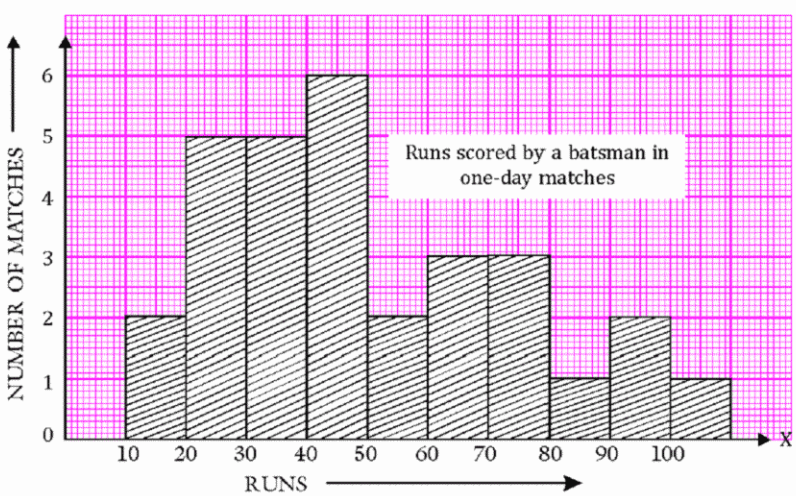
Question 5. The following histogram shows the number of runs scored by a batsman in one-day matches:

Read the histogram and answer the following questions.

(i) How many matches did the batsman play?

(ii) How many matches were played in the lowest run group?

(iii) In how many matches did he score 70 or more runs?



(iv) In how many matches did he score less than half a century?

(i) 2 + 5 + 5 + 6 + 2 + 3 + 3 + 1 + 2 + 1 = 30 matches

(ii) 2 matches (10 – 20)

(iii) 3 + 1 + 2 + 1 = 7 matches

(iv) 2 + 5 + 5 + 6 = 18 matches

Question 6. Study the histogram given in Figure 3 and answer the following questions.

(i) Which age group has the least number of illiterate females?

(ii) Which age group has the maximum number of illiterate females?

(iii) How many more illiterate females are there in the age group 24.5-29.5 years as compared to the age group 29.5-34.5?

(iv) What is the total number of illiterate females in the age group 9.5-34.5 years?

(i) 29.5 – 34.5 years

(ii) 14.5 – 19.5 years

(iii) 600 – 200 = 400

(iv) 400 + 1000 + 800 + 600 + 200 = 3000 families

(v) $\frac{1000}{600} = 5 : 2$

(vi) $\frac{600}{3000} \times 100$

$= 20\%$

CHAPTER 13. PIE CHARTS OR CIRCLE GRAPHS : PIE CHART :– A pie chart is a circular diagram in which the observations are represented by the non intersecting sectors of a circle.

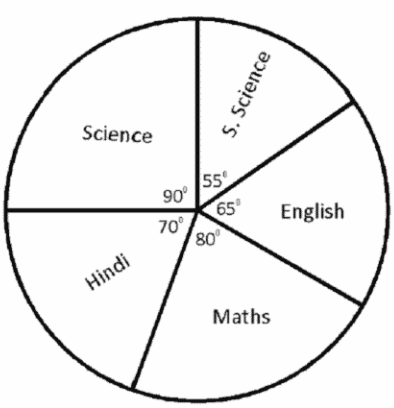
$$\text{Central angle of observation} = \frac{\text{Value of observation}}{\text{Sum of observations}} \times 360$$

Exercise 13 (A) Draw a pie chart for the given data.

Question 1. The marks obtained by Premsukh in an examination are given below:

Subject	Hindi	S.Science	Science	English	Maths	Total
Marks obtained	105	82.5	135	97.5	120	540

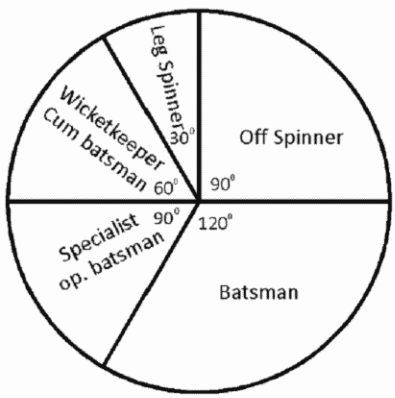
	Subject	Marks Ob.	Measure angle
1.	Hindi	105	$\frac{105}{540} \times 360^0 = 70^0$
2.	S. Sci	82.5	$\frac{82.5}{540} \times 360^0 = 55^0$
3.	Science	135	$\frac{135}{540} \times 360^0 = 90^0$
4.	English	97.5	$\frac{97.5}{540} \times 360^0 = 65^0$
5.	Maths	120	$\frac{120}{540} \times 360^0 = 80^0$
	Total	540	360^0



Question 2. The selectors had to decide on the Indian team to play with Pakistan. They decided on the 12 players as follows:

Players	Wicketkeeper cum batsman	Off spinner	Leg spinner	Specialist opening batsman	Batsman
Number	2	3	1	2	4

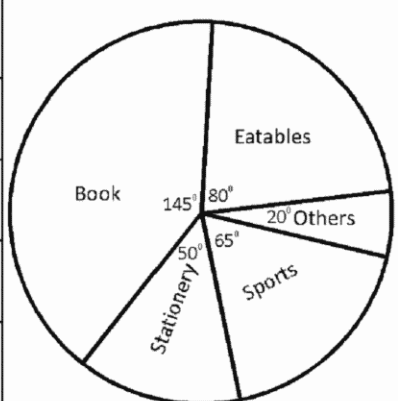
	Players	Numbers	Measure angle
1.	Wicketkeeper Cum batsman	2	$\frac{2}{12} \times 360^0 = 60^0$
2.	Off Spinner	3	$\frac{3}{12} \times 360^0 = 90^0$
3.	Leg Spinner	1	$\frac{1}{12} \times 360^0 = 30^0$
4.	Specialist op. batsman	2	$\frac{2}{12} \times 360^0 = 60^0$
5.	Batsman	4	$\frac{2}{12} \times 360^0 = 120^0$
	Total	12	360^0



Question 3. Ravi student spends his pocket money on various items as given below:

Item	Books	Eatables	Stationery	Sports	Others	Total
Money spent (₹)	29	16	10	13	4	72

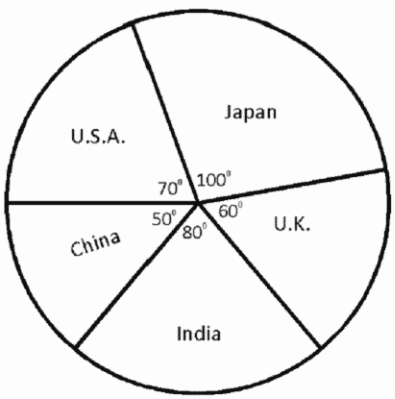
	Team	Money Spent	Central angle
1.	Book	29	$\frac{29}{72} \times 360^0 = 145^0$
2.	Eatables	16	$\frac{16}{72} \times 360^0 = 80^0$
3.	Stationery	10	$\frac{10}{72} \times 360^0 = 50^0$
4.	Sports	13	$\frac{13}{72} \times 360^0 = 65^0$
5.	Others	4	$\frac{4}{72} \times 360^0 = 20^0$
	Total	72	



Question 4. The following table represents the collection of stamps of different countries, by a student:

Country	USA	Japan	UK	India	China
Number of stamps	105	150	90	120	75

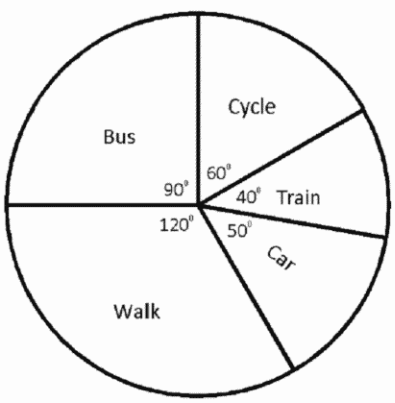
	Country	No. of Stamps	Central angle
1.	U.S.A.	105	$\frac{105}{540} \times 360^0 = 70^0$
2.	Japan	150	$\frac{150}{540} \times 360^0 = 100^0$
3.	U.K.	90	$\frac{90}{540} \times 360^0 = 60^0$
4.	India	120	$\frac{120}{540} \times 360^0 = 80^0$
5.	China	75	$\frac{75}{540} \times 360^0 = 50^0$
	Total	540	360^0



Question 5. The following table illustrates the data on the mode of transport used by the office goers to go to their office:

Transport of the office	Car	Cycle	Bus	Walk	Train	Total
Number of office goers	10	12	18	24	8	72

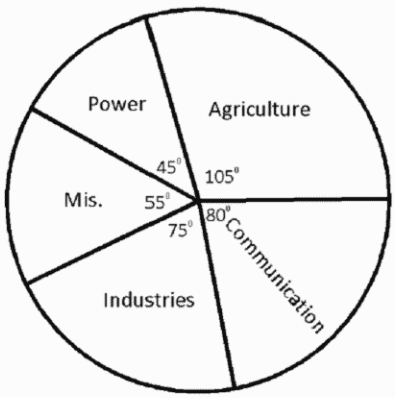
	Transport of the office	No. of office goers	Central angle
1.	Car	10	$\frac{10}{72} \times 360^0 = 50^0$
2.	Cycle	12	$\frac{12}{72} \times 360^0 = 60^0$
3.	Bus	18	$\frac{18}{72} \times 360^0 = 90^0$
4.	Walk	24	$\frac{24}{72} \times 360^0 = 120^0$
5.	Train	8	$\frac{8}{72} \times 360^0 = 40^0$
	Total	72	360^0



Question 6. The table given below provides the data on money spent (in crores) during the sixth 'Five Year Plain':

Item	Agriculture	Communication	Industries	Power	Miscellancous
Rupees (in crores)	5250	4000	3750	2250	2750

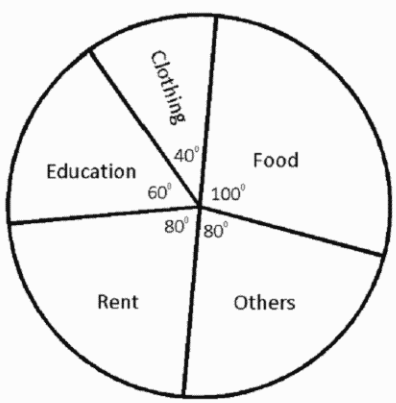
	Item	Rupees (in crores)	Central angle
1.	Agriculture	5250	$\frac{5250}{18000} \times 360^0 = 150^0$
2.	Communication	4000	$\frac{4000}{18000} \times 360^0 = 80^0$
3.	Industries	3750	$\frac{3750}{18000} \times 360^0 = 75^0$
4.	Power	2250	$\frac{2250}{18000} \times 360^0 = 45^0$
5.	Mis.	2750	$\frac{2750}{18000} \times 360^0 = 55^0$
	Total	18000	360^0



Question 7. The following data shows the expenditure of an individual on various items:

Item	Clothing	Rent	Food	Education	Others
Expenditure (in ₹)	1600	3200	4000	2400	3200

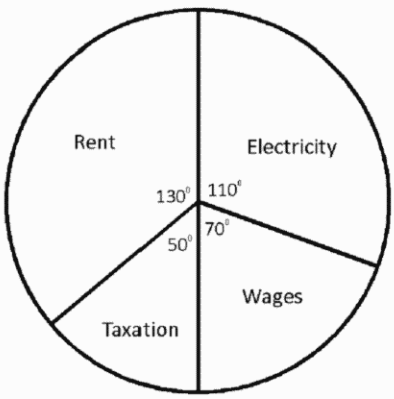
7.	Item	Expenditure (in ₹)	Central angle
1.	Clothing	1600	$\frac{1600}{14400} \times 360^0 = 40^0$
2.	Rent	3200	$\frac{3200}{14400} \times 360^0 = 80^0$
3.	Food	4000	$\frac{4000}{14400} \times 360^0 = 100^0$
4.	Education	2400	$\frac{2400}{14400} \times 360^0 = 60^0$
5.	Others	3200	$\frac{3200}{14400} \times 360^0 = 80^0$
	Total	14400	360^0



Question 8. The following table shows the monthly expenditure of a firm:

Item	Rent	Wages	Taxation	Electricity
Amount (in lakes of ₹)	1560	840	600	1320

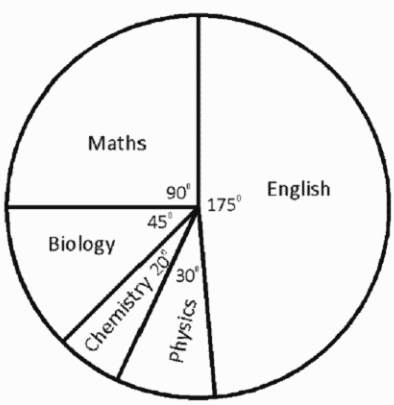
	Item	Amount (₹)	Central angle
1.	Rent	1560	$\frac{1560}{4320} \times 360^0 = 130^0$
2.	Wages	840	$\frac{840}{4320} \times 360^0 = 70^0$
3.	Taxation	600	$\frac{600}{4320} \times 360^0 = 50^0$
4.	Electricity	1320	$\frac{1320}{4320} \times 360^0 = 110^0$
	Total	4320	360^0



Question 9. The following data represents the number of students who appeared for various subjects in an examination.

Subject	Biology	English	Maths	Chemistry	Physics
Number of students	9000	35000	18000	4000	6000

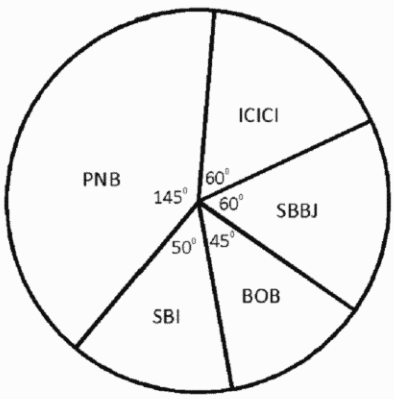
	Subject	No. of students	Central angle
1.	Biology	9000	$\frac{9000}{72000} \times 360^0 = 45^0$
2.	English	35000	$\frac{35000}{72000} \times 360^0 = 175^0$
3.	Maths	18000	$\frac{18000}{72000} \times 360^0 = 90^0$
4.	Chemistry	4000	$\frac{4000}{72000} \times 360^0 = 20^0$
5.	Physics	6000	$\frac{6000}{72000} \times 360^0 = 80^0$
	Total	72,000	360^0



Question 10. The following table gives the number of credit cards issued by five banks in 2005:

Bank	ICICI	SBBJ	BOB	PNB	SBI
Number of credit cards issued	24000	24000	18000	58000	20000

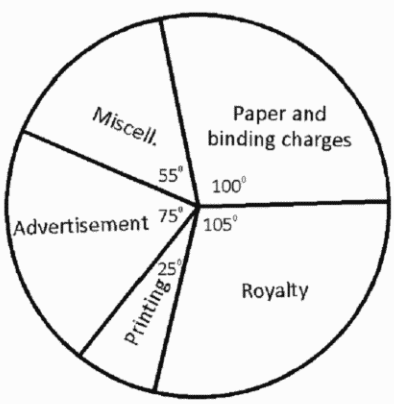
	Bank	No. of credit cards issued	Central angle
1.	ICICI	24000	$\frac{24000}{144000} \times 360^0 = 60^0$
2.	SBBJ	24000	$\frac{24000}{144000} \times 360^0 = 60^0$
3.	BOB	18000	$\frac{18000}{144000} \times 360^0 = 45^0$
4.	PNB	58000	$\frac{58000}{144000} \times 360^0 = 145^0$
5.	SBI	20000	$\frac{20000}{144000} \times 360^0 = 50^0$
	Total	144000	360^0



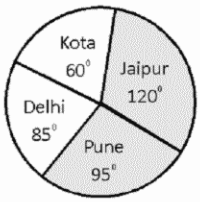
Question 11. Given below is the percentage break-up of the cost of production of a book:

Head	Royalty	Printing	Paper and binding charges	Miscellaneous	Advertisement
Percentage (%)	$\frac{175}{6}$	$\frac{125}{18}$	$\frac{250}{9}$	$\frac{275}{18}$	$\frac{125}{6}$

	Head	Percentage %	Central angle
1.	Royalty	$\frac{175}{6}$	$\frac{175}{6} \times \frac{1}{100} \times 360^0 = 105^0$
2.	Printing	$\frac{125}{8}$	$\frac{125}{8} \times \frac{1}{100} \times 360^0 = 25^0$
3.	Paper and binding charges	$\frac{250}{9}$	$\frac{250}{9} \times \frac{1}{100} \times 360^0 = 100^0$
4.	Miscell.	$\frac{275}{18}$	$\frac{275}{18} \times \frac{1}{100} \times 360^0 = 55^0$
5.	Advertisement	$\frac{125}{6}$	$\frac{125}{6} \times \frac{1}{100} \times 360^0 = 75^0$
	Total	100	360^0



Question 12. A pie chart representing the population of senior citizens in four metropolitan cities is given in Figure 1. If the total population of senior citizens is 36 lakh, read the pie chart and find the population of senior citizens in Jaipur, Pune, Kota and Delhi.



$$\text{Population in the city} = \frac{\text{Central angle}}{360} \times \text{Total population}$$

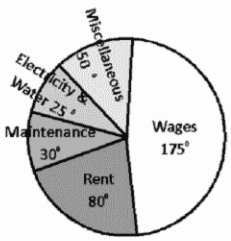
$$\text{Senior citizens in Jaipur} = \frac{120}{360} \times 36 = 12 \text{ lakh}$$

$$\text{Senior citizens in Pune} = \frac{95}{360} \times 36 = 9.5 \text{ lakh}$$

$$\text{Senior citizens in Kota} = \frac{60}{360} \times 36 = 6 \text{ lakh}$$

$$\text{Senior citizens in Delhi} = \frac{85}{360} \times 36 = 8.5 \text{ lakh}$$

Question 13. The pie chart in Figure 2 shows the expenditure of a showroom on various heads. If the total expenditure is ₹ 9 lakh, find the expenditure on individual heads.



$$\text{Expenditure} = \frac{\text{Central angle}}{360} \times \text{Total expenditure}$$

$$\text{Expenditure on wages} = \frac{175}{360} \times 9 = 4.375 \text{ lakh}$$

$$\text{Electricity \& water} = \frac{25}{360} \times 9 = 0.625 \text{ lakh}$$

$$\text{Maintenance} = \frac{30}{360} \times 9 = 0.75 \text{ lakh}$$

$$\text{Rent} = \frac{80}{360} \times 9 = 2.00 \text{ lakh}$$

$$\text{Mise} = \frac{50}{360} \times 9 = 1.25 \text{ lakh}$$

HIGH ORDER THINKING SKILLS (HOTS)

Question 14. Complete the table given below and then draw a pie chart to express the amount spent by five teenaged boys A,B, C, D and E on recreation, in a month.

Boy	A	B	C	D	E	Total
Expenditure of recreation (in ₹)	510	x	450	y	300	2160
Central angle	q_1	80^0	q_2	70^0	q_3	360^0

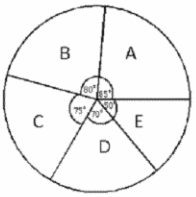
$$Q_1 = \frac{510}{2160} \times 360 = 85^0$$

$$80 = \frac{x}{2160} \times 360 \quad \therefore \quad x = \frac{80 \times 2160}{360} = 480$$

$$Q_2 = \frac{450}{2160} \times 360 = 75^0$$

$$70 = \frac{y}{2160} \times 360 \quad \therefore \quad y = \frac{80 \times 2160}{360} = 420$$

$$Q_3 = \frac{300}{2160} \times 360 = 50^0$$



CHAPTER 14. PROBABILITY Experiment :– An operation which produces well-defined outcomes is called an experiment.

Random Experiment :– All possible outcomes are known and the exact outcomes can not be predicted as it may be any one of the possible out comes.

Event :– The collection of some or all possible outcomes is called events.

Probability of event E.

$$P(E) = \frac{\text{Number of outcomes favourable to E}}{\text{Number of all possible outcomes}}$$

Single dice throw

All possible outcomes {1, 2, 3, 4, 5, 6}

Tossing a coin {H, T}

Tossing a two coin {(HT) (TH) (HH) (TT)

Exercise 14 (A) Question 1. In a single throw of a dice, what is the probability of getting the following? (i) An odd number (ii) An even prime (iii) A multiple of 3 (iv) A number between 2 and 6

Single dice throw all possible outcomes {1, 2, 3, 4, 5, 6}

(i) An odd number = {1, 3, 5}

Probability an odd number $= \frac{\text{Favourable event of odd number}}{\text{Total number of outcomes}}$

$= \frac{3}{6} = \frac{1}{2}$

(ii) An even Prime = {2}

Probability of even prime $= \frac{1}{6}$

(iii) A multiple of 3 = {3, 6}

Probability of multiple of 3 $= \frac{2}{6} = \frac{1}{3}$

(iv) A number between 2 and 6 = {3, 4, 5}

Probability of a number between 2 and 6 $= \frac{3}{6} = \frac{1}{2}$

Question 2. List the possible outcomes of the following experiments.

(i) Throwing a dice (ii) Tossing two coins simultaneously (iii) Tossing a coin

(i) Throwing a dice = {1, 2, 3, 4, 5, 6}

(ii) Tossing two coins simultaneously = {(H,H), (H,T), (T,H), (T,T)}

(iii) Tossing a coin = {H, T}

Question 3. When a dice is thrown, list the probability of an event of getting the following outcomes.
(i) A composite number (ii) A number not less than 4 (iii) A number greater than 3

Total outcomes = {1, 2, 3, 4, 5, 6}

(i) A composite number = {4, 6}

Probability of composite number = $\frac{2}{6} = \frac{1}{3}$

(ii) A number not less than 4 = {4, 5, 6}

Probability of a number not less than 4 = $\frac{3}{6} = \frac{1}{2}$

(iii) A number greater than 3 = {4, 5, 6}

Probability of greeter than 3 = $\frac{3}{6} = \frac{1}{2}$

Question 4. In a lottery there are 5 prizes and 30 blanks. A ticket is chosen at random. What is the probability of getting a prize?

Total tickets = 5 + 30 = 35

Prize ticket = 5

Probability of prize ticket = $\frac{5}{35} = \frac{1}{7}$

Question 5. A box of 12 dozen pens contains a dozen defective pens. One pen is taken out at random. What is the probability that the pen taken out is : (i) defective (ii) non-defective?

Total pens = 12 dozen = 12 × 12 = 144 pens

Total defective pens = 1 dozen = 12 pens

(i) Probability of defective pens = $\frac{12}{144} = \frac{1}{12}$

(ii) Probability of non-defective pens = $\frac{144 - 12}{144} = \frac{132}{144} = \frac{11}{12}$

Question 6. If a number from 1 to 10 is chosen at random, find the probability of choosing.
(i) a prime number (ii) an even number
(iii) a number divisible by 3 (iv) a number divisible by 2 and 5 both.

Total outcomes = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

(i) Prime number = {2, 3, 5, 7}

Probability of a prime number = $\frac{4}{10} = \frac{2}{5}$

(ii) An even number = {2, 4, 6, 8, 10}

Probability of an even number = $\frac{5}{10} = \frac{1}{2}$

(iii) A number divisible by 3 = {3, 6, 9}

Probability of a number divisible by 3 = $\frac{3}{10}$

(iv) A number divisible = {10}

Probability of a number divisible by 2 and 5 = $\frac{1}{10}$

Question 7. A class has 10 girls and 5 boys. The teacher calls on a student at random to answer a questions. What is the probability that a student called upon is : (i) a girl (ii) a boy

Total students in a class = 10 + 5 = 15

(i) Probability of a student is a girl = $\frac{1}{10}$ = $\frac{2}{3}$

(ii) Probability of a student is a boy = $\frac{5}{15}$ = $\frac{1}{3}$

Question 8. What is the probability of selecting the following:

(i) A vowel from the English alphabets

(ii) A vowel when a letter is chosen at random from the word NATURAL.

(i) Total number of words = {A, B, C, – X, Y, Z} = 26

Total number of vowels = {A , E, I, O, U} = 21

Probability of a vowel = $\frac{5}{26}$

(ii) Total outcomes = {N, A, T, U, R, A, L}

Total outcomes for vowels = {A, U, A}

Probability of a vowel = $\frac{3}{7}$

Question 9. One card is drawn at random from a well-shuffled deck of 52 cards. Find the probability that the card drawn is of the following type. (i) Spades (ii) A red 7 (iii) An ace

Total cards = 52

∴ Total number of outcomes = 52

(i) Total number of cards of shape = 13

Probability of an shape = $\frac{13}{52} = \frac{1}{4}$

(ii) Number of Red 7 = 2 (Heart and Diamond)

Probability of Red 7 = $\frac{2}{52} = \frac{1}{26}$

(iii) A number of Ace = 4

Probability of an Ace = $\frac{4}{52} = \frac{1}{13}$

Question 10. Two coins are tossed simultaneously. Find the probability of getting the following outcome. (i) Two Head (ii) No Head (iii) At least Head

2 Coins tossed

Total outcomes {(HH) (HT), (TH) (TT)}

(i) Two heads = {(HH)}

(ii) No head = {(TT)}

Probability of no Head = $\frac{1}{4}$

(iii) Outcomes at least one head = {(HH), (HT), (TH)}

Probability of out come at least one head = $\frac{3}{4}$

Question 11. The last digit of telephone number can be, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. Find the probability that the last digit is : (i) 8 (ii) even (iii) a natural number

(i) Probability of the number last digit is 8 = $\frac{1}{10}$

(ii) Probability of the even number = $\frac{4}{10} = \frac{2}{5}$ {2, 4, 6, 8}

(iii) Probability of the natural number = $\frac{9}{10}$ (Zero is not natural number)

Question 12. A bag contains 4 white balls 6 rwed balls and 5 blue balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is of the following type?

(i) Blue (ii) White (iii) No red (iv) Not blue

Total number of balls = 4 + 6 + 5 = 15

(i) Probability of blue ball = $\frac{5}{15} = \frac{1}{3}$

(ii) Probability of white ball = $\frac{4}{15}$

(iii) Probability of no red ball = $\frac{9}{15} = \frac{3}{5}$

(iv) Probability of no blue ball = $\frac{10}{15} = \frac{2}{3}$

Question 13. What is the probability that a number selected from the numbers 1, 2, 3, ... 25 is not a multiple of 3?

Total numbers = {1, 2, 3, ... 25}

Multiple of 3 = {3, 6, 9, 12, 15, 18, 21, 24}

$\therefore$ Total numbers of not multiple of 3 = 25 – 8 = 17

Probability of a number not multiple of 3 = $\frac{17}{25}$

Question 14. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of drawing the following outcomes. (i) A red king (ii) A red card (iii) A red face card

(i) No. of red king = 2

Probability of red king = $\frac{2}{52} = \frac{1}{26}$

(ii) No. of red card = 26

Probability of red card = $\frac{26}{52} = \frac{1}{2}$

(iii) Number of red face card = 6 (King, Queen and Jack of heart and diamond)

Probability of red face card = $\frac{6}{52} = \frac{3}{26}$

Question 15. A bag contains 4 red and 5 blue marbles. A marble is drawn at random. What is the probability of drawing a red marble?

Total number of marbles = 4 + 5 = 9

Total number of red marbles = 4

Probability of red marbles = $\frac{4}{9}$

HIGH ORDER THINKING SKILLS (HOTS)

Question 16. A bag contains one ball known to be either back or white. A black ball is put in and the bag is shaken and a ball is drawn out. What is the probability of the remaining ball being black, if the ball drawn is of the following types? (i) Black (ii) White

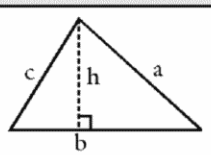
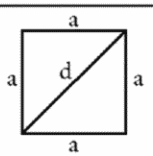
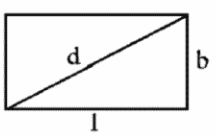
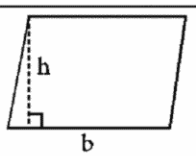
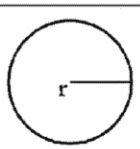
If the remaining ball is black then both balls are black

(i) Probability of remaining ball = $\frac{2}{2} = 1$

(ii) If the remaining ball is white then one ball is white and one ball is black in the black

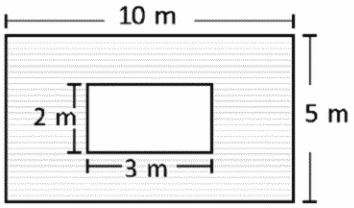
$\therefore$ Probability of white ball = $\frac{1}{2}$

CHAPTER 16. AREA OF POLYGONS Exercise 16 (A)

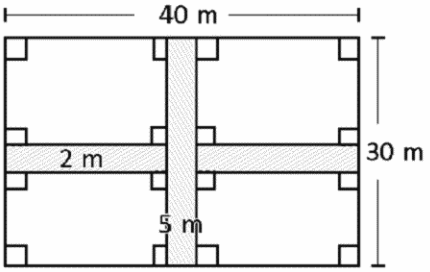
Name of shape	Diagram	Formula
Triangle		Perimeter = a + b + c Area = $\frac{1}{2}$ b × h
Square		Perimeter = 4a Area = a × a = a^2 Diagonal (d) = $\sqrt{a^2 + a^2}$ = $\sqrt{2a^2} = \sqrt{2}a$
Rectangle		Perimeter = 2 (l + b) Area = l × b Diagonal (d) = $\sqrt{l^2 + b^2}$
Parallelogram		Perimeter = 2 (Sum of two adjacent sides) Area = b × h
Circle		Perimeter = Circumference = 2πr Area = πr^2, where $\pi = \frac{22}{7}$ Diameter = 2r

Question 1. Find the area of the shaded parts.

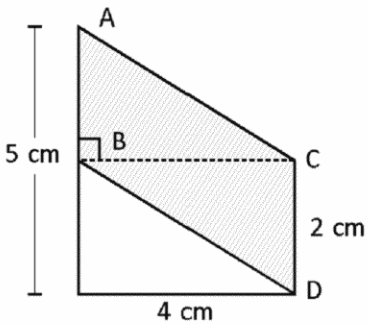
(i)



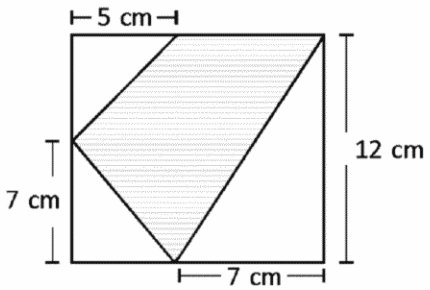
(ii)



(iii)



(iv)



(i) Are of outer rectangle $= l \times b$

$= 10 \times 5\ m^2$

Area of inner rectangle $= 2 \times 3\ m^2$

$= 6\ m^2$

$\therefore$ Area of shaded region $= 50 - 6 = 44\ m^2$

(ii) Area of horizontal rectangle $= 40 \times 2 = 80\ m^2$

Area of vertical rectangle $= 30 \times 5 = 150\ m^2$

Area of square $= 50 \times 2 = 10\ m^2$

Area of shaded region $= 80 + 150 - 10 = 220\ m^2$

(iii) Area of trapezium $= \frac{1}{2} h\ (l + b)$

$= \frac{1}{2} \times a \times (5 + 2) = 14\ cm^2$

Area of right triangle $= \frac{1}{2} \times b \times h = \frac{1}{2} \times 4 \times 2 = 4\ cm^2$

Area of shaded region $= 14 - 4 = 10\ cm^2$

(iv) Area of square $= (side)^2 = (12)^2 = 144\ cm^2$

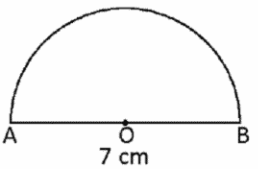
Area of 3 triangles $= 2 \times \frac{1}{2} \times 5 \times 7 + \frac{1}{2} \times 7 \times 12$

$= 35 + 42 = 77\ cm^2$

Area of shaded region $= 144 - 77 = 67\ cm^2$

$= 67\ cm^2$

Question 2. The diameter of a semicircular protractor is 7 cm. Find its perimeter.



Perimeter of protractor $= 2r + \pi r$

$= 2 \times 7 + \frac{22}{7} \times 7$

$= 14 + 22 = 36$ cm

Question 3. The diameter of a wheel is 14 m. How far will it travel in 220 revolutions?

Diameter of wheel = 14 m

Distance covered in one revolution = circumference of the wheel

$= 2\pi r$

$= 2 \times \frac{22}{7} \times \frac{14}{2} = 44$ m

Distance covered in 220 revolution $= 44 \times 220 = 9680$ m

Question 4. The side of an equilateral triangle is 8 cm. Find the length of its altitude.

Altitude of equilateral triangle $= \frac{\sqrt{3}}{2} \times$ side

$= \frac{3}{2} \times 8 = 4\sqrt{3}$ cm

Question 5. Find the area of a circular ring whose external and internal radii are 14 cm and 7 cm respectively.

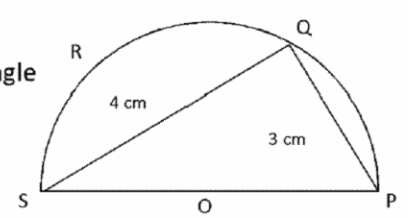
Area of ring $= \pi(R^2 - r^2)$

$= \pi(R - r)(R + r)$

$= \frac{22}{7}(44 - 7)(14 + 7)$

$= \frac{22}{7} \times 7 \times 21 = 22 \times 21 = 462$ cm^2

Question 6. From a semicircular region OPQRS, a PQS in which PQ = 3 cm and QS = 4 cm is removed. Find the perimeter of the remaining figure.



We have PQ = 3 cm QS = 4 cm

We know that angle in a semicircular is a right angle

So $\angle PQS = 90^0$

So ΔPQS is a right Δ

Now $PS^2 = QS^2 + PQ^2 = PS^2 = 4^2 + 3^2$

$= 16 + 9 = 25$ PS = 5 cm

Now circumference of semicircle OPQRS = 7 × Radius + Diameter

= 3.14 × 2.5 + 5 = 12.85 cm2

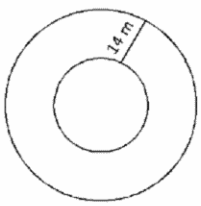
Now when the triangle PQS is removed then figure becomes (attached file). So circumference if romance figure 7.85 + PQ + QS

7.85 + 3 + 4 = 14.85 cm

$$= \quad 7 + 7\frac{6}{7}$$

$$= \quad 14\frac{6}{7}\text{ cm}$$

Question 7. The inner circumference of a circular track is 88 m. The track is 14 m wide every where. Calculate the cost of putting up a fence along the outer circle at the rate of ₹ 2 per meter.



Inner circumference = 88 m

$2\pi r = 88$

$2 \times \frac{22}{7} \times r = 88$

$r = \frac{88 \times 7}{2 \times 22} = 14$ m

Radius of outer circle = 14 + 14 = 28 m

Circumference outer circle = $2\pi r$

$2 \times \frac{22}{7} \times 28 = 176$ m

Cost of fencing = Rate × Length = 176 × 2 = ₹ 352

Exercise 16 (B) Question 1. The area of a trapezium is 150 cm^2. Its parallel sides are in the ratio 2 : 3 and the distance between them is 12 cm. Find the length of each of the parallel sides.

Ratio of parallel sides = 2 : 3

Sides are 2x and 3x cm

Area of trapezium = 150 cm^2

$\frac{1}{2}$ height (sum of parallel slides) = 150

$\frac{1}{2} \times 12\ (2x + 3x) = 150$

$5x = \frac{150 \times 2}{12} = 25$

$x = \frac{25}{5} = 5$

$\therefore$ Sides are 2x = 10 cm and 3x = 15 cm

Question 2. The area of a trapezium is 1200 cm^2 and the length of one of the parallel sides is 14 cm. If its height is 30 cm, find the length of the other parallel side.

Area of trapezium = 1200 cm^2

$\frac{1}{2}$ h (a + b) = 1200

$\frac{1}{2} \times 30\ (14 + b) = 1200$

$14 + b = \frac{1200}{15} = 80$ $\qquad$ $b = 80 - 14 = 66$

$\therefore$ Other parallel side is 66 cm.

Question 3. Find the area of a trapezium whose parallel sides are 10 cm and 12 cm and the distance between them is 4 cm.

Area of trapezium $= \frac{1}{2} h \times (a + b)$

$= \frac{1}{2} \times 4 \times (10 + 12)$

$= 2 \times 22 = 44 \text{ cm}^2$

Question 4. The area of a trapezium is 120 cm^2 and the distance between its parallel sides is 8 cm. Find the length of the parallel sides if their difference is 6 cm.

Area of trapezium = 120 cm^2

$\frac{1}{2} h (a + b) = 120$

$\frac{1}{2} \times 8 (a + b) = 120$

$a + b = \frac{120}{4} = 30$

$a + b = 30$ ..... (1)

$a - b = 6$ ..... (2) (Given)

Adding $2a = 36$ $\Rightarrow$ $a = 18$

From equ. (1) $18 + b = 30$ $\Rightarrow$ $b = 12$

Parallel sides 18 cm and 12 cm

Question 5. Find the height of a trapezium, the sum of lengths of whose bases is 30 cm and whose area is 60 cm^2.

Area of trapezium $= \frac{1}{2} h (a + b)$

$60 = \frac{1}{2} \times h (30)$

$\therefore \quad h = \frac{60 \times 2}{30} = 4$

$\therefore$ Height of trapezium is 4 cm.

Question 6. In Figure 1, a parallelogram is drawn in a trapezium. If the area of the parallelogram is 195 cm^2, find the area of the trapezium.

Area of parallelogram = 195 cm2

Base × Height = 195

$15 \times h = 195$

$\therefore \quad h = \frac{195}{15} = 13$

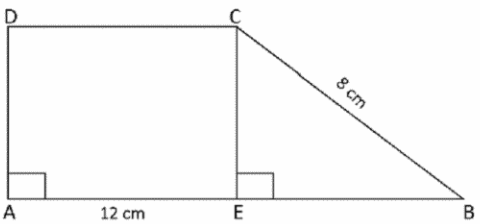
$\therefore$ Height of trapezium = 13 cm

$\therefore$ Area of trapezium $= \frac{1}{2} h (a + b)$

$$= \frac{1}{2} \times 13\ (15 + 25)$$

$$= 13 \times 20 = 260\ cm^2$$

Question 7. In Figure 2, AB || DC and DA ⊥ AB. If DC = 6 cm, CB = 8 cm and AB = 12 cm, find the area of the quadrilateral ABCD. [Hint: Draw CE ⊥ AB. Find CE from ΔCEB.]



Draw CE ⊥ AB

∴ BE = AB – AE

= 12 – 6 = 6 cm

In Δ CEB, LE = 90^0

$CE^2 + BE^2 = BC^2$

$CE^2 + 6^2 = 8^2$

$CE^2 = 64 - 36 = 28$

$CE = \sqrt{28} = 2\sqrt{7}$ cm

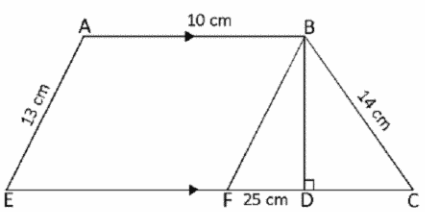
∴ Area of trapezium $= \frac{1}{2} h\ (a + b)$

$$= \frac{1}{2} \times CE\ (AB + DC)$$

$$= \frac{1}{2} \times 2\sqrt{7}\ (6 + 12)$$

$$= 18\sqrt{7}\ cm^2$$

Question 8. The parallel sides of a trapezium are 25 cm and 10 cm, while its non-parallel sides are 14 cm and 13 cm. Find the area of the trapezium.



Draw BE || AD

∴ ABED is a parallelogram

∴ AD = BE = 13 cm

In Δ BCE, BC = 14 cm, BE = 13 cm, CE = 15 cm

$S = \frac{13 + 14 + 15}{2} = 12$ cm

Or Δ BCE $= \sqrt{S(S - a)(S - b)(S - c)}$

$$= \sqrt{21(21 - 13)(21 - 14)(21 - 15)}$$

$$= \sqrt{21 \times 8 \times 7 \times 6}$$

$$= \sqrt{7 \times 3 \times 2 \times 2 \times 2 \times 7 \times 2 \times 3} \qquad = 7 \times 3 \times 2 \times 2 \quad = 84\ cm^2$$

Area of Δ BCE = 84

$$\frac{1}{2} \times CE \times BF = 84$$

$$\frac{1}{2} \times 15 \times BF = 84$$

$BT = \frac{84 \times 2}{15} = \frac{56}{5}$ cm

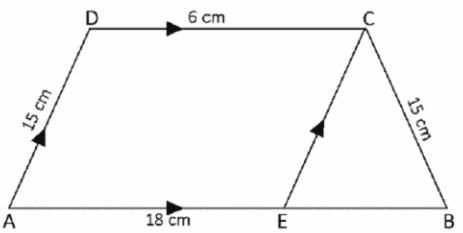
Area of 11^{gm} ABED = base × height

$= 10 \times \frac{56}{5} = 112 \text{ cm}^2$

Area of trapezium ABCD = Ar 11^{gm} ABED + Ar Δ BCE

$= 112 + 84 = 196 \text{ cm}^2$

Question 9. The parallel sides of a trapezium are 6 cm and 18 cm. Its non-parallel sides are equal, each being 15 cm. Find the area of the trapezium.



Draw CE || AD

∴ AECD is a 11^{gm}

∴ AD = CE = BC = 15 cm

BE = AB – AE = 18 – 6 = 12

Δ BCE, $S = \frac{15 + 15 + 12}{2} = 21$ cm

Or Δ BCE $= \sqrt{S(S-a)(S-b)(S-c)}$

$= \sqrt{21(21-15)(21-15)(21-12)}$

$= \sqrt{21 \times 6 \times 6 \times 9}$ $= 6 \times 3 = \sqrt{21}$ $18\sqrt{21} \text{ cm}^2$

$\frac{1}{2} \times BE \times h = 18\sqrt{21}$

$\frac{1}{2} \times 12 \times h = 18\sqrt{21}$

$h = \frac{18\sqrt{21}}{6} = 3\sqrt{21}$

Area of parallelogram = base × height

$= 6 \times 3\sqrt{21}$

$= 18\sqrt{21} \text{ cm}^2$

∴ Area of trapezium $= 18\sqrt{21} + 18\sqrt{21} = 36\sqrt{21} \text{ cm}^2$

Question 10. A field is in the shape of a trapezium (Fig. 3). Its parallel sides are 20 m and 30 m and the distance between them is 15 m. Find the cost of ploughing the field at the rate of ₹ 10 per m^2.

Area of trapezium $= \frac{1}{2} h (a + b)$

$= \frac{1}{2} \times 15 (20 + 30)$

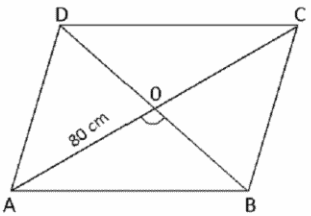
$= 15 \times 25 = 375 \text{ m}^2$

Cost of ploughing = Rate × Area

$= 10 \times 375$

∴ Cost of ploughing = ₹ 3750

Exercise 16 (C) Question 1. The perimeter of a rhombus is 164 cm. One of its diagonal is 80 cm. Find the length of the other diagonal and area of the rhombus.



Perimeter of rhombus = 164 cm

$4 \times AB = 165$

$AB = \frac{164}{4} = 41$ cm

$AO = \frac{1}{2} AC = \frac{1}{2} \times 80 = 40$ cm

In Δ AOB, $\angle O = 90^0$

$AB^2 = AO^2 + BO^2$

$(41)^2 = (40)^2 + BO^2$

$41^2 - 40^2 = BO^2$

$(41 - 40)\ (41140) = BO^2$

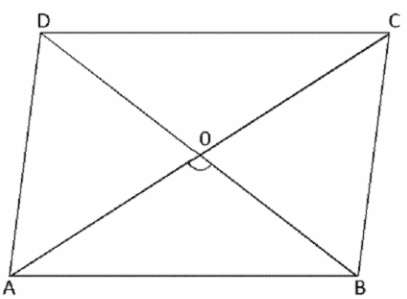
$\therefore$ $BO = \sqrt{81} = 9$ cm

$BD = 2BO = 2 \times 9 = 18$ cm

$\therefore$ Other diagonal = 18 cm

Area of rhombus $= \frac{1}{2} \times d_1 \times d_2 = \frac{1}{2} \times 18 \times 80 = 720$ cm^2

Question 2. The sides of a rhombus are 5 cm each and one diagonal is 8 cm. Calculate the length of the other diagonal and the area of the rhombus.



AB = 5 cm

AC = 8 cm

$\therefore$ $AO = \frac{1}{2} AC = \frac{1}{2} \times 8 = 4$ cm

In Δ AOB, $O = 90^{02}$

$AO^2 + BO^2 = AB^2$

$4^2 + BO^2 = 5^2$

$BO^2 = 25 - 16 = 9$

$BO = \sqrt{9} = 3$

$\therefore$ $BD = 2BO = 2 \times 3 = 6$ cm

$\therefore$ Other diagonal = 6 cm

Area of rhombus $= \frac{1}{2} \times d_1 \times d_2 = \frac{1}{2} \times 6 \times 8 = 24$ cm^2

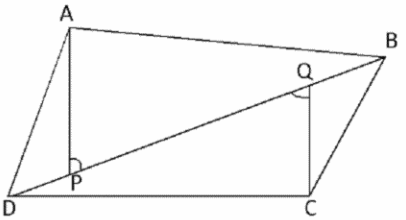
Question 3. The length of the diagonals of a field in the form of a quadrilateral is 48 m. The perpendicular distances of the other two vertices from this diagonal are 10 m and 16 m (as shown in Figure 1). Find the area of the field.

Area = $\frac{1}{2}$ × One diagonal × Sum of lengths of the perpendicular drawn it on remaining two vertices

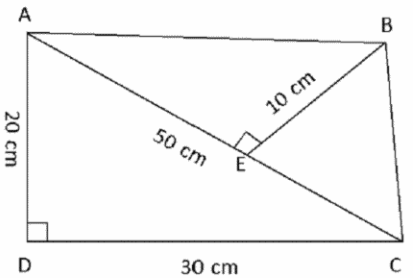
Area = $\frac{1}{2} \times 48\ (10 + 16)$

24(26)

624 **Ans.**



Question 4. In Figure 2, the measurements are given on the figure itself. Find the area of quadrilateral ABCD.



Area Δ ADC $= \frac{1}{2} \times AD \times DC$

$= \frac{1}{2} \times 20 \times 30$

$= 300\ cm^2$

Area Δ ABC $= \frac{1}{2} \times AC \times BE$

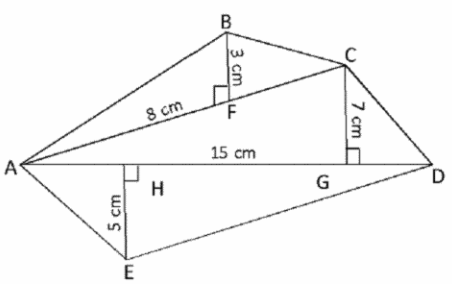
$= \frac{1}{2} \times 50 \times 10$

$= 250\ cm^2$

Area Δ ABCD = Area Δ ADC + Area Δ ABC

$= 300 + 250 = 550\ cm^2$

Question 5. Find the area of pentagon ABCDE (Fig. 3) in which BE $\perp$ AC, CG $\perp$ AD and EH $\perp$ AD, such that AC = 8 cm, AD = 15 cm, BF = 3 cm, CG = 7 cm and EH = 5 cm.



AC = 8 cm AD = 15 cm

BF = 3 cm CG = 7 cm

EH = 5 cm

Area Δ ABC $= \frac{1}{2} \times AC \times BF$

$= \frac{1}{2} \times 8 \times 3$

$= 12\ cm^2$

Area Δ ADC $= \frac{1}{2} \times AD \times CG$

$= \frac{1}{2} \times 15 \times 7$

$= 52.5\ cm^2$

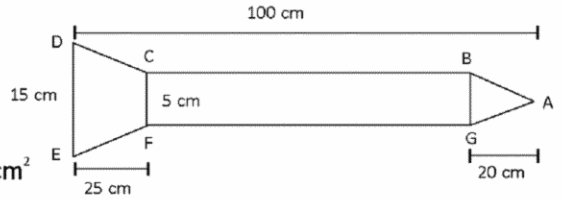
Area Δ ADE $= \frac{1}{2} \times AD \times EH$

$= \frac{1}{2} \times 15 \times 15$

$= 37.5\ cm^2$

Area of pentagon ABCDE = 12 + 52.5 + 37.5 = 102 cm^2

Question 6. Find the area of the given figure ABCDEFG as per dimensions given in it (Fig. 4).



Area Δ ABG $= \frac{1}{2} \times BG \times 20$

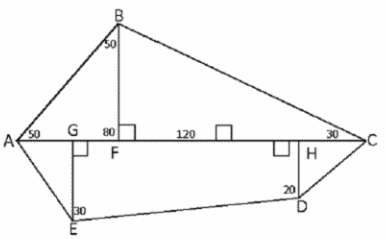
Area Δ ABG $= \frac{1}{2} \times BG \times 20$

Area Δ ABG = BC × BG = 55 × 5 = 275 cm^2

Area trapezium FCDE = $\frac{1}{2} \times 25\ (15 + 5) = 250\ cm^2$

Area of the figure = 50 + 275 + 250 = 575 cm^2

Question 7. The given Figure 5 is a pentagonal field which is ploughed at the rate of ₹ 5.50 per m^2. Find the cost of ploughing it if AH = 120 m, AF = 80 m, AG = 50 m, HC = 30 m, BF = 50 m, EG = 30 m and HD = 20 m.



Area Δ AFB $= \frac{1}{2} \times BF \times 20$

$= \frac{1}{2} \times 50 \times 30 = 750\ m^2$

Area Δ GEDH $= \frac{1}{2}$ GH (GE + HD)

$= \frac{1}{2} \times 70\ (30 + 20)$ (AH – AG = GH)

$= 35 \times 50 = 1750\ m^2$

Area Δ CHD $= \frac{1}{2} \times CH \times HD$

$= \frac{1}{2} \times 30 \times 20 = 300\ m^2$

Area Δ BFC $= \frac{1}{2} \times CF \times BF$

$= \frac{1}{2} \times 40 \times 50 = 1000\ m^2$

Area Δ AFC $= \frac{1}{2} \times AF \times BF$

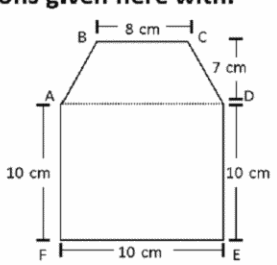
$= \frac{1}{2} \times 80 \times 50 = 2000\ m^2$

Area of given figure = 750 + 1750 + 300 + 1000 + 2000 = 5800 m^2

Cost of ploughing = Rate × Area

= 5.5 × 5800 = ₹ 31900

Question 8. Find the area of hexagonal park ABCDEF (Fig. 6) as per dimensions given here with.



Area of AFED = AF × FE = 10 × 10 = 100 cm^2

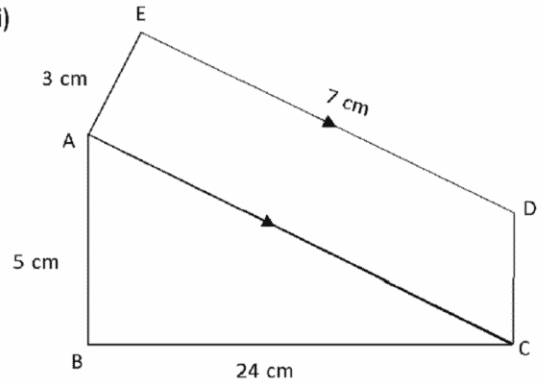
Area of ABCD $= \frac{1}{2} \times 7\ (10 + 8) = 63\ cm^2$

Area of the given figure = 100 + 63

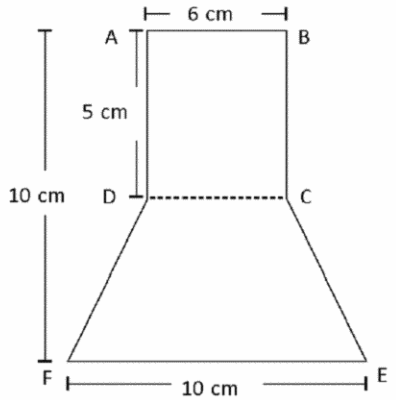
= 163 cm^2

Question 9. Find the area enclosed by each of the following figures:

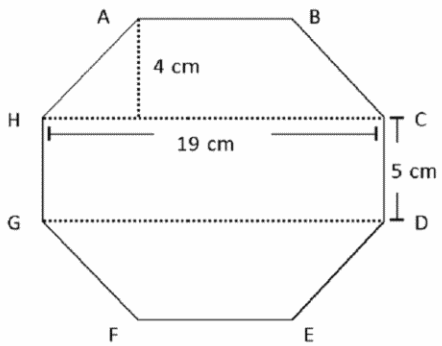
(i)



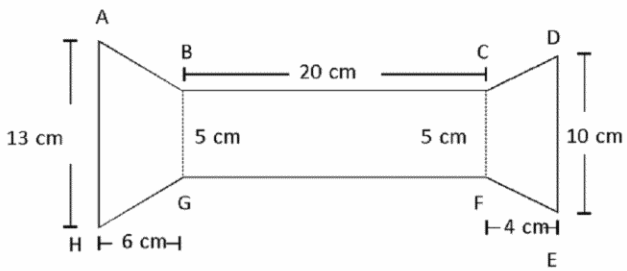
(ii)



(iii)



(iv)



(i) Wrong Figure

AC = 7 cm is not possible

AB + AC $\angle$BC

(ii) Area of ABCD = AB × AC

= 5 × 6 = 30 cm^2

Area of CDFE = $\frac{1}{2}$ × 5 (10 + 6)

= 5 × 8 = 40 cm^2

Area of the figure = 30 + 40 = 72 cm^2

(iii) Incomplete Data

(iv) Area Δ ABGH = $\frac{1}{2}$ × 6 (13 + 5)

= 3 × 18 = 54 cm^2

Area of Δ BCFG = l × b = 20 × 5

= 100 cm^2

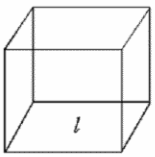
Area Δ CFED = $\frac{1}{2}$ × 4 (5 + 10)

= 2 × 15 = 30 cm^2

Area of the figure = 54 + 100 + 30 = 184 cm^2

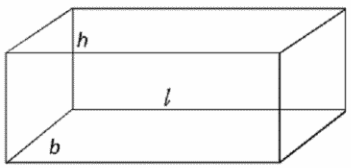
CHAPTER 17. SURFACE AREA AND VOLUME OF SOLIDS

Area of 4 walls of cube	$= 4 \times \text{side}^2$	unit^2
Total area of cube	$= 6 \times \text{side}^2$	unit^2
Volume of cube	$= \text{side}^3$	unit^3



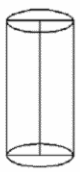
Cuboid

Area of 4 walls	$= 2h\ (l + b)$	Unit^2
Total area	$= 2\ (lb + bh + hl)$	Unit^2
	$= l \times b \times h$	Unit^3



Diesel Cylinder

Curved surface area	$= 2\pi rh$	Unit^2
Total surface area	$= 2\pi r(rth)$	Unit^2
Volume	$= \pi r^2 h$	Unit^3



Question 1. Find edge of a cube whose surface area is 600 cm^2.

	Surface area of cube	$= 600\ \text{cm}^2$
	$6 \times \text{side}^2$	$= 600\ \text{cm}^2$
	Side^2	$= \frac{600}{6} = 100$
	Side	$= \sqrt{100} = 10$
$\therefore$	Side of cube	$= 10$ cm

Question 2. If each side of a cube is increased by 10%, find the percentage increase in its surface area.

Let the side of cube is	$= 100$ cm	
Surface area of cube	$= 6 \times (100)^2$	$= 60000\ \text{cm}^2$
Length of side when 10% increased	$= 100 + 100$	$= 110$ cm
Surface area of cube	$= 6\ (\text{side})^2 = 6\ (110)^2$	
	$= 72600\ \text{cm}^2$	
% increase area	$= \frac{\text{Increased Area}}{\text{Original Area}} \times 100$	
	$= \frac{72600 - 60000}{60000} \times 100$	
	$= \frac{12600}{600} = 21$	
% increase area	$= 21\%$	

Question 2. Find the lateral surface area and total surface area of a cuboid whose length, breadth and height are 40 cm, 20 cm and 20 cm respectively.

Lateral surface area	$= 2h\ (l + b)$
	$= 2 \times 20\ (40 + 20)$

$= 2400 \text{ cm}^2$

Total surface area $= 2(lb + bh + hl)$

$= 2(40 \times 20 + 20 \times 20 + 20 \times 40)$

$= 2\ (800 + 400 + 800)$

$= 4000 \text{ cm}^2$

Question 4. The perimeter of each face of a cube is 16 cm. Find its lateral surface area.

Perimeter of each face of cube = 16 cm

$4 \times \text{side} = 16$

$\therefore$ Side $= \frac{16}{4} = 4$ cm

Lateral surface area of cube $= 4 \times \text{side}^2 = 4\ (4)^2 = 64 \text{ cm}^2$

Question 5. Find the surface area of a cube whose edge is 10 cm.

Total surface area of cube $= 6a^2$

$= 6(10)^2 = 600 \text{ cm}^2$

Question 6. Gori needs to cover a wooden block with a chart paper for her project. If the length, breadth and height of a box are 40 cm, 20 cm and 10 cm respectively, how many square sheets of paper of side 20 cm would she require?

Total surface area of cuboid $= 2(lb + bh + hl)$

$= 2(40 \times 20 + 20 \times 10 + 10 \times 40)$

$= 2(800 + 200 + 400)$

$= 2800 \text{ cm}^2$

Area of square sheet $= (\text{side})^2$

$= (20)^2 = 400 \text{ cm}^2$

Number of sheet required $= \frac{\text{Area of cuboid}}{\text{Area of 1 sheet}} = \frac{2800}{400} = 7$

Question 7. The dimensions of a cuboid tin are 20 cm × 30 cm × 40 cm. Find the cost of tin required for making 10 such tins, if the cost of tin sheet is ₹ 10 per sq. m.

Total Area of 1 cuboid $= 2(lb + bh + hl)$

$= 2(20 \times 30 + 30 \times 40 + 40 \times 20)$

$= 2(600 + 1200 + 800)$

$= 5200 \text{ cm}^2$

Total area for 10 ten box $= 5200 \times 10$

$= 52000 \text{ cm}^2 \quad = 5.2 \text{ m}^2$

Cost of ten sheet = Rate × Area of sheet

$= 10 \times 5.2$

$= ₹ 52$

Question 8. A box made of sheet metal costs ₹ 2820 at the rate of ₹ 30 pr square metre. If the box is 5 m long, 4 m wide, find its height.

Cost of sheet metal $= ₹\ 2820$

Area of sheet metal $= \frac{\text{Total cost}}{\text{Rate}}$

$2(l \times b + b \times h + h \times l) = \frac{2820}{30}$

$2(5 \times 4 + 4 \times h + 5 \times h) = 94\ m^2$

$40 + 18h = 94$

$18\ h = 94 - 40$

$h = \frac{54}{18} = 3$

$\therefore$ Height of box is 3 m.

Question 9. The surface area of a cuboid is 2200 cm^2. If its length and breadth are 30 cm and 20 cm respectively, find its height.

Total surface area $= 2200\ cm^2$

$2(lb + bh + hl) = 2000$

$lb + bh + hl = \frac{2200}{2}$

$30 \times 20 + 20 \times h + h \times 30 = 1100$

$50h = 1100 - 600$

$h = \frac{500}{50} = 10$

$\therefore$ Height of cuboid $= 10$ cm

Question 10. The length, breadth and height of a cuboid are in the ratio 3 : 3 : 1 and its total surface area is 2200 m^2. Find the dimensions of the cuboid.

Ratio of length breadth and height = 3 : 3 : 1

Length, breadth and height is 3x, 3x and x respectively

Total surface area = 2200 m^2

$2(3x \times 3x + 3x \times x + x \times 3x) = 2200$

$2(9x^2 + 3x^2 + 3x^2) = 2200$

$30x^2 = 2200$

$x^2 = \frac{2200}{30} = \frac{1100}{15}$

$x = 10 \times \sqrt{\frac{11}{15}}$

$\therefore$ length $= 3x = 3 \times 10\sqrt{\frac{11}{15}} = 30\sqrt{\frac{11}{15}}$ cm

$\therefore$ breadth = $3x = 3 \times 10\sqrt{\frac{11}{15}} = 30\sqrt{\frac{11}{15}}$ cm

$\therefore$ height = $x = 10\sqrt{\frac{11}{15}} = 10\sqrt{\frac{11}{15}}$ cm

Question 11. Three cubes each of side 4 cm are joined end to end. Find the surface area of the resulting cuboid.

Three cube of 4 cm are joined end to end

$\therefore$ Length of cuboid $= 4 \times 3 = 12$ cm

Breadth and height of cuboid $= 4$ cm each

Total surface area of cuboid $= 2(lb + bh + hl)$

$= 2(12 \times 4 + 4 \times 4 + 4 \times 12)$

$= 2(48 + 16 + 48)$

$\therefore$ Total surface area of cuboid $= 224\ cm^2$

Question 12. The diameter of a circular well is 14 cm and its depth is 10 m. Find the cost of cementing the inner curved surface of the well at the rate of ₹ 3 per m^2.

Curved surface area of well (cylindrical shape) $= 2\pi rh$

$= 2 \times \frac{22}{7} \times \frac{14}{2} \times 10$

$= 440\ m^2$

Cost of cementing = Rate × Area

$= 3 \times 440$

$=$ ₹ 1320

Question 13. An open water tank 6 m long 3 m wide 4 m deep is to be made. Determine the cost of iron sheet required at the rate of ₹ 25 per m, if the sheet is 2 m wide.

Total surface area of open tank = Area of 4 walls + Area of base

$= 2h(l + b) + l \times b$

$= 2 \times 4(6 + 3) + 6 \times 3$

$= 72 + 18$

$= 90\ m^2$

Area of sheet = Area of open tank

length × width $= 90$

length × 2 $= 90$

Length of sheet $= \frac{90}{2} = 45$ m

Cost of sheet = Rate × length of sheet

$= 25 \times 45 = 1125$

Cost of sheet = ₹ 1125

Question 14. Twenty-one cylindrical pillars of a building have to be cleaned. If the diameter of each pillar is 14 cm and the height is 2 cm, find the cost of cleaning them at the rate of ₹ 2 per cm.

C.S.A. = Curve Surface area

C.S.A. of 1 pillar $= 2\pi rh$

$= 2 \times \frac{22}{7} \times \frac{14}{2} \times 2 \text{ cm}^2$

$= 88 \text{ cm}^2$

C.S.A. of 21 pillar $= 88 \times 21 \text{ cm}^2$

$= 1848 \text{ cm}^2$

Cost of Cleaning of 11 pillar = Rate × Area of pillar

$= 2 \times 1848$

$= ₹ 3696$

Question 15. A circular tunnel of diameter 7 m and length 2 km is dug out. Find the cost of plastering it at ₹ 150 per m^2.

Curve surface of area of tunnel $= 2\pi rh \text{ m}^2$ (1 km = 1000 m)

$= 2 \times \frac{22}{7} \times \frac{7}{2} \times 2 \times 1000$

$= 44000 \text{ m}^2$

Cost of plastering = Rate × Area of tunnel

$= 150 \times 44000 = ₹ 6600000$

$\therefore$ Cost of plastering of tunnel is ₹ 6600000

Question 16. Prem Bisnnoi built a cubical water tank with lid for his house, with each outer edge equal to 10 cm. He gets the outer surface of tank including the base, covered with square tiles of side 10 cm. Find how much he would spend for tiles if the cost of tiles is ₹ 480 per tile.

Total surfaced area of cubical water tank $= 6a^2$

$= 6 \times 10 \times 10 = 600 \text{ cm}$

No. of tiles required $= \frac{\text{Total area}}{\text{Area of 1 tile}} = \frac{600}{10 \times 10} = 6$

Cost of 6 tiles = Rate × 6

$= 480 \times 6$

$\therefore$ Cost of tiles $= ₹ 2880$

Question 17. Find the curved surface area and the total surface area of a cylinder whose radius is 7 m and height is 3m.

Curved surface area of cylinder $= 2\pi rh \text{ m}^2$

$= 2 \times \frac{22}{7} \times 7 \times 3 \text{ m}^2$

$= 132 \text{ m}^2$

Total surface area of cylinder $= 2\pi r^2 + 2\pi rh$

$= 2 \times \frac{22}{7} \times 7 \times 7 + 2 \times \frac{22}{7} \times 7 \times 3$

$= 308 + 132$

$\therefore$ T.S.A. of cylinder $= 440\ m^2$

Question 18. The area of the curved surface of a cylinder is 4400 cm^2 and the circumference of its base is 110 cm. Find the height of the cylinder.

Curved surface area of cylinder $= 2\pi rh$

$\therefore$ $2\pi rh = 4400\ cm^2$ ..... (i)

Circumference of base $= 110\ cm^2$

$2\pi r = 110$ ..... (ii)

From (i) & (ii) $\frac{2\pi rh}{2\pi r} = \frac{4400}{110}$

$\therefore$ $h = 40$

Height of the cylinder = 40 cm

Question 19. A road roller is cylindrical in shape. Its circular end has a diameter 140 cm and its width is 40 cm. Find the least number of revolutions that the roller must make in order to level a playground 880 cm × 40cm.

1 Revolution of roller = Curved surface area of roller

$= 2\pi rh$

$= 2 \times \frac{22}{7} \times \frac{140}{2} \times 40\ cm^2$

$= 17600\ cm^2$

Number of revolution $= \frac{\text{Area of playground}}{\text{Area of one revolution}}$

$= \frac{880 \times 40}{17600}$ = 2 revolutions

HIGH ORDER THINKING SKILLS (HOTS)

Question 20. The length and breadth of a cuboid are in the ratio 4 : 5. The height and total surface area of the cuboid are 18 cm and 3276 cm^2 respectively. Find its length and breadth.

Ratio of length and breadth 4 : 5

$\therefore$ Length and breadth of cuboid is 4x and 5x cm respectively

Total surface are of cuboid $= 3276\ cm^2$

$2(lb + bh + hl) = 3276$

$lb + bh + hl = \frac{3276}{2} = 1638$

$4x \times 5x + 5x \times 18 + 18 \times 4x = 1638$

$20x^2 + 90x^2 + 72x^2 = 1638$

$182x^2 = 1638$

$\therefore \quad x^2 = \frac{1638}{182} = 9$

$\therefore \quad x^2 = \sqrt{9} = 3$

Length of cuboid = 4x = 12 cm

Breadth of cuboid = 5x = 15 cm

Question 21. The cost of papering the four walls of a room 121 m long at the rate of ₹ 1.45 per sq. m is ₹ 365.40 and the cost of matting the floor at the rate of 95 paise per sq. m is ₹ 102.60. Find the height of the room.

Cost of papering of 4 walls = ₹ 365.40

Area of papering of 4 walls = $\frac{365.40}{1.45} = 252\ m^2$

$2h(l + b) = 252$

$h(l + b) = \frac{252}{2} = 126\ m^2$ ..... (ii)

Cost of matting = 102.60

Area matting = $\frac{102.60}{0.95} = 108\ m^2$

$l \times b = 108\ m^2$

$12 \times b = 108$

$b = \frac{108}{12} = 9\ m$ ..... (ii)

From euq. (i)

$h(12 + 9) = 126$

$h = \frac{126}{8} = 7$

$\therefore$ Height of the cuboid is 7 m.

Question 22. The heights of two right circular cylinders are in the ratio 5 : 4. If their radii are in the ratio 2 : 3, find the ratio of their curved surface areas.

Ratio of heights = 5 : 4

$\therefore$ Height of two cylinder 5x and 4x respectively

Ratio of radius = 2 : 3

$\therefore$ Radius of two cylinder 2y and 3y respectively

Ratio of curved surface area of two cylinder $= \frac{2\pi r_1 h_1}{2\pi r_2 h_2}$

$= \frac{2y \times 5x}{3y \times 4x} = = 5 : 6$

Exercise 17 (B) Question 1. A matchbox measures 6 cm × 3 cm × 2 cm. What will be the volume of a packet containing 12 dozen such boxes?

Volume of matchbox $= l \times b \times h$

$= 6 \times 3 \times 2\ cm^2$

$= 36\ cm^3$ (1 dozen = 12 pocket)

Volume of box containing 12 dozen watch box $= 36 \times 12 \times 12$

$= 5184\ cm^3$

Question 2. A river 3.5 m deep and 40 m wide is flowing at the rate of 3.6 km/h. Find the volume of water that goes into the sea per minute.

Speed of stream $= 3.6$ km/hr $\left[\begin{matrix}1\text{ km} = 1000\text{ m} \\ 1\text{ hr} = 3600\text{ see}\end{matrix}\right]$

$= \frac{3.6 \times 1000}{60 \times 60}$ 1m=sec

Area of cross section of river $= h \times b$

$= 3.5 \times 40 = 140\ m^3$

Water discharge in 1 sec = Speed of strew × Area of cross section

$= 1 \times 140\ m^3$

Water discharge into sea in 1 minute $= 140 \times 60 = 8400\ m^3$

Question 3. The perimeter of one face of a cube is 25 cm. Find the volume of the cube.

Perimeter of 1 face of a cube = 25 cm

$4 \times$ side = 25 cm

$\therefore$ Side $= \frac{25}{4} = 6.25$ cm

Volume of cube $= (side)^3 = (6.25)^3$

Volume of cube $= 244.14\ cm^3$

Question 4. A cuboidal tank is 10 m long, 5 m wide and 4 cm deep. How many litres of water can it hold? [1 m^3 = 1000 litres]

Volume tank $= l \times b \times h$

$= 10 \times 5 \times \frac{4}{100}$ (1 m = 100 cm)

$= 2\ m^3$

$\therefore$ Volume of tank $= 2 \times 1000$

$= 2000$ litre

Question 5. A certain quality of wood costs ₹ 250 per m^3. A solid cubical block of such wood is bought for ₹ 182.55. Calculate the volume and the length of one edge of the block.

Cost of wood $= ₹\ 250\ m^3$

Cost of cubical block $= ₹\ 182.55$

Volume of block $= \frac{182.55}{250} = \frac{18255}{25000}$

Volume of block $= \frac{3651}{5000}\ m^3$

Volume of block $= \sqrt[3]{\frac{3651}{5000}}\ m$

Question 6. The volume of a cuboid is 4800 cm^3 and its height is 24 cm. If the length and breadth are in the ratio 5 : 1, find its length and breadth.

Ratio of length and breadth 5 : 1

$\therefore$ Length and breadth is 5x and x respectively

Volume of cuboid = 4800 cm^3

lbh = 4800

$5x \times x \times 24 = 4800$

$x^2 = \frac{4800}{120} = 40$

$x = \sqrt{40}$ 2 10

$\therefore$ Length of cuboid = $5x = 10\sqrt{10}$

$\therefore$ Breadth of cuboid = $x = 2\sqrt{10}$

Question 7. The area of a rectangular playground is 4800 m^2. Find the cost of covering it with gravel 1 cm deep, if the gravel costs ₹ 260 per cubic metre.

Volume of play ground 1 cm deep = l × b × h

$= 4800 \times \frac{1}{100}$ (1 m = 100 cm)

$\therefore$ Volume of play ground = 48 m^3

$\therefore$ Cost of the gravel = Rate × Volume of play ground

= 260 × 48

$\therefore$ Cost of the gravel = ₹ 12480

Question 8. A child playing with building blocks which are of the shape of cubes, has build a structure as shown in Figure 1. If the edge of the cube is 4 cm, find the volume of the structure built by the child.

Number of cubes = 10

Volume of 1 cube = $(side)^3 = (4)^3$ cm^3

= 64 cm^3

Volume of structure = $10 \times 64 = 640$ cm^3

Question 9. A closed box is made of wood which is 2 cm thick. If the external dimensions of the box are 25 cm, 18 cm and 15 cm, find the following. (i) Capacity of the box (ii)Volume of wood in it. (iii) Mass of the box if 1 cm^3 of wood has a mass of 10 g

(i) Inner length of the box = $25 - 2 \times 2 = 21$ cm

Inner breadth of the box = $18 - 2 \times 2 = 14$ cm

Inner height of the box = $15 - 2 \times 2 = 11$ cm

Capacity of the box = volume of the box

= l × b × h cm^3

= $21 \times 14 \times 11$ cm^3

$= 294 \times 11 = 3234\ cm^3$

Outer volume of box $= 25 \times 18 \times 15\ cm^3$

$= 450 \times 15$

$= 6750\ cm^3$

Volume of wood $= 6750 - 3234 = 3416\ cm^3$

Mass of the box $= V \times d = 3516 \times 10\ gm$

$= 35160\ gm$

$= 35.160\ kg$ (1 kg = 1000 gm)

Question 10. A cube of metal of 6 cm edge is melted and cast into a cuboid whose base is 9 cm × 8 cm. Find the height of the cuboid.

Volume of the cube $= (side)^3$

$= (6)^3 = 216\ cm^3$

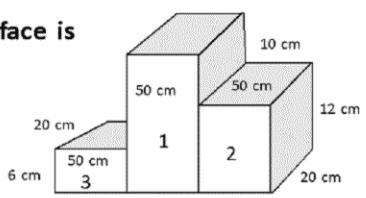
Volume of cuboid = volume of cube

$9 \times 8 \times h = 216$

$h = \frac{216}{72} = 3\ cm$

$\therefore$ Height of the cuboid is 3 cm

Question 11. The given Figure 2 shows a victory stand whose each face is rectangular. Find its volume.



Volume 3rd position victory stand $= l \times b \times h$

$= 20 \times 50 \times 6$

$= 6000\ cm^3$

Volume of 2nd position victory stand $= 20 \times 12 \times 50$

$= 12000\ cm^3$

Volume of 1st position victory stand $= 20 \times 50 \times 22$

$= 22000\ cm^3$

Question 12. A well 14 m in radius and 20 m deep has to be dug. Find the cost of digging the well at ₹ 2 per cubic metre.

Well = cylindrical shape

Volume of well $= \pi r^2 h\ m^3$

$= 2 \times \frac{22}{7} \times 14 \times 14 \times 20$

$= 28 \times 22 \times 20$

$= 12320\ m^3$

Cost of digging the well = Volume of well × Rate

$= 12320 \times 2$

$= ₹\ 24640$

Question 13. Find the capacity (in litres) of a cylindrical storage tank of height 10 m and base diameter 14 cm.

Volume of tank $= Z\pi r^2 h \text{ m}^3$

$= \frac{22}{7} \times \frac{14}{200} \times \frac{14}{200} \times 10$

$= \frac{1540}{10000} \text{ m}^3 = \frac{154}{1000} \text{ m}^3$ $(1\text{m}^3 = 1000 \text{ litre})$

$= \frac{154}{1000} \times 1000 = 154 \text{ litre}$

$\therefore$ Volume of tank $= 154$ litre

Question 14. The radius and height of a cylinder are in the ratio 2 : 7 and its volume is 704 cm^3. Find its radius.

Ratio of radius and height = 2 : 7

$\therefore$ Radius and height of cylinder is 2x and 7x cm respectively

Volume of tank $= 704 \text{ cm}^3$

$\pi r^2 h = 704$

$\frac{22}{7} \times 2x \times 2x \times 7x = 704$

$x^3 = \frac{704}{88} = 8$

$\therefore \quad x = 3\sqrt{8} = 2$

$\therefore$ Radius of the cylinder = 2x = 4 cm

Question 15. How many litres of water flows out of a pipe having an area of cross section 10 cm^2 in 2 minute, if the speed of water in the pipe is 30 cm/s?

Water flow in pipe in 1 second = Area of cross section × Speed of water

$= 10 \times 30 = 300 \text{ cm}^3/\text{sec}$

In 2 minutes $= 300 \times 120 \text{ cm}^3$

$= \frac{300 \times 120}{1000}$ litre

$= 36$ litre

Question 16. A cylindrical tube, open at both ends is made of metal. The internal diameter of the tube is 20 cm and its length is 25 cm. The thickness of the metal is 1 cm everywhere. Calculate the volume of the metal.

Outer radius of tube $= \frac{20}{2} + 1 = 11$ cm

Outer radius of tube $= \frac{20}{2} = 10$ cm

Length of tube $= 25$ cm

Volume of the metal $= \pi(R^2 - r^2)h$

$= \pi(11^2 - 10^2) \times 25$

$$= \frac{22}{7}(121 - 100) \times 25$$

$$= \frac{22}{7} \times 21 \times 25$$

$$= 66 \times 25$$

$$= 1650 \text{ cm}^3$$

Question 17. What length of a solid cylinder 7 cm in diameter must be taken to recast into a hollow cylinder of external diameter 20 cm, 1 cm thick and 15 cm long?

Volume of metal in hollow cylinder $= \pi(R^2 - r^2)h$

$= \pi(10^2 - 9^2) \times 15$

$= \pi(100 - 81) \times 15$

$= \pi \times 19 \times 15$

Let the length of the solid cylinder be x cm

Volume of solid cylinder $= \pi \text{ x} \times \left(\frac{7}{2}\right)^2$

$\pi \times \frac{49}{4} \times x = \pi \times 19 \times 15$

$x = \frac{\pi \times 19 \times 15 \times 4}{\pi \times 49} = \frac{19 \times 60}{49} = \frac{1140}{49}$ cm

Question 18. A powder tin has a square base with side 14 cm and height 20 cm. Another powder tin is cylindrical whose base diameter is 14 cm and height is 20 cm. Which powder tin has more capacity and by how much?

Volume of square base tin $= l \times b \times h$

$= 14 \times 14 \times 20 \text{ cm}^3$

$= 3920 \text{ cm}^3$

Volume of cylindrical tin $= \pi r^2 h$

$= \frac{22}{7} \times 7 \times 7 \times 20 = 3080 \text{ cm}^3$

Square tin has more capacity than cylindrical tin $3920 - 3080 = 840 \text{ cm}^3$

840 cm^3 more capacity of square tin than cylindrical tin

Question 19. 2 cm^3 of copper is drawn into a wire 0.2 mm in diameter. Find the length of the wire.

Let the length of wire by x cm

Volume of wire = 2 cm^3

$\pi r^2 h = 2$

$\frac{22}{7}\left(\frac{0.2}{20}\right)^2 \times x = 2$

$\frac{22}{7} \times \frac{1}{100} \times \frac{1}{100} \times x = 2$

$$x = \frac{2 \times 7 \times 100 \times 100}{22} \text{ cm}$$

$$x = \frac{2 \times 7 \times 100}{22} \text{ m}$$

$$x = 63.636 \text{ m}$$

$\therefore$ length of wire 63.64 m.

HIGH ORDER THINKING SKILLS (HOTS)

Question 20. A classroom is 10 m long, 6 m wide and 4 m high. If each students be given 1.5 m^2 of floor area, how many students can be accommodated in the room? How many cubic metre of air would each student get?

Area of floor $= l \times b$

$= 10 \times 6 = 60 \text{ m}^2$

Number of student accommodated in the room $= \frac{\text{Area of the floor}}{\text{1 student cover areas}}$

$= \frac{60}{1.5} = 40$

Number of students accommodated $= 40$

Volume of room $= l \times b \times h$

$= 10 \times 6 \times 4 = 240 \text{ m}^3$

1 student gets air $= \frac{\text{Volume of room}}{\text{Number of students}}$

$= \frac{240}{40} = 6 \text{ m}^3$

Question 21. On an average each person in a village requires 150 litres of water per day. The village if the water in the tank is sufficient for 2 days.

Ans. **Do yourself::-**

Question 22. The curved surface area of a cylinder is 4400 cm^2 and the circumference of its base is 110 cm. Find the volume of the cylinder.

C.S.A. of cylinder $= 4400 \text{ cm}2$

$2\pi rh = 4400 \text{ cm}$ ..... (1)

Circumference of base = 110 cm

$2\pi r$ = 110 cm ..... (ii)

From (i) & (ii) $\frac{2\pi rh}{2\pi r} = \frac{4400}{110}$ **TIME AND WORK**

$\therefore$ h = 40

From (2) $2 \times \frac{22}{7} \times r = 110$ $\Rightarrow$ $r = \frac{110 \times 7}{2 \times 22} = \frac{35}{2}$

Volume of cylinder $= \pi r^2 h$

$= \frac{22}{7} \times \frac{35}{2} \times \frac{35}{2} \times 40$

$= 22 \times 5 \times 35 \times 10$

Volume of cylinder = 38500 cm^3

Question 23. A solid cylinder has a total surface area of 462 cm^2. Its curved surface area is one-third of its total surface area. Find the volume of the cylinder.

T.S.A. = 462 cm^2

$2\pi r(r+h) = 462\ cm^2$ ..... (1)

C.S.A. $= \frac{1}{3} \times$ T.S.A

$2\pi rh = \frac{1}{3} \times 462$

$2 \times \frac{22}{7} \times r \times h = 154$ ..... (2)

From (1) & (2) $\frac{2\pi r(r+h)}{2\pi r} = \frac{462}{154}$

$= \frac{r+h}{h} = 3$

$= r + h + 3h$

$\therefore$ $2h = r$ ..... (2)

From equ. (2) & (3) $2 \times \frac{22}{7} \times 2h \times h = 154$

$h^2 = \frac{154 \times 7}{2 \times 22 \times 2} = \frac{7 \times 7}{2 \times 2}$ $\therefore$ $h = \frac{7}{2}$

From equ. (3) $r = 2 \times \frac{7}{2} = 7$ cm

Volume of cylinder $= \pi r^2 h$

$= \frac{22}{7} \times 7 \times 7 \times \frac{7}{2} = 539\ cm^3$

CHAPTER 18. TIME AND WORK Exercise 18 (A) Question 1. Ram can remove the weeds from a garden in 20 days and Shayam can do the same work in 30 days. How long will they take to remove the weeds when working together?

Time taken by Ram to remove the weeds = 20 days

$\therefore$ Ram's 1 day work = $\frac{1}{20}$ work

Time taken by Shyam to remove the weeds = 30 days

$\therefore$ Shyam's 1 day work $= \frac{1}{30}$ work

(Ram + Shyam)'s 1 day work $= \frac{1}{20} + \frac{1}{30}$

$= \frac{30 + 20}{600} = \frac{1}{12}$

$\therefore$ Ram + Shyam can do remove the weeds from the garden = 12 days

Question 2. A can do a piece of work in 12 days and B in 18 days. They worked together for 4 days when A fell ill and B had to complete the remaining work. In how many days was the work completed?

A can do the work = 12 days

$\therefore$ A's 1 day work $= \frac{1}{12}$ days

B can do the work = 18 days

$\therefore$ B's 1 day work $= \frac{1}{18}$ days

(A+B)'s 1 day work $= \frac{1}{12} + \frac{1}{18} = \frac{3 + 2}{36} = \frac{5}{36}$ work

(A+B)'s 4 day work $= 4 \times \frac{5}{36} = \frac{5}{9}$ work

Remaining work $= 1 - \frac{5}{9} = \frac{4}{9}$ work

B completes the remains work $= 18 \times \frac{4}{9} = 8$ days

$\therefore$ B completes the remaining work = 8 days

Question 3. P and Q can do a piece of work in 30 days. P alone can complete this work in 45 days. In how many days can Q alone do it?

Let Q can do the work in x day

Q's 1 days work $= \frac{1}{x}$ work

(P+Q)'s one day work $= \frac{1}{30}$

P's 1 day work $= \frac{1}{45}$ work

$\therefore$ $\frac{1}{x} + \frac{1}{45} = \frac{1}{30}$

$\therefore$ $\frac{1}{x} = \frac{1}{30} = \frac{1}{45}$

$= \frac{3 - 2}{90} = \frac{1}{90}$

x = 90

Q can do the work in 90 days

Question 4. A, B and C working together can finish a piece of work in 5 hours. A alone can do it in 10 hours and B alone can do it in 15 hours. In how many hours will C alone do the same work?

(A + B + C)'s 1 day work $= \frac{1}{12}$ hours

A's 1 hour work $= \frac{1}{10}$

B's 1 hour work $= \frac{1}{15}$

(A + B + C)'s 1 day work $= \frac{1}{5}$

$\frac{1}{10} + \frac{1}{15}$ + C's 1 hour work $= \frac{1}{5}$

C's 1 hour work $= \frac{1}{5} - \frac{1}{10} - \frac{1}{15}$

$= \frac{6-3-2}{30} = \frac{1}{30}$

C can complete the work = 30 hours

Question 5. Two inlet pipes A and B can fill an empty cistern in 4 hours and 8 hours, respectively. If both are opened together in the empty cistern, how much time will they take to fill it completely?

A fills the tank = 4 hours

A's fills in 1 hour $= \frac{1}{4}$

Similarly B's fill in 1 hour $= \frac{1}{8}$

(A + B)'s fill in 1 hour $= \frac{1}{4} + \frac{1}{8} = \frac{3}{8}$ hours

(A + B)'s fill the tank $= \frac{8}{3}$ hours = 2 hours 40 minutes

Question 6. Anjali can complete $\frac{1}{3}$ of a work in 10 days and Harish can complete $\frac{1}{10}$ of the same work in 2 days. How long will both of them take to complete that work if they work together?

Anjali can complete $\frac{1}{3}$ work in 10 days

$\therefore$ Anjali complete the work in 30 days

Anjali's one day work = $\frac{1}{30}$

Harish can complete $\frac{1}{10}$ work in 2 days

$\therefore$ Harish can complete work in 20 days

Harish's 1 day work = $\frac{1}{20}$

(Anjali and Harish)'s 1 day work $\frac{1}{30} + \frac{1}{20}$

$= \frac{2+3}{60}$ $= \frac{1}{12}$

$\therefore$ Anjali and Harish complete the work = 12 days

Question 7. Tap A can fill an empty cistern in 3 hours while the outlet pipe B can empty it in 2 hours. How long will it take to empty the filled cistern if both the tap and the pipe are opened simultaneously?

A's fills the tank in 1 hour $= \frac{1}{3}$

B's fills the tank in 1 hour $= \frac{1}{2}$

(A + B)'s fill the tank $= \frac{1}{3} + \frac{1}{2} = \frac{5}{6}$

(A + B) fill the tank $= \frac{6}{5}$ hours $= 1\frac{1}{5}$ hours

= 1 hour 12 minutes

Question 8. A and B can do a piece of work in 20 days, B and C in 30 days and C and A in 24 days. In how many days can A, B and C finish it if they all work together? Also find the number of days B will require to finish the work if he works alone.

(A + B)'s 1 day work $= \frac{1}{20}$

(B + C)'s 1 day work $= \frac{1}{30}$

(B + A)'s 1 day work $= \frac{1}{24}$

(A + B + C)'s 2 day work $= \frac{1}{20} + \frac{1}{30} + \frac{1}{24}$

$= \frac{6+4+5}{120}$ $= \frac{15}{120}$ $= \frac{1}{8}$

(A + B + C)'s 1 day work $= \frac{1}{16}$

(A + B + C) complete the work = 16 days

B's 1 day work $= \frac{1}{16} - \frac{1}{24}$ $= \frac{6-4}{96}$ $= \frac{1}{48}$

B complete the work = 48 days

Question 9. Three taps A, B and C can fill an empty water tank in 6 hours, 12 hours and 8 hours, respectively. How long would the three taps take to fill the empty water tank if all of them are opened simultaneously?

A's fills in 1 hour $= \frac{1}{6}$

B's fills in 1 hour $= \frac{1}{12}$

C's fills in 1 hour $= \frac{1}{8}$

(A + B + C)'s fill in 1 hour $= \frac{1}{6} + \frac{1}{12} + \frac{1}{8}$

$= \frac{4+2+3}{24} = \frac{9}{24} = \frac{3}{8}$

(A + B + C)'s fill the tank $= \frac{8}{3}$ hours $= 2\frac{2}{3}$ hours

= 2 hours 40 minutes

Question 10. A cistern has two inlet pipes A and B which can fill it in 8 hours and 6 hours, respectively. An outlet pipe C can empty the full cistern in 4 hours. If the pipes A, B and C are opened simultaneously in the empty cistern, how much time will they take to fill the cistern completely?

A's can fill in 1 hour $= \frac{1}{8}$

B's can fill in 1 hour $= \frac{1}{6}$

C's can empty in 1 hour $= \frac{1}{4}$

(A + B + C)'s fill in 1 hour $= \frac{1}{8} + \frac{1}{8} - \frac{1}{8}$

(A + B + C)'s fill in 1 hour $= \frac{3+4-6}{24} = \frac{1}{24}$

(A + B + C)'s fill the tank = 24 hours

HIGH ORDER THINKING SKILLS (HOTS)

Question 11. A can do a piece of work in 20 days and B in 30 days. They began to work together but A left after some days. B finished the remaining work in 10 days. After how many days did A leave?

B's 1 day work $= \frac{1}{30}$

B's 10 days work $= \frac{10}{30} = \frac{1}{3}$

Remaining work $= 1 - \frac{1}{3} = \frac{2}{3}$

(A + B)'s 1 day work $= \frac{1}{20} + \frac{1}{30} = \frac{3+2}{60} = \frac{5}{60} = \frac{1}{12}$

(A + B) can complete the work = 12 days

(A + B) can complete $\frac{2}{3}$ work $= 12 \times \frac{2}{3} = 8$ days

$\therefore$ A left the work after = 8 days

Question 12. A pipe can fill a tank in 10 hours. Due to a leak at its bottom, the tank takes 2 hours extra to fill. If the tank is full, in how much time will it be emptied by the leak?

Let tank emptied in x hour b leak in the table.

$\therefore \quad \frac{1}{10} - \frac{1}{x} = \frac{1}{12}$

$\frac{1}{x} = \frac{1}{10} - \frac{1}{12}$

$$\frac{1}{x} = \frac{6-5}{60} = \frac{1}{60}$$

$\therefore$ $x = 60$

$\therefore$ Tank emptied in 60 hours by leak.

Question 13. Pipe A can fill an overhead tank in 10 hours and pipe B can fill it in 15 hours. Both the pipes are opened and after 4 hours pipe B is closed. How much time will A take to fill the remaining part of the tank?

[Hint: Work done by (A + B) in one hour = $\frac{1}{10} + \frac{1}{15} = \frac{1}{6}$; work done by (A + B) in 4 hours = $\frac{1}{6} \times 4 = \frac{2}{3}$; remaining work = $1 - \frac{2}{3} = \frac{1}{3}$; whole tank is filled by pipe A in 10 hours. $\therefore \frac{1}{3}$ part of the tank is filled by pipe A in $10 \times \frac{1}{3}$ hours = $\frac{10}{3}$ = hours]

Pipe A fills in 1 hour $= \frac{1}{10}$

Pipe B fills in 1 hour $= \frac{1}{15}$

Pipe (A + B) fills in 1 hour $= \frac{1}{10} + \frac{1}{15} = \frac{3+2}{30} = \frac{1}{6}$

Pipe (A + B) fills in 4 hours $= \frac{4}{6} \div \frac{2}{3}$

Empty volume in the tank $= 1 - \frac{2}{3} = \frac{1}{3}$

Empty tank filled by A $= \frac{1}{3} \times 10 = \frac{10}{3} = 3\frac{1}{3}$ hours or 3 hours 20 minutes