

MATH-6 PTB CH 3 PDF

We know that

$\text{LCM} \times \text{HCF} = \text{Product of numbers}$

$$\text{LCM} = \frac{\text{Product of numbers}}{\text{HCF}} = \frac{2952 \times 2256}{24}$$

$$\text{LCM} = \frac{277488}{24} = 277488 \text{ Ans.}$$

Q.10. The HCF and LCM of two numbers are 23 and 345. If one number is 115, find the other

Sol.

We know that

$\text{LCM} \times \text{HCF} = \text{Product of numbers}$

Let the second number = x then

$$23 \times 345 = 115 \times x$$

$$x = \frac{23 \times 345}{115} = 23 \times 3$$

$$x = 69 \quad \text{Other number} = 36 \quad \text{Ans.}$$

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Objective Exercise 3

Q.1. Answer the following questions

i. What is meant by the factor of a number?

Ans. A number that divides a given number exactly is called a factor of the given number.

ii. Define the prime numbers.

Ans. Those numbers which have only two factors are called prime number.

iii. Which number has only one factor?

Ans. 1 has only one factor.

iv. How do we tell if a number is divisible by 3?

Ans. If 3 divides a number exactly, it is divisible by 3.

v. What is meant by prime factorization?

Ans. If we factorize a number in such a way that its factors are prime numbers. This process is called prime factorization.

(45)

Q.8. Use the long division method to find

L.C.M

ii. 324, 1053

3	324, 1053
3	108, 351
3	36, 117
3	12, 39
4	4, 13
13	1, 13
	1, 1

$$= 3 \times 3 \times 3 \times 3 \times 4 \times 13$$

$$= 4212 \quad \text{Ans.}$$

ii. 385, 1050, 1155

5	385, 1050, 1155
3	77, 210, 231
7	77, 70, 77
11	11, 10, 11
10	1, 10, 1
	1, 1, 1

$$= 5 \times 3 \times 11 \times 7 \times 10$$

$$= 11550 \quad \text{Ans.}$$

iii. 52, 56, 112, 156

2	52, 56, 112, 156
2	26, 28, 56, 78
2	13, 14, 28, 39
3	13, 7, 14, 39
7	13, 7, 14, 13
2	13, 1, 2, 13
13	13, 1, 1, 13
	1, 1, 1, 1

$$= 2 \times 2 \times 2 \times 2 \times 3 \times 7 \times 13 = 4368 \quad \text{Ans.}$$

Q.9. The HCF of two numbers 2952 and 2256 is 24. Find their LCM

Sol.

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Q.7. Use prime factorization method to find L.C.M

i.

3	75
5	25
5	5
	1

2	120
2	60
2	30
3	15
5	5
	1

$$75 = 3 \times 5 \times 5 = 3 \times 5^2$$

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

$$\text{LCM of 75 \& 120} = 3 \times 2^3 \times 5^2$$

$$= 3 \times 8 \times 25 = 600$$

ii.

2	234
3	117
3	39
13	13
	1

2	702
3	351
3	117
3	39
13	13
	1

$$234 = 2 \times 3 \times 3 \times 13 = 2 \times 3^2 \times 13$$

$$702 = 2 \times 3 \times 3 \times 3 \times 13 = 2 \times 3^3 \times 13$$

$$\text{LCM of 234 \& 702} = 2 \times 3^3 \times 13$$

$$= 2 \times 27 \times 13 = 720$$

iii.

3	75
5	25
5	5
	1

5	125
5	25
5	5
	1

2	350
5	175
5	35
	1

$$75 = 3 \times 5 \times 5 = 3 \times 5^2$$

$$125 = 5 \times 5 \times 5 = 5^3$$

$$350 = 2 \times 5 \times 5 \times 7$$

$$\text{L.C.M} = 3 \times 2 \times 5^3 \times 7$$

$$= 3 \times 2 \times 125 \times 7 = 5250 \text{ Ans.}$$

112

$$\begin{array}{r|l}
 21 & 28 \\
 \hline
 21 & 3 \\
 7 & 21 \\
 & 21 \\
 \hline
 & \times
 \end{array}$$

H.C.F = 7

iii. 710, 1815, 945

Sol.

$$\begin{array}{r}
 \begin{array}{r|l}
 1 & 945 \\
 \hline
 1815 & \\
 945 & 1 \\
 \hline
 870 & 945 \\
 870 & 11 \\
 \hline
 75 & 870 \\
 825 & 1 \\
 \hline
 45 & 75 \\
 45 & 1 \\
 \hline
 30 & 45 \\
 30 & 2 \\
 \hline
 15 & 30 \\
 30 & \\
 \hline
 & \times
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \begin{array}{r|l}
 47 & 15 \\
 \hline
 710 & \\
 705 & 3 \\
 \hline
 5 & 15 \\
 15 & \\
 \hline
 & \times
 \end{array}
 \end{array}$$

H.C.F = 5 Ans.

Qpt

iii. 33, 44, 77

Sol.

$$= 2 \times 2 \times 3 \times 7 \times 11$$

$$= 2^2 \times 3 \times 7 \times 11 \text{ Ans.}$$

2	33, 44, 77
2	33, 22, 77
3	33, 11, 77
7	11, 11, 77
11	11, 11, 11
	1, 1, 1

Q.6. Use division method to find the H.C.F.

i. 924, 1045

Sol.

$$\begin{array}{r}
 1 \\
 924 \overline{) 1045} \\
 \underline{-924} \\
 121 \overline{) 924} \\
 \underline{-847} \\
 77 \overline{) 121} \\
 \underline{-77} \\
 44 \overline{) 77} \\
 \underline{-44} \\
 33 \overline{) 44} \\
 \underline{-33} \\
 11 \overline{) 33} \\
 \underline{-33} \\
 \times
 \end{array}$$

H.C.F. = 11

ii. 1505, 2982

Sol.

$$\begin{array}{r}
 1 \\
 1505 \overline{) 2982} \\
 \underline{1505} \\
 1477 \overline{) 1505} \\
 \underline{1477} \\
 28 \overline{) 1477} \\
 \underline{1456} \\
 21
 \end{array}$$

110

iii. 7056

Sol.

$$\Rightarrow 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 7 \times 7$$

$$\Rightarrow 2^4 \times 3^2 \times 7^2$$

2	7056
2	3528
2	1764
2	882
3	441
3	147
7	49
7	7
	1

iv. 39204

Sol.

$$2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 11 \times 11$$

$$2^2 \times 3^4 \times 11^2 \text{ Ans.}$$

2	39204
2	19602
3	9801
3	3267
3	1089
3	363
11	121
11	11
	1

Q.5. Use prime factorization method to find the H.C.F.

i. 48, 72

Sol.

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

$$= 2^4 \times 3^2 \text{ Ans.}$$

2	48, 72
2	24, 36
2	12, 28
2	6, 14
3	3, 7
7	1, 7
	1, 1

ii. 70, 105

Sol.

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

2	70, 105
5	35, 105
7	7, 21
3	1, 3
	1, 1

(39)

Odd numbers less than 20
 1, 3, 5, 7, 9, 11, 13, 15, 17, 19
 Prime numbers less than 20
 2, 3, 5, 7, 11, 13, 17, 19
 Composite numbers less than 20
 4, 6, 8, 9, 10, 12, 14, 15, 16, 18

Q.3. Tell which of the following numbers are divisible by 2, 3 and 5 without carrying division.

Sol.

Divisible by 2
 6420, 5030, 4132, 20004, 45678, 32124
 Divisible by 3
 6420, 11115, 20004
 Divisible by 5
 6420, 7125, 5030, 11115

Q.4. Write the prime factors of the following numbers using index notation.

i. 900

Sol.

$$\Rightarrow 2 \times 2 \times 3 \times 3 \times 5 \times 5$$

$$\Rightarrow 2^2 \times 3^2 \times 5^2$$

2	900
2	450
3	225
3	75
5	25
5	5

ii. 1296

Sol.

$$\Rightarrow 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3$$

$$\Rightarrow 2^4 \times 3^4$$

2	1296
2	648
2	324
2	162
3	81
3	27
3	9
3	3
	1

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Review Exercise '3'

Q.1. Write all numbers less than 40 which are

i. Multiples of 2

2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38

ii. Multiples of 5

5, 10, 15, 20, 25, 30, 35

iii. Multiples of 7

7, 14, 21, 28, 35

iv. Multiples of 9

9, 18, 27, 36

Q.2. Write all even, odd, prime and composite numbers less than 20

Sol.

Even numbers less than 20

2, 4, 6, 8, 10, 12, 14, 16, 18

(37)

$$\text{LCM} = 2 \times 2 \times 2 \times 2 \times 3 \times 5 = 240$$

They flash together after 240 seconds.

Q.10. Manahil wants to prepare some handkerchiefs of same size from a piece of cloth 9m long and 1.25m wide. What will be the largest size of the handkerchiefs when no wastage is allowed.

Sol.

$$9\text{m} = 9 \times 100 = 900\text{cm}, \quad 1.25\text{m} = 1.25 \times 100 = 125\text{cm}$$

$$\begin{array}{r|l} 7 & 900 \\ \hline 125 & 875 \\ \hline & 25 \end{array} \quad \begin{array}{r|l} 5 & 125 \\ \hline & 125 \\ \hline & \times \end{array}$$

The largest size of handkerchief = (25×25) cm
or 25cm by 25 cm

Q.8. There are 416, 364 and 312 students in three classes respectively. Buses are to be hired to take these students to a school trip. Find the maximum number of students who can sit in a bus if each bus carries an equal number of students.

Sol.

$$\begin{array}{r} 1 \\ 364 \overline{) 416} \\ \underline{364} 7 \\ 52 \overline{) 364} \\ \underline{364} \\ \times \end{array}$$

$$\begin{array}{r} 6 \\ 52 \overline{) 312} \\ \underline{-312} \\ \times \end{array}$$

= 52 students **Ans.**

Q.9. Three light houses flash their lights every 16 seconds, 24 second, and 40 seconds respectively. If they flash together at 2 p.m, at what time will they next flash together?

Sol.

2	16, 24, 40
2	8, 12, 20
2	4, 6, 10
2	2, 3, 5,
3	1, 3, 5
5	1, 1, 5
	1, 1, 1

(26)

$$= 2 \times 2 \times 2 \times 3 \times 3 = 72$$

Hence, Ali can draw '72' square patterns to cover the paper completely.

- Q.6.** In a morning walk, three friends step off together. Their steps measure 70 cm, 76 cm and 90 cm respectively. At what distance from the starting point will they step off again together.

Sol.

2	70, 76, 90
2	35, 38, 45
5	35, 19, 45
3	7, 19, 9
3	7, 19, 3
7	7, 19, 1
19	1, 19, 1
	1, 1, 1

$$= 2 \times 2 \times 5 \times 3 \times 3 \times 7 \times 19 = 23940$$

- Q.7.** Two containers have 850 litres and 680 litres of milk respectively. Find the capacity of a container which can measure the milk in each container in exact number of times.

Sol.

2	850
5	425
8	85
17	17
	1

2	680
2	340
2	170
5	85
17	17
	1

$$850 = 2 \times 5 \times 5 \times 7$$

$$680 = 2 \times 2 \times 2 \times 5 \times 7$$

$$\text{HCF} = 2 \times 5 \times 7 = 170$$

$$\text{Capacity of container} = 170\text{L.}$$

35

$$= 2 \times 2 \times 2 \times 3 \times 3 = 72$$

Hence, Ali can draw '72' square patterns to cover the paper completely.

- Q.6.** In a morning walk, three friends step off together. Their steps measure 70 cm, 76 cm and 90 cm respectively. At what distance from the starting point will they step off again together.

Sol.

2	70, 76, 90
2	35, 38, 45
5	35, 19, 45
3	7, 19, 9
3	7, 19, 3
7	7, 19, 1
19	1, 19, 1
	1, 1, 1

$$= 2 \times 2 \times 5 \times 3 \times 3 \times 7 \times 19 = 23940$$

- Q.7.** Two containers have 850 litres and 680 litres of milk respectively. Find the capacity of a container which can measure the milk in each container in exact number of times.

Sol.

2	850
5	425
8	85
17	17
	1

2	680
2	340
2	170
5	85
17	17
	1

$$850 = 2 \times 5 \times 5 \times 17$$

$$680 = 2 \times 2 \times 2 \times 5 \times 17$$

$$\text{HCF} = 2 \times 5 \times 17 = 170$$

$$\text{Capacity of container} = 170\text{L.}$$

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Q.4. Find the shortest length of a pipe that can be measured exactly with 4m, 6m and 9m long measuring tapes reportedly.

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

$$= 36 \text{ m}$$

is the shortest length of a pipe that can be measured with 4m, 6m, and 9m tapes.

2	4, 6, 9
2	2, 3, 9
3	1, 3, 9
3	1, 1, 3
	1, 1, 1

- Q.5.** The paper of a note book is 18cm by 24 cm. Ali wants in cover the paper completely with square pattern of the same size. Find i. The largest possible area of each square pattern.
ii. The number of square pattern that Ali can draw two cover the paper completely.

Sol.

$$\begin{array}{r}
 18 \overline{) 24} \\
 \underline{18} \\
 6
 \end{array}
 \quad
 \begin{array}{r}
 3 \\
 \underline{18} \\
 18 \\
 \underline{} \\
 0
 \end{array}$$

Hence, '6cm²' is the largest possible area of each square pattern

ii.

2	18, 24
2	9, 12
3	9, 6
2	3, 2
3	3, 1
	1, 1

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Exercise 3.6

Q.1. Find the smallest number that can exactly divide the numbers 108, 180 and 216.

$$2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 \\ = 1080 \text{ Ans.}$$

2	108, 180, 216
2	54, 90, 108
3	27, 45, 54
3	9, 15, 18
3	3, 5, 6
2	1, 5, 2
5	1, 5, 1
	1, 1, 1

Q.2. Find the smallest number that is exactly divisible by 5, 15, 25

$$3 \times 5 \times 5 = 75 \text{ Ans.}$$

3	5, 15, 25
5	5, 5, 25
5	1, 1, 5
	1, 1, 1

Q.3. Find the greatest measure of a string that can measure exactly 27m, 45m and long wooden border exactly.

Sol.

To determine the greatest measure of string, we find HCF of given lengths.

3	27
3	9
3	3
	1

3	45
3	15
5	5
	1

3	63
3	21
7	7
	1

$$27 = 3 \times 3 \times 3 \\ 45 = 3 \times 3 \times 5 \\ 63 = 3 \times 3 \times 7$$

So HCF of 27, 45, 63 = $3 \times 3 = 9$

So greatest measure = 9m.

33

Q.5. The LCM of two numbers 660 and 2100 is 23100. Find their HCF

Sol.

We know that

$\text{LCM} \times \text{HCF} = \text{Product of two numbers}$

$$23100 \times \text{HCF} = 660 \times 2100$$

$$\text{HCF} = \frac{660 \times 2100}{23100}$$

$$\text{HCF} = 60$$

Q.6. The HCF and LCM of two numbers are 29 and 3045. If one of the numbers is 435, find the other.

Sol.

Let second number = x

$\text{LCM} \times \text{HCF} = \text{Product of two numbers}$

$$29 \times 3045 = 435 \times x$$

$$\Rightarrow x = \frac{29 \times 3045}{435}$$

$$x = 203$$

So the second number is 203.

Q.7. The HCF of two numbers is 16 and their product is 3328. Find their LCM.

Sol.

We know that

$\text{LCM} \times \text{HCF} = \text{Product of two number}$

$$\text{LCM} \times 16 = 3328$$

$$\text{LCM} = \frac{3328}{16}$$

$$\text{LCM} = 208$$

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iv. 210, 140, 315

Sol.

Thus the L.C.M of 210, 140 and 315 = $2 \times 2 \times 3 \times 3 \times 5 \times 7$
= 1260 Ans.

2	210, 140, 315
5	105, 70, 315
3	21, 14, 63
7	7, 14, 21
2	1, 2, 3
3	1, 1, 3
	1, 1, 1

v. 112, 120, 150

Sol.

Thus the L.C.M of 112, 120 and 150 = $2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5 \times 7$
= 25200 Ans.

2	112, 120, 150
2	56, 60, 75
2	28, 30, 75
2	14, 15, 75
5	7, 15, 75
3	7, 3, 5
5	7, 1, 5
7	7, 1, 1
	1, 1, 1

vi. 144, 180, 300

Sol.

Thus the L.C.M of 144, 180 and 300 = $2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5$
= 3600 Ans.

2	144, 180, 300
2	72, 90, 150
2	36, 45, 75
2	18, 45, 75
3	9, 45, 75
3	3, 15, 25
5	1, 5, 25
5	1, 1, 5
	1, 1, 1

Q.4. The HCF of two numbers 525 and 1155 is 105. Find the LCM

Sol.

We know that

$L.C.M \times HCF = \text{Product of two numbers}$

$LCM \times 105 = 525 \times 1155$

$LCM = \frac{525 \times 1155}{105} = 1155 \times 5 \Rightarrow LCM = 5775$

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xii. 25, 50, 75

Sol.

5	25
5	5
	1

2	50
5	25
5	5
	1

3	75
5	25
5	5
	1

Therefore,

$$25 = 5 \times 5$$

$$50 = 2 \times 5 \times 5$$

$$75 = 3 \times 5 \times 5$$

$$= 5^2 \times 2 \times 3$$

Thus the L.C.M of 25, 50 and 75 = $5^2 \times 3 \times 2$
 $= 25 \times 3 \times 2 = 150$

Q.3. Find the L.C.M by using the division method.

i. 27, 81, 54

Sol.

Thus the L.C.M of 27, 81 and 54
 is $3 \times 3 \times 3 \times 3 \times 2$
 $= 162$ Ans.

3	27, 81, 54
3	9, 27, 18
3	3, 9, 6
3	1, 3, 2
2	1, 1, 2
	1, 1, 1

ii. 18, 45, 63

Sol.

Thus the L.C.M of 18, 45 and 63
 is $3 \times 3 \times 2 \times 5 \times 7$
 $= 630$ Ans.

3	18, 45, 63
3	6, 15, 21
2	2, 5, 7
5	1, 5, 7
7	1, 1, 7
	1, 1, 1

iii. 35, 55, 100

Sol.

Thus the L.C.M of 35, 55 and 100
 is $5 \times 2 \times 2 \times 5 \times 7 \times 11$
 $= 7700$ Ans.

2	35, 55, 100
2	35, 55, 50
5	35, 55, 25
5	7, 11, 5
7	7, 11, 1
11	1, 11, 1
	1, 1, 1

(30)

Therefore,

$$12 = 2 \times 2 \times 3$$

$$18 = 2 \times 3 \times 3$$

$$24 = 2 \times 2 \times 2 \times 3$$

$$= \begin{matrix} 2^3 \\ 2 \\ 2^3 \end{matrix} \times \begin{matrix} 3 \\ 3^2 \\ 3 \end{matrix}$$

Thus, L.C.M of 12, 18 and 24

$$= 2^3 \times 3^2$$

$$= 8 \times 9 = 72$$

x. 25, 35, 45

Sol.

$$\begin{array}{r|l} 5 & 25 \\ \hline 5 & 5 \\ \hline 1 & \end{array}$$

$$\begin{array}{r|l} 5 & 35 \\ \hline 7 & 7 \\ \hline 1 & \end{array}$$

$$\begin{array}{r|l} 3 & 45 \\ \hline 3 & 15 \\ \hline 5 & 5 \\ \hline 1 & \end{array}$$

Therefore,

$$25 = 5 \times 5$$

$$35 = 5 \times 7$$

$$45 = 3 \times 3 \times 5$$

$$= \begin{matrix} 5^2 \\ 5 \\ 5 \end{matrix} \times 7$$

$$= 5 \times 3^2$$

Thus the L.C.M of 25, 35 and 45 = $3^2 \times 5^2 \times 7$

$$= 9 \times 25 \times 7 = 1575$$

xi. 9, 15, 21

Sol.

$$\begin{array}{r|l} 3 & 9 \\ \hline 3 & 3 \\ \hline 1 & \end{array}$$

$$\begin{array}{r|l} 3 & 15 \\ \hline 5 & 5 \\ \hline 1 & \end{array}$$

$$\begin{array}{r|l} 3 & 21 \\ \hline 7 & 7 \\ \hline 1 & \end{array}$$

Therefore,

$$9 = 3 \times 3$$

$$15 = 3 \times 5$$

$$21 = 3 \times 7$$

$$= \begin{matrix} 3^2 \\ 3 \\ 3 \end{matrix} \times 5$$

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

Thus the L.C.M of 9, 15 and 21 = $3^2 \times 5 \times 7$

$$= 9 \times 5 \times 7 = 315$$

29

vii. 45, 75

Sol.

3	45
3	15
5	5
1	

3	75
5	25
5	5
1	

Therefore,

$$45 = 3 \times 3 \times 5$$

$$75 = 3 \times 5 \times 5$$

$$= \begin{array}{c} 3^2 \\ 3 \\ \hline 3^2 \end{array} \times \begin{array}{c} 5 \\ 5^2 \\ \hline 5^2 \end{array}$$

Thus the L.C.M of 45 and 75 = $3^2 \times 5^2$
 $= 9 \times 25 = 225$

viii. 36, 84

Sol.

2	36
2	18
3	9
3	3
1	

2	84
2	42
3	21
7	7
1	

$$36 = 2 \times 2 \times 3 \times 3$$

$$84 = 2 \times 2 \times 3 \times 7$$

$$= 2^2 \times 3^2 \times 7$$

Thus the L.C.M of 36 and 84 = $2^2 \times 3^2 \times 7$
 $= 4 \times 9 \times 7 = 252$

ix. 12, 18, 24

Sol.

2	12
2	6
3	3
1	

2	18
3	9
3	3
1	

2	24
2	12
2	6
3	3
1	

28

Thus the L.C.M of 28 and 44 = $2^2 \times 7 \times 11$
 $= 4 \times 7 \times 11 = 308$

v. 20, 32

Sol.

2	20
2	10
5	5
	1

2	32
2	16
3	8
3	4
2	2
	1

Therefore,

$$20 = 2 \times 2 \times 5$$

$$32 = 2 \times 2 \times 2 \times 2 \times 2$$

$$= 2^2 \times 5$$

$$= 2^5$$

$$5$$

Thus the L.C.M of 20 and 32 = $2^5 \times 5$

$$= 32 \times 5 = 160$$

vi. 20, 135

Sol.

2	20
2	10
5	5
	1

5	135
3	27
2	9
2	3
	1

Therefore,

$$20 = 2 \times 2 \times 5$$

$$135 = 5 \times 3 \times 3 \times 3$$

$$= 2^2 \times 3^3 \times 5$$

$$= 2^2 \times 3^3 \times 5$$

Thus the L.C.M of 20 and 135 = $2^2 \times 3^3 \times 5$

$$= 4 \times 27 \times 5 = 540$$

27

Therefore,
 $16 = 2 \times 2 \times 2 \times 2$
 $40 = 2 \times 2 \times 2 \times 5$

$$= \begin{array}{c} 2^4 \\ 2^3 \\ \hline 2^4 \end{array} \times \begin{array}{c} 5 \\ \hline 5 \end{array}$$

Thus the L.C.M of 16 and 40 = $2^4 \times 5 = 16 \times 5 = 80$
iii. 30, 36

Sol.

2	30
3	15
5	5
	1

2	36
2	18
3	9
3	3
	1

Therefore,
 $30 = 2 \times 3 \times 5$
 $36 = 2 \times 2 \times 3 \times 3$

$$= \begin{array}{c} 2 \\ 2^2 \\ \hline 2^2 \end{array} \times \begin{array}{c} 3 \\ 3^2 \\ \hline 3^2 \end{array} \times \begin{array}{c} 5 \\ \hline 5 \end{array}$$

Thus the L.C.M of 30 and 36 = $2^2 \times 3^2 \times 5$
 $= 4 \times 9 \times 5 = 180$

iv. 28, 44

Sol.

2	28
2	14
7	7
	1

2	44
2	22
11	11
	1

Therefore,
 $28 = 2 \times 2 \times 7$
 $44 = 2 \times 2 \times 11$

$$= \begin{array}{c} 2^2 \\ 2^2 \\ \hline 2^2 \end{array} \times \begin{array}{c} 7 \\ \hline 7 \end{array} \times \begin{array}{c} 11 \\ \hline 11 \end{array}$$

96

Multiples of 8 = 8, 16, 24, 32, 40,

Multiples of 12 = 12, 24, 36, 48, 60,

Common Multiple of 4, 6 and 9 are 18

Therefore, L.C.M of 2, 6 and 9 is 18.

xi. 2, 6, 11

Sol.

Multiples of 2 = 2, 4, 6, 8, 10, 12, 64, 66,

Multiples of 6 = 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, ... 72...

Multiples of 11 = 11, 22, 33, 44, 55, 66, 77,

Common Multiples of 2, 6 and 11 is 66,

Therefore, L.C.M of 2, 6 and 11 is 66.

Q.2. Find the L.C.M of the following numbers by prime factorization method.

i. 18, 24

Sol.

2	18
3	9
3	3
	1

2	24
2	12
2	6
3	3
	1

Therefore,

$$18 = 2 \times 3 \times 3$$

$$24 = 2 \times 2 \times 2 \times 3$$

$$= \begin{matrix} 2 \\ 2^3 \end{matrix} \times \begin{matrix} 3^2 \\ 3 \end{matrix}$$

$\boxed{2^3} \quad \boxed{3^2}$

Thus the L.C.M of 18 and 24 is $2^3 \times 3^2 = 8 \times 9 = 72$

ii. 16, 40

Sol.

2	16
2	8
2	4
2	2
	1

2	40
2	20
2	10
5	5
	1

25

vi. 8, 12

Sol.

Multiples of 8 = 8, 16, 24, 32, 40, 48, 56, 64, 72, 80,

Multiples of 12 = 12, 24, 36, 48, 60, 72, 84,

Common multiples of 8, 12 are 24, 48, 72,

Therefore, L.C.M of 8 and 12 is 24.

vii. 7, 14

Sol.

Multiples of 7 = 7, 14, 21, 28, 35, 42, 49, 56,

Multiples of 14 = 14, 28, 42, 56, 70, 84,

Common multiples of 7 and 14 are 14, 28, 42, 56,

Therefore, L.C.M of 7 and 14 is 14.

viii. 10, 15

Sol.

Multiples of 10 = 10, 20, 30, 40, 50, 60, 70, 80, 90, 100,

Multiples of 15 = 15, 30, 45, 60, 75, 90, 105, 120, 135,

Common multiples of 10 and 15 are 30, 60, 90,

Therefore, L.C.M of 10 and 15 is 30

ix. 3, 6, 9

Sol.

Multiples of 3 = 3, 6, 9, 12, 15, 18, 21, 24, 27, 30,

Multiples of 6 = 6, 12, 18, 24, 30, 36, 42, 48, 54, 60,

Multiples of 9 = 9, 18, 27, 36, 45, 54, 63, 72, 81,

Common Multiples of 3, 6 and 9 is 18

Therefore, L.C.M of 3, 6 and 9 is 18.

x. 2, 6, 9

Sol.

Multiple of 2 = 2, 4, 6, 8, 10, 12, 14, 16, 18, 20,

Multiples of 6 = 6, 12, 18, 24, 30, 36, 42, 48, 54, 60,

Multiples of 3 = 3, 6, 9, 12, 15, 18, 21, 24, 27,

Common Multiples of 2, 6 and 9 is 18

Therefore, L.C.M of 2, 6 and 9 is 18.

xi. 4, 8, 12

Sol.

Multiple of 4 = 4, 8, 12, 16, 20, 24, 28, 32, 36,

24

Exercise 3.5

Q.1. Find the L.C.M of given numbers by finding their common multiples.

i. 2, 4

Sol.

Multiples of 2 = 2, 4, 6, 8, 10, 12, 14, 16,

Multiples of 4 = 4, 8, 12, 16, 20, 24, 28,

Common multiples of 2 and 4 are 4, 8, 12, 16

Therefore, L.C.M of 2 and 4 is '4'

ii. 5, 6

Sol.

Multiples of 5 = 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65,

Multiples of 6 = 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66,

Common multiples of 5 and 6 are 30, 60,

Therefore, L.C.M of 5 and 6 is '30'.

iii. 3, 4

Sol.

Multiples of 3 = 3, 6, 9, 12, 15, 18, 21, 24, 27, 30,

Multiple of 4 = 4, 8, 12, 16, 20, 24, 28, 32, 36,

Common multiples of 3 and 4 are 12, 24,

Therefore, L.C.M of 3 and 4 are '12'

iv. 7, 8

Sol.

Multiples of 7 = 7, 14, 21, 28, 35, 42, 56, 63,

Multiples of 8 = 8, 16, 24, 32, 40, 48, 56, 64,

Common multiple of 7, 8 is 56

Therefore, L.C.M of 7 and 8 is '56'

v. 6, 9

Multiples of 6 = 6, 12, 18, 24, 30, 36, 42, 48, 54,

Multiples of 9 = 9, 18, 27, 36, 45, 54, 63,

Common multiples of 6 and 9 are 36, 54,

Therefore, L.C.M of 6 and 9 is 36.

vii. 234, 538, 678

Sol.

$$\begin{array}{r}
 1 \\
 538 \overline{) 678} \\
 \underline{-538} \quad 3 \\
 140 \overline{) 538} \\
 \underline{-420} \quad 1 \\
 118 \overline{) 140} \\
 \underline{-118} \quad 3 \\
 32 \overline{) 118} \\
 \underline{-96} \quad 1 \\
 22 \overline{) 32} \\
 \underline{-22} \\
 10 \overline{) 22} \\
 \underline{-20} \\
 2 \overline{) 10} \\
 \underline{-10} \\
 \times
 \end{array}$$

H.C. F of 538 and 678 is 2

$$\begin{array}{r}
 117 \\
 2 \overline{) 234} \\
 \underline{-2} \\
 3 \\
 \underline{-2} \\
 14 \\
 \underline{-14} \\
 \times
 \end{array}$$

Therefore 2 is H.C.F of 234, 538, 678

24

$$\begin{array}{r}
 -14 \quad 2 \\
 \hline
 6 \mid 14 \\
 -12 \quad 3 \\
 \hline
 2 \mid 6 \\
 -6 \\
 \hline
 \times
 \end{array}$$

H.C. F = 2

v.405, 513

Sol.

$$\begin{array}{r}
 1 \\
 405 \overline{) 513} \\
 \underline{-405} \quad 3 \\
 108 \mid 405 \\
 \underline{-324} \quad 1 \\
 81 \mid 108 \\
 \underline{-81} \quad 3 \\
 27 \mid 81 \\
 \underline{-81} \\
 \times
 \end{array}$$

H.C. F = 27

vi.128, 340

Sol.

$$\begin{array}{r}
 2 \\
 128 \overline{) 340} \\
 \underline{-256} \quad 1 \\
 84 \mid 128 \\
 \underline{-84} \quad 1 \\
 44 \mid 84 \\
 \underline{-44} \quad 1 \\
 40 \mid 44 \\
 \underline{-40} \quad 10 \\
 4 \mid 40 \\
 \underline{-40} \\
 \times
 \end{array}$$

H.C. F = 4

20

ii. 63, 112

Sol.

$$\begin{array}{r}
 1 \\
 63 \overline{) 112} \\
 \underline{-63} \quad 1 \\
 49 \overline{) 63} \\
 \underline{-49} \quad 3 \\
 14 \overline{) 49} \\
 \underline{-42} \quad 2 \\
 7 \overline{) 14} \\
 \underline{-14} \\
 \times
 \end{array}$$

H.C.F = 7

iii. 276, 161

Sol.

$$\begin{array}{r}
 1 \\
 161 \overline{) 276} \\
 \underline{-161} \quad 1 \\
 115 \overline{) 161} \\
 \underline{-115} \quad 2 \\
 46 \overline{) 115} \\
 \underline{-92} \quad 2 \\
 23 \overline{) 46} \\
 \underline{-46} \\
 \times
 \end{array}$$

H.C.F = 23

iv. 314, 334

Sol.

$$\begin{array}{r}
 1 \\
 314 \overline{) 334} \\
 \underline{-314} \quad 15 \\
 20 \overline{) 314} \\
 \underline{-300} \quad 1 \\
 14 \overline{) 20}
 \end{array}$$

(19)

viii. 22, 55, 110

Sol.

$$\begin{array}{r|l} 2 & 22 \\ \hline 11 & 11 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 5 & 55 \\ \hline 11 & 11 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 110 \\ \hline 5 & 55 \\ \hline 11 & 11 \\ \hline & 1 \end{array}$$

$$22 = 2 \times 11$$

$$55 = 5 \times 11$$

$$110 = 2 \times 5 \times 11$$

$$\text{H.C.F} = 11$$

ix. 56, 189, 175

Sol.

$$\begin{array}{r|l} 2 & 56 \\ \hline 2 & 28 \\ \hline 2 & 14 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 3 & 189 \\ \hline 3 & 63 \\ \hline 3 & 21 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 5 & 175 \\ \hline 5 & 35 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$56 = 2 \times 2 \times 2 \times 7$$

$$189 = 3 \times 3 \times 3 \times 7$$

$$175 = 5 \times 5 \times 7$$

$$\text{H.C.F} = 7$$

Q.4. Find the H.C.F of the following numbers, using the Long division method.

i. 72, 184

Sol.

$$\begin{array}{r} 72 \overline{) 184} \\ \underline{-144} 1 \\ 40 \overline{) 72} \\ \underline{-40} 1 \\ 32 \overline{) 40} \\ \underline{-32} 4 \\ 8 \overline{) 32} \\ \underline{-32} \\ \times \end{array}$$

$$\text{H.C. F} = 8$$

18

v. 22, 132

Sol.

2	22
11	11
	1

2	132
3	66
3	33
11	11
	1

$$22 = 2 \times 11$$

$$132 = 2 \times 2 \times 3 \times 11$$

$$\text{H.C.F} = 11 \times 2 = 22$$

Ans.

vi. 60, 72

Sol.

2	60
2	30
3	15
5	5
	1

2	72
2	36
2	18
3	9
3	3
	1

$$60 = 2 \times 2 \times 3 \times 5$$

$$72 = 2 \times 2 \times 2 \times 3 \times 3$$

$$\text{H.C.F} = 2 \times 2 \times 3 = 12$$

vii. 16, 54, 84

Sol.

2	16
2	8
2	4
2	2
	1

2	54
3	27
3	9
3	3
	1

2	84
2	42
3	21
7	7
	1

$$16 = 2 \times 2 \times 2 \times 2$$

$$54 = 2 \times 3 \times 3 \times 3$$

$$84 = 2 \times 2 \times 3 \times 7$$

$$\text{H.C.F} = 2$$

17

ii. 22, 55

Sol.

2	22
11	11
1	

5	55
11	11
1	

$$22 = 2 \times 11$$

$$55 = 5 \times 11$$

$$\text{H.C.F} = 11$$

iii. 36, 54

Sol.

2	36
2	18
3	9
3	3
1	

2	54
3	27
3	9
3	3
1	

$$36 = 2 \times 2 \times 3 \times 3$$

$$54 = 2 \times 3 \times 3 \times 3$$

$$\text{H.C.F} = 2 \times 3 \times 3 = 18$$

iv. 24, 48

Sol.

2	24
2	12
2	6
3	3
1	

2	48
2	24
2	12
2	6
3	3
1	

$$24 = 2 \times 2 \times 2 \times 3$$

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

$$\text{H.C.F} = 2 \times 2 \times 2 \times 3 = 24$$

16

iv. 12, 33

Sol.

$$12 = 1, 2, 3, 4, 6, 12$$

$$33 = 1, 3, 11, 33$$

Common factors = 1, 3

H.C.F of 12 and 33 = 3

v. 39, 52

Sol.

$$39 = 1, 3, 13, 39$$

$$52 = 1, 2, 4, 13, 26, 52$$

Common factors = 1, 13

H.C.F of 39 and 52 = 13

vi. 16, 20

Sol.

$$16 = 1, 2, 4, 8, 16$$

$$20 = 1, 2, 4, 5, 10, 20$$

Common factors = 1, 2, 4

H.C.F of 16 and 20 = 4

vii. 4, 6, 10

Sol.

$$4 = 1, 2, 4$$

$$6 = 1, 2, 3, 6$$

$$10 = 1, 2, 5, 10$$

Common factors = 1, 2

H.C.F of 4, 6 and 10 = 2

viii. 22, 44, 66

Sol.

$$22 = 1, 2, 11, 22$$

$$44 = 1, 2, 4, 11, 22, 44$$

$$66 = 1, 2, 3, 6, 11, 33, 66$$

Common factors = 1, 2, 11

H.C.F of 22, 44 and 66 = 11

ix. 35, 20, 45

Sol.

$$35 = 1, 5, 7, 35$$

$$20 = 1, 2, 4, 5, 10, 20$$

$$45 = 1, 3, 5, 9, 15, 45$$

Common factors = 1, 5

H.C.F of 35, 20 and 45 = 5

Q.3. Find the H.C.F of the following numbers, using the prime factorization method.

i. 12, 18

Sol.

2	12
2	6
3	3
	1

$$12 = 2 \times 2 \times 3$$

$$18 = 2 \times 3 \times 3$$

$$\text{H.C.F} = 2 \times 3 = 6$$

2	18
3	9
3	3
	1

15

iii. 10 and 15

Sol. The factors of 10 are = 1, 2, 5, 10
The factor of 15 are = 1, 3, 5, 15

⇒ The common factors of 10 and 15 are 1 and 5.

iv. 12 and 18

Sol. The factors of 12 are = 1, 2, 3, 4, 6, 12
The factor of 18 are = 1, 2, 3, 6, 9, 18

⇒ The common factors of 12 and 18 are 1, 2, 3 and 6.

v. 20 and 30

Sol. The factors of 20 are = 1, 2, 4, 5, 10, 20
The factor of 30 are = 1, 2, 3, 5, 6, 10, 15, 30
⇒ The common factors of 20 and 30 are 1, 2, 5 and 10.

vi. 28 and 36

Sol. The factors of 28 are = 1, 2, 4, 7, 14, 28
The factor of 36 are = 1, 2, 3, 4, 6, 9, 12, 18, 36
⇒ The common factors of 28 and 36 are 1, 2 and 4.

Q.2. Find H.C.F by writing the common factors of each number.

i. 24, 36

Sol.

24 = 1, 2, 3, 4, 6, 8, 12, 24
36 = 1, 2, 3, 4, 6, 9, 12, 18, 36

Common factors = 1, 2, 3, 4, 6, 12
H.C.F of 24 and 36 = 12

ii. 25, 45

Sol.

25 = 1, 5, 25
45 = 1, 3, 5, 9, 15, 45

Common factors = 1, 5
H.C.F of 25 and 45 = 5

iii. 21, 49

Sol.

21 = 1, 3, 7, 21
49 = 1, 7, 49

Common factors = 1, 7
H.C.F of 21 and 49 = 7

14

Exercise 3.4

Q.1. Find all the common factors of

i. 6 and 10

Sol. The factors of 6 are = $\textcircled{1}, \textcircled{2}, 3, 6$

The factors of 10 are = $\textcircled{1}, \textcircled{2}, 5$

\Rightarrow The common factors of 6 and 10 are 1 and 2.

ii. 8 and 12

Sol. The factors of 8 are = $\textcircled{1}, \textcircled{2}, \textcircled{4}, 8$

The factors of 12 are = $\textcircled{1}, \textcircled{2}, 3, \textcircled{4}, 6, 12$

\Rightarrow The common factors of 8 and 12 are 1, 2 and 4.

13

Exercise 3.4

Q.1. Find all the common factors of

i. 6 and 10

Sol. The factors of 6 are = $\textcircled{1}, \textcircled{2}, 3, 6$

The factors of 10 are = $\textcircled{1}, \textcircled{2}, 5$

\Rightarrow The common factors of 6 and 10 are 1 and 2.

ii. 8 and 12

Sol. The factors of 8 are = $\textcircled{1}, \textcircled{2}, \textcircled{4}, 8$

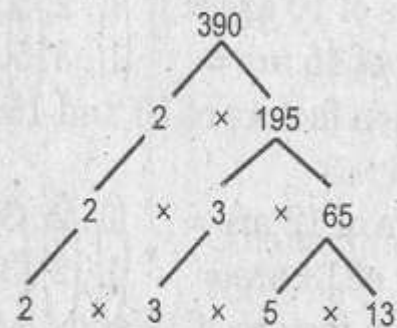
The factors of 12 are = $\textcircled{1}, \textcircled{2}, 3, \textcircled{4}, 6, 12$

\Rightarrow The common factors of 8 and 12 are 1, 2 and 4.

$\textcircled{3}$

vii. 390

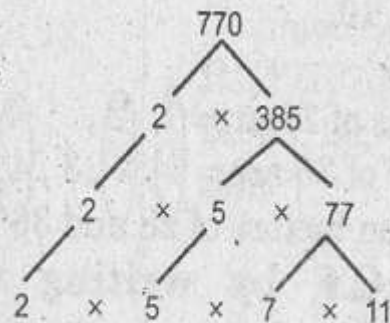
Sol.



Hence, the prime factors of 390 are
 $= 2 \times 3 \times 5 \times 13$ Ans.

viii. 770

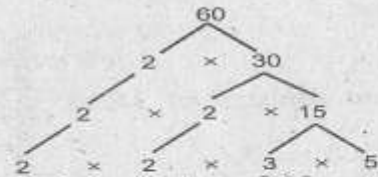
Sol.



Hence, the prime factors of 770 are
 $= 2 \times 5 \times 7 \times 11$ Ans.

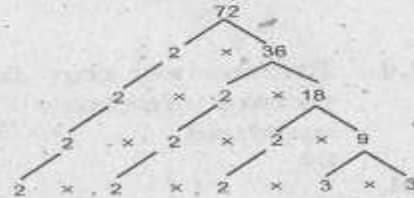
12

iii. 60
Sol.



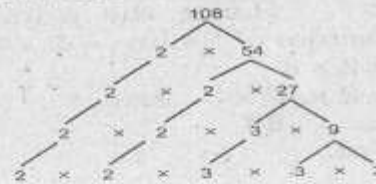
Hence the prime factors of 60 are $= 2 \times 2 \times 3 \times 5$
 $= 2^2 \times 3 \times 5$ Ans.

iv. 72
Sol.



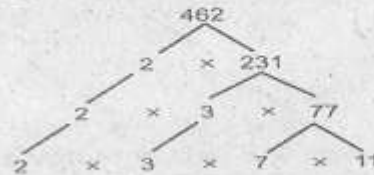
Hence, the prime factor of 72 are $= 2 \times 2 \times 2 \times 3 \times 3$
 $= 2^3 \times 3^2$ Ans.

v. 108
Sol.



Hence, the prime factors of 108 are
 $= 2 \times 2 \times 3 \times 3 \times 3 = 2^2 \times 3^3$ Ans.

vi. 462
Sol.



Hence the prime factors of 462 are
 $= 2 \times 3 \times 7 \times 11$ Ans.

11

$$2 \times 3 \times 7 \times 7 \times 7$$

$$= 2 \times 3 \times 7^3 \text{ Ans.}$$

xii. 1248

Sol.

Hence the prime factors of 1248 are;

$$2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 13$$

$$= 2^5 \times 3 \times 13 \text{ Ans.}$$

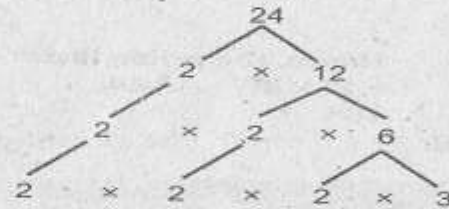
7	7
	1
2	1248
2	624
2	312
2	156
2	78
3	39
13	13
	1

Q.4. Factorize the following numbers into prime factors by using factor tree method.

i. 24

Sol.

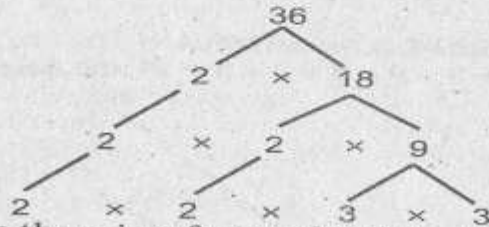
Hence the prime factors of 24 are = $2 \times 2 \times 2 \times 3$
 $= 2 \times 2^3 \times 3 \text{ Ans.}$



ii. 36

Sol.

Hence the prime factor of 36 are = $2 \times 2 \times 3 \times 3$
 $= 2^2 \times 3^2 \text{ Ans.}$



(10)

vii. 256

Sol.

Hence the prime factors of 256 are:

$$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

$$= 2^8 \text{ Ans.}$$

2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

viii. 392

Sol.

Hence the prime factors of 392 are:

$$2 \times 2 \times 2 \times 7 \times 7 = 2^3 \times 7^2 \times 2 \text{ Ans.}$$

2	392
2	196
2	98
7	49
7	7
	1

ix. 5250

Sol.

Hence the prime factors of 5250 are:

$$2 \times 3 \times 5 \times 5 \times 5 \times 7$$

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

$$= 2 \times 3 \times 5^3 \times 7 \text{ Ans.}$$

2	5250
5	2625
5	525
5	105
3	21
7	7
	1

x. 2310

Sol.

Hence the prime factors of 2310 are:

$$= 2 \times 3 \times 5 \times 7 \times 11 \text{ Ans.}$$

2	2310
5	1155
3	231
7	77
11	11
	1

xi. 2058

Sol.

Hence the prime factors of 2058 are:

2	2058
3	1029
7	343
7	49

9

Q.3. Find the prime factors of the following numbers by using division method.

i. 20

Sol.

Hence the prime factors of 20 are:

$$2 \times 2 \times 5 = 2^2 \times 5 \text{ Ans.}$$

2	20
2	10
5	5
	1

ii. 36

Sol.

Hence the prime factors of 36 are:

$$2 \times 2 \times 3 \times 3 = 2^2 \times 3^2 \text{ Ans.}$$

2	36
2	18
3	9
3	3
	1

iii. 98

Sol.

Hence the prime factors of 98 are:

$$2 \times 7 \times 7 = 2 \times 7^2 \text{ Ans.}$$

2	98
7	49
7	7
	1

iv. 225

Sol.

Hence the prime factors of 225 are:

$$3 \times 3 \times 5 \times 5 = 3^2 \times 5^2 \times 13 \text{ Ans.}$$

3	225
3	75
5	25
5	5
	1

v. 216

Sol.

Hence the prime factors of 216 are:

$$3 \times 3 \times 3 \times 2 \times 2 \times 2$$

$$= 3^3 \times 2^3 \text{ Ans.}$$

3	216
3	72
3	24
2	8
2	4
2	2
	1

vi. 441

Sol.

Hence the prime factors of 441 are:

$$3 \times 3 \times 7 \times 7 = 3^2 \times 7^2 \text{ Ans.}$$

3	441
3	147
7	49
7	7
	1

82

Exercise 3.3

Q.1. Express the following factors by using the index notation.

i. $13 \times 13 \times 13$

Ans. 13^3

ii. $7 \times 7 \times 7 \times 7$

Ans. 7^4

iii. 29×29

Ans. 29^2

iv. $5 \times 5 \times 5 \times 5 \times 5 \times 5$

Ans. 5^6

v. $11 \times 11 \times 11 \times 11$

Ans. 11^4

vi. $3 \times 3 \times 3 \times 3 \times 3 \times 3$

Ans. 3^6

vii. $2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5$

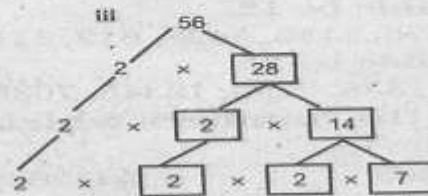
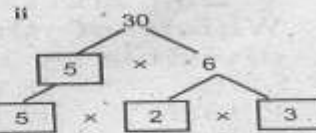
Ans. $2^3 \times 3^2 \times 5^2$

viii. $7 \times 7 \times 11 \times 23 \times 23$

Ans. $7^2 \times 11 \times 23^2$

Q.2. Fill in the boxes to complete the factor tree.

Ans. i



7

iv. 1111150

v. 626205

vi. 100200300

Ans. Divisible by '25'

142300, 5412625, 1111150, 100200300

6

Ans. Divisible by 3

762, 5361, 1215, 12345, 45678

Divisible by 4

512, 968, 3692 and 4952.

Divisible by 5

110, 1215, 7310, 1010, 12345

Q.3. Using the divisibility test, determine which of the following numbers are divisible by 8 or 9.

i. 512	ii. 333	iii. 440	iv. 904
v. 56565	vi. 2968	vii. 6669	viii. 11241
ix. 16920	x. 11088	xi. 9144	xii. 6312

Ans. Divisible by '8'

512, 440, 904, 2968, 16920, 11088, 9144, 6312.

Divisible by '9'

333, 56565, 6669, 11241

Q.4. Find the number which is divisible by 11.

i. 2550	ii. 3673	iii. 8415	iv. 5155
v. 135795	vi. 21211212	vii. 7654321	
viii. 654313			

Ans. Divisible by '11'

135795, 21211212, 654313

Q.5. Which of the following numbers are divisible by 12 or 15.

i. 312	ii. 576	iii. 729	iv. 1140
v. 1335	vi. 4428	vii. 3150	viii. 612
ix. 11112	x. 12345	xi. 23448	xii. 70350

Ans. Divisible by 12.

312, 576, 1140, 4428, 612, 11112, 23448, 7035,

Divisible by 15

1140, 1335, 3150, 12345, 70350

Q.6. Find the numbers which can be divided by 25.

i. 142300	ii. 5412625	iii. 810235
-----------	-------------	-------------

5

Exercise 3.2

Q.1. Separate the following into even and odd numbers without carrying division.

- i. 6423 ii. 8321 iii. 6254 iv. 989
v. 810 vi. 8394 vii. 1234 viii. 1357
ix. 54321 x. 86420 xi. 99880 xii. 30005

Ans.

Even Numbers	Odd Numbers
6254	6423
810	8321
8394	989
1234	1357
86420	54321
99880	30005

Q.2. Which of the following numbers are divisible by 3, 4 and by 5.

- i. 762 ii. 512 iii. 110 iv. 968
v. 3692 vi. 5361 vii. 1215 viii. 7310
ix. 1010 x. 12345 xi. 4952 xii. 45678

(4)

Q.6. List all numbers less than 50 which are multiples of 3 and 4.

Ans. Multiples of 3: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48
Multiples of 4: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48

Q.7. Write all composite numbers less than 20.

Ans. 4, 6, 8, 9, 10, 12, 14, 15, 16, 18

Q.8. Write five consecutive composite numbers just below 50.

Ans. 44, 45, 46, 48, 50

Q.9. Write all prime numbers less than 15 (3)

Ans. 2, 3, 5, 7, 11, 13

iv. 99

Sol.

The factor of '99' are 1, 3, 9, 11, 33, 99

Q.2. Write first five multiples of each of the following numbers

i. 3

Sol: 3, 6, 9, 12, 15

ii 5

Sol. 5, 10, 15, 20, 25

iii. 9

Sol. 9, 18, 27, 36, 45

iv. 12

Sol. 12, 24, 36, 48, 60

Q.3. Separate the odd and even numbers

i. 135

ii. 342

iii. 1112

iv. 5008

v. 9427

vi. 8134

vii. 10006

viii. 78965

Answers:

Odd numbers

i. 135

v. 9427

viii. 78965

Even numbers

ii. 342

iii. 1112

iv. 5008

vi. 8134

vii. 10006

Q.4. List all the prime numbers between;

i. 10 and 50

ii. 25 and 60

iii. 32 and 48

iv. 76 and 90

Answers:

i. 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47

ii. 29, 31, 37, 41, 43, 47, 53, 59.

iii. 37, 41, 43, 47

iv. 79, 83, 89

Q.5. List all numbers less than 100 which are multiples of 5 and 10.

Ans. Multiples of 5: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95,

Multiples of 10: 10, 20, 30, 40, 50, 60, 70, 80, 90

2

denoted with the capital

Exercise 3.1

Q.1. Write all the factors of each of the following numbers

i. 21

Sol.

The factors of '21' are 1, 3, 7 and 21.

ii. 36

Sol.

The factors of '36' are 1, 2, 3, 4, 6, 9, 12, 18, 36.

iii. 48

Sol.

The factors of '48' are 1, 2, 3, 4, 6, 8, 12, 16, 24, 48



vi. Show that relation between HCF and LCM of two number by using a formula.

Ans. First no. \times 2nd no = HCF \times LCM

Q.2. Fill in the blanks.

- i. The number having no common factors other than 1 are called _____ numbers.
- ii. A number having a factor other than 1 and itself is called _____ number.
- iii. _____ is the only even prime number.
- iv. A number is divisible by _____ if the digit at its unit place is 0 or even number.
- v. The process of writing numbers into its factors is called _____.

Answers:

- | | | |
|----------|------------------|--------|
| i. Prime | ii. Composite | iii. 2 |
| iv. 2 | v. factorization | |

Q.3. Tick(✓) the correct answer.

- i. The factor of every number is
a. 0 b. 1 c. 2 d. 3
- ii. Every number greater than 1 has at least factors
a. one b. two c. three d. four
- iii. A number is divisible by 6, if it has even number at the unit place and the sum of its digits is divisible by
a. 2 b. 3 c. 6 d. 9
- iv. The LCM of 2 and 3 is
a. 2 b. 3 c. 6 d. 9
- v. If LCM of two numbers 4 and 9 is 36, then its HCF will be.
a. 1 b. 2 c. 9 d. 12

Answer:

- | | | | | |
|------|-------|--------|-------|------|
| i. b | ii. b | iii. b | iv. d | v. a |
|------|-------|--------|-------|------|

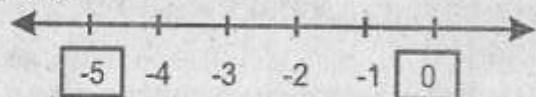
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SOLVED PTB MATH-6 CH:4,5

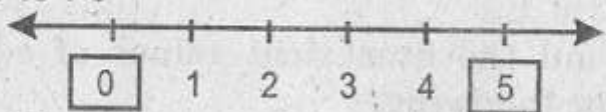
Exercise 4.1

Q.1. Draw the number line and mark the following numbers

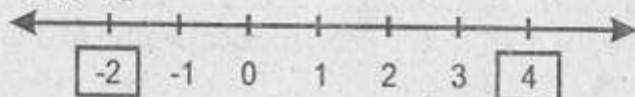
i. -5 to 0



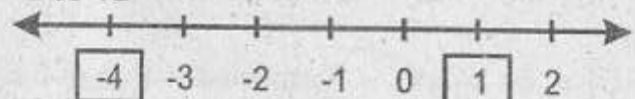
ii. 0 to +5



iii. -2 to +4



iv. -4 to +1



Q.2. Fill in the box with $>$ or $<$.

Sol.

i. $6 \boxed{>} 5$

ii. $-6 \boxed{<} -5$

iii. $-2 \boxed{<} 0$

iv. $0 \boxed{<} 4$

v. $8 \boxed{>} -10$

vi. $-9 \boxed{<} 1$

Q.3. Which is greater -101 or -111?

Sol. -101

Q.4. Which is smaller -99 or -199?

Sol. -199

7. What was the total rainfall in a week when it rained $1\frac{1}{2}$ cm on Thursday, $\frac{2}{5}$ cm on Friday and $\frac{3}{10}$ cm on Sunday, the rest of week was dry?

Sol.

$$\text{Rainfall on Thursday} = 1\frac{1}{2} \text{ cm} = \frac{3}{2} \text{ cm}$$

$$\text{Rainfall on Friday} = \frac{2}{5} \text{ cm}$$

$$\text{Rainfall on Sunday} = \frac{3}{10} \text{ cm}$$

$$\begin{aligned} \text{Total rainfall} &= \frac{3}{2} + \frac{2}{5} + \frac{3}{10} \\ &= \frac{15 + 4 + 3}{10} \end{aligned}$$

$$= \frac{22}{10}$$

$$= 2\frac{2}{10}$$

$$= 2\frac{1}{5} \text{ cm} \quad \text{Ans.}$$

Objective Exercise 5

Q.1. Answer the following questions

- i. Write the order in which brackets are solved.

- Ans. 1. Bar or Vinculum. " ".
 2. Parenthesis. "()".
 3. Braces. "{ }".
 4. Square Brackets. "[]".

ii. What is BODMAS rule?

- Ans. B O for Brackets of
 D for Division
 M for Multiplication
 A for Addition
 S for Subtraction

iii. What are three points needed to concentrate while solving a word problem?

- Ans. i. What do you know?
 ii. What do you want to know?
 iii. What is the proper operation?

iv. What is the other name of square brackets?

- Ans. Box brackets is the other name of square brackets.

Q.2. Fill in the blanks.

- i. In short the simplification rule is called the _____.
 ii. Additions, subtraction, multiplication and division are the four _____ of mathematics.
 iii. _____ is called curly brackets or braces.
 iv. "()" is called a round bracket.
 v. "_____" is called a bar or _____.

Answers:

- i. BODMAS ii. operation.
 iv. parenthesis v. vinculum

Q.3. Tick the correct answer.

- i. According to BODMAS rule, first basic operation is performed.
 a. addition b. division
 c. subtraction d. multiplication

$$= \frac{3}{2} + \left[\frac{27}{5} - \left(\frac{26+25}{10} \right) \right]$$

$$= \frac{3}{2} + \left[\frac{27}{5} - \frac{51}{10} \right]$$

$$= \frac{3}{2} + \left[\frac{54-51}{10} \right]$$

$$= \frac{3}{2} + \frac{3}{10}$$

$$= \frac{3}{2} \times \frac{10}{3}$$

$$= 5 \quad \text{Ans.}$$

$$3. \quad 4\frac{2}{3} + \left[3\frac{8}{9} \times \left(1\frac{3}{4} - \left(3\frac{1}{2} + 7\frac{1}{4} + 1\frac{1}{2} \right) \right) \right]$$

Sol.

$$= 4\frac{2}{3} + \left[3\frac{8}{9} \times \left(1\frac{3}{4} - \left(3\frac{1}{2} + 7\frac{1}{4} + 1\frac{1}{2} \right) \right) \right]$$

$$= \frac{14}{3} + \left[\frac{35}{9} \times \left(\frac{7}{4} - \left(\frac{7}{2} + \frac{29}{4} + \frac{3}{2} \right) \right) \right]$$

$$= \frac{14}{3} + \left[\frac{35}{9} \times \left(\frac{7}{4} - \left(\frac{7}{2} + \frac{29+6}{4} \right) \right) \right]$$

$$= \frac{14}{3} + \left[\frac{35}{9} \times \left(\frac{7}{4} - \left(\frac{7}{2} + \frac{35}{4} \right) \right) \right]$$

$$= \frac{14}{3} + \left[\frac{35}{9} \times \left(\frac{7}{4} - \left(\frac{7}{2} + \frac{4}{35} \right) \right) \right]$$

$$= \frac{14}{3} + \left[\frac{35}{9} \times \left(\frac{7}{4} - \frac{2}{5} \right) \right]$$

$$= \frac{14}{3} + \left[\frac{35}{9} \times \left(\frac{35-8}{20} \right) \right]$$

Rev. Ex. 5

$$= \frac{14}{3} + \left[\frac{35}{9} \times \frac{27}{20} \right]$$

$$= \frac{14}{3} + \frac{21}{4}$$

$$= \frac{14}{3} \times \frac{4}{21}$$

$$= \frac{8}{9} \quad \text{Ans.}$$

$$4. \quad [0.5 \times \{4.25 - (5.1 + \overline{2.35 + 1.05})\}]$$

Sol.

$$= [0.5 \times \{4.25 - (5.1 + \overline{2.35 + 1.05})\}]$$

$$= [0.5 \times \{4.25 - (5.1 + 3.40)\}]$$

$$= [0.5 \times \{4.25 - 1.5\}]$$

$$= [0.5 \times 2.75]$$

$$= 1.375 \quad \text{Ans.}$$

$$5. \quad [2.95 + \{3.02 \times (6.125 + \overline{5.196 - 2.746})\}]$$

Sol.

$$= [2.95 + \{3.02 \times (6.125 + \overline{2.45})\}]$$

$$= [2.95 + \{3.02 \times 2.5\}]$$

$$= [2.95 + 7.55]$$

$$= 10.5 \quad \text{Ans.}$$

$$6. \quad 11.34 \times [3.42 + \{11.075 - (3.045 + 2.064 + 1.032)\}]$$

Sol.

$$= 11.34 \times [3.42 + \{11.075 - (3.045 + 2.064 + 1.032)\}]$$

$$= 11.34 \times [3.42 + \{11.075 - (3.045 + 2)\}]$$

$$= 11.34 \times [3.42 + \{11.075 - 5.045\}]$$

$$= 11.34 \times [3.42 + 6.03]$$

$$= 11.34 \times 9.45$$

$$= 107.16 \quad \text{Ans.}$$

Rev. Ex. 5

Q.10. Sadaf bought 2.25 kg beef at the rate of Rs.160 per kg, 0.7 kg mutton at the rate of Rs.350 per kg and 2.35kg chicken at the rate of Rs.170 per kg. What amount does she have now out of Rs.1000?

Sol.

$$\text{Cost of beef} = 2.25 \times 160 \\ = \text{Rs.360}$$

$$\text{Cost of mutton} = 0.75 \times 350 \\ = \text{Rs.262.5}$$

$$\text{Cost of chicken} = 2.35 \times 170 \\ = \text{Rs.399.5}$$

$$\text{Total amount spent on items} \\ = \text{Rs.360} + \text{Rs.262.5} + \text{Rs.399.5} \\ = \text{Rs.1022}$$

$$\text{Sadaf has amount} = \text{Rs.1000} \\ \text{Further she has to pay Rs.22 along with Rs.1000.}$$

Review Exercise 5

Simplify

1. $[1\frac{3}{8} - (\frac{2}{3} + \frac{1}{2} \times (\frac{3}{4} + \frac{5}{7} \times 1\frac{1}{20}))]$

Sol.

$$= [1\frac{3}{8} - (\frac{2}{3} + \frac{1}{2} \times (\frac{3}{4} + \frac{5}{7} \times 1\frac{1}{20}))]$$

$$= [\frac{11}{8} - (\frac{2}{3} + \frac{1}{2} \times (\frac{3}{4} + \frac{5}{7} \times \frac{21}{20}))]$$

$$= [\frac{11}{8} - (\frac{2}{3} + \frac{1}{2} \times (\frac{3}{4} + \frac{3}{4}))]$$

$$= [\frac{11}{8} - (\frac{2}{3} + \frac{1}{2} \times (\frac{3}{4} + \frac{4}{3}))]$$

$$= [\frac{11}{8} - (\frac{2}{3} + \frac{1}{2} \times 1)]$$

$$= [\frac{11}{8} - (\frac{4+3}{6})]$$

$$= [\frac{11}{8} - (\frac{4+3}{6})]$$

$$= [\frac{11}{8} - \frac{7}{6}]$$

$$= \frac{33-28}{24} = \frac{5}{24}$$

2. $1\frac{1}{2} \div [5\frac{2}{5} - (2\frac{3}{5} + (2\frac{1}{12} + \frac{1}{2} + \frac{1}{3}))]$

Sol.

$$= 1\frac{1}{2} \div [5\frac{2}{5} - (2\frac{3}{5} + (2\frac{1}{12} + \frac{1}{2} + \frac{1}{3}))]$$

$$= \frac{3}{2} \div [\frac{27}{5} - (\frac{13}{5} + (\frac{25}{12} + \frac{1}{2} + \frac{1}{3}))]$$

$$= \frac{3}{2} \div [\frac{27}{5} - (\frac{13}{5} + (\frac{25}{12} + \frac{3+2}{6}))]$$

$$= \frac{3}{2} \div [\frac{27}{5} - (\frac{13}{5} + (\frac{25}{12} + \frac{5}{6}))]$$

$$= \frac{3}{2} \div [\frac{27}{5} - (\frac{13}{5} + (\frac{25}{12} \times \frac{6}{5}))]$$

$$= \frac{3}{2} \div [\frac{27}{5} - (\frac{13}{5} + \frac{25}{12} \times \frac{6}{5})]$$

$$= \frac{3}{2} \div [\frac{27}{5} - (\frac{13}{5} + \frac{5}{2})]$$

Rev. Ex. 5

$$\text{Remaining amount} = 12000 - 1000 = \text{Rs } 11000$$

$$\text{House Expenditures} = \frac{1}{2}(11000) = \text{Rs. } 5500 \quad (5-2)$$

$$\text{Remaining amount} = \text{Rs. } 5500$$

$$\text{Given as debt} = \frac{2}{5}(5500)$$

$$= \text{Rs. } 2200$$

$$\text{Total amount left} = 5500 - 2200$$

$$= \text{Rs. } 3300 \quad \text{Ans.}$$

Q.5. A person is walking at a speed of $1\frac{1}{8}$ km per hour. How much time does he require to reach a goal at the distance of $5\frac{1}{16}$ km.

Sol.

$$\text{Speed of the person} = 1\frac{1}{8} \text{ km per hr}$$

$$\text{Distance} = 5\frac{1}{16} \text{ km}$$

$$\text{Time spent} = \text{Distance} \div \text{Speed}$$

$$= 5\frac{1}{16} \div 1\frac{1}{8}$$

$$= \frac{81}{16} \div \frac{9}{8}$$

$$= \frac{81}{16} \times \frac{8}{9}$$

$$= \frac{9}{2}$$

$$= 4\frac{1}{2} \text{ hours} \quad \text{Ans.}$$

Q.6. The rate of a piece of gift paper is Rs. 0.40 per paper. How many pieces of paper can we purchase for Rs. 78.40? (5-2)

Sol.

$$\text{Rate of one paper} = \text{Rs. } 0.40$$

$$\text{Total Cost} = \text{Rs. } 78.40$$

$$\text{No. of paper pieces purchased} = 78.40 \div 0.40$$

$$= \frac{7840}{100} \div \frac{40}{100}$$

$$= 7840 \div 40$$

$$= 196 \quad \text{Ans}$$

Q.7. The price of a book is Rs. 650. Two friends have Rs. 325 and Rs. 296 respectively. Find how many rupees two friends need more to buy that book?

Sol.

$$\text{Price of a book} = \text{Rs. } 650$$

$$\text{Total amount} = \text{Rs. } 325 + \text{Rs. } 296$$

$$= \text{Rs. } 621$$

$$\text{Amount needed} = \text{Rs. } 650 - \text{Rs. } 621$$

$$= \text{Rs. } 29 \quad \text{Ans.}$$

Q.9. The price of a chemical of 16 kg weight is Rs. 1429.60. What is the price of 11.4 kg chemical?

Sol.

$$\text{Price of 16 kg} = \text{Rs. } 1429.60$$

$$\text{Price of 1 kg} = \frac{1429.60}{16}$$

$$\text{Price of 11.4 kg} = \frac{1429.60}{16} \times 11.4$$

$$= 1018.59 \quad \text{Ans.}$$

Milk supplied to 3rd family = $2\frac{1}{3}$ ltr

Total milk supplied = $5\frac{1}{2} + 1\frac{1}{6} + 2\frac{1}{3}$

$$= \frac{11}{2} + \frac{7}{6} + \frac{7}{3}$$

$$= \frac{33 + 7 + 14}{6}$$

$$= \frac{54}{6}$$

= 9 Litres Ans.

Q.2. Nosheen bought 12 metres cloth from the market. She used half of cloth for her suit and $\frac{2}{3}$ of remaining for her daughter's suit. How much cloth left with her?

Sol.

Total cloth purchased = 12 metres

Cloth used for Nosheen's suit = 6 metres

Cloth used for daughter's suit = $6 \times \frac{2}{3}$

$$= 2 \times 2$$

$$= 4 \text{ metres}$$

Cloth left = 6 metres - 4 metres

= 2 metres Ans.

Q.3. Ahmed required $18\frac{1}{2}$ feet long wire for a cable connection. He joined two wires of length $9\frac{3}{4}$ feet and $11\frac{1}{6}$ feet. How

much wire he has more than the required length?

Sol.

Required length of wire = $18\frac{1}{2}$ feet = $\frac{37}{2}$

Joined length of wire = $9\frac{3}{4}$ ft + $11\frac{1}{6}$ ft

$$= \frac{39}{4} + \frac{67}{6} \text{ ft}$$

$$= \frac{117 + 134}{12} = \frac{251}{12}$$

$$\text{More wire} = \frac{251}{12} - \frac{37}{2}$$

$$= \frac{251 - 222}{12}$$

$$= \frac{29}{12} = 2\frac{5}{12} \text{ Ans.}$$

Q.4. Saleem's salary is Rs. 12000. He gave $\frac{1}{12}$ of his salary as alms, half of the remaining salary for house expenditures and $\frac{2}{5}$ of the remaining as debt that was due upon him. What is the remaining salary with him?

Sol.

Total amount = Rs. 12000

Given as alms = $\frac{1}{12} \times 12000$

= Rs. 1000

$$= [1.25 + (12.099 \div 4.033)]$$

$$= [1.25 + 3]$$

$$= 4.25 \text{ Ans.}$$

11. $2.25 \times [1.005 + (0.5 \times (2.75 + 2.2 \times 4.12))]$

Sol.

$$= 2.25 \times [1.005 + (0.5 \times (2.75 + 2.2 \times 4.12))]$$

$$= 2.25 \times [1.005 + (0.5 \times 5.15)]$$

$$= 2.25 \times [1.005 + 2.575]$$

$$= 2.25 \times 3.58$$

$$= 8.055 \text{ Ans.}$$

12. $13.311 \div [3.251 + (2.045 - (1.9 \times 1.06 - 1.02))]$

Sol.

$$= 13.311 \div [3.251 + (2.045 - (1.9 \times 1.06 - 1.02))]$$

$$= 13.311 \div [3.251 + (2.045 - (1.9 \times 0.04))]$$

$$= 13.311 \div [3.251 + 1.969]$$

$$= 13.311 \div 5.22$$

$$= 2.55 \text{ Ans.}$$

13. $0.6 \times [3.9 \times (0.5328 + (0.1 + 0.01 + 0.001))]$

Sol.

$$= 0.6 \times [3.9 \times (0.5328 + (0.1 + 0.01 + 0.001))]$$

$$= 0.6 \times [3.9 \times (0.5328 + 0.111)]$$

$$= 0.6 \times [3.9 \times 0.48]$$

$$= 0.6 \times 4.8$$

$$= 2.88 \text{ Ans.}$$

14. $4.4238 \div [1.047 + (1.111 \times (9.261 + 5.432 + 2.345))] \times 1.01$

Sol.

$$= 4.4238 \div [1.047 + (1.111 \times (9.261 + 7.777))] \times 1.01$$

$$= 4.4238 \div [1.047 + (1.111 \times 1.1908)] \times 1.01$$

$$= 4.4238 \div [1.047 + 2.30] \times 1.01$$

$$= 4.4238 \div 3.349 \times 1.01$$

$$= 1.3209 \times 1.01$$

$$= 1.33 \text{ Ans.}$$

15. $100.014 - [2.3584 + (0.044 + (8.25 - 5.235 + 1.255))]$

Sol.

$$= 100.014 - [2.3584 + (0.044 + (8.25 - 5.235 + 1.255))]$$

$$= 100.014 - [2.3584 + (0.044 + (8.25 - 6.49))]$$

$$= 100.014 - [2.3584 + (0.044 + 1.76)]$$

$$= 100.014 - [2.3584 + 0.025]$$

$$= 100.014 - 94.336$$

$$= 5.678 \text{ Ans.}$$

Exercise 5.2

Q.1. Three families live together in a house.

The daily milk of one family is $5\frac{1}{2}$ litres

and the other two families use $1\frac{1}{6}$ litres

and $2\frac{1}{3}$ litres respectively. How much

milk would a milkman supply them?

Sol.

Milk supplied to 1st family = $5\frac{1}{2}$ ltr.

Milk supplied to 2nd family = $1\frac{1}{6}$ ltr.

$$= \frac{48-25}{15}$$

(5.1)

$$= \frac{23}{15}$$

$$= 1\frac{8}{15} \quad \text{Ans.}$$

$$7. \quad 1\frac{4}{5} + \left[\frac{1}{25} \times \left(1\frac{1}{4} + \left(3\frac{1}{3} + 2\frac{1}{2} \times 1\frac{5}{16} \right) \right) \right] \times \frac{1}{2}$$

Sol.

$$= 1\frac{4}{5} + \left[\frac{1}{25} \times \left(1\frac{1}{4} + \left(3\frac{1}{3} + 2\frac{1}{2} \times 1\frac{5}{16} \right) \right) \right] \times \frac{1}{2}$$

$$= \frac{9}{5} + \left[\frac{1}{25} \times \left(\frac{5}{4} + \left(\frac{10}{3} + \frac{5}{2} \times \frac{21}{16} \right) \right) \right] \times \frac{1}{2}$$

$$= \frac{9}{5} + \left[\frac{1}{25} \times \left(\frac{5}{4} + \left(\frac{10}{3} \times \frac{2}{5} \times \frac{21}{16} \right) \right) \right] \times \frac{1}{2}$$

$$= \frac{9}{5} + \left[\frac{1}{25} \times \left(\frac{5}{4} + \frac{7}{4} \right) \right] \times \frac{1}{2}$$

$$= \frac{9}{5} + \left[\frac{1}{25} \times \left(\frac{5+7}{4} \right) \right] \times \frac{1}{2}$$

$$= \frac{9}{5} + \left[\frac{1}{25} \times \frac{12}{4} \right] \times \frac{1}{2}$$

$$= \frac{9}{5} + \frac{3}{25} \times \frac{1}{2}$$

$$= \frac{9}{5} \times \frac{25}{3} \times \frac{1}{2}$$

$$= \frac{15}{2} = 7\frac{1}{2} \quad \text{Ans.}$$

$$8. \quad \left[2\frac{1}{3} + \left(1\frac{1}{3} + \left(1\frac{1}{3} \times 3\frac{1}{5} - 3\frac{1}{5} \right) \right) \right] \times 1\frac{4}{5}$$

Sol.

$$= \left[2\frac{1}{3} + \left(1\frac{1}{3} + \left(1\frac{1}{3} \times 3\frac{1}{5} - 3\frac{1}{5} \right) \right) \right] \times 1\frac{4}{5}$$

$$= \left[\frac{7}{3} + \left(\frac{4}{3} + \left(\frac{4}{3} \times \frac{16}{5} - \frac{16}{5} \right) \right) \right] \times \frac{9}{5}$$

(5.1)

$$= \left[\frac{7}{3} + \left(\frac{4}{3} + \left(\frac{64}{15} - \frac{16}{5} \right) \right) \right] \times \frac{9}{5}$$

$$= \left[\frac{7}{3} + \left(\frac{4}{3} + \left(\frac{64-48}{15} \right) \right) \right] \times \frac{9}{5}$$

$$= \left[\frac{7}{3} + \left(\frac{4}{3} + \frac{16}{15} \right) \right] \times \frac{9}{5}$$

$$= \left[\frac{7}{3} + \left(\frac{20+16}{15} \right) \right] \times \frac{9}{5}$$

$$= \left[\frac{7}{3} + \frac{36}{15} \right] \times \frac{9}{5}$$

$$= \left[\frac{7}{3} \times \frac{15}{36} \times \frac{9}{5} \right]$$

$$= \frac{7}{4}$$

$$= 1\frac{3}{4} \quad \text{Ans.}$$

$$9. \quad [2 + \{1.25 \times 3.85 + (5.64 - 2.9 + 1.2)\}]$$

Sol.

$$= [2 + \{1.25 \times 3.85 + (5.64 - 2.9 + 1.2)\}]$$

$$= [2 + \{1.25 \times 3.85 + (5.64 - 4.1)\}]$$

$$= [2 + \{1.25 \times 3.85 + 1.54\}]$$

$$= [2 + \{1.25 \times 2.5\}]$$

$$= [2 + 3.125]$$

$$= 5.125 \quad \text{Ans.}$$

$$10. \quad [1.25 + \{12.099 + (1.45 + 2.1 \times 1.23)\}]$$

Sol.

$$= [1.25 + \{12.099 + (1.45 + 2.1 \times 1.23)\}]$$

$$= [1.25 + \{12.099 + (1.45 + 2.583)\}]$$

$$= \frac{48-25}{15}$$

$$= \frac{23}{15}$$

$$= 1\frac{8}{15} \quad \text{Ans.}$$

$$7. \quad 1\frac{4}{5} + \left[\frac{1}{25} \times \left(1\frac{1}{4} + \left(3\frac{1}{3} + 2\frac{1}{2} \times 1\frac{5}{16} \right) \right) \right] \times \frac{1}{2}$$

Sol.

$$= 1\frac{4}{5} + \left[\frac{1}{25} \times \left(1\frac{1}{4} + \left(3\frac{1}{3} + 2\frac{1}{2} \times 1\frac{5}{16} \right) \right) \right] \times \frac{1}{2}$$

$$= \frac{9}{5} + \left[\frac{1}{25} \times \left(\frac{5}{4} + \left(\frac{10}{3} + \frac{5}{2} \times \frac{21}{16} \right) \right) \right] \times \frac{1}{2}$$

$$= \frac{9}{5} + \left[\frac{1}{25} \times \left(\frac{5}{4} + \left(\frac{10}{3} \times \frac{2}{5} \times \frac{21}{16} \right) \right) \right] \times \frac{1}{2}$$

$$= \frac{9}{5} + \left[\frac{1}{25} \times \left(\frac{5}{4} + \frac{7}{4} \right) \right] \times \frac{1}{2}$$

$$= \frac{9}{5} + \left[\frac{1}{25} \times \left(\frac{5+7}{4} \right) \right] \times \frac{1}{2}$$

$$= \frac{9}{5} + \left[\frac{1}{25} \times \frac{12}{4} \right] \times \frac{1}{2}$$

$$= \frac{9}{5} + \frac{3}{25} \times \frac{1}{2}$$

$$= \frac{9}{5} \times \frac{25}{3} \times \frac{1}{2}$$

$$= \frac{15}{2} = 7\frac{1}{2} \quad \text{Ans.}$$

$$8. \quad \left[2\frac{1}{3} + \left(1\frac{1}{3} + \left(1\frac{1}{3} \times 3\frac{1}{5} - 3\frac{1}{5} \right) \right) \right] \times 1\frac{4}{5}$$

Sol.

$$= \left[2\frac{1}{3} + \left(1\frac{1}{3} + \left(1\frac{1}{3} \times 3\frac{1}{5} - 3\frac{1}{5} \right) \right) \right] \times 1\frac{4}{5}$$

$$= \left[\frac{7}{3} + \left(\frac{4}{3} + \left(\frac{4}{3} \times \frac{16}{5} - \frac{16}{5} \right) \right) \right] \times \frac{9}{5}$$

$$= \left[\frac{7}{3} + \left(\frac{4}{3} + \left(\frac{64}{15} - \frac{16}{5} \right) \right) \right] \times \frac{9}{5}$$

$$= \left[\frac{7}{3} + \left(\frac{4}{3} + \left(\frac{64-48}{15} \right) \right) \right] \times \frac{9}{5}$$

$$= \left[\frac{7}{3} + \left(\frac{4}{3} + \frac{16}{15} \right) \right] \times \frac{9}{5}$$

$$= \left[\frac{7}{3} + \left(\frac{20+16}{15} \right) \right] \times \frac{9}{5}$$

$$= \left[\frac{7}{3} + \frac{36}{15} \right] \times \frac{9}{5}$$

$$= \left[\frac{7}{3} \times \frac{15}{36} \right] \times \frac{9}{5}$$

$$= \frac{7}{4}$$

$$= 1\frac{3}{4} \quad \text{Ans.}$$

$$9. \quad [2 + \{1.25 \times 3.85 + (5.64 - 2.9 + 1.2)\}]$$

Sol.

$$= [2 + \{1.25 \times 3.85 + (5.64 - 2.9 + 1.2)\}]$$

$$= [2 + \{1.25 \times 3.85 + (5.64 - 4.1)\}]$$

$$= [2 + \{1.25 \times 3.85 + 1.54\}]$$

$$= [2 + \{1.25 \times 2.5\}]$$

$$= [2 + 3.125]$$

$$= 5.125 \quad \text{Ans.}$$

$$10. \quad [1.25 + \{12.099 + (1.45 + 2.1 \times 1.23)\}]$$

Sol.

$$= [1.25 + \{12.099 + (1.45 + 2.1 \times 1.23)\}]$$

$$= [1.25 + \{12.099 + (1.45 + 2.583)\}]$$

Sol.

$$\begin{aligned}
 &= \left[1 \frac{1}{24} + \left\{ 1 \frac{1}{4} \times \left[1 \frac{1}{10} + 1 \frac{2}{5} - 1 \frac{1}{4} \right] \right\} \right] \\
 &= \left[\frac{25}{24} + \left\{ \frac{5}{4} \times \left(\frac{11}{10} + \frac{7}{5} - \frac{5}{4} \right) \right\} \right] \\
 &= \left[\frac{25}{24} + \left\{ \frac{5}{4} \times \left(\frac{22+28-25}{20} \right) \right\} \right] \\
 &= \left[\frac{25}{24} + \left\{ \frac{5}{4} \times \frac{25}{20} \right\} \right] \\
 &= \left[\frac{25}{24} + \frac{25}{16} \right] \\
 &= \left[\frac{25}{24} \times \frac{16}{25} \right] \\
 &= \frac{2}{3} \quad \text{Ans.}
 \end{aligned}$$

2. $\frac{8}{9} + \left[\frac{5}{3} + \left\{ \frac{4}{39} \times \left(\frac{3}{4} + \frac{2}{3} \times \frac{1}{2} \right) \right\} \right]$

Sol.

$$\begin{aligned}
 &= \frac{8}{9} + \left[\frac{5}{3} + \left\{ \frac{4}{39} \times \left(\frac{3}{4} + \frac{2}{3} \times \frac{1}{2} \right) \right\} \right] \\
 &= \frac{8}{9} + \left[\frac{5}{3} + \left\{ \frac{4}{39} \times \left(\frac{3}{4} + \frac{1}{3} \right) \right\} \right] \\
 &= \frac{8}{9} + \left[\frac{5}{3} + \left\{ \frac{4}{39} \times \left(\frac{9+4}{12} \right) \right\} \right] \\
 &= \frac{8}{9} + \left[\frac{5}{3} + \left\{ \frac{4}{39} \times \frac{13}{12} \right\} \right] \\
 &= \frac{8}{9} + \left[\frac{5}{3} + \frac{1}{9} \right] \\
 &= \frac{8}{9} + \left[\frac{15+1}{9} \right]
 \end{aligned}$$

$$\begin{aligned}
 &= \frac{8}{9} + \frac{16}{9} \\
 &= \frac{8+16}{9} = \frac{24}{9} \\
 &= 2 \frac{2}{3} \quad \text{Ans.}
 \end{aligned}$$

3. $\left[1 \frac{1}{4} + 1 \frac{1}{10} \times \left\{ 8 \frac{1}{2} - \left(6 \frac{1}{2} \times 1 \frac{5}{39} \right) \right\} \right]$

Sol.

$$\begin{aligned}
 &= \left[1 \frac{1}{4} + 1 \frac{1}{10} \times \left\{ 8 \frac{1}{2} - \left(6 \frac{1}{2} \times 1 \frac{5}{39} \right) \right\} \right] \\
 &= \left[\frac{5}{4} + \frac{11}{10} \times \left\{ \frac{17}{2} - \left(\frac{13}{2} \times \frac{44}{39} \right) \right\} \right] \\
 &= \left[\frac{5}{4} + \frac{11}{10} \times \left\{ \frac{17}{2} - \frac{22}{3} \right\} \right] \\
 &= \left[\frac{5}{4} + \frac{11}{10} \times \left\{ \frac{51-44}{6} \right\} \right] \\
 &= \left[\frac{5}{4} + \frac{11}{10} \times \frac{7}{6} \right] \\
 &= \frac{5}{4} + \frac{11}{10} \times \frac{7}{6} \\
 &= \frac{5}{4} + \frac{77}{60} \\
 &= \frac{75+77}{60} = \frac{152}{60} \\
 &= \frac{76}{30} = \frac{38}{15} = 2 \frac{8}{15} \quad \text{Ans.}
 \end{aligned}$$

4. $2 \frac{8}{14} + \left[1 \frac{4}{5} \times \left\{ 1 \frac{1}{3} + \left(2 \frac{1}{2} + 1 \frac{1}{3} - 2 \frac{1}{6} \right) \right\} \times 1 \frac{2}{3} \right]$

Sol.

$$= 2 \frac{8}{14} + \left[1 \frac{4}{5} \times \left\{ 1 \frac{1}{3} + \left(2 \frac{1}{2} + 1 \frac{1}{3} - 2 \frac{1}{6} \right) \right\} \times 1 \frac{2}{3} \right]$$

iii. Which process is known as the inverse process of addition? Ex. 4

Ans. Subtraction is known as the inverse process of addition.

iv. Write two integers less than 1.

Ans. 0, -1

Q.2. Fill in the blanks.

i. In routine, we do not use sign with _____ integers.

ii. _____ is neither a positive nor a negative integer.

iii. The product of two integers of opposite signs is a _____ integer.

iv. Integers are also known as _____

Answers:

i. Positive ii. 0 iii. negative iv. directed

Q.3. Tick (✓) the correct answer.

i. The numerical value of -55 is :

a. 55 b. 5 c. -5 d. -55

ii. Division of an integer is not possible by

a. positive integer b. negative integer
c. zero d. its absolute value

iii. $(+7) + (-3) = ?$

a. 10 b. -4 c. -10 d. +4

iv. $[(-1) + (-1)] - (-1) = ?$

a. +1 b. -1 c. -2 d. +2

v. $(-1) + (-1) = ?$

a. +1 b. -1 c. -2 d. 1

Answers

i. 55 ii. 0 iii. +4
iv. -1 v. +1

CHAPTER 5

SIMPLIFICATION

Brackets

Brackets tell us the order of solving of the expression.

Order of Brackets

Brackets are solved in the following order.

- | | |
|-----------|-----------------|
| 1. _____ | Bar or vinculum |
| 2. () | Parenthesis |
| 3. { } | Braces |
| 4. [] | Square Brackets |

BODMAS Rule

Simplification rule is also called BODMAS rule.

It means to perform the four operation as

- i. BO for Brackets of
- ii. D for Division
- iii. M for Multiplication
- iv. A for Addition
- v. S for subtraction

Exercise 5.1

Q.1. Simplify the following:

1. $[1\frac{1}{24} + \{1\frac{1}{4} \times \{1\frac{1}{10} + 1\frac{2}{5} - 1\frac{1}{4}\}]]$

$$\text{ii. } (+1) \times (-2) \times (+3) \times (4)$$

$$\text{Sol. } -2 \times 12 = -24$$

$$\text{iii. } [(+2) \times (+9)] \times (-4)$$

$$\text{Sol. } = +18 \times (-4) \\ = -72$$

$$\text{vi. } [(-18) \times (3)] \times (2)$$

$$\text{Sol. } \\ = -54 \times 2 \\ = -108$$

$$\text{v. } [(25) \times (-8)] \times (-16)$$

$$\text{Sol. } \\ = (-200) \times (-16) \\ = 3200$$

$$\text{vi. } [(-100) \times (-15)] \times (3)$$

$$\text{Sol. } \\ = +1500 \times 3 \\ = 4500 \quad \text{Ans.}$$

Exercise 4.5

Q.1. Solve

$$\text{i. } (-42) \div (-7)$$

$$\text{Sol. } = \frac{-42}{-7} = 6$$

$$\text{ii. } (+36) \div (+9)$$

$$\text{Sol. } = \frac{+36}{+9} = +4$$

$$\text{iii. } (+65) \div (+5)$$

$$\text{Sol. } = \frac{+65}{+5} = +13$$

$$\text{iv. } (-27) \div (-3)$$

$$\text{Sol. } = \frac{-27}{-3} = +9$$

$$\text{v. } (-126) \div (+14)$$

$$\text{Sol. } = \frac{-126}{+14} = -9$$

$$\text{vi. } (+34) \div (-17)$$

$$\text{Sol. } = \frac{+34}{-17} = -2$$

$$\text{vii. } (+260) \div (-13)$$

$$\text{Sol. } = \frac{+260}{-13} = -20$$

$$\text{viii. } (-189) \div (-21)$$

$$\text{Sol. } = \frac{-189}{-21} = +9$$

$$\text{ix. } (-155) \div (+31)$$

$$\text{Sol. } = \frac{-155}{+31} \\ = -5$$

$$\text{x. } (+372) \div (+124)$$

$$\text{Sol. } = \frac{+372}{+124} \\ = +3$$

Q.2. Fill in the following boxes.

$$\text{i. } \frac{12}{3} = \boxed{4}$$

$$\text{ii. } \frac{-16}{\boxed{8}} = -2$$

$$\text{iii. } \frac{\boxed{-20}}{5} = -4$$

$$\text{iv. } \frac{30}{\boxed{-5}} = -6$$

$$\text{v. } \frac{\boxed{-72}}{-8} = 9$$

$$\text{vi. } \frac{169}{13} = \boxed{13}$$

$$\text{vii. } \frac{8}{2} = 2 \times \boxed{2}$$

$$\text{viii. } -\frac{16}{2} = 2 \times \boxed{-4}$$

$$\text{ix. } \frac{-27}{-3} = 3 \times \boxed{3}$$

Q.3. Find the quotient of the following.

$$\text{i. } (+252) \div (+18)$$

$$\text{Sol. } = \frac{+252}{+18} \\ = 14$$

$$\text{ii. } (-195) \div (+15)$$

$$\text{Sol. } = \frac{-195}{+15} \\ = -13$$

$$\text{iii. } (-480) \div (-120)$$

$$\text{Sol. } = \frac{-480}{-120} \\ = +4$$

$$\text{iv. } (+196) \div (-28)$$

$$\text{Sol. } = \frac{+196}{-28} \\ = -7$$

$$\text{v. } (-99) \div (+11)$$

$$\text{Sol. } = \frac{-99}{+11} = -9$$

$$\text{vi. } (+2000) \div (-40)$$

$$\text{Sol. } = \frac{+2000}{-40} \\ = -50$$

- iv. $(+16) - (+5) = (+11)$
 v. $(+6) - (-3) = +9$
 vi. $(-16) - (+13) = -29$

Q.3. Simplify the following.

i. $[(-8) - (-6)] - (-4)$

Sol. $= [-8 + 6] + 4$
 $= -2 + 4$
 $= 2$

ii. $[(+11) - (+5)] - (+19)$

Sol. $= [+11 - 5] - 19$
 $= +6 - 19$
 $= -13$

iii. $[(-13) - (-18)] - (+17)$

Sol. $= [-13 + 18] - 17$
 $= +5 - 17 = -12$

iv. $[(-18) - (+12)] - (-19)$

Sol. $= [-18 - 12] + 19$
 $= -30 + 19$
 $= -11$

v. $[(+23) - (-9)] - (+29)$

Sol. $= [+23 + 9] - 29$
 $= +32 - 29$
 $= +3$

vi. $[(+100) - (+50)] - (+25)$

Sol. $= [+100 - 50] - 25$
 $= 50 - 25$
 $= 25$

Q.4. Subtract -111 from +111

Sol. $= (+111) - (-111)$
 $= +111 + 111$
 $= +222$ Ans.

Q.5. The sum of two integers is -99. One integer is -66, find the other.

Sol. $= (-99) - (-66)$
 $= -99 + 66 = 33$

Exercise 4.4

Q.1. Fill in the boxes.

i. $(+6) \times (-3) = \boxed{-18}$

ii. $(-9) \times \boxed{-9} = 81$

iii. $(-2) \times (+8) = \boxed{-16}$

iv. $\boxed{+11} \times +11 = 121$

v. $\boxed{-8} \times -7 = 56$

vi. $-25 \times \boxed{+3} = -75$

Q.2. Find the product of the following.

i. $+3, +4$

Sol. $= +3 \times +4 = +12$

ii. $-6, -2$

Sol. $= -6 \times -2 = +12$

iii. $+5, -5$

Sol. $= +5 \times -5 = -25$

iv. $-7, +8$

Sol. $= -7 \times +8 = -56$

v. $-9, -4$

Sol. $= -9 \times -4 = +36$

vi. $+3, -8$

Sol. $= +3 \times -8 = -24$

vii. $-10, -5$

Sol. $= -10 \times -5 = +50$

viii. $+11, -7$

Sol. $= +11 \times -7 = -77$

Q.3. Simplify each of the following

i. $(-1) \times (-1) \times (-1) \times (-1)$

Sol. $= +1 \times +1 = +1$
 $= 1$ Ans.

vii. $(-) \times (-) = \boxed{+}$

viii. $(+) \times (-) = \boxed{-}$

ix. $-9, -8$

Sol. $= -9 \times -8 = +72$

x. $+6, +12$

Sol. $= +6 \times +12 = +72$

xi. $-3, +50$

Sol. $= -3 \times +50$
 $= -150$

xii. $-7, +7$

Sol. $= -7 \times +7 = -49$

xiii. $-4, -9$

Sol. $= -4 \times -9$
 $= +36$

xiv. $-5, -13$

Sol. $= -5 \times -13$
 $= +65$

xv. $+110, -8$

Sol. $= +110 \times -8$
 $= -880$

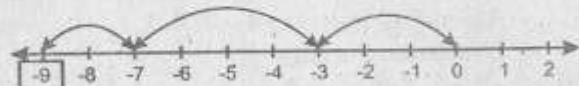
v. $(-1) + (-2) + (-3)$

Sol.



vi. $(-3) + (-4) + (-2)$

Sol.



Q.2. Find the sum of the following.

i. $(+5) + (+2)$

Sol. +7

iii. $(-4) + (-6)$

Sol. -10

v. $(+10) + (-2)$

Sol. +8

vii. $(-11) + (+7)$

Sol. -4

ix. $(+5) + (-8)$

Sol. -3

xi. $(+12) + (+23)$

Sol. +35

ii. $(+9) + (+7)$

Sol. 16

iv. $(-8) + (-8)$

Sol. -16

vi. $(-7) + (+6)$

Sol. -1

viii. $(+3) + (-9)$

Sol. -6

x. $(-13) + (-11)$

Sol. -24

xii. $(-27) + (-19)$

Sol. -46

Q.3. Fill in the boxes.

i. $(+3) + (-6) = \boxed{-3}$

ii. $(+7) + (+3) = \boxed{+10}$

iii. $(-6) + (-9) = \boxed{-15}$

iv. $(+5) + \boxed{+2} = (+7)$

v. $\boxed{-11} + (-5) = -16$

vi. $\boxed{+19} + (-17) = (+2)$

vii. $(100) + \boxed{-50} = (+50)$

viii. $(-11) + \boxed{-100} = (-111)$

Q.4. Solve the following.

i. $[(+2) + (+3)] + (+4)$

Sol. = $[2 + 3] + (+4)$

= $5 + 4 = 9$

ii. $[(-1) + (-1)] + (-5)$

Sol. = $[-1 - 1] - 5$

= $-2 - 5 = -7$

iii. $[(+3) + (+5)] + (-1)$

Sol. = $[+3 + 5] - 1$

= $8 - 1 = 7$

iv. $[(-2) + (-6)] + (+4)$

Sol. = $[-2 - 6] + 4$

= $-8 + 4 = -4$

v. $(+25) + [(+25) + (+50)]$

Sol. = $25 + [25 + 50]$

= $25 + 75 = 100$

vi. $(-18) + [(25) + (-30)]$

Sol. = $(-18) + [25 - 30]$

= $-18 + 25 - 30$

= $25 - 48 = -23$

Exercise 4.3

Q.1. Simplify the following.

i. $(+4) - (+1)$

Sol. = $+4 - 1$

= +3

ii. $(+8) - (+5)$

Sol. = $+8 - 5$

= +3

iii. $(-6) - (-2)$

Sol. = $-6 + 2$

= -4

iv. $(-7) - (-9)$

Sol. = $-7 + 9$

= 2

v. $(+15) - (-4)$

Sol. = $+15 + 4$

= 19

vi. $(-18) - (+7)$

Sol. = $-18 - 7$

= -25

vii. $(+23) - (+15)$

Q.2. Fill in the blanks.

i. $(+2) - (+9) = -7$

ii. $(-8) - (+4) = -12$

iii. $(-11) - (-13) = (+2)$

Sol. = $+23 - 15$

= 8

viii. $(-42) - (-21)$

Sol. = $-42 + 21$

= -21

ix. $(+69) - (-21)$

Sol. = $+69 + 21$

= 90

x. $(+49) - (+81)$

Sol.

= $+49 - 81$

= -32

xi. $(+102) - (-133)$

Sol. = $102 + 133$

= 235

xii. $(-195) - (-165)$

Sol. = $-195 + 165$

= -30

Q.5. Write the integers between (4.1)

i. 2 and 6

Sol. 3, 4, 5

ii. -2 and 3

Sol. -1, 0, 1, 2

iii. -6 and -1

Sol. -5, -4, -3, -2

iv. -3 and 4

Sol. -2, -1, 0, 1, 2, 3

Q.6. Give two possible integers in following cases.

i. $0 <$

Sol. 1, 2,

ii. < 0

Sol. -1, -2

iii. > -3

Sol. -2, -1

Q.7. Write three integers smaller than 2.

Sol. 1, 0, -1

Q.8. Write four integers greater than -2.

Sol. -1, 0, 1, 2

Q.9. Find the numerical values of each of the following.

i. 3

Sol. $|3| = 3 \Rightarrow$ Numerical value of 3 is 3.

ii. -8

Sol. $|-8| = 8 \Rightarrow$ Numerical value of -8 is 8.

iii. 5

Sol. $|5| = 5 \Rightarrow$ Numerical value of 5 is 5

iv. -9

Sol. $|-9| = 9 \Rightarrow$ Numerical value of -9 is 9.

v. -6

Sol. $|-6| = 6 \Rightarrow$ Numerical value of -6 is 6.

vi. -2

Sol. $|-2| = 2 \Rightarrow$ Numerical value of -2 is 2

Q.10. Write the integer whose numerical value is 0.

Sol. '0'.

Q.11. Arrange the given integers in ascending and descending order.

i. -4, 1, -2, 0

Ascending order = -4, -2, 0, 1

Descending order = 1, 0, -2, -4

ii. 1, -3, -4, 0

Ascending order = -4, -3, 0, 1

Descending order = 1, 0, -3, -4

iii. -2, -3, 3, 2

Ascending order = -3, -2, 2, 3

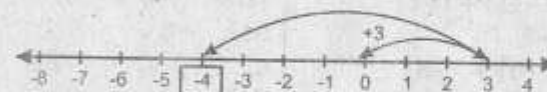
Descending order = 3, 2, -2, -3

Exercise 4.2

Q.1. Use the number line to write the sum.

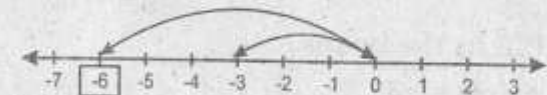
i. $-7 + (+3)$

Sol.



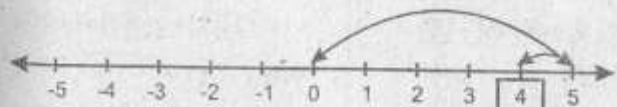
ii. $(-2) + (-4)$

Sol.



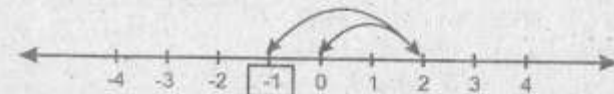
iii. $(+5) - (+1)$

Sol.



iv. $(+2) + (-3)$

Sol.



- ii. The bracket vinculum is denoted by obj
Ex. 5
- a. () b. { }
- c. [] d. _____
- iii. [] is called.
- a. parenthesis b. braces
- d. vinculum d. box brackets
- iv. After simplifying $\{1+(2+4+2 \times 1-3)\}$ we get
- a. 1 b. 2
- c. 3 d. -1
- v. $[1+2 \times \{5 - (1 + \overline{6+2})\}]$
- a. $\frac{1}{2}$ b. $\frac{1}{3}$
- c. $\frac{2}{3}$ d. $\frac{1}{4}$

Answers:

- i. division ii. _____ iii. Box paranthesis
- iv. 2 v. $\frac{1}{3}$

SOLVED PTB MATH-6 CH:6,7,8

Q.4. If $x = 4$, $y = 2$ and $z = 5$, then find the value of

Sol.

i. $2x - 3 = ?$

Put $x = 4$, $z = 5$ above. So

$$2x - z = 2(4) - 5 \\ = 8 - 5 = 3$$

ii. $5x^2 = ?$

Put $x = 4$ above. So

$$5x^2 = 5(4)^2 \\ = 5(16) = 80$$

iii. $x + y = ?$

Put $x = 4$, $y = 2$ above

So $x + y = 4 + 2 \\ x + y = 6$

iv. $x + y - z = ?$

Put $x = 4$, $y = 2$, $z = 5$ above. So

$$x + y - z = 4 + 2 - 5 \\ = 6 - 5 = 1$$

v. $2xy - yz + y = ?$

Put $x = 4$, $y = 2$, $z = 5$ above. So

$$2xy - yz + y = 2(4)(2) - (2)(5) + 2 \\ = 16 - 10 + 2 = 18 - 10 = 8$$

vi. $x^2 + z^2 - 2y = ?$

Put $x = 4$, $y = 2$, $z = 5$ above. So

$$x^2 + z^2 - 2y = (4)^2 + (5)^2 - 2(2) \\ = 16 + 25 - 4 = 41 - 4 = 37$$

vii. $4x^2 + 2yz - y = ?$

Put $x = 4$, $y = 2$, $z = 5$ above. So

$$4x^2 + 2yz - y = 4(4)^2 + 2(2)(5) - 2 \\ = 4(16) + 20 - 2 = 64 + 20 - 2 = 82$$

viii. $4yz - z^2 + 3x^2 = ?$

Put $x = 4$, $y = 2$, $z = 5$ above. So

$$4yz - z^2 + 3x^2 = 4(2)(5) - (5)^2 + 3(4)^2 \\ = 40 - 25 + 48 = 15 + 48 \\ = 63 \quad \text{Ans.}$$

ix. $4x^2 - 3y^2z - 8xz = ?$

Put $x = 4$, $y = 2$, $z = 5$ above. So

$$4x^2 - 3y^2z - 8xz = 4(4)^2 - 3(2)^2(5) - 8(4)(5) \\ = 4(16) - 15(4) - 160 \\ = 64 - 60 - 160 = -156 \quad \text{Ans.}$$

Objective Exercise 8

Q.1. Answer the following questions.

i. Define the sentence.

Ans. A group of words that makes a complete sense is called as sentence.

ii. What is meant by an open statement?

Ans. The statement about which we can't decide which is true and which is false, until we get further information.

iii. What is called the number that makes an open statement true?

Ans. It is called satisfying statement.

iv. What is a variable?

Ans. In algebra, a letter is used as symbol of any number or value which is called a variable.

v. Define the evaluation.

Ans. The process of finding the numerical value of an expression by using numbers in place of variables.

iv. $= 7a - b - c$ Ans. Rev. Ex. 8
 $a - 2b + c, 5b - 2a$ and $-4a - 3b$
 Sol.
 $= (a - 2b + c) + (5b - 2a) + (-4a - 3b)$
 $= a - 2b + c + 5b - 2a - 4a - 3b$
 $= a - 2a - 4a - 2b + 5b - 3b + c$
 $= -5a + 3b - 3b + c$
 $= -5a + c$ Ans.

v. $3l^2 + 4m - 5n^3, 7l^2 - 8m - 6n^3, 4l^2 - 9m - 7n^3$
 Sol.
 Sum $= 3l^2 + 4m - 5n^3 + 7l^2 - 8m - 6n^3 + 4l^2 - 9m - 7n^3$
 $= 14l^2 - 13m - 18n^3$

vi. $p^2 + 2pq + q^3, p^2 - 2pq + q^2, -p^2 - q^2$
 Sol.
 Sum $= p^2 + 2pq + q^3 + p^2 - 2pq + q^2 - p^2 - q^2$
 $= p^2 + q^3$

Q.2. Subtract the second expression from the first.

i. $-3a - 7b - c$
 $\frac{-3a + 8b + 6c}{-6a + b + 5c}$

ii. $19p - q + r$
 $\frac{-8p + 3q + 4r}{11p + 2q + 5r}$

v. $x^2 - 3xy + 7y^2 - 2$
 $\frac{+ 4x^2 + 6xy + y^2 + 5}{5x^2 + 3xy + 8y^2 - 7}$

iii. $2x^3 - 3x^2 + x + 5$
 $\frac{4x^3 + 5x^2 + 3x + 8}{-2x^2 - 8x^2 + 4x - 3}$

iv. $3a - 3b + 4c - 6d$
 $\frac{-4a + 6b + c + 7d}{-a + 3b + 5c - 13d}$

Q.3. Simplify.

Sol.

i. $[3x^2 - \{x^2 - 2y(5x - 3y)\}]$
 $= [3x^2 - \{x^2 - 10xy + 6y^2\}]$
 $= [3x^2 - x^2 + 10xy - 6y^2]$
 $= 2x^2 + 10xy - 6y^2$

ii. $x - [2y - \{3x - (2y + 3z)\}]$
 $= x - [2y - \{3x - 2y - 3z\}]$
 $= x - [2y - 3x + 2y + 3z]$
 $= x - [3x + 4y + 3z]$
 $= x + 3x - 4y - 3z$
 $= 4x - 4y - 3z$ Ans.

iii. $2a - [3a - \{4a - (3a - 2a + 3b)\}]$
 $= 2a - [3a - \{4a - (3b - 2a - 3b)\}]$
 $= 2a - [3a - \{4a - (-2a)\}]$
 $= 2a - [3a - \{4a + 2a\}]$
 $= 2a - [3a - \{6a\}]$
 $= 2a - [3a - 6a]$
 $= 2a - [-3a]$
 $= 2a + 3a$
 $= 5a$ Ans.

iv. $-l - 5m - [2l - m - \{3l - 2m - (l + 2m)\}]$
 $= -l - 5m - [2l - m - \{3l - 2m - l - 2m\}]$
 $= -l - 5m - [2l - m - \{2l - 4m\}]$
 $= -l - 5m - [2l - m - 2l + 4m]$
 $= -l - 5m - [3m]$
 $= -l - 5m - 3m$
 $= -l - 8m$ Ans.

(ii) $a \times b = b \times a$

Sol.

L.H.S

$$(3) \times (2) = (2) \times (3) \quad \text{R.H.S}$$

$$6 = 6$$

So,

$$\text{L.H.S} = \text{R.H.S}$$

(iii) $(a + b) + c = a + (b + c)$

Sol.

L.H.S

$$= (3 + 2) + 1 = 6$$

R.H.S

$$= a + (b + c) = (3) + (2 + 1) = 6 \text{ Ans.}$$

So,

$$\text{L.H.S} = \text{R.H.S}$$

(iv) $(a \times b) \times c = a \times (b \times c)$

Sol.

L.H.S

$$= (3 \times 2) \times 1 = 3 \times (2 \times 1) \quad \text{R.H.S}$$

$$6 = 6$$

So,

$$\text{L.H.S} = \text{R.H.S}$$

(v) $a \times (b + c) = a \times b + a \times c$

Sol.

L.H.S

$$= a \times (b + c) = (3) \times (2 + 1) = 9$$

So,

$$\text{L.H.S} = \text{R.H.S}$$

(vi) $a \times (b - c) = a \times b - a \times c$

Sol.

L.H.S

$$= a \times (b - c) = (3) \times (2 - 1) = 3$$

R.H.S

$$= a \times b - a \times c = (3) \times (2) - (3) \times (1)$$

$$= 3$$

So,

$$\text{L.H.S} = \text{R.H.S}$$

(vii) $a^2 - b^2 = (a + b)(a - b)$

Sol.

L.H.S

$$= a^2 - b^2 = (3)^2 - (2)^2 = 9 - 4 = 5$$

R.H.S

$$= (a + b)(a - b) = (3 + 2)(3 - 2)$$

$$= (5)(1) = 5$$

So,

$$\text{L.H.S} = \text{R.H.S}$$

Review Exercise 8

Q.1. Find the sum of

i. $3x^2 - x + 7$ and $-2x^2 + 5x - 8$

Sol.

$$= 3x^2 - x + 7 - 2x^2 + 5x - 8$$

$$= x^2 + 4x + 7 - 8$$

$$= x^2 + 4x - 1$$

ii. $5x^2 - 4x + 2$ and $-3x^2 - 7x + 4$

Sol.

$$5x^2 - 4x + 2$$

$$-3x^2 - 7x + 4$$

$$\hline 2x^2 - 11x + 6$$

$$= 2x^2 - 11x + 6 \quad \text{Ans.}$$

iii. $2a - 3b + 4c$ and $5a + 2b - 5c$

Sol.

$$= (2a - 3b + 4c) + (5a + 2b - 5c)$$

$$= 2a - 3b + 4c + 5a + 2b - 5c$$

$$= 2a + 5a - 3b + 2b + 4c - 5c$$

Q.3. If $a = 1$, $b = 1$ and $c = 9$, then prove that $a - b + c = 9$. (8.6)

Sol.

L.H.S

$$= a - b + c$$

R.H.S

$$= 9$$

So,

$$\text{L.H.S} = \text{R.H.S}$$

$$= (1) - (1) + 9 = 9 \text{ Ans.}$$

Q.4. If $a = 10$, $b = -10$ and $c = 4$, then prove that $a \times b + 25c = 0$.

Sol.

L.H.S

$$\begin{aligned} &= a \times b + 25c = (10) \times (-10) + 25(4) \\ &= -100 + 100 = 0 \end{aligned}$$

R.H.S

$$= 0$$

So,

$$\text{L.H.S} = \text{R.H.S}$$

Q.5. If $x = 1$ and $y = 1$, then prove that $(x + y)^2 = x^2 + 2xy + y^2$

Sol.

L.H.S

$$= (x + y)^2 = (1 + 1)^2 = (2)^2 = 4$$

R.H.S

$$\begin{aligned} &= x^2 + 2xy + y^2 = (1)^2 + 2(1)(1) + (1)^2 \\ &= 1 + 2 + 1 = 4 \end{aligned}$$

So,

$$\text{L.H.S} = \text{R.H.S}$$

Q.6. If $x = 2$ and $y = 1$, then prove that $(x - y)^2 = x^2 - 2xy + y^2$. (8.6)

Sol.

L.H.S

$$= (x - y)^2 = (2 - 1)^2 = (1)^2 = 1$$

R.H.S

$$\begin{aligned} &= x^2 - 2xy + y^2 = (2)^2 - 2(2)(1) + (1)^2 \\ &= 4 - 4 + 1 = 1 \end{aligned}$$

So,

$$\text{L.H.S} = \text{R.H.S}$$

Q.7. Evaluate $2 - [2 - \{2 - (2 - \overline{2 - x})\}]$ when $x = 1$.

Sol.

$$\begin{aligned} &= 2 - [2 - \{2 - (2 - \overline{2 - x})\}] \\ &= 2 - [2 - \{2 - (2 - 2 + 1)\}] \\ &= 2 - [2 - \{2 - (1)\}] \\ &= 2 - [2 - \{1\}] \\ &= 2 - [1] \\ &= 2 - 1 \\ &= 1 \text{ Ans.} \end{aligned}$$

Q.8. If $a = 1$, $b = 3$ and $c = 1$, their evaluate $b^2 - 4ac$.

Sol.

$$\begin{aligned} &= b^2 - 4ac = (3)^2 - 4(1)(1) \\ &= 9 - 4 = 5 \text{ Ans.} \end{aligned}$$

Q.9. If $a = 3$, $b = 2$ and $c = 1$, then prove that.
(i) $a + b = b + a$

Sol.

L.H.S

$$\begin{aligned} &= (3) + (2) = (2) + (3) \text{ R.H.S} \\ &= 5 = 5 \end{aligned}$$

So,

$$\text{L.H.S} = \text{R.H.S}$$

Exercise 8.6

1. Evaluate the following when $a = 2$, $b = 1$ and $c = 1$.

(i) $a + b$

Sol.

$$= a + b = (2) + (1) = 3 \text{ Ans.}$$

(ii) $a - c$

Sol.

$$= (2) - (1) = 1 \text{ Ans.}$$

(iii) $b + c$

Sol.

$$= (1) + (1) = 2 \text{ Ans.}$$

(iv) $a + b + c$

Sol.

$$= (2) + (1) + (1) = 4 \text{ Ans.}$$

(v) $a - b$

Sol.

$$= (2) - (1) = 1 \text{ Ans.}$$

(vi) $a - b + c$

Sol.

$$= (2) - (1) + (1) = 2 \text{ Ans.}$$

(vii) $ab + bc$

Sol.

$$= (2)(1) + (1)(1) = 3 \text{ Ans.}$$

(viii) $4ab$

Sol.

$$= 4(2)(1) = 8 \text{ Ans.}$$

(ix) abc

Sol.

$$= (2)(1)(1) = 2 \text{ Ans.}$$

(x) $ab - bc + ac$

Sol.

$$= (2)(1) - (1)(1) + (2)(1) = 3 \text{ Ans.}$$

(xi) $6a - 2b - 2c$

Sol.

$$= 6(2) - 2(1) - 2(1) = 8 \text{ Ans.}$$

(xii) $a^2 + b^2 + c^2$

Sol.

$$= (2)^2 + (1)^2 + (1)^2 = 6 \text{ Ans.}$$

(xiii) $\frac{a^2 + b^2 - c^2}{2}$

Sol.

$$= \frac{(2)^2 + (1)^2 - (1)^2}{2} = \frac{4}{2} = 2 \text{ Ans.}$$

(xiv) $\frac{a}{b} + \frac{b}{c}$

Sol.

$$= \frac{(2)}{(1)} + \frac{(1)}{(1)} = 2 + 1 = 3 \text{ Ans.}$$

(xv) $\frac{ab}{bc} + \frac{ac}{bc}$

Sol.

$$= \frac{(2)(1)}{(1)(1)} + \frac{(2)(1)}{(1)(1)} = 2 + 2 = 4 \text{ Ans.}$$

Q.2. If $a = 5$ and $b = -3$ then prove that $a+b=2$.

Sol.

L.H.S

$$= a + b = (5) + (-3) = 5 - 3 = 2 \text{ Ans.}$$

R.H.S

$$= 2$$

So,

$$\text{L.H.S} = \text{R.H.S}$$

$$\begin{aligned}
 &= [6a + \{3a + (3a + b)\}] + 6c \\
 &= [6a + \{3a + 3a + b\}] + 6c \\
 &= [6a + \{6a + b\}] + 6c \\
 &= [6a + 6a + b] + 6c \\
 &= [12a + b] + 6c \\
 &= 12a + b + 6c \text{ Ans.}
 \end{aligned}$$

x. $[2x^2 - xy - \{xy - (2x^2 - y^2)\}]$
Sol.

$$\begin{aligned}
 &= [2x^2 - xy - \{xy - (x^2 - y^2)\}] \\
 &= [2x^2 - xy - \{xy - x^2 + y^2\}] \\
 &= [2x^2 - xy - xy + x^2 - y^2] \\
 &= [2x^2 - 2xy + x^2 - y^2] \\
 &= [(3x^2 - 2xy - y^2)] \\
 &= [3x^2 - 2xy - y^2] \\
 &= 3x^2 - 2xy - y^2 \text{ Ans.}
 \end{aligned}$$

xi. $8\{3(4a + 5b) - 2(6a - 5b)\}$
Sol.

$$\begin{aligned}
 &= 8[12a + 15b - 12a + 10b] \\
 &= 8[12a - 12a + 15b + 10b] \\
 &= 8[25b] \\
 &= 200b \text{ Ans.}
 \end{aligned}$$

xii. $[11a - \{5b - 3(2a + b)\}]$
Sol.

$$\begin{aligned}
 &= [11a - \{5b - 6a - 3b\}] \\
 &= [11a - \{2b - 6a\}] \\
 &= [11a - 2b + 6a] \\
 &= [11a + 6a - 2b] \\
 &= [17a - 2b] \\
 &= 17a - 2b \text{ Ans.}
 \end{aligned}$$

xiii. $[a + c + \{a - c + (a + b + \overline{b - c})\}]$
Sol.

$$\begin{aligned}
 &= [a + c + \{a - c + (a + b + \overline{b - c})\}] \\
 &= [a + c + \{a - c + (a + b + b - c)\}]
 \end{aligned}$$

$$\begin{aligned}
 &= [a + c + \{a - c + (a + 2b - c)\}] \\
 &= [a + c + \{a - c + a + 2b - c\}] \\
 &= [a + c + \{2a + 2b - 2c\}] \\
 &= [a + c + 2a + 2b - 2c] \\
 &= [a + 2a + 2b + c - 2c] \\
 &= [3a + 2b - c] \\
 &= 3a + 2b - c \text{ Ans.}
 \end{aligned}$$

xiv. $5x - \{3y - \{4x - (5y - \overline{6x - 7y})\}\}20$

Sol.

$$\begin{aligned}
 &= 5x - \{3y - \{4x - (5y - 6x + 7y)\}\} \\
 &= 5x - \{3y - \{4x - 5y + 6x - 7y\}\} \\
 &= 5x - \{3y - \{4x + 6x - 5y - 7y\}\} \\
 &= 5x - \{3y - \{10x - 12y\}\} \\
 &= 5x - \{3y - 10x + 12\} \\
 &= 5x - \{-10x + 15y\} \\
 &= 5x + 10x - 15y \\
 &= 15x - 15y \text{ Ans.}
 \end{aligned}$$

xv. $2(x^2 - y^2) - 3\{x^2 - \{y^2 - x^2 + (x^2 - \overline{y^2 - x^2})\}\}$

Sol.

$$\begin{aligned}
 &= 2(x^2 - y^2) - 3\{x^2 - \{y^2 - x^2 + (x^2 - y^2 + x^2)\}\} \\
 &= 2(x^2 - y^2) - 3\{x^2 - \{y^2 - x^2 + (2x^2 - y^2)\}\} \\
 &= 2(x^2 - y^2) - 3\{x^2 - \{y^2 - x^2 + 2x^2 - y^2\}\} \\
 &= 2(x^2 - y^2) - 3\{x^2 - \{x^2\}\} \\
 &= 2(x^2 - y^2) - 3\{x^2 - x^2\} \\
 &= 2x^2 - 2y^2 - 3 \text{ Ans.}
 \end{aligned}$$

Exercise 8.5

Q.1. Simplify the following expressions.

(i) $[a + \{a + (a + a + a)\}]$

Sol.

$$\begin{aligned} &= [a + \{a + (a + a + a)\}] \\ &= [a + \{4a\}] \\ &= [a + 4a] \\ &= 5a \text{ Ans.} \end{aligned}$$

(ii) $[7x - \{4x + (3x - 2x)\}]$

Sol.

$$\begin{aligned} &= [7x - \{4x + (x)\}] \\ &= [7x - \{4x + x\}] \\ &= [7x - 5x] \\ &= [2x] \\ &= 2x \text{ Ans.} \end{aligned}$$

(iii) $[5l - \{2m + (6m - 3m)\}]$

Sol.

$$\begin{aligned} &= [5l - \{2m + (6m - 3m)\}] \\ &= [5l - \{2m + 6m - 3m\}] \\ &= [5l - \{5m\}] \\ &= [5l - 5m] \\ &= 5l - 5m = 5(l - m) \text{ Ans.} \end{aligned}$$

(iv) $[2y + \{x + x + (x - 2x + x)\}]$

Sol.

$$\begin{aligned} &= [2y + \{x + x + (x - 2x + x)\}] \\ &= [2y + \{x + x + (x - 2x - x)\}] \\ &= [2y + \{x + x - 2x\}] \end{aligned}$$

$$= [2y + \{2x - 2x\}]$$

$$= [2y]$$

$$= 2y \text{ Ans.}$$

(v) $[x^2 + \{2xy + (3y^2 - 2y^2)\}]]$

Sol.

$$\begin{aligned} &= [x^2 + \{2xy + (y^2)\}] \\ &= [x^2 + \{2xy + y^2\}] \\ &= [x^2 + 2xy + y^2] \\ &= x^2 + 2xy + y^2 \text{ Ans.} \end{aligned}$$

(vi) $[(9a^4 + \{5a^2 + (a^2 + 1)\})]$

Sol.

$$\begin{aligned} &= [(9a^4 + \{5a^2 + (a^2 + 1)\})] \\ &= [(9a^4 + \{6a^2 + 1\})] \\ &= [(9a^4 + 6a^2 + 1)] \\ &= 9a^4 + 6a^2 + 1 \text{ Ans.} \end{aligned}$$

vii. $[x^2 + \{3x^2 - (x^2 + 2x^2)\}]$

Sol.

$$\begin{aligned} &= [x^2 + \{3x^2 - (3x^2)\}] \\ &= [x^2 + \{3x^2 - 3x^2\}] \\ &= [x^2] \\ &= x^2 \text{ Ans.} \end{aligned}$$

viii. $[7l - 2\{3(5l - m) - 2(4l + m)\}]$

Sol.

$$\begin{aligned} &= 7l - 2[15l - 3m - 8l - 2m] \\ &= 7l - 2[15l - 8l - 3m - 2m] \\ &= 7l - 2[7l - 5m] \\ &= 7l - 14l + 10m \\ &= -7l + 10m \text{ Ans.} \end{aligned}$$

ix. $[6a + \{3a + (2a + a + b)\}] + 6c$

Sol.

$$\begin{aligned} &= [6a + \{3a + (2a + a + b)\}] + 6c \\ &= [6a + \{3a + (2a + a + b)\}] + 6c \end{aligned}$$

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(ix) $(x^3 - x^2y^2 + x^2y) - (y^3 - x^2y^2 + xy^2)$

Sol.

$$\begin{array}{r} x^3 - x^2y^2 + x^2y \\ + x^2y^2 \quad \quad \quad + y^3 + xy^2 \\ \hline x^3 \quad \quad + x^2y \quad - y^3 - xy^2 \end{array}$$

$= x^3 + x^2y - y^3 - xy^2$ Ans.

(x) $(x^2 - 2xy + y^2) - (2x^2 - xy + y^2)$

Sol.

$$\begin{array}{r} (3x^2 - 6xy + 3y^2) - (x^2 - xy + y^2) \\ 3x^2 - 6xy + 3y^2 \\ + 2x^2 + xy \quad + y^2 \\ \hline x^2 - 5xy + 2y^2 \end{array}$$

$= x^2 - 5xy + 2y^2$ Ans.

Q.2. Subtract $2l - 3m - n$ from $l - 4m - 6n$.

Sol.

$$\begin{array}{r} l - 4m - 6n \\ + 2l + 3m + n \\ \hline -l - m - 5n \end{array}$$

$= -l - m - 5n$ Ans.

Q.3. Subtract $2a^3 - 3a^2 + 5a + 5$ from $5a^3 + a^2 + 2a - 3$.

Sol.

$$\begin{array}{r} 5a^3 + a^2 + 2a - 3 \\ + 2a^3 + 3a^2 + 5a + 5 \\ \hline 3a^3 + 4a^2 - 3a - 8 \end{array}$$

$= +3a^3 + 4a^2 - 3a - 8$ Ans.

Q.4. Subtract $3x^5 - 4x^4 + 8x^3 - 6$ from $8x^5 + 5x^4 - 3x^3 + 4x + 2$.

Sol.

$$\begin{array}{r} 8x^5 + 5x^4 - 3x^3 + 4x + 2 \\ + 3x^5 + 4x^4 + 8x^3 \quad + 6 \\ \hline 5x^5 + 9x^4 - 11x^3 + 4x + 8 \end{array}$$

$= 5x^5 + 9x^4 - 11x^3 + 4x + 8$ Ans.

Q.5. If $A = a + b + c$, $B = a - b + c$, $C = a + b - c$ and $D = -a - b - c$ then find;

(i) $A - B$

Sol.

$$\begin{aligned} &= A - B \\ &= [(a + b + c) - (a - b + c)] \\ &= [a + b + c - a + b - c] \\ &= 2b \text{ Ans.} \end{aligned}$$

(ii) $B - C$

Sol.

$$\begin{aligned} &= [(a - b + c) - (a + b - c)] \\ &= [a - b + c - a - b + c] \\ &= -2b + 2c = 2(c - b) \text{ Ans.} \end{aligned}$$

(iii) $A - C$

Sol.

$$\begin{aligned} &= A - C \\ &= [(a + b + c) - (a + b - c)] \\ &= [a + b + c - a - b + c] \\ &= 2c \text{ Ans.} \end{aligned}$$

(iv) $C - D$

Sol.

$$\begin{aligned} &= C - D \\ &= [(a + b - c) - (-a - b - c)] \\ &= [a + b - c + a + b + c] \\ &= 2a + 2b = 2(a + b) \text{ Ans.} \end{aligned}$$

Exercise 3.4

Q.1. Simplify the following.

(i) $(6x) - (4x)$

Sol.

$$\begin{array}{r} 6x \\ \pm 4x \\ \hline 2x \end{array}$$

$= 2x$ Ans.

(ii) $(13a) - (2a)$

Sol.

$$\begin{array}{r} 13a \\ \pm 2a \\ \hline 11a \end{array}$$

$= 11a$ Ans.

(iii) $(x+1) - (x-1)$

Sol.

$$\begin{array}{r} x+1 \\ \pm x \mp 1 \\ \hline +2 \end{array}$$

$= 2$ Ans.

(iv) $(m-n) - (m+n)$

Sol.

$$\begin{array}{r} m-n \\ \pm m \pm n \\ \hline -2n \end{array}$$

$= -2n$ Ans.

(v) $(2p+q+2r) - (p+q+r)$

Sol.

$$\begin{array}{r} 2p+q+2r \\ \pm p \pm q \pm r \\ \hline p+r \end{array}$$

$= p+r$ Ans.

(vi) $(2) - (x^2 - x^3 + 2x - 1)$

Sol.

$$\begin{array}{r} +2 \\ \mp x^3 \pm x^2 \pm 2x \mp 1 \\ \hline x^3 - x^2 - 2x + 3 \end{array}$$

$= x^3 - x^2 - 2x + 3$ Ans.

(vii) $(x^3 + x^2y + xy^2 + y^3) - (x^2y + xy^2 + 1)$

Sol.

$$\begin{array}{r} x^3 + x^2y + xy^2 + y^3 \\ \pm x^2y \pm xy^2 \pm 1 \\ \hline x^3 \qquad \qquad \qquad + y^3 - 1 \end{array}$$

$= x^3 + y^3 - 1$ Ans.

(viii) $(3x^2 + 6xy + 9y^2) - (2x^2 - 3xy^2 + xy^2)$

Sol.

$$\begin{array}{r} 3x^2 + 6xy + 9y^2 \\ \pm 2x^2 \qquad \qquad \qquad \mp 3xy^2 \pm xy^2 \\ \hline x^2 + 6xy + 9y^2 \qquad + 3xy^2 - xy^2 \end{array}$$

$= x^2 + 6xy + 9y^2 + 2xy^2$ Ans.

(8.4)

iii. $3mn + 2lm + nl, 3nl + 2mn + lm, 3lm + 2nl + mn$

Sol.

$$\begin{array}{r} 3mn + 2lm + nl \\ 2mn + lm + 3nl \\ mn + 3lm + 2nl \\ \hline 6mn + 6lm + 6nl \\ \hline 6(lm + mn + nl) \end{array}$$

iv. $2p + 3q, 3q + 3r, r + 3p$

Sol.

$$\begin{array}{r} 2p + 3q \\ + 3q + 3r \\ 3p + r \\ \hline 5p + 6q + 4r \end{array}$$

v. $b + 1, a + b + 2, 3, a + 1$

Sol.

$$\begin{array}{r} b + 1 \\ a + b + 2 \\ + 3 \\ a + 1 \\ \hline 2a + 2b + 7 \end{array}$$

Q.5. Find $A+B+C$, when

i. $A=2a, B=3b, C=4c$

Sol.

$$\begin{aligned} &= A + B + C \\ &= (2a) + (3b) + (4c) \\ &= 2a + 3b + 4c \text{ Ans.} \end{aligned}$$

ii. $A=x+y, B=x-2y, C=3y-x$

Sol.

$$\begin{aligned} &= A + B + C \\ &= (x+y) + (x-2y) + (3y-x) \\ &= x+y+x-2y+3y-x \\ &= x+x-x+y-2y+3y \\ &= x+2y \end{aligned}$$

iii. $A=s+st, B=g+t, C=s+2g$

Sol.

$$\begin{aligned} &= A + B + C \\ &= (s+st) + (g+t) + (s+2g) \\ &= s+st+g+t+s+2g \\ &= 2s+st+t+3g \text{ Ans.} \end{aligned}$$

iv. $A=p+q+r, B=p+q-2r, C=p-2q-r$

Sol.

$$\begin{aligned} &= A + B + C \\ &= (p+q+r) + (p+q-2r) + (p-2q-r) \\ &= p+q+r+p+q-2r+p-2q-r \\ &= p+p+p+q+q-2q-2r \\ &= 3p+(-2r) \\ &= 3p-2r \text{ Ans.} \end{aligned}$$

v. $A=lm+mn, B=mn+nl, C=nl+lm$

Sol.

$$\begin{aligned} &= A + B + C \\ &= (lm+mn) + (mn+nl) + (nl+lm) \\ &= lm+mn+mn+nl+nl+lm \\ &= lm+lm+mn+mn+nl+nl \\ &= 2lm+2mn+2nl \\ &= 2(lm+mn+nl) \text{ Ans.} \end{aligned}$$

- ii. Mehak, Naz and Kinza have m , $2n$ and $3l$ books respectively. How many books have they altogether?

Sol.

Books of Mehak = m

Books of Naz = $2n$

Books of Kinza = $3l$

Total books = $m + 2n + 3l$. Ans.

- iii. Zain had x candies. He bought more $2x$ candies and y candies. Find the sum of the candies that he has now.

Sol.

Zain had candies = x

He bought more candies = $2x$ and y

Sum of candies = $x + 2x + y$

= $3x + y$ Ans.

3. Add the following

- i. $ab, bc, bc, bc,$

Sol.

ab

bc

bc

bc

$ab + 3bc$

= $b(a + 3c)$ Ans.

- ii. $2x^2y, x^2y, xy^2$

Sol.

$2x^2y$

x^2y

$+xy^2$

$3x^2y + xy^2$

= $3xy(3x + y)$ Ans.

- iii. $6m^3, 2m^2, 1, 3m^2$

Sol.

$6m^3$

$+2m^2$

$+1$

$+3m^2$

$6m^3 + 5m^2 + 1$

= $6m^3 + 5m^2 + 1$ Ans.

- iv. $b^2, 3ab, 4ab, 2a^2$

Sol.

b^2

$+3ab$

$+4ab$

$+2a^2$

$2a^2 + b^2 + 7ab$

= $2a^2 + b^2 + 7ab$

Q.4. Find the sum of the following algebraic expressions

- i. $a^2 + 2ab + b^2, a^2 - 2ab + b^2, a^2 - ab - b^2$

Sol.

$a^2 + 2ab + b^2$

$a^2 - 2ab + b^2$

$a^2 - ab - b^2$

$3a^2 - ab + b^2$

- ii. $x^3y + 2x^2y + y^2, x^3y + x^2 + 2y^2, x^2y - 2x^3y - y^2$

Sol.

$x^3y + 2x^2y + y^2$

$x^3y + 2y^2 + x^2$

$-2x^3y + x^2y - y^2$

$3x^2y + 2y^2 + x^2$

- v. $x^2, -xy, y^2, -xy$

Sol.

x^2

$-xy$

$+y^2$

$-xy$

$x^2 - 2xy + y^2$

= $x^2 - 2xy + y^2$

- vi. $p, -2q, r, -q$

Sol.

p

$-2q$

$-q - r$

$p - 3q - r$

= $p - 3q - r$

Q.1. Simplify

i. $x + x + x + x$

Sol.

$$\begin{array}{r} 4x \\ x \\ x \\ x \\ + x \\ \hline 4x \end{array}$$

ii. $2y + 3y + 4y$

Sol.

$$\begin{array}{r} 2y \\ 3y \\ + 4y \\ \hline 9y \end{array}$$

$= 9y$ Ans.

iii. $6m + 3m + m$

Sol.

$$\begin{array}{r} 6m \\ 3m \\ + m \\ \hline 10m \end{array}$$

$= 10m$ Ans.

iv. $a + 9a + 3b$

Sol.

$$\begin{array}{r} a \\ 9a \\ 3b \\ \hline 10a + 3b \end{array}$$

$= 10a + 3b$ Ans.

v. $3p + q + 2q$

Sol.

$$\begin{array}{r} 3p \\ q \\ + 2p \\ \hline 5p + q \end{array}$$

$= 5p + q$ Ans.

vi. $x + y + x + 2y$

Sol.

$$\begin{array}{r} x \\ y \\ x \\ + 2y \\ \hline 2x + 3y \end{array}$$

$= 2x + 3y$ Ans.

vii. $11a + 6a + 2a + 9b$

Sol.

$$\begin{array}{r} 11a \\ 6a \\ 2a \\ + 9b \\ \hline 19a + 9b \end{array}$$

$= 19a + 9b$ Ans.

viii. $m + 2n + 3n + 4n$

Sol.

$$\begin{array}{r} m \\ + m \\ 2n \\ 3n \\ 4n \\ \hline 9n + m \end{array}$$

$= 9n + m$ Ans.

ix. $x + y + z + 2x + z$

Sol.

$$\begin{array}{r} x \\ + y \\ + z \\ 2x \\ + z \\ \hline 3x + y + 2z \end{array}$$

$= 3x + y + 2z$ Ans.

x. $p + 2q + q + r + 2p$

Sol.

$$\begin{array}{r} p \\ + 2q \\ q \\ + r \\ \hline 2p \end{array}$$

$= 3p + 3q + r$ Ans.

Q.2. Answer the following questions.

- i. Ifra had $2p$ chocolates. She bought q more chocolates. How many chocolates she has now?

Sol.

Ifra has chocolates $= 2p$

She bought more chocolates $= q$

Total chocolates $= 2p + q$

Ans.

iii. $xy \cdot xy$

Sol.

$= x^2y^2$

iv. $m \cdot m \cdot m \cdot m$

Sol.

$= m^4$

Q.4. Separate the terms of the following algebraic sentences.

i. $2a + 3b$

Sol.

$= 2a + 3b$

$= 2a, 3b$ Ans.

ii. $l - 2m + 4n$

Sol.

$= l - 2m + 4n$

$= l, 2m \text{ and } 4n$ Ans.

iii. $9a^2 - 12b^2$

Sol.

$= 9a^2 - 12b^2$

$= 9a^2, -12b^2$

iv. $p^2 + 2q^2 - r^2$

Sol.

$= p^2 + 2q^2 - r^2$

$= p^2, 2q^2, -r^2$

v. $a + 8b - 4c$

Sol.

$= a + 8b - 4c$

$= a, 8b \text{ and } -4c$ Ans.

v. $pq \cdot pq \cdot pq$

Sol.

p^3q^3

vi. $abc \cdot abc$

Sol.

$a^2b^2c^2$

vi. $2lm - 3mn - 4nl$

Sol.

$= 2lm - 3mn - 4nl$

$= 2lm, -3mn, -4nl$

vii. $3xy + 4x^2y + 9$

Sol.

$= 3xy + 4x^2y + 9$

$= 3xy, 4x^2y, 9$

viii. $\frac{2}{5}xy + \frac{1}{3}yz + \frac{3}{5}xz$

Sol.

$= \frac{2}{5}xy + \frac{1}{3}yz + \frac{3}{5}xz$

$= \frac{2}{5}xy, \frac{1}{3}yz \text{ and } \frac{3}{5}xz$

ix. $\frac{a}{b} + \frac{b}{c} + \frac{c}{a}$

Sol.

$= \frac{a}{b} + \frac{b}{c} + \frac{c}{a}$

$= \frac{a}{b}, \frac{b}{c} \text{ and } \frac{c}{a}$

Q.5. Write the algebraic expressions by adding the following terms.

i. a, b

Sol.

$= a + b$ Ans.

ii. $x, -y$

Sol.

$= x + (-y)$

$= x - y$ Ans.

iii. $l, m, -n$

Sol.

$= l, m, -n$

$= l + m + (-n)$

$= l + m - n$

iv. p, pq, qr

Sol.

$= p + pq + qr$ Ans.

v. xy^2, xz^2, yz^2

Sol.

$= xy^2 + xz^2 + yz^2$

vi. $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$

Sol.

$= \frac{1}{a} + \frac{1}{b} + \frac{1}{c}$

vii. $16a^2 - 8b^2$

Sol.

$= 16a^2 + (-8b^2)$

$= 16a^2 - 8b^2$ Ans.

viii. $\frac{l}{m}, \frac{m}{n}, \frac{n}{l}$

Sol.

$= \frac{l}{m} + \frac{m}{n} + \frac{n}{l}$

ix. $2ab, 4ac, -3bc$

Sol.

$= 2ab, 4ac, -3bc$

$= 2ab + 4ac + (-3bc)$

$= 2ab + 4ac - 3bc$

Exercise 8.2

Q.1. Write each of the following word expressions into algebraic sentences.

i. x plus y

Sol.

$x + y$ Ans.

ii. a minus b

Sol.

$a - b$ Ans.

iii. m multiplied by n

Sol.

$m \times n$ Ans.

iv. p divided by q

Sol.

$\frac{p}{q}$ Ans.

v. The sum of 3x and 2y

Sol.

$3x + 2y$ Ans.

vi. The difference of 5a and 4b

Sol.

$5a - 4b$ Ans.

vii. The product of x and y

Sol.

xy

viii. The sum of the p and q divided by r.

Sol.

$\frac{p + q}{r}$

ix. Half of l multiplied by the difference of n and m. (m is less than n)

Sol.

$\frac{l}{2} \times (n - m)$

Q.2. Write the co-efficient, base and exponent of the following.

i. 5x

Sol.

Co-efficient = 5

Base = x

Exponent = 1

ii. $16p^2$

Sol.

Co-efficient = 16

Base = p

Exponent = 2

iii. $18t^3$

Sol.

Co-efficient = 18

Base = t

Exponent = 3

Q.3. Write the following in the exponential form:

i. a.a.a.

Sol.

a^3

iv. $-6k^5$

Sol.

Co-efficient = -6

Base = k

Exponent = 5

v. $\frac{2}{3}q^{-1}$

Sol.

Co-efficient = $\frac{2}{3}$

Base = q

Exponent = -1

vi. $\frac{1}{3}y^{-2}$

Sol.

Co-efficient = $\frac{1}{3}$

Base = y

Exponent = -2

ii. x.x

Sol.

x^2

Exercise 8.1

Q.1. Separate true, false and open statements.

i. 5 is a natural number.

Ans. True sentence

ii. $(5+4) - 2 = (6+8)+2$

Ans. True sentence

iii. 9 is a prime number.

Ans. False sentence

iv. $8 + \square = 4$

Ans. Open sentence

v. $5 \times \Delta = 15 + 0$

Ans. Open sentence

vi. -1 is a whole number

Ans. False sentence

vii. $5 \times 6 = 4 \times 8$

Ans. False sentence

viii. $0.2 + 0.5 = \square$

Ans. Open sentence

ix. 2 is the only even prime number.

Ans. True sentence

Q.2. Replace the unknowns by the numbers to make the statement true.

i. $x + 2 = 6$

Sol.

$$x + 2 = 6$$

$$x = 6 - 2$$

$$x = 4 \text{ Ans.}$$

ii. $p - 1 = 7$

Sol.

$$p - 1 = 7$$

$$p = 7 + 1 = 8 \text{ Ans.}$$

iii. $m + 15 = 20$

Sol.

$$m + 15 = 20$$

$$m = 20 - 15$$

$$m = 5 \text{ Ans.}$$

iv. $6x = 48$

Sol.

$$6x = 48$$

$$x = \frac{48}{6} = 8$$

$$x = 8 \text{ Ans.}$$

v. $5 \times x = 75$

Sol.

$$5 \times x = 75$$

$$x = \frac{75}{5} = 15$$

$$x = 15 \text{ Ans.}$$

vi. $\frac{2}{3}m = \frac{14}{3}$

Sol.

$$(2m)(3) = (14)(3)$$

$$6m = 42$$

$$m = \frac{42}{6} = 7$$

$$m = 7$$

vii. $\frac{1}{2} + m = 15$

Sol.

$$\frac{1}{2} + m = 15$$

$$\frac{1}{2} \times \frac{1}{m} = 15$$

$$\frac{1}{2m} = 15$$

$$\frac{1}{m} = 15 \times 2$$

$$\frac{1}{m} = 30$$

$$m = \frac{1}{30} \text{ Ans.}$$

viii. $2m = 3$

Sol.

$$2m = 3$$

$$m = \frac{3}{2}$$

$$m = 1.5 \text{ Ans.}$$

ix. $x - 0.3 = 0.4$

Sol.

$$x - 0.3 = 0.4$$

$$x = 0.4 + 0.3$$

$$x = 0.7$$

x. $x + 2 = 7$

Sol.

$$x + 2 = 7$$

$$x = 7 - 2$$

$$x = 5$$

xi. $5 + p = 11$

Sol.

$$5 + p = 11$$

$$p = 11 - 5$$

$$p = 6$$

xii. $0.4m = 0.8$

Sol.

$$0.4m = 0.8$$

$$m = \frac{0.8}{0.4}$$

$$m = 2 \text{ Ans.}$$

Q.2. Fill in the blanks.


(Obj. Ex. 7)

- $\frac{1}{100}$ means percent and is denoted by _____.
- The price that we pay to purchase a thing, is called _____.
- Profit percentage = $\frac{\text{Profit}}{\text{Cost price}} \times 100$
- To change a percentage into a decimal, first, we convert it into a _____.

Answers:

- %
- Cost price
- Cost price
- fraction

Q.3. Tick (✓) the correct answer.

- When we change a fraction $\frac{1}{25}$ into percentage, we get:
a. 1 % b. 4% c. 25 % d. 0.4 %
- By changing 10% into a decimal, we get
a. 1 b. 100 c. 0.1 d. 0.01
- 1 % of 1000 means:
a. 1 b. 10 c. 100 d. 1000
- The coloured parts of  are
a. 3% b. 30% c. 7% d. 70%
- Profit or loss is calculated as percentage of
a. cost price b. sale price c. marked price

Answers:

- b
- c
- b
- b
- a

CHAPTER

8

INTRODUCTION TO ALGEBRA

Algebra

Algebra is a general form of the arithmetic.

Variable

In algebra, a letter is used as symbol of any number or value which is called a variable.

Coefficient

The multiplying factor of a variable is called is coefficient.

Algebraic Expressions

The expressions in which the numbers or variables or both are connected by operational signs are called algebraic expression.

Constant

A constant is a quantity which has a fixed numerical value.

Like terms

The terms of same kind only differ by their coefficients are called like terms.

Evaluation

The process of finding the absolute or numerical value of an expression by using numbers in place of variables is called evaluation.

$$= \text{Rs. } 5800 - \text{Rs. } 5500$$

$$= \text{Rs. } 300$$

$$\text{Loss percentage} = \frac{\text{Loss}}{\text{Cost price}} \times 100$$

$$= \frac{300}{5800} \times 100$$

$$= 5.17\% \quad \text{Ans.}$$

Q.7. A dealer bought 18 toy chairs at Rs. 65 per chair he sold 12 of them at Rs. 75 each and the remaining chairs at Rs. 60 each. Find his profit or loss %.

Sol.

$$\text{Cost price of 18 chairs} = 18 \times 65 = \text{Rs. } 1170$$

$$\text{Sale price} = 12 \times 75 = \text{Rs. } 900$$

$$\text{S.P of 6 chairs} = 6 \times 60 = 360$$

$$\text{Total sale} = 900 + 360 = \text{Rs. } 1260$$

$$\text{Profit} = 1260 - 1170 = \text{Rs. } 90$$

$$\text{Profit \%} = \frac{90}{1170} \times 100$$

$$= 7.7\%$$

Q.8. Fatima bought a doll for Rs.440 after getting a discount 20%. Find the marked price of the doll.

Sol.

$$\text{Discount} = \frac{20}{100} \times 440$$

$$= \text{Rs. } 88$$

$$\text{Marked price} = \text{Cost price} + \text{Discount}$$

$$= 440 + 88$$

$$= \text{Rs. } 528 \quad \text{Ans. (Rev. Ex.)}$$

Q.9. A mobile is sold for Rs.2160 after giving a discount. If marked price is Rs.2700, find the discount percentage.

Sol.

$$\text{Sale price} = \text{Rs. } 2160$$

$$\text{Market price} = \text{Rs. } 2700$$

$$\text{Discount} = 2700 - 2160 = \text{Rs. } 540$$

$$\text{Marked price : Discount}$$

$$2700 : 540$$

$$100 : x$$

$$\frac{x}{540} = \frac{100}{2700}$$

$$x = \frac{540 \times 100}{2700}$$

$$x = 20\% \quad \text{Ans.}$$

Objective Exercise 7

Q.1. Answer the following questions.

i. Define the percentage.

Ans. Any fraction with 100 as a denominator is called a percentage.

ii. What we do to change a fraction into percentage?

Ans. We multiply it by 100 to change a fraction into percentage.

iii. Write the formula for finding the profit.

Ans. Profit = Sale price - Cost price

iv. What is meant by percent?

Ans. Percent means divided by 100.

v. What is the formula of finding a discount?

Ans. Discount = Marked price - Sale price

What percent of amount did he spend?

Sol.

$$= \frac{156}{1200} \times 100$$

$$= \frac{156}{12}$$

$$= 13\%$$

Q.3. In a town election, Azeem got 42% of the votes cast and remaining got Hamza. If the total number of votes cast is 40,000. Find the votes obtained by Hamza.

Sol.

$$\text{Total no of votes} = 40,000$$

$$\text{Votes got by Azeem} = \frac{42}{100} \times 40000$$

$$= 16800$$

$$\text{Votes obtained by Hamza} = 40000 - 16800 \\ = 23200 \quad \text{Ans.}$$

Q.4. Nabeel traveled 75km by bus and 125 km by train. Find what percent of the total journey did he travel by bus and what percent by train?

Sol.

$$\text{Travel by bus} = 75 \text{ km}$$

$$\text{Travel by train} = 125 \text{ km}$$

$$\text{Total journey} = 200 \text{ km}$$

$$\text{Percentage travel by bus} = \frac{75}{200} \times 100$$

$$= 37.5\%$$

$$\text{Percentage travel by train} = \frac{125}{200} \times 100$$

$$= 62.5\%$$

Q.5. A shopkeeper bought a pair of shoes for Rs. 720 and sold it for Rs. 810. Find his profit percent.

Sol.

$$\text{Cost price} = \text{Rs. 720}$$

$$\text{Sale price} = \text{Rs. 810}$$

$$\text{Profit} = \text{Sale price} - \text{Cost price}$$

$$= \text{Rs. 810} - \text{Rs. 720}$$

$$= \text{Rs. 90}$$

$$\text{Profit percentage} = \frac{\text{Profit}}{\text{Cost price}} \times 100$$

$$= \frac{90}{720} \times 100$$

$$= 12.5\% \quad \text{Ans.}$$

Q.6. Komal bought a sewing machine for Rs. 5800. Due to some defects in the machine, she sold it for Rs. 5500. Find her loss percentage.

Sol.

$$\text{Cost price} = \text{Rs. 5800}$$

$$\text{Sale price} = \text{Rs. 5500}$$

$$\text{Loss} = \text{Cost price} - \text{Sale price}$$

73 Q.16. The cost price of a jean is Rs.200 and marked price is 50% more than the cost price. But the shopkeeper sold it at 25% discount.

- Find the marked price.
- Find the discounted price.

Sol.

Cost price of jean = Rs.200

Marked price = 50% more than cost price

$$\text{Marked price} = \frac{50}{100} \times 200 + 200 = \text{Rs.}300$$

- So marked price = 200 + 100 = Rs.300.

- Discounted price = $300 - \frac{25}{100} \times 300$
 $= 300 - 75$
 $= \text{Rs.}225$ Ans.

Q.17. Find the marked price when 9% discount is Rs.81.

Sol.

Discount = 9%

Discount = Rs.81

$$\text{Marked price} = \frac{100}{9} \times 81$$

= Rs.900 Ans.

Q.18. Find the marked price of a pair of shoes, when its sale price is Rs.360 and discount percentage is 18%.

Sol.

Sale price = Rs.360

Discount percentage = 18%

Marked price = ?

Let marked price = Rs. x

Then

$$x - 18\% \text{ of } x = 360$$

$$x - 0.18x = 360$$

$$0.82x = 360$$

$$x = \frac{360}{0.82}$$

$$x = \text{Rs.}439$$

Marked price of pair of shoes = Rs.439Ans.

Review Exercise 7

Q.1. Find the percentage of the following.

- Rs. 20 out of Rs. 250

Sol.

$$= \frac{20}{250} \times 100$$

$$= 8\%$$

- 30 kg out of 260 kg

Sol.

$$= \frac{30}{260} \times 100$$

$$= 11.53\%$$

- 250 marks out of 300 marks.

Sol.

$$= \frac{250}{300} \times 100$$

$$= 83.33\%$$

- 24 min out of 1 hour

Sol.

$$= \frac{24}{60} \times 100$$

$$= 40\%$$

Q.12. Sheikh Khalid purchased 80 metres cloth for Rs.2,240. He sold 50 meters cloth at the rate of Rs.30 per metre and 30 metres cloth at the rate of Rs.35 per metres.

i. Find that sheikh Khalid is in profit or loss.

ii. Find profit or loss percentage.

Sol.

Cost of 80 metres cloth = Rs.2240

Sale price of 50m cloth = $50 \times 30 = \text{Rs.}1500$

Sale price of 30 m cloth = $30 \times 35 = \text{Rs.}1050$

Sale price of 80 m cloth = Rs.1500 + Rs.1050
= Rs. 2550

i. As S.P > C.P

So Khalid is in profit

ii. Profit = 2550 - 2240

Profit = Rs.310

Profit percentage = $\frac{310}{2240} \times 100$

= 2240

= 13.84 % Ans.

Q.13. Gul Khan purchased 180 chocolates for Rs.2,160. He sold 155 chocolates at the rate of Rs. 15 each and 25 chocolates at the rate of Rs. 10

i. Find that he is in profit or loss.

ii. Find profit or loss percentage.

Sol.

Cost price of 180 chocolates = Rs.2,160

Sale price of 155 chocolates = 15×155

= Rs. 2325

Sale price of 25 chocolates = 25×10

= Rs.250

= Rs. 2527

i. Since S.P > C.P

So,

Gul Khan in profit

ii. Profit percentage = $\frac{415}{2160} \times 100\%$

= 19.21% Ans.

Q.14. A shirt priced for Rs.150 is sold for Rs.120. Find the percentage discount.

Sol.

Shirt priced at = Rs.150

Sale price = Rs.120

Discount = $150 - 120 = \text{Rs.}30$

% discount = $\frac{30}{150} \times 100$

= 20% Ans.

Q.15. Sarah bought a dinner set for Rs. 480 at 20% discount. Find the actual prices of the dinner set.

Sol.

Let actual price of dinner set = Rs. x

Then

$x - 20\% \text{ of } x = 480$

$x - \frac{20}{100} x = 480$

$x(1 - 0.2) = 480$

$x(0.8) = 480$

$x = \frac{480}{0.8} = \text{Rs.}600$

So original price of dinner set

= Rs.600. Ans.

8. **The cost price of 25 pairs of shoes is Rs.190 each. Find the sale price of each of them, when the retailer has a total gain of Rs. 2875.**

Sol.

Cost price of 1 pair = Rs. 190

Cost price of 25 pairs = Rs. 4750

Total profit = Rs. 2875

Sale price = Cost price + Total profit

$$= \text{Rs. } 4750 + \text{Rs. } 2875$$

Sale price = Rs. 7625

Sale price of each pair = Rs. $\frac{7625}{25}$

$$= \text{Rs. } 305 \quad \text{Ans.}$$

9. **25% loss on a mobile set is Rs. 475. Find the cost and sale price of the mobile set.**

Sol.

Loss = 25%

Loss price = Rs.475

$$\text{C.P} = \frac{475}{25} \times 100 = \text{Rs. } 1900$$

$$\text{S.P} = \text{C.P} - \text{L.P}$$

$$= 1900 - 475 = \text{Rs. } 1425 \quad \text{Ans.}$$

10. **The profit percentage on a bicycle is 40%. Find the cost and sale price of the bicycle when the shopkeeper got a profit of Rs. 500.**

Sol.

Profit = 40%

Profit = Rs.500

$$\text{C.P} = \frac{\text{profit}}{\text{profit\%}} \times 100$$

$$= \frac{500}{40} \times 100 = \text{Rs. } 1250$$

$$\text{S.P} = \text{profit} + \text{c.p}$$

$$= 500 + 1250 = \text{Rs. } 1750 \quad \text{Ans.}$$

11. **The cost price of 18 sweaters is Rs.425 per sweater, and the total gain of shopkeeper is Rs.6750.**

i. **Find the sale price of each sweater.**

ii. **Find profit percentage**

Sol.

Cost price of 1 sweater = Rs. 425

Cost price of 18 sweaters = Rs. 425 \times 18

$$= \text{Rs. } 7650$$

Profit = Rs. 6750

Sale price = Cost price + Profit

$$= \text{Rs. } 7650 + \text{Rs. } 6750$$

$$= \text{Rs. } 14400$$

i. Sale price of each sweater = $\frac{14400}{18}$

$$= \text{Rs. } 800 \quad \text{Ans.}$$

ii. Profit Percentage = $\frac{\text{Profit}}{\text{Cost price}} \times 100$

$$= \frac{6750}{7650} \times 100$$

$$= 88.23 \%$$

Q.5. Saleem bought 90 oranges at the rate of 3 oranges for Rs. 10 and sold them at the rate of 2 oranges for Rs. 9. Find that Saleem is in profit or loss and also find its percentage.

Sol.

Cost price of 3 oranges = Rs. 10

Cost price of 1 orange = $\frac{10}{3}$ = Rs. 3.33

Cost price of 90 oranges = Rs. 300

Sale price of 2 oranges = Rs. 9

Sale price of 1 oranges = Rs. 4.5

Sale price of 90 oranges = Rs. 405

Profit = Sale price - Cost price
= Rs. 405 - Rs. 300 = Rs. 105

Profit Percentage = $\frac{\text{Profit}}{\text{Cost Price}} \times 100$
= $\frac{105}{300} \times 100$
= 35 % Ans.

Q.6. Shahid bought 80 bananas at the rate of 4 bananas for Rs. 5 and sold at the rate of 5 bananas for Rs. 8. Find that he is in profit or loss and also find its percentage, when 25% of bananas have been spoiled.

Sol.

• Cost price of 4 bananas = Rs. 5
Cost price of 1 banana = Rs. 1.25
Cost price of 80 bananas = Rs. 100

Spoiled bananas = 25 % = $\frac{25}{100} \times 80 = 20$ (7.3)

Remaining bananas = 80 - 20 = 60

Sale price of 5 bananas = Rs. 8

Sale price of banana = Rs. 1.6

Sale price of 60 bananas = Rs. 96

Loss = Cost price - Sale price
= Rs. 100 - Rs. 96
= Rs. 4

Loss Percentage = $\frac{\text{Loss}}{\text{Cost price}} \times 100$
= $\frac{4}{100} \times 100$
= 4 % Ans.

Q.7. 12% profit on a computer is Rs.540

- Find the cost price of the computer
- Find the sale price of the computer

Sol.

Profit percentage = $\frac{\text{Profit}}{\text{Cost price}} \times 100$

12 % = $\frac{540}{\text{Cost price}} \times 100$

$\frac{12}{100} \times \text{Cost price} = 540 \times 100$

Cost price = $\frac{540}{12} \times 100$

Cost price = 4500

Profit = Sale price - Cost Price

Profit = 540 + 4500
= Rs.5040 Ans.

$$x = 50$$

$$\Rightarrow \text{Cost price} = \text{Rs. } 50$$

$$\begin{aligned} \Rightarrow \text{Profit} &= \text{Sale price} - \text{Cost price} \\ &= \text{Rs. } 70 - \text{Rs. } 50 \\ &= \text{Rs. } 20 \quad \text{Ans.} \end{aligned}$$

Q.2. A shopkeeper sold a toy for Rs. 96 at a loss of 20%. Find the loss.

Sol.

$$\begin{aligned} \text{Sale price} &= 96 \\ \text{Loss \%} &= 20\% \\ \text{Loss} &= ? \end{aligned}$$

Let Cost price is Rs. 100, the sale price will be,

$$\begin{aligned} \text{Sale price} &= \text{Cost price} - \text{Loss} \\ &= \text{Rs. } 100 - \text{Rs. } 20 \\ &= \text{Rs. } 80 \end{aligned}$$

Cost price : Sale price

$$100 : 80$$

$$x : 96$$

$$\text{Resolve } \frac{x}{100} = \frac{96}{80}$$

$$x = \frac{96}{80} \times 100$$

$$\Rightarrow \text{Cost price} = \text{Rs. } 120$$

$$\begin{aligned} \Rightarrow \text{Loss} &= \text{Cost price} - \text{Sale price} \\ &= \text{Rs. } 120 - \text{Rs. } 96 \\ &= \text{Rs. } 24 \end{aligned}$$

* Loss Rs. 24

Q.3. Chand bought a shirt for Rs. 250 and sold it for Rs. 295. Find the profit percentage.

Sol.

$$\begin{aligned} \text{Cost price} &= \text{Rs. } 250 \\ \text{Sale price} &= \text{Rs. } 295 \\ \text{Profit} &= \text{Sale price} - \text{Cost price} \\ &= \text{Rs. } 295 - \text{Rs. } 250 \\ &= \text{Rs. } 45 \end{aligned}$$

$$\begin{aligned} \text{Profit percentage} &= \frac{\text{Profit}}{\text{Cost Price}} \times 100 \\ &= \frac{45}{250} \times 100 \\ &= 18\% \quad \text{Ans.} \end{aligned}$$

Q.4. Waleed bought one dozen pens for Rs. 144 and sold each of them for Rs. 11. Find the loss percentage.

Sol.

Cost price of one dozen pens = Rs. 144

Sale price of one pen = Rs. 11

Sale price of one dozen pens = $12 \times 11 = \text{Rs. } 132$

$$\begin{aligned} \text{Loss} &= \text{Cost price} - \text{Sale price} \\ &= \text{Rs. } 144 - \text{Rs. } 132 \\ &= \text{Rs. } 12 \end{aligned}$$

$$\begin{aligned} \text{Loss Percentage} &= \frac{\text{Loss}}{\text{Cost price}} \times 100 \\ &= \frac{12}{144} \times 100 = \frac{100}{12} \\ &= 8.33\% \quad \text{Ans.} \end{aligned}$$

7.2 save the remaining. Find the percentage of his saving.

Sol.

$$\frac{1440}{2000} \times 100 = 72\%$$

$$\text{Saving} = 100 - 72 = 28\% \text{ Ans.}$$

Q.11. A shoe company found that 4.25% of the production is defective. The company made 28000 pairs of shoes. How many pairs of shoes are defective?

Sol.

$$\frac{4.25}{100} \times 28000 = 1190 \text{ Ans.}$$

Q.12. Find the actual amount if 40% of the amount is 60 rupees.

Sol.

$$= 40\% \text{ of } 60$$

$$= \frac{60}{40} \times 100 = 150 \text{ Ans.}$$

Q.13. Bano spends 70% of her pocket money and saves 30%. Find the amount she spends and saves. Where as she gets Rs. 1800 as the pocket money.

Sol.

$$\frac{70}{100} \times 1800 = \text{R.}1260$$

$$\frac{30}{100} \times 1800 = \text{R.}540$$

Q.14. 200 litres pure milk contains 77 liters cream. What is the percentage of cream in pure milk?

Sol.

$$= \frac{77}{200} \times 100 = 38.5\% \text{ Ans.}$$

Q.15. Every 3 persons are using tobacco out of 5 persons in Pakistan. What is the percentage of tobacco users?

Sol.

$$= \frac{3}{5} \times 100 = 60\% \text{ Ans.}$$

Exercise 7.3

Q.1. A book seller sold a book for Rs. 70 at a gain of 70%. Find the profit.

Sol.

$$\text{Sale price} = \text{Rs. } 70$$

$$\text{Profit \%} = \text{Rs. } 40\%$$

$$\text{Profit} = ?$$

Let the cost price is Rs. 100, then the sale price will be

$$= \text{Cost price} + \text{profit}$$

$$= \text{Rs. } 100 + \text{Rs. } 40$$

$$= \text{Rs. } 140$$

$$\text{Cost Price} : \text{Sale price}$$

$$100 : 140$$

$$x : 70$$

$$\frac{x}{100} = \frac{70}{140}$$

$$x = \frac{70}{140} \times 100$$

$$x = \frac{700}{14}$$

Q.4. The 60% length of a road is 75 km. Find the total length of the road. (7.2)

Sol.

60% of road = 75

$$= \frac{75}{60} \times 100$$

$$= 125 \text{ km} \quad \text{Ans.}$$

Q.5. Sana got 484 marks out of 550 marks. Find the percentage of her marks.

Sol.

484 marks out of 550

$$= \frac{484}{550} \times 100$$

$$= 88 \% \quad \text{Ans.}$$

Q.6. In a town 35% of 15000 voters did not cast vote in an election. How many people did not cast vote?

Sol.

Total = 15000

Cast vote = 35 %

$$= \frac{15000 \times 35}{100}$$

$$= 5250$$

$$\text{Not cast} = 15000 - 5250 = 9750 \quad \text{Ans.}$$

Q.7. In a test match Shoaib Malik made 134 runs in the first innings and 41 runs in the second innings. Find the percentage of Shoaib's score if total score in both innings of Pakistan was 500 runs.

Sol.

$$\text{First innings} = \frac{134}{500} \times 100 = 26.8 \%$$

$$\text{Second innings} = \frac{41}{500} \times 100 = 8.2 \%$$

$$\text{Total Score} = 26.8 + 8.2$$

$$= 35 \%$$

Ans.

Q.8. Farooq paid 25% of salary as a house rent and 50% of salary for other expenses. Find the remaining amount if his salary is Rs.8000.

Sol.

$$= \frac{25}{100} \times 8000 = 2000$$

$$= \frac{50}{100} \times 8000 = 4000$$

$$= 8000 - 6000$$

$$= \text{Rs.}2000$$

Ans.

Q.9. Shakeel had Rs. 7500. He paid a debt of Rs.1500. Find the percentage of the remaining amount.

Sol.

Paid = Rs.7500

Debt = Rs.1500

$$\text{Remaining} = 7500 - 1500 = \text{Rs.}6000$$

$$\text{Percentage} = \frac{6000}{7500} \times 100$$

$$= 80 \% \quad \text{Ans.}$$

ii. 64 % of 25

Sol. $= \frac{64}{100} \times 25 = 16$

iii. 75 % of 4

Sol. $= \frac{75}{100} \times 4 = 3$

iv. 3.5 % of 1000

Sol. $= \frac{3.5}{100} \times 1000 = 35$

v. 50 % of 180

Sol. $= \frac{50}{100} \times 180 = 90$

vi. 90 % of 190

Sol. $= \frac{90}{100} \times 190 = 171$

vii. 65 % of 60

Sol. $= \frac{65}{100} \times 60 = 39$

viii. 18% of 1400

Sol. $= \frac{18}{100} \times 1400 = 252$

ix. 18.5 % of 2000

Sol. $= \frac{18.5}{100} \times 2000 = 370$

Sol.

$$= \frac{9.5}{100} \times 3000 = 285$$

Exercise 7.2

Q.1. Saeed has Rs. 75. He gives 20% of its as alms. What remains with him?

Sol.

$$\begin{aligned}\text{Alms} &= \frac{20}{100} \times 75 \\ &= \text{Rs. } 15\end{aligned}$$

$$\text{Remaining} = 75 - 15 = \text{Rs. } 60 \text{ Ans.}$$

Q.2. Komal made a suit of 5.5 meters cloth out of 44 meters. What percentage of the cloth did she use for the cloth?

Sol.

$$\begin{aligned}&= \frac{5.5}{44} \times 100 \\ &= 12.5 \% \quad \text{Ans.}\end{aligned}$$

Q.3. 85% of the students in a school of 300 students passed an annual examination. How many of them are fail.

Sol.

$$\begin{aligned}&= \frac{85}{100} \times 300 = 255 \\ &= 255\end{aligned}$$

$$\text{Failed student} = 300 - 255 = 45 \text{ Ans.}$$

vi. 510 marks out of 850 marks.

Sol.

$$\text{Fraction} = \frac{510}{850} = \frac{3}{5}$$

$$\text{Decimal} = 0.6$$

$$\text{Ratio} = 510 : 850 = 3 : 5$$

$$\text{Percentage} = 60 \%$$

vii. 700 g out of 2 kg

Sol.

$$\text{Fraction} = \frac{700}{2000} = \frac{7}{20}$$

$$\text{Decimal} = 0.35$$

$$\text{Ratio} = 700 : 2000 = 7 : 20$$

$$\text{Percentage} = 35 \%$$

viii. 42 students out of 75 students

Sol.

$$\text{Fraction} = \frac{42}{75} = \frac{14}{25}$$

$$\text{Decimal} = 0.56$$

$$\text{Ratio} = 42 : 75 = 14 : 25$$

$$\text{Percentage} = 56 \%$$

ix. Rs. 900 out of Rs. 4500

Sol.

$$\text{Fraction} = \frac{900}{4500} = \frac{1}{5}$$

$$\text{Decimal} = 0.2$$

$$\text{Ratio} = 900 : 4500 = 1 : 5$$

$$\text{Percentage} = 20 \%$$

x. Rs. 245 out of Rs. 9800

Sol.

$$\text{Fraction} = \frac{245}{9800} = \frac{1}{40}$$

$$\text{Decimal} = 0.025$$

$$\text{Ratio} = 245 : 9800 = 1 : 40$$

$$\text{Percentage} = 2.5 \%$$

xi. 1.5 liters out of 90 liters

Sol.

$$\text{Fraction} = \frac{1.5}{90} = \frac{1}{60}$$

$$\text{Decimal} = 0.017$$

$$\text{Ratio} = 1.5 : 90 = 1 : 60$$

$$\text{Percentage} = 1.67 \%$$

xiii. 125 ml out of 1 liters.

$$125 : 1000$$

$$\text{Fraction} = \frac{125}{1000} = \frac{1}{8}$$

$$\text{Decimal} = 0.125$$

$$\text{Ratio} = \frac{125}{1000} = 1 : 8$$

$$\begin{aligned} \text{Percentage} &= \frac{125}{1000} \% \\ &= 12.5 \% \end{aligned}$$

Q.4. Find the following percentages

i. 8 % of 50

Sol.

$$= \frac{8}{100} \times 50 = 4$$

xii. 160 %

Sol.

$$\text{Fraction} = \frac{160}{100} = \frac{8}{5} = 1 \frac{3}{5}$$

$$\text{Decimal} = 1.6$$

Q.2. Convert the following into percentages

i. $\frac{1}{2}$

Sol. $= \frac{1}{2} \times 100 = 50 \%$

ii. 0.25

Sol. $= \frac{25}{100} \times 100 = 25 \%$

iii. $\frac{7}{2}$

Sol. $= \frac{7}{2} \times 100 = 350 \%$

iv. $\frac{1}{8}$

Sol. $= \frac{1}{8} \times 100 = 12.5 \%$

v. $\frac{3}{10}$

Sol. $= \frac{3}{10} \times 100 = 30 \%$

vi. $\frac{9}{20}$

Sol. $= \frac{9}{20} \times 100 = 45 \%$

vii. 0.59

Sol. $= \frac{59}{100} \times 100 = 59 \%$

viii. 3.8

Sol. $= \frac{38}{10} \times 100 = 380 \%$

Q.3. Use fraction, decimal, ratio and percentage to express the following situations.

i. 50 marks out of 100 marks

Sol.

$$\text{Fraction} = \frac{50}{100} = \frac{1}{2}$$

$$\text{Decimal} = 0.5$$

$$\text{Ratio} = 50 : 100 = 1 : 2$$

$$\text{Percentage} = 50 \%$$

ii. 90 meters out of 150 meters

Sol.

$$\text{Fraction} = \frac{90}{150} = \frac{3}{5}$$

$$\text{Decimal} = 0.6$$

$$\text{Ratio} = 90 : 150 = 3 : 5$$

$$\text{Percentage} = 60 \%$$

iii. 48 min out of 1 hour

Sol.

$$\text{Fraction} = \frac{48}{60} = \frac{4}{5}$$

$$\text{Decimal} = 0.8$$

$$\text{Ratio} = 48 : 60 = 4 : 5$$

$$\text{Percentage} = 80 \%$$

iv. 8 months out of 1 year

Sol.

$$\text{Fraction} = \frac{8}{12} = \frac{2}{3}$$

$$\text{Decimal} = 0.67$$

$$\text{Ratio} = 8 : 12 = 2 : 3$$

$$\text{Percentage} = 66.67 \%$$

v. 6 egg out of 2 dozen eggs.

Sol.

$$\text{Fraction} = \frac{6}{24} = \frac{1}{4}$$

$$\text{Decimal} = 0.25$$

$$\text{Ratio} = 6 : 24 = 1 : 4$$

$$\text{Percentage} = 25 \%$$

Exercise 7.1

Q.1. Express the following in fractions and decimals.

i. 45 %

Sol.

$$\text{Fraction} = \frac{45}{100} = \frac{9}{20}$$

$$\text{Decimal} = \frac{45}{100} = 0.45$$

ii. 6 %

Sol.

$$\text{Fraction} = \frac{6}{100} = \frac{3}{50}$$

$$\text{Decimal} = \frac{6}{100} = 0.06$$

iii. 56%

Sol.

$$\text{Fraction} = \frac{56}{100} = \frac{14}{25}$$

$$\text{Decimal} = \frac{56}{100} = 0.56$$

iv. 96 %

Sol.

$$\text{Fraction} = \frac{96}{100} = \frac{24}{25}$$

$$\text{Decimal} = \frac{96}{100} = 0.96$$

v. 18 %

Sol.

$$\text{Fraction} = \frac{18}{100} = \frac{9}{50}$$

$$\text{Decimal} = 0.18$$

vi. 48 %

Sol.

$$\text{Fraction} = \frac{48}{100} = \frac{12}{25}$$

$$\text{Decimal} = 0.48$$

vii. 78 %

Sol.

$$\text{Fraction} = \frac{78}{100} = \frac{39}{50}$$

$$\text{Decimal} = 0.78$$

viii. 89 %

Sol.

$$\text{Fraction} = \frac{89}{100} = \frac{89}{100}$$

$$\text{Decimal} = 0.89$$

ix. 68 %

Sol.

$$\text{Fraction} = \frac{68}{100} = \frac{17}{25}$$

$$\text{Decimal} = 0.68$$

x. 15 %

Sol.

$$\text{Fraction} = \frac{15}{100} = \frac{3}{20}$$

$$\text{Decimal} = 0.15$$

xi. 350 %

Sol.

$$\text{Fraction} = \frac{350}{100} = \frac{7}{2} = 3\frac{1}{2}$$

$$\text{Decimal} = 3.5$$

7.1

Q.2. Fill in the blanks.

Obj Ex. 6

- The simplest form of a _____ is the same as the lowest form of a fraction.
- The second and third elements of the proportion are called as _____.
- _____ proportion is the relation in which one quantity increase or decrease in a same proportion by increasing or decreasing the other quantity.

Answers:

- ratio
- means of ratio
- Direct proportion

Q.3. Tick(✓) the correct answer.

- A ratio is written by putting.
 - a. : b. , c. ; d. ::
- $a:b = c:d$, if and only if
 - a. $a \times b = c \times d$
 - b. $a \times c = b \times d$
 - c. $b \times c = a \times d$
 - d. $c \times d = a \times b$
- The reduced form of $\frac{1}{4} : \frac{1}{2}$ is
 - a. 2 : 4
 - b. 4 : 2
 - c. 2 : 1
 - d. 1 : 2
- 10 : 15 is an equivalent ratio of
 - a. 15 : 10
 - b. 2 : 3
 - c. 2 : 5
 - d. 3 : 2
- The relation of equality of two ratio is called as
 - a. ratio
 - b. Proportion
 - c. equivalent ratio
 - d. Cross multiplication

Answer:

- i. a
- ii. c
- iii. a
- iv. b
- v. b

CHAPTER

7

FINANCIAL ARITHMETIC

Percentage

Any ratio with a second term of 100 or any fraction with 100 as a denominator is called a percentage.

Profit

If selling price is greater than cost price, then it is called profit, i.e. Profit = Sale price - Cost price

Loss

If cost price is greater than sale price, it is called loss i.e.

$$\text{Loss} = \text{Cost price} - \text{Sale price}$$

Profit or Loss percent

We calculate the profit or loss as a percentage of the cost price.

$$\text{Profit \%} = \frac{\text{Profit}}{\text{Cost Price}} \times 100$$

$$\text{Loss \%} = \frac{\text{Loss}}{\text{Cost price}} \times 100$$

Discount

The difference between marked price and sale price is called discount.

Q.4. Ali, Usman and Waleed distribute an amount in the ratio of 2 : 5 : 3. Find the amount of Usman and Waleed if Ali gets 170. Also the total amount

Sol.

Ali: Usman : Waleed
 2 : 5 : 3
 $2 \times 85 : 5 \times 85 : 3 \times 85$
 170 : 425 : 255
 Total = 170 + 425 + 255
 = 850 Ans.

Usman's amount = Rs.425
 Waleed's amount = Rs.255

Q.5. Aliha takes 200 steps for walking distance of 160m. Find the distance covered by her in 350 steps.

Sol.

$200 : 160 :: 350 : x$
 $200x = 56000$
 $x = \frac{56000}{200}$
 $x = 280$ Ans.

Q.6. If a car need 9 liters of petrol for a journey of 162 km. Find how many liters of petrol is required for 306 km?

Sol.

$9 : 162 :: x : 306$
 $162x = 2754$
 $x = \frac{2754}{162}$
 $x = 17$ Ans

Q.7. An army camp of 200 has enough food for 60 days. How long will the food last if the number of man in the camp is reduced to 160?

Sol.

Men : food
 200 : 60
 160 : x
 $200 \times 60 = 160x$
 $x = \frac{200 \times 60}{160}$

$x = 75$ days Ans.

Q.8. 45 goats can graze a field in 13 days. How many goats will graze the same field in a day?

Days : graze
 13 : 45
 1 : x

$x = 45 \times 13$

$x = 585$ goats Ans.

Objective Exercise

Q.1. Answer the following questions.

i. What is meant by ratio?

Ans. The numerical comparison between the two quantities of the same kind is called as ratio.

ii. Define the proportion

Ans. The relation of equality of two ratios is called as proportion.

iii. What is meant by extremes of proportion

Ans. The first and fourth elements are called as extremes of proportion

Review Exercise 6

Q.1. Write the following ratios into simplest form.

i. Rs. 105 and Rs. 150

Sol.

$$\begin{aligned} &= 105 : 150 \\ &= 21 : 30 \\ &= 7 : 10 \quad \text{Ans.} \end{aligned}$$

ii. 35 m and 119 m

Sol.

$$\begin{aligned} &= 35 : 119 \\ &= 5 : 17 \end{aligned}$$

iii. 0.76 m and 1.9 m.

Sol.

$$\begin{aligned} &= \frac{76}{100} : \frac{19}{10} \\ &= \frac{76}{100} \times 100 : \frac{19}{10} \times 100 \\ &= 76 : 190 \\ &= 38 : 95 = 2 : 17 \quad \text{Ans.} \end{aligned}$$

iv. 26 liters and 39 liters

Sol.

$$\begin{aligned} &= 26 : 39 \\ &= 2 : 3 \quad \text{Ans.} \end{aligned}$$

Q.2. Out of 150 eggs in a basket, 25 eggs were found rotten. Find the ratio of

- Rotten eggs to the good eggs.
- Rotten eggs to the total eggs.
- Good eggs to the total eggs.

Sol.

- Good eggs = $150 - 25 = 125$
Rotten eggs = 25 eggs
Ratio is = 25 : 125

$$1 : 5$$

- Rotten : total

$$25 : 150$$

$$5 : 30$$

$$1 : 6$$

- good : total

$$125 : 150$$

$$5 : 6$$

Q.3. Out of 75 passengers in a bus, 35 are male, 30 are female and remaining are children. Find out the ratio of the following.

- male passenger to the total passengers.
- Female passengers to the male passengers.
- Children to the total passengers

Sol.

- Male : total

$$35 : 75$$

$$7 : 15$$

- Female : male

$$30 : 35$$

$$6 : 7$$

- Children : total

$$10 : 75$$

$$2 : 15$$

Q.7. If 7 buffaloes give 56 liters milk, how much milk can we get from 12 buffaloes? (62)

Sol.

Let x be the litres of milk

$$7 : 56 :: 12 : x$$

$$7x = 672$$

$$x = \frac{672}{7} = 96$$

$$x = 96 \text{ litres} \quad \text{Ans.}$$

Q.8. A farmer has 8 days food for 33 cows. He bought 11 more cows. For how many days will the food be enough?

Sol.

Let x be the no of days

$$8 : 33 :: x : 11$$

$$33x = 88$$

$$x = \frac{88}{33} = \frac{8}{3} = 2.67 \quad \text{Ans.}$$

Q.9. If 40 workers do a work in 35 days, in how many days will the same work be done by increasing 10 more workers.

Sol.

Let x be the no of days

$$40 : x :: 50 : 35$$

$$x = \frac{40 \times 35}{50}$$

$$x = 28 \text{ day} \quad \text{Ans.}$$

Q.10. Raheem paid his servant Rs. 750 for 1 week and 3 day. What amount will he pay him for a month of 30 day. (62)

Sol.

$$750 : x :: 10 : 30$$

$$10x = 750 \times 30$$

$$x = \frac{750 \times 30}{10}$$

$$x = \text{Rs. } 2250 \quad \text{Ans.}$$

Q.11. A machine starts working in 45 minutes at the temperature of 60 °C. How much time is required to work it at the temperature of 75°C.

$$45 : x :: 60 : 75$$

$$60x = 45 \times 75$$

$$x = \frac{45 \times 75}{60}$$

$$x = 36 \text{ min} \quad \text{Ans.}$$

Q.12. 72 persons have enough food for 7 days. But after 1 day they decided to finish the food in 3 remaining days. For it the invited more persons. How many person did they invite.

Sol.

$$\text{Days} = 7$$

$$\text{person} = 72$$

So

$$72 : x :: 6 : 3$$

$$6x = 72 \times 3$$

$$x = \frac{72 \times 3}{6} = 36 \text{ person}$$

Ans.

Q.2. Find the value of 'x' in each of the following proportion. (6-2)

i. $2 : 7 :: x : 49$

Sol.

$$7x = 2 \times 49$$

$$7x = 98$$

$$x = \frac{98}{7} = 14$$

$$x = 14 \quad \text{Ans.}$$

ii. $8 : 12 :: 6 : x$

Sol.

$$8x = 12 \times 6$$

$$8x = 72$$

$$x = \frac{72}{8} = 9$$

$$x = 9 \quad \text{Ans.}$$

Q.3. $5 : 9$ is a ratio, if we increase first element of the ratio up to 40. What will be the second element?

Sol.

$$5 : 9 :: 40 : x$$

$$5x = 40 \times 9$$

$$x = \frac{40 \times 9}{5}$$

$$= 8 \times 9 = 72$$

So, Second element = 72 Ans.

iii. $1.2 : 3.6 :: x : 3$

Sol.

$$3.6x = 1.2 \times 3$$

$$3.6x = 3.6$$

$$x = \frac{3.6}{3.6} = 1$$

$$x = 1 \quad \text{Ans.}$$

iv. $x : 2 :: 150 : 100$

Sol.

$$100x = 2 \times 150$$

$$100x = 300$$

$$x = \frac{300}{100}$$

$$x = 3 \quad \text{Ans.}$$

Q.4. What is the fourth proportional of 1, 3 and 4. (6-2)

Sol.

Let the fourth proportional be x

Then

$$1 : 3 = 4 : x$$

$$1x = 12$$

$$x = \frac{12}{1}$$

$$x = 12 \quad \text{Ans.}$$

Q.5. Find mean proportional of 4 and 9.

Sol.

Let the mean proportional be x, then

$$4 : x :: x : 9$$

$$4 \times 9 = x^2$$

$$x^2 = 36 \Rightarrow x = 6$$

Q.6. If 150 shirt can be stitched on 6 sewing machines in a day how many machines are required to stitch 225 shirts in a day?

Sol.

Let x be the no of machines then

$$150 : 6 :: 225 : x$$

$$150x = 1350$$

$$x = \frac{1350}{150} = 9$$

x = 9 Machines are required Ans.

vi. 1 year and 240 day

Sol. = 365 : 240

= 73 : 48

v. 1 day 1 week and 15 days

Sol. = 1 : 7 : 15

Q.5. Simplify

i. 12 is to 120

Sol. 12 : 120

= 6 : 60

= 1 : 10 Ans.

ii. 25 is to 50

Sol.

= 25 : 50

= 5 : 10

= 1 : 2 Ans.

iii. 80 is to 100

Sol.

= 80 : 100

= 40 : 50

= 8 : 10

= 4 : 5 Ans.

iv. 72 is to 48

Sol.

= 72 : 48

= 36 : 24

= 6 : 4

= 3 : 2 Ans.

v. 4000 is to 40

Sol.

= 4000 : 40

= 100 : 1 Ans.

vi. $\frac{1}{99}$ is to $\frac{2}{33}$

Sol. $\frac{1}{99} : \frac{2}{33} = \frac{1}{99} \times 99 : \frac{2}{33} \times 99 = 1 : 6$

Exercise 6.2

Q.1. Find the value of "P" in each of the following.

i. $\frac{2}{5} = \frac{P}{20}$

Sol. $2 : 5 = P : 20$

= $5P = 40$

$P = \frac{40}{5}$

$P = 8$ Ans.

ii. $\frac{P}{5} = \frac{3}{10}$

Sol.

$P : 5 :: 3 : 10$

$10P = 15$

$P = \frac{15}{10} = 1.5$

$P = 1.5$ Ans.

iii. $\frac{0.1}{0.4} = \frac{6}{P}$

Sol.

$0.1 : 0.4 :: 6 : P$

$0.1P = 0.4 \times 6$

$0.1P = 2.4$

$P = \frac{2.4}{0.1} = 24$

$P = 24$ Ans.

ix. $1.3 : 3.9$

Sol.

$$\begin{aligned} &= \frac{13}{10} : \frac{39}{10} \\ &= \frac{13}{10} \times 10 : \frac{39}{10} \times 10 \\ &= 13 : 39 \\ &= 13 : 39 \\ &= 1 : 3 \text{ Ans.} \end{aligned}$$

ix. $.02 : 0.4$

Sol.

$$\begin{aligned} &= \frac{2}{100} : \frac{4}{10} \\ &= \frac{2}{100} \times 1000 : \frac{4}{10} \times 1000 \\ &= 20 : 400 \\ &= 10 : 200 \\ &= 5 : 100 \\ &= 1 : 20 \text{ Ans.} \end{aligned}$$

ix. $\frac{1}{4} : \frac{1}{6} : \frac{1}{8}$

Sol.

$$\begin{aligned} &= \frac{1}{4} \times 24 : \frac{1}{6} \times 24 : \frac{1}{8} \times 24 \\ &= 6 : 4 : 3 \quad \text{Ans.} \end{aligned}$$

x. $75 : 100 : 125$

Sol.

$$\begin{aligned} &= 15 : 20 : 25 \\ &= 3 : 4 : 5 \quad \text{Ans.} \end{aligned}$$

xi. $0.2 : 0.4 : 0.6$

Sol.

$$\begin{aligned} &= \frac{2}{10} : \frac{4}{10} : \frac{6}{10} \\ &= \frac{1}{5} : \frac{2}{5} : \frac{3}{5} = 1 : 2 : 3 \end{aligned}$$

xii. $\frac{1}{10} : \frac{1}{100} : \frac{1}{1000}$

Sol.

$$\begin{aligned} &= \frac{1}{10} \times 1000 : \frac{1}{100} \times 1000 : \frac{1}{1000} \times 1000 \\ &= 100 : 10 : 1 \quad \text{Ans.} \end{aligned}$$

Q.4. Write each of the following quantities into ratios and reduce into the simplest form.

i. Rs. 100 and Rs. 250

$$\begin{aligned} \text{Sol.} &= \frac{100}{5} : \frac{250}{5} \\ &= 20 : 50 \\ &= 4 : 10 \\ &= 2 : 5 \text{ Ans.} \end{aligned}$$

ii. 2 kg and 800 gram

$$\begin{aligned} \text{Sol.} &= 2 : 800 \\ &= 2000 : 800 \\ &= 5 : 2 \text{ Ans.} \end{aligned}$$

iii. 1 m and 500 cm

$$\begin{aligned} \text{Sol.} &= 100 : 500 \\ &= 1 : 5 \text{ Ans.} \end{aligned}$$

Exercise 6.1

Q.1. Write each of the following inter ratio form.

i. $\frac{3}{4}$

Sol. 3 : 4

ii. $\frac{2}{7}$

Sol. 2 : 7

iii. $\frac{9}{11}$

Sol. 9 : 11

iv. $\frac{1}{13}$

Sol. 1 : 13

v. $\frac{5}{6}$

Sol. 5 : 6

vi. $\frac{8}{13}$

Sol. 8 : 13

vii. $\frac{14}{23}$

Sol. 14 : 23

viii. $\frac{10}{99}$

Sol. 10 : 99

ix. $\frac{a}{b}$

Sol. a : b

x. $\frac{x}{y}$

Sol. x : y

Q.2. Write each of the following into fraction form.

i. 2 : 3

Sol. $\frac{2}{3}$

ii. 7 : 4

Sol. $\frac{7}{4}$

iii. 19 : 20

Sol. $\frac{19}{20}$

iv. 99 : 100

Sol. $\frac{99}{100}$

v. 1 : 10

Sol. $\frac{1}{10}$

vi. 4.1 : 5.2

Sol. $\frac{4.1}{5.2}$

vii. a : b

Sol. $\frac{a}{b}$

viii. x : y

Sol. $\frac{x}{y}$

Q.3. Simplify the following ratios

i. 3 : 9

Sol. $= 1 : 3$ Ans.

ii. 25 : 40

Sol. $= 5 : 8$ Ans.

iii. $\frac{1}{4} : \frac{1}{6}$

Sol. $= \frac{1}{4} \times 24 : \frac{1}{6} \times 24$
 $= 6 : 4 = 3 : 2$ Ans.

iv. $\frac{2}{3} : \frac{1}{9}$

Sol. $\frac{2}{3} \times 27 : \frac{1}{9} \times 27$
 $= 18 : 3 = 6 : 1$ Ans.

v. $1 : \frac{1}{7}$

Sol. $\frac{1}{1} \times 7 : \frac{1}{7} \times 7$
 $= 7 : 1$ Ans.

vi. $5 : \frac{2}{3}$

Sol. $= \frac{5}{1} : \frac{2}{3}$
 $= \frac{5}{1} \times 3 : \frac{2}{3} \times 3$
 $= 15 : 2$ Ans.

Q.2. Fill in the blanks.

- i. A _____ can be either true or false.
ii. Algebra is a _____ form of arithmetic.
iii. The multiplying factor of a variable is called its _____.
iv. The parts of an algebraic expression, separated by the signs + and -, are called _____.
v. The terms of the same kind only differ by their coefficients are called _____ terms.

Answers

- i. statement ii. general iii. coefficient
iv. terms v. like

Q.3. Tick(✓) the correct answer.

- i. In $4x^2$, 2 is known as
a. base b. coefficient
c. exponent d. term
- ii. If $a = 1$, $b = 1$ and $c = 1$, $\frac{a^2 + b^2 + c^2}{3} = ?$
a. 1 b. 2
c. $\frac{1}{3}$ d. $-\frac{1}{3}$
- iii. In $x + 2$, 2 is known as,
a. coefficient b. constant
c. variable d. exponent
- iv. $x^2 + x^2 + x + x = ?$
a. x^2 b. $x^2 + x$
c. $2(x^2 + x)$ d. $(x^2 + x)^2$

Answer:

- i. c ii. a iii. b iv. c

11.5
Q.5. Find the cost of leveling a triangular playground at the rate of Rs.25.5 per square metre. The base of playground is 88m and height is 66m.

Sol.

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} (\text{Base} \times \text{Height}) \\ &= \frac{1}{2} (88\text{m} \times 66\text{m}) \\ &= \frac{1}{2} (5808) \\ &= 2904\text{m}^2 \quad \text{Ans.}\end{aligned}$$

$$\begin{aligned}\text{Cost of leveling at Rs. 25.5/m}^2 &= (2904 \times 25.5) \\ &= \text{Rs.74052} \quad \text{Ans.}\end{aligned}$$

Q.6. The base of a triangular shaped field is 246m and height is 125m. How much rice will be produced in this field at the rate of 24 quintal per hectare?

Sol.

$$\begin{aligned}\text{Base of field} &= 246 \text{ m} \\ \text{Height of field} &= 125\text{m}\end{aligned}$$

$$\begin{aligned}\text{Area of field} &= (246 \times 125) \times \frac{1}{2} \\ &= 15375\text{m}^2\end{aligned}$$

$$\text{Area in hectares} = \frac{15375}{10000} = 1.5375 \text{ ha}$$

$$\begin{aligned}\text{Rice produced 24 quintals/ hectare} &= 24 \times 1.5375 \\ &= 36.9 \text{ Quintals} \quad \text{Ans.}\end{aligned}$$

11.5
Q.7. A room is triangular in shape. Its base is 9.4m and height is 8.6m. Find the cost of wooden floor at the rate of Rs.250 per square metre.

Sol.

$$\begin{aligned}\text{Base of room} &= 9.4\text{m} \\ \text{Height of room} &= 8.6\text{m}\end{aligned}$$

$$\begin{aligned}\text{Area of room} &= \frac{1}{2} \times \text{base} \times \text{height} \\ &= \frac{1}{2} 9.4 \times 8.6 \\ &= 40.42\text{m}^2\end{aligned}$$

$$\begin{aligned}\text{Cost of wooden floor} &= 250 \times 40.42 \\ &= \text{Rs.10105}\end{aligned}$$

Q.8. The height of a triangular garden is 54m and base is 92m. Find the number of flowers in the garden if there are 18 flowers on the area of each sq. metre.

Sol.

$$\begin{aligned}\text{Height of garden} &= 54\text{m} \\ \text{Base of garden} &= 92\text{m}\end{aligned}$$

$$\begin{aligned}\text{Area of garden} &= \frac{1}{2} \times 54 \times 92 \\ &= 27 \times 92 = 2484\text{m}^2\end{aligned}$$

$$\text{No of flowers per m}^2 = 18$$

$$\begin{aligned}\text{So no of flowers} &= 18 \times 2484 \\ &= 44,712 \quad \text{Ans.}\end{aligned}$$

vi. Base = 20.1m, Height = 12.8m (11.5)

Sol.

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} (\text{Base} \times \text{Height}) \\ &= \frac{1}{2} (20.1\text{m} \times 12.8\text{m}) \\ &= \frac{1}{2} (257.28) \\ &= 128.64\text{m}^2 \text{ Ans.}\end{aligned}$$

vii. Base = 8.25m, Height = 6.4cm

Sol.

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} (\text{Base} \times \text{Height}) \\ &= \frac{1}{2} (8.25\text{cm} \times 6.4\text{cm}) \\ &= \frac{1}{2} (52.80) \\ &= 26.4\text{cm}^2 \text{ Ans.}\end{aligned}$$

viii. Base = 25m, Height = 33m

Sol.

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} (\text{Base} \times \text{Height}) \\ &= \frac{1}{2} (25\text{m} \times 33\text{m}) \\ &= \frac{1}{2} (825) \\ &= 412.5\text{m}^2 \text{ Ans.}\end{aligned}$$

Q.2. Find the area of triangular floor whose base is 9m and height is 5.4m.

Sol.

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} (\text{Base} \times \text{Height}) \\ &= \frac{1}{2} (9\text{m} \times 5.4\text{m}) \\ &= \frac{1}{2} (48.6) \\ &= 24.3\text{m}^2 \text{ Ans.}\end{aligned}$$

Q.3. A triangular sandwich has the same height and base. Find the area of the sandwich if its base is 7.4cm.

Sol.

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} (\text{Base} \times \text{Height}) \\ &= \frac{1}{2} (7.4\text{cm} \times 7.4\text{cm}) \\ &= \frac{1}{2} (54.76) \\ &= 27.38\text{cm}^2 \text{ Ans.}\end{aligned}$$

Q.4. The base of triangle shaped clock is 28cm and height is 32cm. Find the area of the clock that it will be cover on the wall.

Sol.

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} (\text{Base} \times \text{Height}) \\ &= \frac{1}{2} (28\text{cm} \times 32\text{cm}) \\ &= \frac{1}{2} (896) \\ &= 448\text{cm}^2 \text{ Ans.}\end{aligned}$$

Sol.

$$\begin{aligned}\text{Area of trapezium} &= \frac{1}{2} [9\text{m} \times 24\text{m}] \\ &= \frac{1}{2} [216] \\ &= \frac{216}{2} = 108\text{m}^2\end{aligned}$$

Cost of carpeting = $(108 \times 32) = \text{Rs. } 3456$. Ans.

Exercise 11.5

Q.1. Find the area of the following triangles.

i. Base = 8m, Height = 14m

Sol.

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} (\text{Base} \times \text{Height}) \\ &= \frac{1}{2} (8\text{m} \times 14\text{m}) \\ &= \frac{1}{2} (112) \\ &= 56\text{m}^2 \quad \text{Ans.}\end{aligned}$$

ii. Base = 19m, Height = 16m

Sol.

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} (\text{Base} \times \text{Height}) \\ &= \frac{1}{2} (19\text{m} \times 16\text{m}) \\ &= \frac{1}{2} (304) \\ &= 152\text{m}^2 \quad \text{Ans.}\end{aligned}$$

iii. Base = 14.4m, Height = 12.5m

Sol.

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} (\text{Base} \times \text{Height}) \\ &= \frac{1}{2} (14.4\text{m} \times 12.5\text{m}) \\ &= \frac{1}{2} (180) \\ &= 90\text{m}^2 \quad \text{Ans.}\end{aligned}$$

iv. Base = 6.7m, Height = 10m

Sol.

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} (\text{Base} \times \text{Height}) \\ &= \frac{1}{2} (6.7\text{m} \times 10\text{m}) \\ &= \frac{1}{2} (67\text{m}^2) \\ &= 33.5\text{m}^2 \quad \text{Ans.}\end{aligned}$$

v. Base = 5.6m, Height = 6.5m

Sol.

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} (\text{Base} \times \text{Height}) \\ &= \frac{1}{2} (5.6\text{m} \times 6.5\text{m}) \\ &= \frac{1}{2} (36.4\text{m}^2) \\ &= 18.2\text{m}^2 \quad \text{Ans.}\end{aligned}$$

Q.2. Find the area of a trapezium whose length of its parallel sides are 19m and 24m long respectively and distance between them is 14m.

Sol.

$$\begin{aligned}\text{Area of trapezium} &= \frac{1}{2} [\text{perpendicular distance} \times \\ &\text{sum of length of parallel sides}] \\ &= \frac{1}{2} [14m \times 43m] \\ &= \frac{14m \times 43m}{2} = 7m \times 43m \\ &= 301m^2 \quad \text{Ans.}\end{aligned}$$

Q.3. A trapezium has 20m and 35m in lengths of its two parallel sides and perpendicular distance is 16m. Calculate its area.

Sol.

$$\begin{aligned}\text{Area of trapezium} &= \frac{1}{2} [\text{perpendicular distance} \times \\ &\text{sum of length of parallel sides}] \\ &= \frac{1}{2} [16m \times 55m] \\ &= \frac{16 \times 55}{2} m^2 = 8 \times 55m^2 = 440m^2\end{aligned}$$

Q.4. The perpendicular distance of a trapezium is 8m and the length of parallel sides are 10m and 15m. Calculate the area of trapezium.

Sol.

$$\begin{aligned}\text{Area of trapezium} &= \frac{1}{2} [\text{perpendicular distance} \times \\ &\text{sum of length of parallel sides}] \\ &= \frac{1}{2} [8m \times 25m] \\ &= \frac{200}{2} m^2 = 100m^2 \quad \text{Ans.}\end{aligned}$$

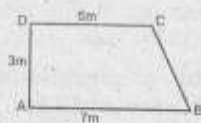
Q.5. A trapezium shaped playground has lengths of its two parallel sides 80m and 120m. Find the cost of its flooring at the rate of Rs.25/m², where the distance between two parallel sides is 45m.

Sol.

$$\begin{aligned}\text{Area of trapezium} &= \frac{1}{2} [\text{perpendicular distance} \times \\ &\text{sum of length of parallel sides}] \\ &= \frac{1}{2} [45m \times 200m] \\ &= \frac{9000}{2} m^2 = 4500m^2 \\ \text{Cost of flooring} &= (4500 \times 25) \\ &= \text{Rs.112500 Ans.}\end{aligned}$$

Q.6. Find the cost of carpeting a trapezium shaped floor at the rate of Rs.32/m², where the lengths of parallel sides of trapezium are 7m and 17m respectively and distance between them is 9m.

ii.



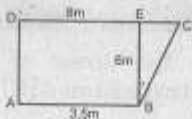
Sol.

Area of trapezium = $\frac{1}{2}$ [perpendicular distance \times sum of lengths of parallel sides]

$$= \frac{1}{2} [3\text{m} \times 12\text{m}]$$

$$= \frac{36}{2} \text{m}^2 = 18\text{m}^2. \quad \text{Ans.}$$

iii.



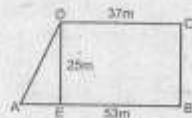
Sol.

Area of trapezium = $\frac{1}{2}$ [perpendicular distance \times sum of length of parallel sides]

$$= \frac{1}{2} [6\text{m} \times 11.5\text{m}]$$

$$= \frac{69}{2} = 34.5\text{m}^2 \quad \text{Ans.}$$

iv.



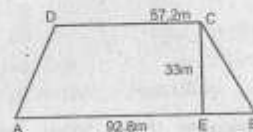
Sol.

Area of trapezium = $\frac{1}{2}$ [perpendicular distance \times sum of length of parallel sides]

$$= \frac{1}{2} [25\text{m} \times 90\text{m}]$$

$$= \frac{2250}{2} = 1125\text{m}^2 \quad \text{Ans.}$$

v.

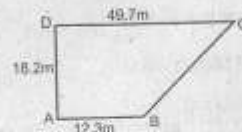


Sol.

Area of trapezium = $\frac{1}{2}$ [perpendicular distance \times sum of length of parallel sides]

$$= \frac{1}{2} [33\text{m} \times 150\text{m}] = \frac{4950}{2} = 2475\text{m}^2 \quad \text{Ans.}$$

vi.



Sol.

Area of trapezium = $\frac{1}{2}$ [perpendicular distance \times sum of length of parallel sides]

$$= \frac{1}{2} [18.2\text{m} \times 62\text{m}] = \frac{1}{2} (1128.4)$$

$$= 564.2\text{m}^2 \quad \text{Ans.}$$

$$\text{Height} = \frac{\text{Area}}{\text{Base}} = \frac{405}{27} = 15\text{m}$$

Q.5. Find the base of a parallelogram when its height is 16m and area is 560m².

Sol.

Area of a parallelogram = Base \times height

$$\text{Base} = \frac{\text{area}}{\text{height}}$$

$$= \frac{560}{16}$$

$$= 35\text{m}$$

Ans.

Q.6. Find the cost of leveling a plot of 200m base and 140m height at the rate of Rs.4.50/m².

Sol.

Area of plot = Base \times Height

$$= 200\text{m} \times 140\text{m}$$

$$= 28000\text{m}^2$$

$$\text{Cost of leveling a plot} = 28000 \times 4.5$$

$$= \text{Rs.}126,000 \text{ Ans.}$$

Q.7. Find the cost of ploughing a parallelogram shaped field at the rate of Rs.6/m² whose base is 175m and height is 125m.

Sol.

$$\text{Area} = \text{Base} \times \text{Height}$$

$$= 175\text{m} \times 125\text{m}$$

$$= 21875\text{m}^2$$

$$\text{Cost of ploughing at the rate of Rs. 6/m}^2 = (21875 \times 6) = \text{Rs.}131250 \text{ Ans.}$$

Q.8. The height of parallelogram floor is 25.8m and base is 36.5m. Find the cost of tiles used on floor at rate or Rs. 460/m² that will be used on the floor.

Sol.

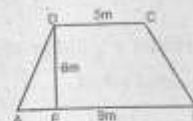
$$\begin{aligned} \text{Area of parallelogram} &= \text{Base} \times \text{height} \\ &= 36.5\text{m} \times 25.8\text{m} \\ &= 941.7\text{m}^2 \end{aligned}$$

$$\begin{aligned} \text{Cost of flooring tiles at Rs. 460/m}^2 \\ &= (460 \times 941.7) = \text{Rs.}433,182 \text{ Ans.} \end{aligned}$$

Exercise 11.4

Q.1. Calculate the area of each of the following trapezium ABCD.

i.



Sol.

$$\begin{aligned} \text{Area of trapezium} &= \frac{1}{2} [\text{perpendicular distance} \times \\ &\quad \text{sum of length of parallel sides}] \end{aligned}$$

$$= \frac{1}{2} [8\text{m} \times 14\text{m}]$$

$$= \frac{84}{2} \text{m}^2 = 42\text{m}^2 \text{ Ans.}$$

11.2
Q.5. A 3m wide road is all around on the outside of a 125m long and 60m wide garden. Find the cost of repairing the road at the rate of Rs. 150/m².

Sol.

$$\text{Inner length} = 125\text{m}$$

$$\text{Inner width} = 60\text{m}$$

$$\text{Inner area} = \text{inner length} \times \text{inner width}$$

$$= 125\text{m} \times 60\text{m}$$

$$= 7500\text{m}^2$$

$$\text{Outer breadth} = \text{inner breadth} + 2(\text{width of road})$$

$$= 60\text{m} + 2(3\text{m})$$

$$= 60 + 6\text{m}$$

$$= 66\text{m}$$

$$\text{Outer length} = 125 + 2(3)$$

$$= 125 + 6 = 131\text{m}$$

$$\text{Outer area} = \text{outer length} \times \text{outer breadth}$$

$$= 131\text{m} \times 66\text{m}$$

$$= 8646\text{m}^2$$

$$\text{Area of road} = \text{outer area} - \text{Inner area}$$

$$= 8646\text{m}^2 - 7500\text{m}^2$$

$$= 1146\text{m}^2$$

$$\text{Cost of repairing the road at the rate of Rs. 150/m}^2$$

$$= 150 \times 1146$$

$$= \text{Rs. } 171900 \text{ Ans.}$$

Exercise 11.3

Q.1. Find the area of a parallelogram shaped pool whose base is 17m and height is 9m.

Sol.

$$\text{Area of parallelogram} = \text{Base} \times \text{height}$$

$$= 17\text{m} \times 9\text{m}$$

$$= 153\text{m}^2$$

Q.2. Find the height of a parallelogram shaped hall when its base is 12m and the area of the hall is 216m².

Sol.

$$\text{Area of parallelogram} = \text{Base} \times \text{height}$$

$$\text{Height} = \frac{\text{Area}}{\text{Base}}$$

$$= \frac{216}{12}$$

$$= 18\text{m} \quad \text{Ans.}$$

Q.3. Find the area of a parallelogram whose base is 75m and height is 50m.

Sol.

$$\text{Area of a parallelogram} = \text{Base} \times \text{Height}$$

$$= 75\text{m} \times 50\text{m}$$

$$= 3750\text{m}^2$$

Q.4. Find the height of a parallelogram whose base is 27m and area is 405m².

Sol.

$$\text{Area of a parallelogram} = \text{Base} \times \text{Height}$$

$$= 96\text{m} - 2(3.5\text{m})$$

$$= 96\text{m} - 7\text{m}$$

$$= 89\text{m}$$

$$\text{Inner breadth} = \text{outer length} - 2(\text{width of border})$$

$$= 50\text{m} - 2(3.5\text{m})$$

$$= 50\text{m} - 7\text{m}$$

$$= 43\text{m}$$

$$\text{Inner area} = \text{inner length} \times \text{inner breadth}$$

$$= 89\text{m} \times 43\text{m}$$

$$= 3827\text{m}^2$$

$$\text{Area of shaded border} = \text{outer area} - \text{inner area}$$

$$= 4800\text{m}^2 - 3827\text{m}^2$$

$$= 973\text{m}^2 \quad \text{Ans.}$$

Q.3. Find the area of a 4m wide running track constructed inside of a park, when the length and breadth of the park are 150m and 80m respectively.

Sol.

$$\text{Width of track} = 4\text{m}$$

$$\text{Outer length of park} = 150\text{m}$$

$$\text{Outer width of park} = 80\text{m}$$

$$\text{Outer area of park} = 150\text{m} \times 80\text{m}$$

$$= 12000\text{m}^2$$

Now

$$\text{Inner length of park} = 150 - 2(4)$$

$$= 150 - 8$$

$$= 142\text{m}$$

$$\text{Inner width of park} = 80 - 2(4)$$

$$= 80 - 8 = 72\text{m}$$

$$\text{Inner area of park} = 142\text{m} \times 72\text{m}$$

$$= 10224\text{m}^2$$

$$\text{So area of 4m wide running track}$$

$$= 12000 - 10224$$

$$= 1776\text{m}^2$$

Q.4. A room is 8m long and 5m wide. Find the cost of the flooring tiles at the rate of Rs.40/m² that used in verandah of 1.5m width which surrounded the room.

Sol.

$$\text{Inner length} = 8\text{m}$$

$$\text{Inner breadth} = 5\text{m}$$

$$\text{Inner area} = 8 \times 5\text{m}^2 = 40\text{m}^2$$

$$\text{Outer length} = \text{Inner length} + 2(\text{width of border})$$

$$= 8\text{m} + 2(1.5\text{m})$$

$$= 8\text{m} + 3\text{m} = 11\text{m}$$

$$\text{Outer breadth} = \text{outer length} + 2(\text{width of border})$$

$$= 5\text{m} + 2(1.5\text{m})$$

$$= 5\text{m} + 3\text{m} = 8\text{m}$$

$$\text{Outer Area} = \text{Outer length} \times \text{Outer breadth}$$

$$= 11\text{m} \times 8\text{m}$$

$$= 88\text{m}^2$$

$$\text{Area of verandah} = \text{Outer area} - \text{Inner area}$$

$$= 88\text{m}^2 - 40\text{m}^2 = 48\text{m}^2$$

$$\text{Cost of flooring at the rate of Rs.40/m}^2$$

$$= 48 \times 40$$

$$= \text{Rs. } 1920 \quad \text{Ans.}$$

$$\text{Outer length} = \text{inner length} + 2(\text{width of border})$$

$$= 100\text{m} + 2(2\text{m})$$

$$= 100\text{m} + 4\text{m} = 104\text{m}$$

$$\text{Outer breadth} = \text{outer breadth} + 2(\text{width of border})$$

$$= 50\text{m} + 2(2\text{m})$$

$$= 50\text{m} + 4\text{m} = 54\text{m}$$

$$\text{Outer area} = \text{outer length} \times \text{outer breadth}$$

$$= 104\text{m} \times 54\text{m}$$

$$= 5616 \text{ m}^2$$

$$\text{Area of border} = \text{outer area} - \text{Inner Area}$$

$$= 5616 - 5000$$

$$= 616 \text{ m}^2$$

i.

$$\text{Inner length} = 120\text{m}$$

$$\text{Inner breadth} = 70\text{m}$$

$$\text{Width of the border} = 3\text{m}$$

Sol.

$$\text{Inner Area} = \text{Inner length} \times \text{inner breadth}$$

$$= 120\text{m} \times 70\text{m}$$

$$= 8400 \text{ m}^2$$

$$\text{Outer length} = \text{Inner length} + 2(\text{width of border})$$

$$= 120\text{m} + 2(3\text{m})$$

$$= 120 + 6\text{m} = 126\text{m}$$

$$\text{Outer breadth} = \text{Inner breadth} + 2(\text{width of border})$$

$$= 70\text{m} + 2(3\text{m})$$

$$\text{Outer width} = 70\text{m} + 6\text{m} = 76\text{m}$$

$$\text{Outer area} = \text{outer length} \times \text{outer breadth}$$

$$= 126\text{m} \times 76\text{m}$$

$$= 9576 \text{ m}^2$$

$$\text{Area of shaded border} = \text{outer area} - \text{inner area}$$

$$= 9576 \text{ m}^2 - 8400$$

$$= 1176 \text{ m}^2$$

iii. Outer length 80m

$$\text{Outer breadth} = 45\text{m}$$

$$\text{Width of the border} = 4\text{m}$$

Sol.

$$\text{Outer area} = \text{outer length} \times \text{outer breadth}$$

$$= 80\text{m} \times 45\text{m}$$

$$= 3600 \text{ m}^2$$

$$\text{Inner length} = \text{outer length} - 2(\text{width of border})$$

$$= 80\text{m} - 2(4\text{m})$$

$$= 80\text{m} - 8\text{m}$$

$$= 72\text{m}$$

$$\text{Inner breadth} = \text{outer breadth} - 2(\text{width of border})$$

$$= 45\text{m} - 2(4\text{m})$$

$$= 45\text{m} - 8\text{m}$$

$$= 37\text{m}$$

$$\text{Inner area} = \text{inner length} \times \text{inner breadth}$$

$$= 72\text{m} \times 37\text{m}$$

$$= 2664 \text{ m}^2$$

$$\text{Area of shaded border} = \text{outer area} - \text{inner area}$$

$$= 3600 \text{ m}^2 - 2664 \text{ m}^2$$

$$= 936 \text{ m}^2 \quad \text{Ans.}$$

iv. Outer length = 96m

$$\text{Outer breadth} = 50\text{m}$$

$$\text{Width of the border} = 3.5\text{m}$$

Sol.

$$\text{Outer area} = \text{outer length} \times \text{outer breadth}$$

$$= 96\text{m} \times 50\text{m}$$

$$= 4800 \text{ m}^2$$

$$\text{Inner length} = \text{outer length} - 2(\text{width of border})$$

Sol.

$$\begin{aligned}\text{Area of rectangular ground} &= \text{length} \times \text{breadth} \\ &= 45\text{m} \times 30\text{m} \\ &= 1350\text{m}^2\end{aligned}$$

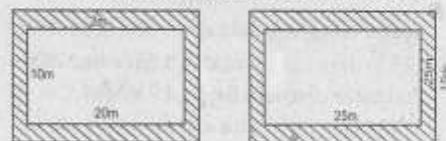
$$\begin{aligned}\text{Cost of repairing the garden} &= (1350 \times 50) \\ &= \text{Rs. } 67500 \text{ Ans.}\end{aligned}$$

$$\begin{aligned}\text{Perimeter of rectangular garden} &= 2 \times (\text{length} + \text{breadth}) \\ &= 2 \times (45\text{m} + 30\text{m}) \\ &= 2(75\text{m}) = 150\text{m}\end{aligned}$$

$$\begin{aligned}\text{Cost of constructing a wall around it} &= 150 \times 425 \\ &= \text{Rs. } 63750 \text{ Ans.}\end{aligned}$$

Exercise: 11.2

Q.1. Find the area of the border (shaded portion) from the following figures.



a. Area of Inner portion = (Inner length \times Inner breadth)

$$\begin{aligned}&= 20\text{m} \times 10\text{m} \\ &= 200\text{m}^2\end{aligned}$$

Outer length = inner length + twice of width of the outer

$$\begin{aligned}\text{Portion} &= 20\text{m} + 2(2\text{m}) \\ &= 20\text{m} + 4\text{m} \\ &= 24\text{m}\end{aligned}$$

Outer breadth = Inner breadth + twice of width of outer portion

$$\begin{aligned}&= 10\text{m} + 2(2\text{m}) \\ &= 10 + 4\text{m} = 14\text{m}\end{aligned}$$

$$\begin{aligned}\text{Total Area} &= \text{Outer length} \times \text{outer breadth} \\ &= 24\text{m} \times 14\text{m} \\ &= 336\text{m}^2\end{aligned}$$

Area of the shaded portion = total Area - Area of Inner portion

$$= 336\text{m}^2 - 200\text{m}^2 = 136\text{m}^2 \text{ Ans.}$$

b. Outer length of rectangle = 25m
Outer width of rectangle = 15 m
Outer area of rectangle

$$\begin{aligned}&= \text{Outer length} \times \text{outer width} \\ &= 25 \times 15\text{m}^2 \\ &= 375\text{m}^2\end{aligned}$$

$$\begin{aligned}\text{Now inner length} &= 25 - 2(2.5) \\ &= 25 - 5 = 20\text{m}\end{aligned}$$

$$\begin{aligned}\text{Inner width} &= 15 - 2(2.5) \\ &= 15 - 5 = 10\text{m}\end{aligned}$$

$$\begin{aligned}\text{Inner area} &= \text{Inner length} \times \text{Inner width} \\ &= 20\text{m} \times 10\text{m} = 200\text{m}^2\end{aligned}$$

$$\text{Area of border} = 375 - 200 = 175\text{m}^2$$

Q.2. Find the area of the following borders.

i. Inner length = 100m
Inner breadth = 50m
Width of the border = 2m

Sol.

$$\begin{aligned}\text{Inner Area} &= \text{inner length} \times \text{inner Breadth} \\ &= 100\text{m} \times 50\text{m} \\ &= 5000\text{m}^2\end{aligned}$$

$$\begin{aligned}
 &= 21\text{m} \times 21\text{m} \\
 &= 441\text{ m}^2 \\
 \text{Perimeter of square} &= 4 \times \text{length} \\
 &= 4 \times 21\text{m} \\
 &= 84\text{m}
 \end{aligned}$$

Q.6. The perimeter of a square shaped room is 36m. Find the cost of tiling the room at the rate of Rs.182.5 per square metre.

Sol.

$$\text{Perimeter of square} = 36\text{m}$$

$$4 \times \text{length} = 36\text{m}$$

$$\text{length} = \frac{36}{4}$$

$$\text{length} = 9\text{m}$$

$$\begin{aligned}
 \text{Area of square} &= \text{length} \times \text{length} \\
 &= 9\text{m} \times 9\text{m} \\
 &= 81\text{m}^2
 \end{aligned}$$

$$\text{Cost of tiling the room at the rate of Rs. 182.5 per sq. m} = \text{Rs.182.5}$$

$$\text{Total cost of tiling} = 81 \times 182.5 = \text{Rs.14782.5}$$

Q.7. Find the cost of leveling a play ground at the rate of Rs. 150/m² whose length is 33m and breadth is 22m. Also find cost of fencing the play ground at the rate of Rs. 100/m.

Sol.

$$\begin{aligned}
 \text{Area of rectangular park} &= \text{length} \times \text{Breadth} \\
 &= 33\text{m} \times 22\text{m} \\
 &= 726\text{ m}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Perimeter of rectangular park} &= 2 \times (\text{length} + \text{breadth}) \\
 &= 2 \times (33\text{m} + 22\text{m}) \\
 &= 2 \times 55\text{m} \\
 &= 110\text{ m}
 \end{aligned}$$

$$\text{Cost of leveling the play ground at Rs.150/m}^2 = (726 \times 150) = \text{Rs.108900}$$

$$\text{Cost of fencing the play ground at rate of 100/m} = (100 \times 10) = \text{Rs.11000} \quad \text{Ans.}$$

Q.8. The length of a side of a square shaped field is 48m. Find the cost of ploughing the field at the rate of Rs.25/m² and cost of fencing the field at the rate of Rs. 18/m.

Sol.

$$\begin{aligned}
 \text{Area of square field} &= \text{length} \times \text{length} \\
 &= 48\text{m} \times 48\text{m} \\
 &= 2304\text{m}^2
 \end{aligned}$$

$$\text{Cost of ploughing field at the rate of Rs. 25/m}^2 = (2304 \times 25) = \text{Rs.57600}$$

$$\begin{aligned}
 \text{Perimeter of square field} &= 4 \times \text{length} \\
 &= 4 \times 48\text{m} \\
 &= 192\text{m}
 \end{aligned}$$

$$\begin{aligned}
 \text{Cost of fencing the field at the rate of Rs. 18/m} &= (192 \times 18) \\
 &= \text{Rs.3456} \quad \text{Ans.}
 \end{aligned}$$

Q.9. A garden is 45m long and 30m wide. Find the cost of repairing the garden at the rate of Rs.50/m² and cost of constructing a wall around it at the rate of Rs. 425/m.

vi.

Sol.

$$\begin{aligned}\text{Area of square} &= \text{length} \times \text{length} \\ &= 17\text{cm} \times 17\text{cm} \\ &= 289\text{cm}^2\end{aligned}$$

$$\begin{aligned}\text{Perimeter of square} &= 4 \times \text{length} \\ &= 4 \times 17\text{cm} = 68\text{cm}\end{aligned}$$

vii.

Sol.

$$\begin{aligned}\text{Area of rectangle} &= \text{length} \times \text{breadth} \\ &= 11.2\text{cm} \times 6.5\text{cm} = 72.8\text{cm}^2\end{aligned}$$

$$\begin{aligned}\text{Perimeter of rectangle} &= 2 \times (\text{length} + \text{breadth}) \\ &= 2 \times (11.2\text{cm} + 6.5\text{cm}) \\ &= 2(17.7\text{cm}) = 35.4\text{cm}\end{aligned}$$

viii.

Sol.

$$\begin{aligned}\text{Area of rectangle} &= \text{length} \times \text{breadth} \\ &= 7.6\text{cm} \times 3.8\text{cm} \\ &= 28.88\text{cm}^2\end{aligned}$$

$$\begin{aligned}\text{Perimeter of rectangle} &= 2 \times (\text{length} + \text{breadth}) \\ &= 2 \times (7.6\text{cm} + 3.8\text{cm}) \\ &= 2(11.4\text{cm}) = 22.8\text{cm}\end{aligned}$$

ix.

Sol.

$$\begin{aligned}\text{Area of Square} &= \text{length} \times \text{length} \\ &= 4.5\text{cm} \times 4.5\text{cm} \\ &= 20.25\text{cm}^2\end{aligned}$$

$$\begin{aligned}\text{Perimeter of Square} &= 4 \times \text{length} \\ &= 4 \times 4.5\text{cm} = 18\text{cm}\end{aligned}$$

Q.2. Find the length of a rectangular park whose breadth is 15m and area is 675m^2 .

Sol.

We know that

$$\text{Area of rectangular park} = \text{length} \times \text{breadth}$$

$$\text{Length} = \frac{\text{Area}}{\text{breadth}} = \frac{675\text{m}^2}{15\text{m}} = 45\text{m}$$

Q.3. The perimeter of square garden is 12km. Find its area.

Sol.

$$\text{Perimeter of square} = 4 \times \text{length} = 12\text{km}$$

$$4 \times \text{length} = 12\text{km}$$

$$\text{Length} = \frac{12}{4}\text{km} = 3\text{km}$$

$$\text{Area of square} = \text{length} \times \text{length} = 3 \times 3 = 9\text{km}^2$$

Q.4. Find the breadth of a swimming pool whose length is 18m and area is 198m^2 .

Sol.

$$\text{Area of rectangle} = \text{length} \times \text{breadth}$$

$$= \frac{\text{area}}{\text{length}}$$

$$= \frac{198\text{m}^2}{18\text{m}} = 11\text{m}$$

Q.5. Find the area and perimeter of a square shaped garden whose measure of side is 21m.

Sol.

$$\text{Area of square} = \text{length} \times \text{length}$$

ii.

Sol.

$$\begin{aligned}\text{Area of rectangle} &= \text{length} \times \text{breadth} \\ &= 6\text{cm} \times 4\text{cm} \\ &= 24\text{cm}^2\end{aligned}$$

$$\begin{aligned}\text{Perimeter of rectangle} &= 2 \times (\text{length} + \text{breadth}) \\ &= 2 \times (6\text{cm} + 4\text{cm}) \\ &= 2 \times (10\text{cm}) \\ &= 20\text{cm}\end{aligned}$$

iii.

Sol.

$$\begin{aligned}\text{Area of rectangle} &= \text{length} \times \text{breadth} \\ &= 12.4\text{cm} \times 8\text{cm} \\ &= 99.2\text{cm}^2\end{aligned}$$

$$\begin{aligned}\text{Perimeter of rectangle} &= 2 \times (\text{length} + \text{breadth}) \\ &= 2 \times (12.4\text{cm} + 8\text{cm}) \\ &= 2 \times (20.4\text{cm}) \\ &= 40.8\text{cm} \quad \text{Ans.}\end{aligned}$$

iv.

Sol.

$$\begin{aligned}\text{Area of rectangle} &= \text{length} \times \text{breadth} \\ &= 9\text{cm} \times 3\text{cm} \\ &= 27\text{cm}^2\end{aligned}$$

$$\begin{aligned}\text{Perimeter of rectangle} &= 2 \times (\text{length} + \text{breadth}) \\ &= 2 \times (9\text{cm} + 3\text{cm}) \\ &= 2 \times 12\text{cm} = 24\text{cm} \quad \text{Ans.}\end{aligned}$$

v.

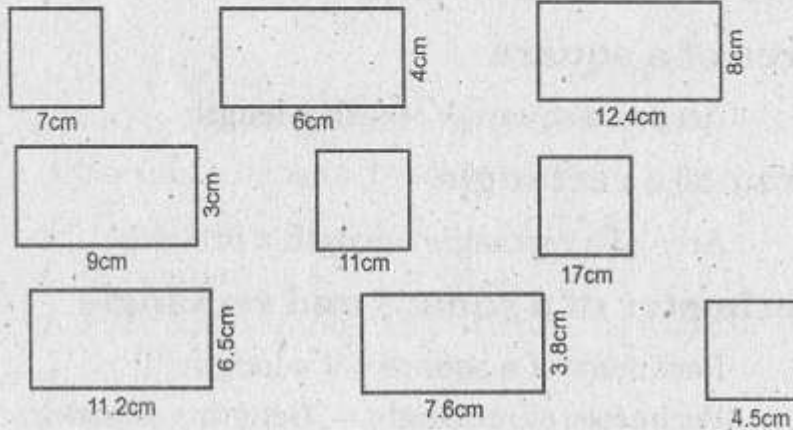
Sol.

$$\begin{aligned}\text{Area of square} &= \text{length} \times \text{length} \\ &= 11\text{cm} \times 11\text{cm} \\ &= 121\text{cm}^2\end{aligned}$$

$$\begin{aligned}\text{Perimeter of square} &= 4 \times \text{length} \\ &= 4 \times 11\text{cm} = 44\text{cm} \quad \text{Ans.}\end{aligned}$$

Exercise 11.1

Q.1. Find the area and perimeter of the following squares and rectangles.



i.

Sol.

$$\begin{aligned}\text{Area of square} &= \text{length} \times \text{length} \\ &= 7\text{cm} \times 7\text{cm} \\ &= 49\text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Perimeter of square} &= 4 \times \text{length} \\ &= 4 \times 7\text{cm} \\ &= 28\text{cm}\end{aligned}$$

Q.2. Fill in the blanks.

Obj Ex. 10

- i. A _____ is a part of a line which has two distinct end points.
- ii. The unit of measuring an angle is called _____.
- iii. A straight line has an angle of _____.
- iv. Only three elements can construct a triangle but one of them must be a _____.

Answer:

- i. line segment ii. degree iii. 180° iv. side

Q.3. Tick (✓) the correct answers

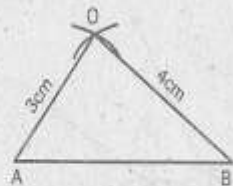
- i. In a line AB, the right bisector passes through its.
 - a. point A
 - b. mid-point
 - c. point B
 - d. none
- ii. Bisection means to divide into parts.
 - a. one
 - b. two
 - c. three
 - d. four
- iii. A right bisector intersects the line at angle of
 - a. 60°
 - b. 45°
 - c. 90°
 - d. 180°
- iv. The sum of internal angles of a triangle is always
 - a. 90°
 - b. 180°
 - c. 45°
 - d. 360°

Answers:

- i. c ii. b iii. c iv. b

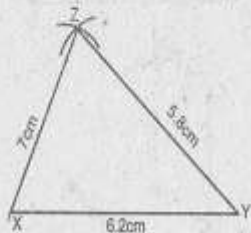
Q.1. Construct the following triangles.

- i. $m\overline{AB} = 5\text{cm}$, $m\overline{BO} = 4\text{cm}$, $m\overline{AO} = 3\text{cm}$

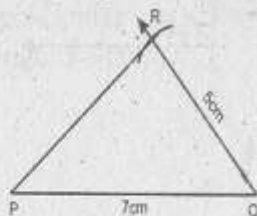


Rev. Ex 10

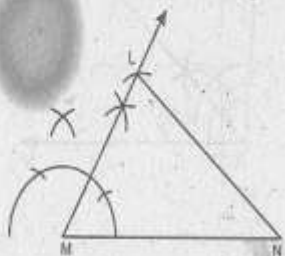
- ii. $m\overline{XY} = 6.2\text{cm}$, $m\overline{YZ} = 5.8\text{cm}$, $m\overline{ZX} = 7\text{cm}$



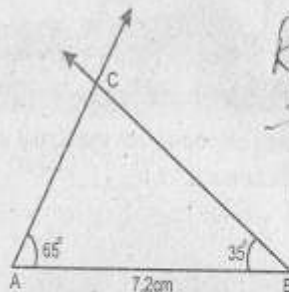
- iii. $m\overline{PQ} = 7\text{cm}$, $m\overline{QR} = 5\text{cm}$, $m\angle Q = 60^\circ$



- iv. $m\overline{LM} = 4.2\text{cm}$, $m\overline{MN} = 6.4\text{cm}$, $m\angle M = 75^\circ$



- v. $m\overline{AB} = 7.2\text{cm}$, $m\angle A = 65^\circ$, $m\angle B = 35^\circ$



Rev. Ex 10

Objective Exercise 10

Q.1. Answer the following questions.

- i. Write the meaning of the word geometry?

Ans. The word "geometry" means measurement of earth.

- ii. What is meant by right bisector of a line?

Ans. A right bisector can be a line, ray or a line segment which divides another line segment into two equal parts, perpendicularly.

- iii. What are congruent angles?

Ans. The two angles of the same measurement are called congruent angles.

- iv. How many elements are required to construct a triangle?

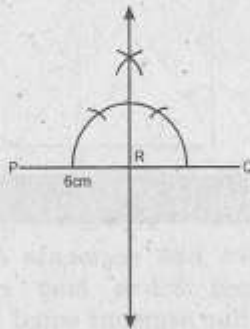
Ans. Three elements are required to construct a triangle.

- v. Define a line segment.

Ans. A line segment is a part of a line which has two distinct end points.

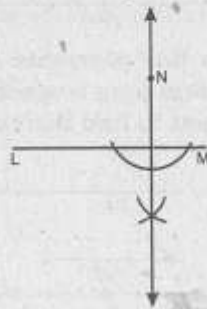
Q.3. Draw a line segment PQ of length 6cm. Take a point R on it and draw a perpendicular passing through it.

Rev. Ex 10
Sol.



Q.4. Draw a line segment LM of length 5cm. Take a point N outside of it and draw a perpendicular on the line passing through the point.

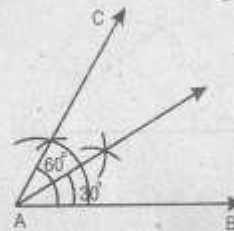
Sol.



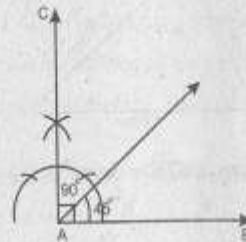
Q.5. Draw the following angles and bisect them

Rev. Ex 10

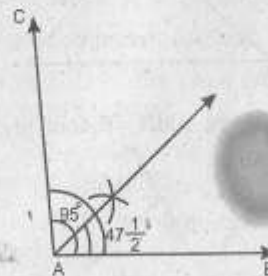
i. 60°



ii. 90°

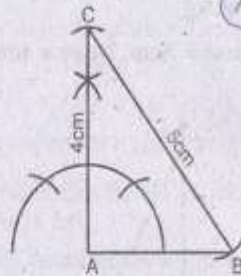


iii. 95°



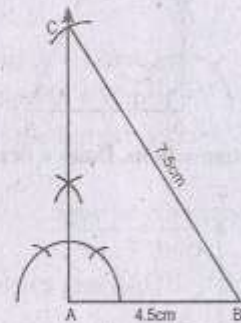
iii. Hypotenuse = 5cm, Altitude = 4cm.

Sol.



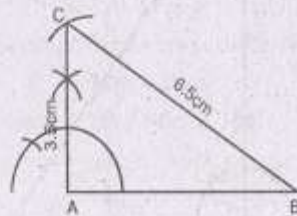
iv. Hypotenuse = 7.5cm, Base = 4.5cm.

Sol.



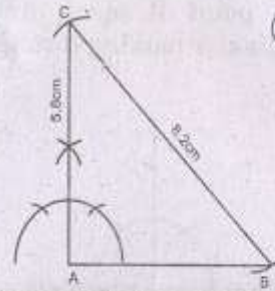
v. Hypotenuse = 6.5cm, Altitude = 3.5cm.

Sol.



vi. Hypotenuse = 8.2cm, Altitude = 5.8cm.

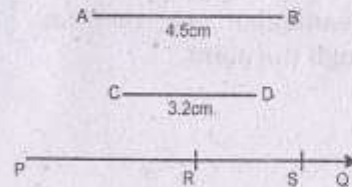
Sol.



Review Exercise 10

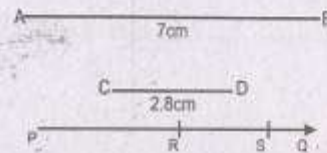
Q.1. Draw two line segments AB and CD 4.5cm and 3.2cm long respectively. Draw a line segment equal in length to their sum.

Sol.

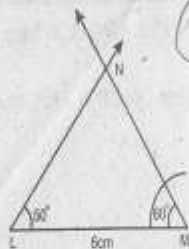


Q.2. Draw two line segments AB and CD 7 cm and 2.8cm long respectively. Draw a line segment to find their difference.

Sol.



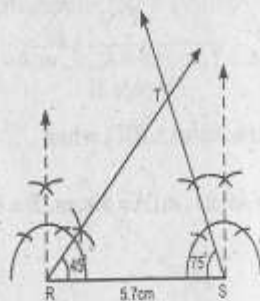
Sol.



Q.6. Construct the $\triangle RST$, when

i. $m\overline{RS} = 5.7\text{cm}$, $m\angle R = 45^\circ$, $m\angle S = 75^\circ$

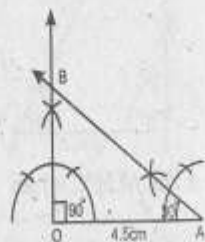
Sol.



Q.7. Construct the $\triangle AOB$, when

i. $m\overline{OA} = 4.5\text{cm}$, $m\angle O = 90^\circ$, $m\angle A = 30^\circ$

Sol.

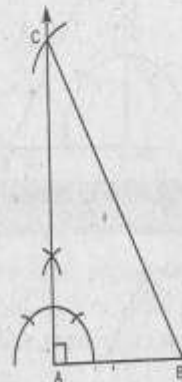


Exercise 10.7

Q.1. Construct the right angled triangles for the following.

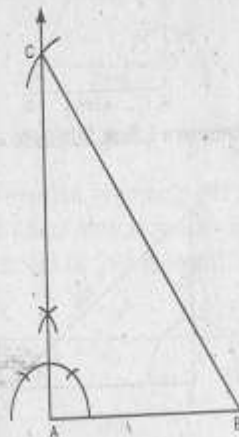
i. Hypotenuse = 8cm, Base = 4cm.

Sol.



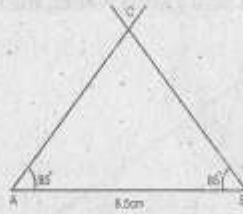
ii. Hypotenuse = 9cm, Base = 6cm.

Sol.



iii. $m\overline{AB} = 8.3\text{cm}$, $m\angle BAC = 85^\circ$

Sol.

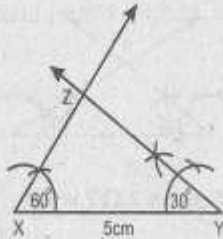


Exercise 10.6

Q.1. Construct the $\triangle XYZ$ when

i. $m\overline{XY} = 5\text{cm}$, $m\angle X = 60^\circ$, $m\angle Y = 30^\circ$

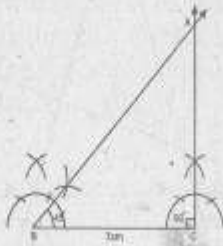
Sol.



Q.2. Construct the $\triangle ABC$ when

i. $m\overline{BC} = 7\text{cm}$, $m\angle B = 45^\circ$, $m\angle C = 90^\circ$

Sol.



Q.3. Construct the $\triangle PQR$, when

i. $m\overline{Q} = 6.8\text{cm}$, $m\angle P = 120^\circ$, $m\angle Q = 45^\circ$

Sol.

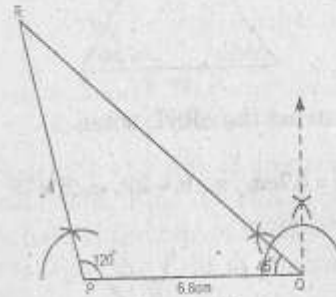
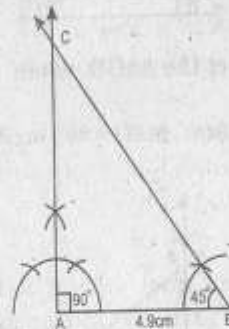


Fig page 31

Q.4. Construct the $\triangle ABC$, when

i. $m\overline{AB} = 4.9\text{cm}$, $m\angle A = 90^\circ$, $m\angle B = 60^\circ$

Sol.

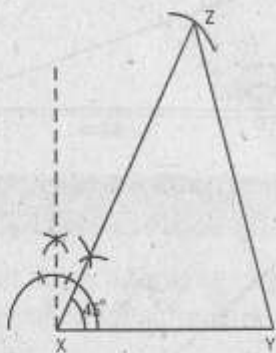


Q.5. Construct the $\triangle LMN$, when

i. $m\overline{LM} = 6\text{cm}$, $m\angle L = 50^\circ$, $m\angle M = 60^\circ$

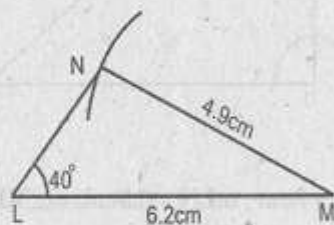
- v. $m\overline{XY} = 5.5\text{cm}$, $m\overline{YZ} = 6.6\text{cm}$, $m\angle XYZ = 45^\circ$

Sol.



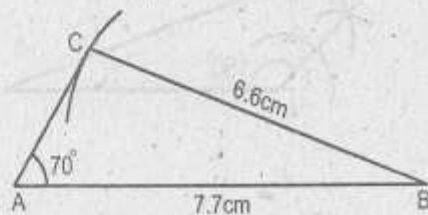
- vi. $m\overline{LM} = 6.2\text{cm}$, $m\overline{MN} = 4.9\text{cm}$, $m\angle LMN = 40^\circ$

Sol.



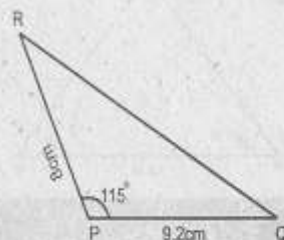
- vii. $m\overline{AB} = 7.7\text{cm}$, $m\overline{BC} = 6.6\text{cm}$, $m\angle ABC = 70^\circ$

Sol.



- viii. $m\overline{PQ} = 9.2\text{cm}$, $m\overline{PR} = 8\text{cm}$, $m\angle QPR = 115^\circ$

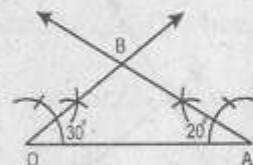
Sol.



Q.2. Draw the following isosceles triangles.

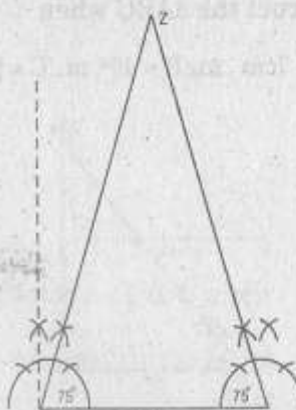
- i. $m\overline{OA} = 5.5\text{cm}$, $m\angle AOB = 30^\circ$

Sol.

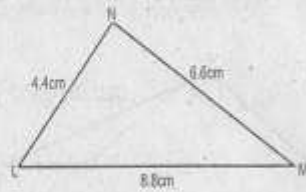


- ii. $m\overline{YX} = 6.3\text{cm}$, $m\angle XYZ = 75^\circ$

Sol.



- v. $m\overline{LM} = 8.8\text{cm}$, $m\overline{MN} = 6.6\text{cm}$, $m\overline{NL} = 4.4\text{cm}$
Sol.



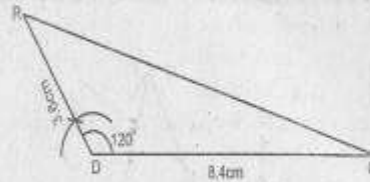
Exercise 10.5

Q.1. Construct the following triangles by using a protractor, a pair of compasses and a ruler.

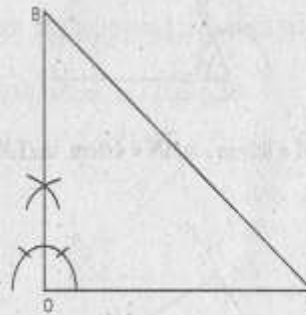
- i. $m\overline{AB} = 5\text{cm}$, $m\overline{BC} = 7\text{cm}$, $m\angle ABC = 60^\circ$.
Sol.



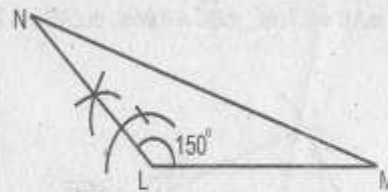
- ii. $m\overline{PQ} = 8.4\text{cm}$, $m\overline{PR} = 3.6\text{cm}$, $m\angle QPR = 120^\circ$.
Sol.



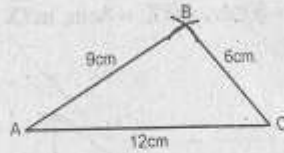
- iii. $m\overline{OA} = 8\text{cm}$, $m\overline{OB} = 6\text{cm}$, $m\angle AOB = 90^\circ$.
Sol.



- iv. $m\overline{LM} = 9\text{cm}$, $m\overline{LN} = 6.5\text{cm}$, $m\angle MLN = 150^\circ$.
Sol.



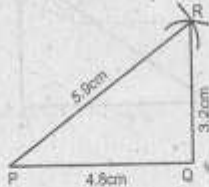
- iii. $m\overline{BC} = 9\text{cm}$, $m\overline{AC} = 12\text{cm}$, $m\overline{AB} = 6\text{cm}$
Sol.



- iv. $m\overline{LM} = 6.3\text{cm}$, $m\overline{MN} = 4.1\text{cm}$, $m\overline{LN} = 2.2\text{cm}$
Sol.

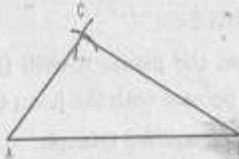


- v. $m\overline{PQ} = 4.8\text{cm}$, $m\overline{QR} = 3.2\text{cm}$, $m\overline{RP} = 5.9\text{cm}$
Sol.

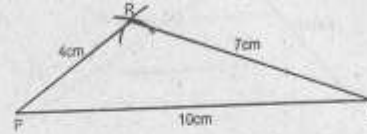


Q.2. Construct the following triangles

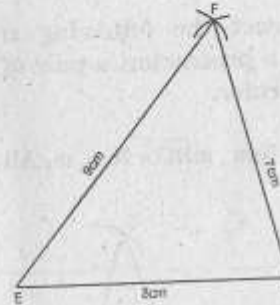
- i. $m\overline{AB} = 6\text{cm}$, $m\overline{BC} = 5\text{cm}$, $m\overline{AC} = 4\text{cm}$
Sol.



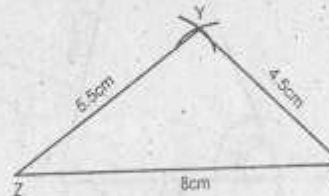
- ii. $m\overline{PQ} = 10\text{cm}$, $m\overline{QR} = 7\text{cm}$, $m\overline{PR} = 4\text{cm}$
Sol.



- iii. $m\overline{DE} = 8\text{cm}$, $m\overline{EF} = 9\text{cm}$, $m\overline{DF} = 7\text{cm}$
Sol.

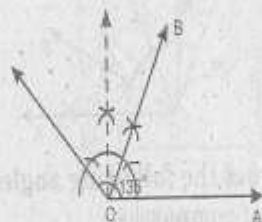


- iv. $m\overline{XY} = 4.5\text{cm}$, $m\overline{YZ} = 5.5\text{cm}$, $m\overline{ZX} = 8\text{cm}$
Sol.



iii. $(67\frac{1}{2})^\circ$

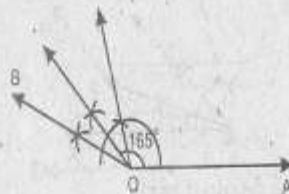
Sol.



$\angle OAB$ is the required angle.

iv. 165°

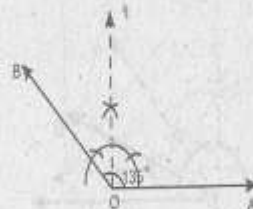
Sol.



$\angle OAB$ is the required angle.

v. 135°

Sol.



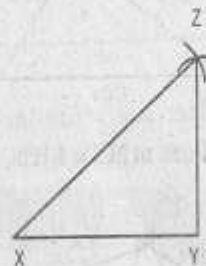
$\angle OAB$ is the required angle.

Exercise 10.4

Q.1. Construct the triangle if possible.

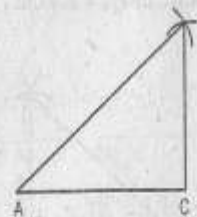
i. $m\overline{XY} = 5 \text{ cm}$, $m\overline{YZ} = 8 \text{ cm}$, $m\overline{ZX} = 2 \text{ cm}$

Sol.



ii. $m\overline{AB} = 6 \text{ cm}$, $m\overline{BC} = 4 \text{ cm}$, $m\overline{AC} = 2 \text{ cm}$

Sol.

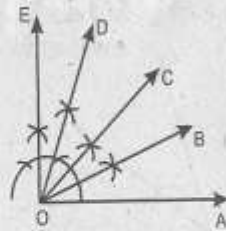


Steps

- Draw a 4cm long line segment BC.
 - Consider the point B as centre and draw an arc of radius 6cm.
 - Now consider the point C as centre and draw an arc of radius 2 cm.
 - Finally join the points A with the point B and again the point A with the point C.
- $\triangle ABC$ is the required triangle.

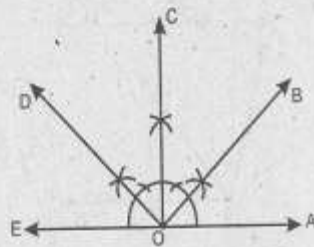
ii. 90°

Sol.



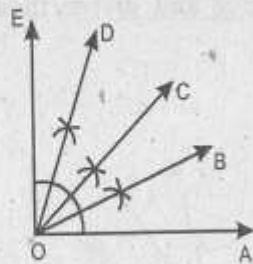
iii. 180°

Sol.



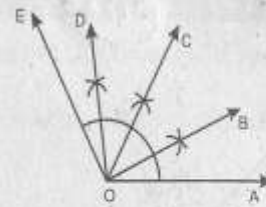
iv. 88°

Sol.



v. 140°

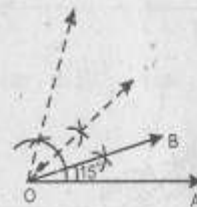
Sol.



Q.5. Construct the following angles by using a pair of compasses.

i. 15°

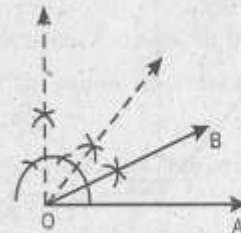
Sol.



$\angle OAB$ is required angle.

ii. $\left(22\frac{1}{2}\right)^\circ$

Sol.



$\angle OAB$ is the required angle.

Q.3. Draw the following angles by using a protractor and bisect them by using a pair of compasses.

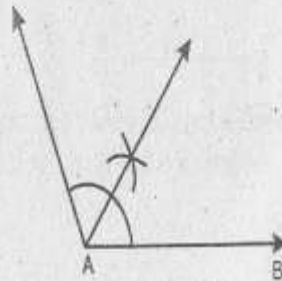
i. 45°

Sol.



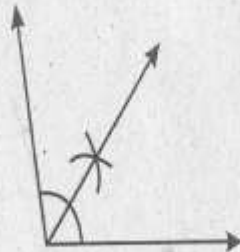
ii. 120°

Sol.



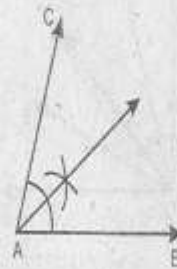
iii. 98°

Sol.



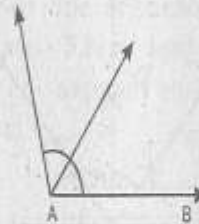
iv. 76°

Sol.



v. 109°

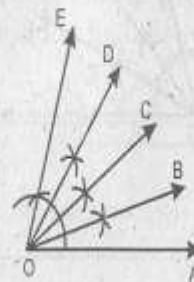
Sol.



Q.4. Draw the following angles by using a protractor and divide them into four angles.

i. 60°

Sol.



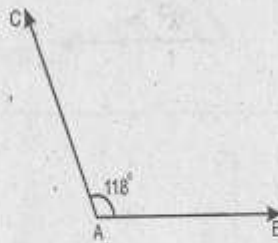
iv. 56°

Sol.



v. 118°

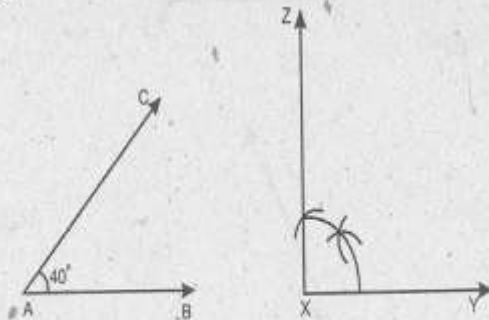
Sol.



Q.2. Draw the twice of the following angles by using a pair of compasses.

i. 40°

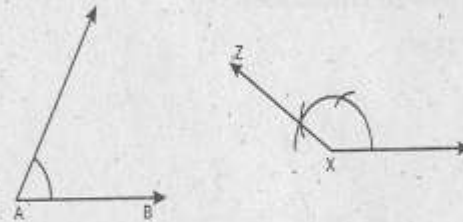
Sol.



$\angle XYZ$ is required angles

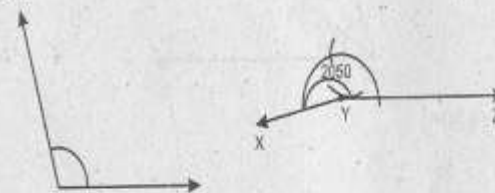
ii. 75°

Sol.



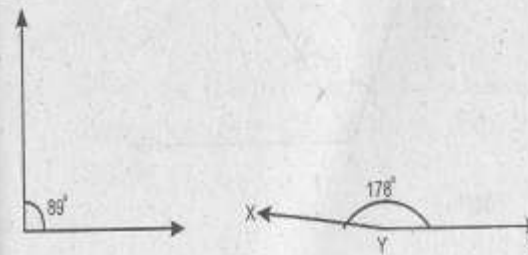
iii. 105°

Sol.



iv. 89°

Sol.



v. 76°

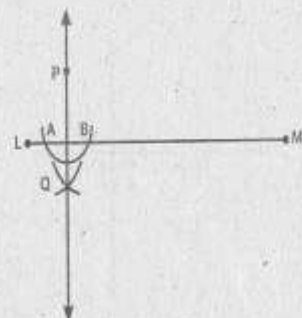
Sol.



iii.



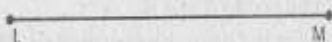
Sol.



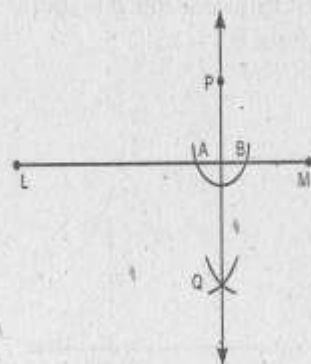
Steps

Same as in (i)

iv.



Sol.



Steps

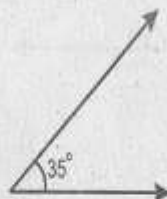
Same as in (i)

Exercise 10.3

Q.1. Construct the congruent angles of the following measurements by using a pair of compasses.

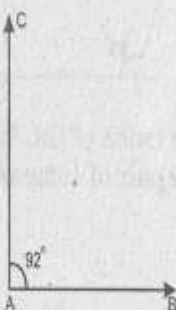
i. 35°

Sol.



ii. 92°

Sol.



iii. 67°

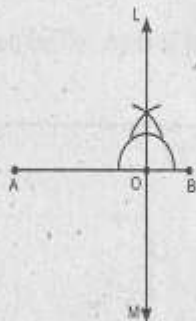
Sol.



iii.



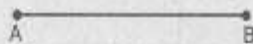
Sol.



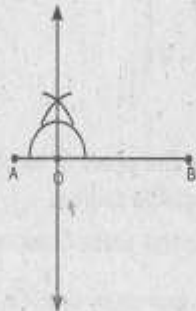
Steps

Same as in (i) and (ii)

iv.



Sol.

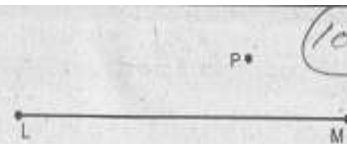


Steps

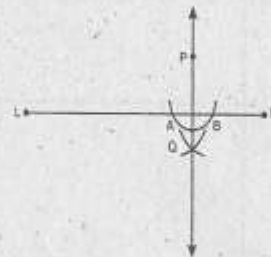
Same as in (i) and (ii)

Q.3, Draw perpendiculars from the points P to the line segment LM.

i.



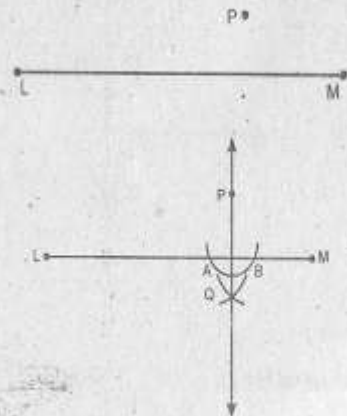
Sol.



Steps

- i. Consider the point P as centre and draw an arc of a suitable radius that will cut the line LM at any two points A and B.
- ii. Consider the point A as centre and draw an arc of suitable radius.
- iii. Repeat the process with B as centre.
- iv. Join P and Q.

Sol.

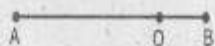


Steps

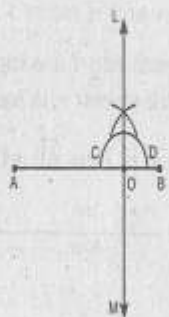
Same as in (i)

- (p. 2) i. Draw two arcs of radius $> \frac{1}{2} \overline{LM}$ with centre at L on each side of line segment.
- iii. Repeat the process with centre at M.
- iv. Join A and B. Thus \overleftrightarrow{AB} is the right bisector.
- v.

Q.2. Draw perpendiculars from the point O to the line segment AB.



Sol.



Steps

- Consider the point O as centre and draw an arc of suitable radius that will cut the line \overleftrightarrow{AB} at any two points C and D respectively i.e., $m \overline{OC} = m \overline{OD}$.
- Consider the point C as centre and draw an arc of radius more than \overline{OC} as given below.

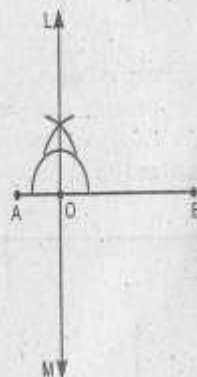
- Now consider the point D as centre and repeat the last process.
- Join the points L and O. Draw a line that will give a perpendicular to the given line.

Thus \overleftrightarrow{LM} is required perpendicular.

ii.



Sol.

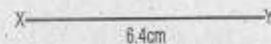


Steps

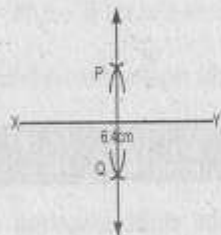
- Consider the point O as centre and draw an arc of suitable radius.
 - Consider the point C as centre and draw an arc of radius more than \overline{OC} .
 - Repeat the process with D as center.
 - Join the points L and O.
- \overleftrightarrow{LM} is required perpendicular.

- ii. Consider the point A as centre and draw two arcs of radius more than $\frac{1}{2} \overline{AB}$ on each side.
- iii. Repeat the process with B as centre
- iv. Join P and Q. Thus \overleftrightarrow{PQ} is the right bisector.

ii.



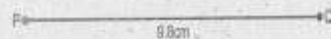
Sol.



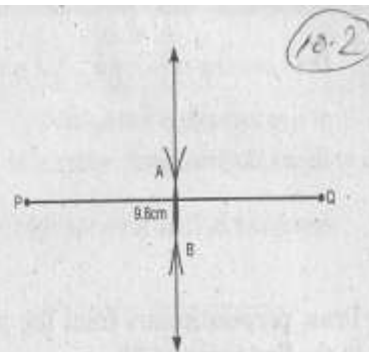
Steps

- i. Draw a 6.4 cm line segment \overline{XY} .
- ii. Consider point X as center and draw two arcs of radius more than $\frac{1}{2} \overline{XY}$ on each side.
- iii. Repeat the process with centre at Y.
- iv. Join P and Q.
- v. Thus \overleftrightarrow{PQ} is the right bisector.

iii.



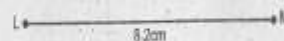
Sol.



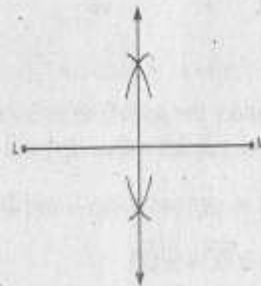
Steps

- i. Draw a line segment \overline{PQ} of length 9.8 cm.
- ii. Draw two arcs of radius $> \frac{1}{2} \overline{PQ}$ with centre at P on each side of line segment.
- iii. Repeat the process with centre at Q.
- iv. Join A and B. Thus \overleftrightarrow{AB} is the right bisector.

iv.



Sol.



Steps

- i. Draw a line segment \overline{LM} of length 8.2 cm.

Step-3

Similarly, measure the length of \overline{CD} and cut another segment \overline{RS} from \overrightarrow{PQ} i.e. $m \overline{RS} = m \overline{CD}$ but here R lies between P and S.



From the above, we can see that

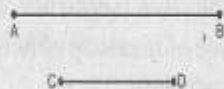
$$m \overline{PR} = m \overline{PS} - m \overline{RS}$$

But we know that $m \overline{PR} = m \overline{AB}$, $m \overline{RS} = m \overline{CD}$

$$\text{Then } m \overline{PR} = m \overline{CD} - m \overline{CD}$$

Thus, \overline{PR} is the required line segment.

ii.



Sol.

Step-1

Draw a ray \overrightarrow{PQ} .



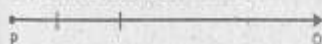
Step-2

Measure the length of \overline{AB} and cut a segment \overline{PR} of the same length. i.e. $m \overline{PR} = m \overline{AB}$.



Step-3

Similarly, measure the length of \overline{CD} and cut another segment \overline{RS} from \overrightarrow{PQ} i.e. $m \overline{RS} = m \overline{CD}$ but here R lies between P and S.



From the above, we can see that

$$m \overline{PR} = m \overline{PS} - m \overline{RS}$$

But we know that $m \overline{PR} = m \overline{AB}$, $m \overline{RS} = m \overline{CD}$

$m \overline{RS}$ is the required line segment

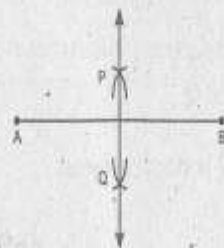
Exercise 10.2

Q.1. Draw the right bisectors of following line segments by using a pair of compasses.

i.



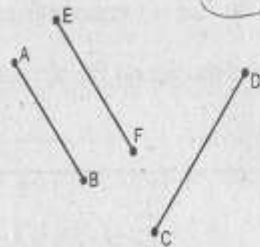
Sol.



Steps

i. Draw a 7.6cm long line segment \overline{AB} .

iv.



Step-1

Draw a ray \vec{PQ} .

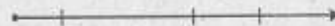


Step-2

Measure the length of line segment \overline{AB} with the help of a pair of compasses.

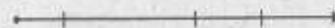
Step-3

Remove the pair of compasses from \overline{AB} and cut a segment \overline{PR} from the ray \vec{PQ} of same length i.e. $m \overline{PR} = m \overline{AB}$



Step-4

Similarly measure the length of \overline{CD} and cut another segment \overline{RS} from \vec{PQ} i.e. $m \overline{RS} = m \overline{CD}$



Step-5

Similarly measure the length of \overline{EF} and cut another segment \overline{ST} from \vec{PQ} i.e. $m \overline{ST} = m \overline{EF}$



From the above, we can say that

$$m \overline{PT} = m \overline{PR} + m \overline{RS} + m \overline{ST}$$

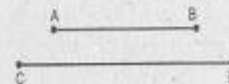
But we know, $m \overline{PR} = m \overline{AB}$, $m \overline{RS} = m \overline{CD}$, $m \overline{ST} = m \overline{EF}$

$$\text{Then } \overline{PT} = m \overline{AB} + m \overline{CD} + m \overline{EF}$$

Thus, \overline{PS} is required line segment.

Q.2. Draw the line segments to find the difference of measure of following pairs of line segments.

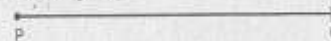
i.



Sol.

Step-1

Draw a ray \vec{PQ} .



Step-2

Measure the length of \overline{AB} and cut a segment \overline{PR} of the same length. i.e. $m \overline{PR} = m \overline{AB}$.



Step-4

Similarly measure the length of \overline{CD} and cut another segment \overline{RS} from \overrightarrow{PQ} i.e. $m \overline{RS} = m \overline{CD}$



From the above, we can say that

$$m \overline{PS} = m \overline{PR} + m \overline{RS}$$

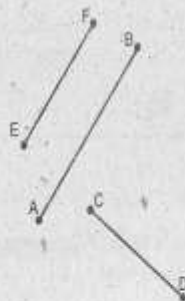
But we know that $m \overline{PR} = m \overline{AB}$,

$$m \overline{RS} = m \overline{CD}$$

$$\text{Then } m \overline{PS} = m \overline{AB} + m \overline{CD}$$

Thus, \overline{PS} is required line segment.

iii.

**Step-1**

Draw a ray \overrightarrow{PQ} .

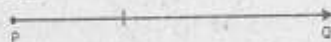
Step-2

Measure the length of line segment \overline{AB} with the help of a pair of compasses.

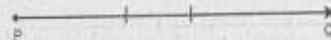
Step-3

Remove the pair of compasses from \overline{AB} and cut a segment \overline{PR} from the ray \overrightarrow{PQ} of same length i.e.

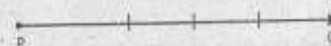
$$m \overline{PR} = m \overline{AB}$$

**Step-4**

Similarly measure the length of \overline{CD} and cut another segment \overline{RS} from \overrightarrow{PQ} i.e. $m \overline{RS} = m \overline{CD}$

**Step-5**

Similarly measure the length of \overline{EF} and cut another segment \overline{ST} from \overrightarrow{PQ} i.e. $m \overline{ST} = m \overline{EF}$



From the above, we can say that

$$m \overline{PT} = m \overline{PR} + m \overline{RS} + m \overline{ST}$$

But we know, $m \overline{PR} = m \overline{AB}$, $m \overline{RS} = m \overline{CD}$,

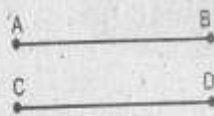
$$m \overline{ST} = m \overline{EF}$$

$$\text{Then } \overline{PT} = m \overline{AB} + m \overline{CD} + m \overline{EF}$$

Thus, \overline{PS} is required line segment.

Exercise 10.1

Q.1. Draw the line segment to find the sum of measure of the following pairs of line segments.



Sol.

Step - 1

Draw a ray \vec{PQ} .



Step - 2

Measure the length of line segment \overline{AB} with the help of a pair of compasses.

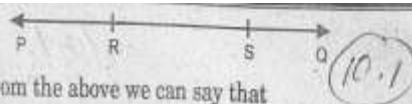
Step - 3

Remove the pair of compass from \overline{AB} and cut a segment \overline{PR} from the ray \vec{PQ} of same length i.e. $m \overline{PR} = m \overline{AB}$.



Step - 4

Similarly, measure the length of \overline{CD} and cut another segment \overline{RS} from \vec{PQ} i.e. $m \overline{RS} = m \overline{CD}$



From the above we can say that

$$m \overline{PS} = m \overline{PR} + m \overline{RS}$$

But we know that, $m \overline{PR} = m \overline{AB}$ and $m \overline{RS} = m \overline{CD}$ then $m \overline{PS} = m \overline{AB} + m \overline{CD}$

Thus \overline{PS} is required line segment.

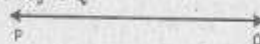
ii.



Sol.

Step-1

Draw a ray \vec{PQ}



Step-2

Measure the length of line segment \overline{AB} with the help of a pair of compasses.

Step-3

Remove the pair of compasses from \overline{AB} and cut a segment \overline{PR} from the ray \vec{PQ} of same length i.e. $m \overline{PR} = m \overline{AB}$



Q.2. Fill in the blanks.*Object 1*

- i. The weighing balance is an excellent example of an _____.
- ii. A relationship of _____ between two expressions is called an equation.
- iii. The value of unknown of an equation is called _____ of the equation.
- iv. The equation which contains a single variable with the greatest exponent of _____ is called the linear equation.
- v. A number or a variable can be transferred from one side to the other side by changing its sign. This operation is called _____.

Answers:

- | | |
|------------------|--------------|
| i. Equation | ii. Equality |
| iii. Solution | iv. 1 |
| v. transposition | |

Q.3. Tick(✓) the correct answer

- i. The solution of the equation $x - 1 = -1$ is
a. 0 b. 1 c. 2 d. 2
- ii. To write an equation, we use the sign.
a. + b. -1 c. = d. <
- iii. If $\frac{x-1}{2} = 1$, then $x = ?$
a. 0 b. +1 c. 2 d. 3
- iv. The statement "my age is equal to the twice of my brother's age" can be written in the form of equation as
a. $x + y = 2$ b. $x = 2y$ c. $\frac{x+y}{2}$ d. $\frac{x}{2} = \frac{y}{2}$

Answer:

- | | | | |
|------|-------|--------|-------|
| i. a | ii. c | iii. d | iv. b |
|------|-------|--------|-------|

But number are consecutive, the next numbers will be

$$x+1, x+2, x+3$$

Now according to the condition

$$x + (x+1) + (x+2) + (x+3) = 266$$

$$x + x + 1 + x + 2 + x + 3 = 266$$

$$x + x + x + x = 266 - 1 - 2 - 3$$

$$4x = 260$$

$$x = \frac{260}{4}$$

$$x = 65$$

Therefore,

$$1^{\text{st}} \text{ number} = x = 65$$

$$2^{\text{nd}} \text{ number} = x + 1 = 65 + 1 = 66$$

$$3^{\text{rd}} \text{ number} = x + 2 = 65 + 2 = 67$$

$$4^{\text{th}} \text{ number} = x + 3 = 65 + 3 = 68$$

$$\text{Check: Sum of number} = 65 + 66 + 67 = 266$$

Q.5. The numerator of a fraction is larger than its denominator by 4. If we add 1 to its denominator, the fraction becomes $\frac{3}{2}$. Find the fraction.

Sol.

Let the denominator = x

Therefore, numerator = $x + 4$

According to the condition

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

$$x + 4 = \frac{3}{2} \times (x + 1)$$

$$2 \times (x + 4) = 3 \times (x + 1)$$

$$2x + 8 = 3x + 3$$

$$2x - 3x = 3 - 8$$

$$-x = -5$$

$$x = 5$$

$$\text{Denominator} = x = 5$$

$$\text{Numerator} = x + 4 = 5 + 4 = 9$$

$$\text{Fraction} = \frac{9}{5} \quad \text{Ans.}$$

Objective Exercise 9

Q.1. Answer the following questions.

i. Define an equation.

Ans. A relationship of equality between two algebraic expressions is called an equation.

ii. Which equation is called a linear equation?

Ans. The equation which contains a single variable with the greatest exponent of 1 is called linear equation.

iii. What is meant by solving an equation.

Ans. The value of unknown in an equation is called solving an equation.

iv. What are four steps for solving a problem by using an equation?

- Ans.**
- What is the required thing?
 - Represent the required thing by variable.
 - Write an equation according to the statement
 - Solve the equation and check the solution.

v. $3(x-4) - 4(2x+3) = 2(x+5) + 1$ *Rev. Ex. 9*

Sol.

$$3x - 12 - 8x - 12 = 2x + 10 + 1$$

$$3x - 8x - 2x = 10 + 1 + 12 + 12$$

$$-7x = 35$$

$$x = -\frac{35}{7}$$

$$x = -5$$

vi. $2(x-2) + 3(x-3) = 3(x-5) - 4(x-8)$

Sol.

$$2x - 4 + 3x - 9 = 3x - 15 - 4x + 32$$

$$5x - 13 = -x + 17$$

$$5x + x = 17 + 13$$

$$6x = 30$$

$$x = \frac{30}{6}$$

$$x = 5$$

Q.2. If a number is doubled and then increased by 7, it becomes 13. Find the number.

Sol.

Let the number be x

According to the condition

$$2x + 7 = 13$$

$$2x = 13 - 7$$

$$2x = 6$$

$$x = \frac{6}{2}$$

$$x = 3$$

Thus the number is 3.

Q.3. The length of a rectangle of a rectangle is 6 m larger than three times of its breadth. If its perimeter is 148 m. Find its length and breadth.

Sol.

Let breath of rectangle = x

Breath = x

Then by given condition

Length = $3x + 6$

So

Perimeter of rectangle = $2(\text{Length} + \text{Breadth})$

$$2(x + 3x + 6) = 148$$

$$2(4x + 6) = 148$$

$$8x + 12 = 148$$

$$8x = 148 - 12$$

$$8x = 136$$

$$x = \frac{136}{8}$$

$$x = 17$$

$$\text{Breadth} = 17\text{m}$$

$$\text{Length} = 3x + 6$$

$$= 3(17) + 6$$

$$= 51 + 6$$

$$\text{Length} = 57\text{ m} \quad \text{Ans.}$$

Q.4. The sum of four consecutive numbers is 266. Find the numbers.

Sol.

Let 1st number be x

As given,

Review Exercise 9

Q.1. Solve the following equations.

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

Sol.

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

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

$$4x = \frac{8}{5}$$

$$x = \frac{8}{5 \times 4}$$

$$x = \frac{2}{5}$$

ii. $\frac{x}{4} + \frac{x}{6} = \frac{x}{2} - \frac{3}{4}$

Sol.

$$\frac{x}{4} + \frac{x}{6} - \frac{x}{2} = -\frac{3}{4}$$

$$\frac{3x + 2x - 6x}{12} = -\frac{3}{4}$$

$$-\frac{x}{12} = -\frac{3}{4}$$

$$\frac{x}{12} = \frac{3}{4}$$

$$x = \frac{3}{4} \times 12$$

$$x = 3 \times 3$$

$$x = 9$$

iii. $\frac{5x-4}{8} - \frac{x-3}{5} = \frac{x+6}{4}$ *Rev. Ex. 8*

Sol.

$$\frac{5(5x-4) - 8(x-3)}{40} = \frac{x+6}{4}$$

$$5(5x-4) - 8(x-3) = \frac{(x+6)}{4} \times 40 = 10(x+6)$$

$$25x - 20 - 8x + 24 = 10x + 60$$

$$25x - 8x - 10x = 60 - 24 + 20$$

$$25x - 18x = 80 - 24$$

$$7x = 56$$

$$x = \frac{56}{7}$$

$$x = 8 \quad \text{Ans.}$$

iv. $\frac{2}{3}(x-5) - \frac{1}{4}(x-2) = -\frac{3}{2}$

Sol.

$$\frac{2(x-5)}{3} - \frac{(x-2)}{4} = -\frac{3}{2}$$

$$\frac{8(x-5) - 3(x-2)}{12} = -\frac{3}{2}$$

$$8(x-5) - 3(x-2) = -\frac{3}{2} \times 12$$

$$= -3 \times 6$$

$$8x - 40 - 3x + 6 = -18$$

$$8x - 3x = -18 - 6 + 40$$

$$5x = 16$$

$$x = \frac{16}{5} \quad \text{Ans.}$$

$$8y + y = 45,$$

$$9y = 45 \Rightarrow y = \frac{45}{9} \Rightarrow y = 5$$

Put $y = 5$ in (i)

$$x + 5 = 45$$

$$x = 45 - 5$$

$$x = 40$$

So price of book = Rs.40, price of pen = Rs.5

Ans.

Q.7. Qasim Hussain opened his account book. He observed that the sum of the two page, in front of him is 93. Find the page numbers in front of him. (Hint: Suppose the one page number is x , then other will be $x + 1$)

Sol.

Suppose one page number = x

Then the other will be $x + 1$

According to the condition

$$x + (x + 1) = 93$$

$$x + x + 1 = 93$$

$$2x = 93 - 1$$

$$2x = 92$$

$$x = \frac{92}{2}$$

$$x = 46$$

The other number = $x + 1$

Put $x = 46$

$$x = 46 + 1$$

$$x = 47$$

Ans.

Q.8. Imran Farhat and Abdul Razzaq enhanced 69 runs in the score of Pakistan, if the score of Abdul Razzaq is double than the score of Imran Farhat. Find that how many runs Abdul Razzaq require to complete his half century?

Sol.

Let runs scored by Imran Farhat = x

Runs scored by Abdul Razzaq = y

According to given condition,

$$x + y = 69$$

As given $y = 2x$

Put $y = 2x$ above

$$x + 2x = 69$$

$$3x = 69$$

$$x = \frac{69}{3}$$

$$x = 23$$

Runs scored by Imran Farhat = 23

As, Abdul Razzaq scores double runs than Imran Farhat, runs scored by Abdul Razzaq = 23×2
= 46

Therefore Abdul Razzaq requires '4' more runs to complete his half century, i.e. $46 + 4 = 50$ Ans.

$$x + y = 12 \quad \text{-----(i) } (9.2)$$

As given, one number is twice of the other.

Then

$$x + 2x = 12$$

$$3x = 12$$

$$x = \frac{12}{3}$$

$$x = 4$$

Put $x = 4$ in (i)

$$x + y = 12$$

$$4 + y = 12$$

$$y = 12 - 4$$

$$y = 8$$

So, number are 4 and 8.

Q.4. The product of two numbers is 72. Find the other number when the one number is 9.

Sol.

Let two numbers be x and y

According to the statement

$$xy = 72$$

As given, one number is 9.

$$\text{Let } x = 9$$

$$(9) y = 72$$

$$y = \frac{72}{9}$$

$$y = 8 \quad \text{Ans.}$$

Q.5. The difference of the two numbers is 6. Find the numbers when the one number is $\frac{1}{4}$ th of the other. (9.2)

Sol.

$$x - \frac{x}{4} = 6$$

$$\frac{4x - x}{4} = 6$$

$$\frac{3x}{4} = 6$$

$$3x = 6 \times 4$$

$$3x = 24$$

$$x = 8$$

$$\text{one number} = 8$$

$$2^{\text{nd}} \text{ no.} = \frac{x}{4} = \frac{8}{4} = 2 \text{ Ans.}$$

Q.6. Sabeena bought a pen and a book for Rs. 45. The book was 8 times more expensive than the pen. What are the prices of book and pen?

Sol.

Let the prices of book and pen be x and y respectively.

According to the statement

$$x + y = 45 \quad \text{-----(i)}$$

As given, the book is 8 times more expensive than the pen. So

$$x = 8y$$

$$\text{Put } x = 8y \text{ in (i)}$$

$$x = \frac{1.5}{3} = \frac{15/10}{3} = \frac{15}{10 \times 3} = \frac{15}{30} = \frac{1}{2} \quad (21.)$$

$$x = 0.5$$

Verification

$$\frac{3(0.5) - 1.5}{0.9 - 1.5(0.5)} = 0$$

$$\frac{1.5 - 1.5}{0.9 - 0.75} = 0$$

$$\frac{0}{0.15} = 0$$

$$0 = 0$$

$$\text{L.H.S} = \text{R.H.S}$$

Exercise 9.2

Q.1. Find the value of m by putting $n = 2$ in each of the followings.

i. $2m - n = 12$

Sol.

$$\text{Put } n = 2$$

$$2m - 2 = 12$$

$$2m = 12 + 2$$

$$2m = 14$$

$$m = \frac{14}{2}$$

$$m = 7$$

ii. $\frac{m}{n} = \frac{9}{2}$

Sol.

$$\text{Put } n = 2$$

$$\frac{m}{2} = \frac{9}{2}$$

$$m = 2 \times \frac{9}{2}$$

$$m = 9$$

iii. $\frac{2m}{n} = 9 - 3m$

Sol.

$$\text{Put } n = 2$$

$$\frac{2m}{2} = 9 - 3m$$

$$m = 9 - 3m$$

$$m + 3m = 9$$

$$4m = 9$$

$$m = \frac{9}{4}$$

iv. $m = 2n + n + 1$

Sol.

$$\text{Put } n = 2$$

$$m = 2(2) + 2 + 1$$

$$m = 4 + 2 + 1$$

$$m = 7$$

v. $2m + n - 2 = 3n$

+ 2n

Sol.

$$\text{Put } n = 2$$

$$2m + 2 - 2 = 3(2) + 2(2)$$

$$2m = 6 + 4$$

$$2m = 10$$

$$m = \frac{10}{2}$$

$$m = 5$$

vi. $m + n = mn$

Sol.

$$\text{Put } n = 2$$

$$m + 2 = m(2)$$

$$m + 2 = 2m$$

$$m - 2m = -2$$

$$-m = -2$$

$$m = 2$$

Q.2. The price of the toy gun decreased by Rs.7. Find the original price when the new price is Rs.18.

Sol.

Let original price = x

According to the statement

Discounted price = $x - 7 = 18$

$$x = 18 + 7$$

$$x = 25$$

Original price of gun = Rs.25

Q.3. The sum of the two numbers is 12 when the one number is twice of the other. (Hint: suppose the one number is x then there is $2x$)

Sol.

Let the numbers be x and y

According to the statement

$$\text{xvi. } \frac{6a-4}{2a+2} = 2$$

Sol.

$$6a-4 = 2(2a+2)$$

$$6a-4 = 4a+4$$

$$6a-4a = 4+4$$

$$2a = 8$$

$$a = \frac{8}{2}$$

$$a = 4$$

Verification

$$\frac{6(4)-4}{2(4)+2} = 2$$

$$\frac{24-4}{8+2} = 2$$

$$\frac{20}{10} = 2$$

$$2 = 2$$

$$\text{L.H.S} = \text{R.H.S}$$

$$\text{xvii. } 0.9x - 3 = 6$$

Sol.

$$0.9x = 6+3$$

$$0.9x = 9$$

$$\frac{9}{0.9} x = 9$$

$$\text{xix. } 1.5x + 4 = 7$$

Sol.

$$1.5x = 7-4$$

$$1.5x = 3$$

$$x = 9 \times \frac{10}{9}$$

$$x = 10$$

Verification

$$0.9(10) - 3 = 6$$

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

$$9 - 3 = 6$$

$$6 = 6$$

$$\text{L.H.S} = \text{R.H.S}$$

$$\text{xviii. } 0.1x + 2.5 = 3$$

Sol.

$$0.1x = 3 - 2.5$$

$$0.1x = 0.5$$

$$x = \frac{0.5}{0.1}$$

$$x = 5$$

Verification

$$0.1(5) + 2.5 = 3$$

$$\frac{1}{10} (5) + 2.5 = 3$$

$$\frac{1}{2} + 2.5 = 3$$

$$0.5 + 2.5 = 3$$

$$3 = 3$$

$$\text{L.H.S} = \text{R.H.S}$$

$$x = \frac{3}{1.5} = \frac{3}{1.5/10} = \frac{3 \times 10}{15} = \frac{30}{15}$$

$$x = 2$$

Verification

$$1.5(2) + 4 = 7$$

$$3 + 4 = 7$$

$$7 = 7$$

$$\text{L.H.S} = \text{R.H.S}$$

$$\text{xx. } 0.25x + 1.5 = 7.5$$

Sol.

$$0.25x = 7.5 - 1.5$$

$$0.25x = 6.0$$

$$x = \frac{6}{0.25} = \frac{6}{25/100} = \frac{6 \times 100}{25}$$

$$x = 24$$

Verification

$$0.25(24) + 1.5 = 7.5$$

$$6 + 1.5 = 7.5$$

$$7.5 = 7.5$$

$$\text{L.H.S} = \text{R.H.S}$$

$$\text{xxi. } \frac{3x-1.5}{0.9-1.5x} = 0$$

Sol.

$$\frac{3x-1.5}{0.9-1.5x} = 0$$

$$3x - 1.5 = 0 \times (0.9 - 1.5x)$$

$$3x - 1.5 = 0$$

$$3x = 0 + 1.5$$

$$3x = 1.5$$

xii. $\frac{x}{2} + \frac{3x}{2} + \frac{x}{2} + \frac{5x}{2} = 25$

Sol.

$$\frac{x + 3x + x + 5x}{2} = 25$$

$$\frac{10x}{2} = 25$$

$$5x = 25$$

$$x = \frac{25}{5}$$

$$x = 5$$

Verification

$$\frac{5}{2} + \frac{3(5)}{2} + \frac{5}{2} + \frac{5(5)}{2} = 25$$

$$\frac{5}{2} + \frac{15}{2} + \frac{5}{2} + \frac{25}{2} = 25$$

$$\frac{5+15+5+25}{2} = 25$$

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

$$25 = 25$$

$$\text{L.H.S} = \text{R.H.S.}$$

xiii. $\frac{x}{2} = \frac{7}{2}$

Sol.

$$\frac{x}{2} = \frac{7}{2}$$

$$x = \frac{7}{2} \times 2$$

$$x = 7$$

Verification

$$\frac{7}{2} = \frac{7}{2}$$

$$\text{L.H.S} = \text{R.H.S.}$$

xiv. $2m - 5 = \frac{1}{2} + \frac{5}{2}$

Sol.

$$2m - 5 = \frac{1}{2} + \frac{5}{2}$$

$$2m = \frac{1}{2} + \frac{5}{2} + 5$$

$$2m = \frac{1+5+10}{2}$$

$$2m = \frac{16}{2}$$

$$2m = 8$$

$$m = \frac{8}{2}$$

$$m = 4$$

Verification

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

$$8 - 5 = \frac{1+5}{2}$$

$$3 = \frac{6}{2}$$

$$3 = 3$$

$$\text{L.H.S} = \text{R.H.S.}$$

xv. $\frac{a}{2} + \frac{a}{2} = 3a + 14$

Sol.

$$\frac{a+a}{2} = 3a + 14$$

$$\frac{2a}{2} - 3a = 14$$

$$a - 3a = 14$$

$$-2a = 14$$

$$a = \frac{14}{-2}$$

$$a = -7$$

Verification

$$-\frac{7}{2} + \left(-\frac{7}{2}\right) = 3$$

$$(-7) + 14$$

$$\frac{-7-7}{2} = -21 + 14$$

$$\frac{-14}{2} = -7$$

$$-7 = -7$$

$$\text{L.H.S} = \text{R.H.S.}$$

$3-3=0$
 $0=0$
 iii. $x-3=5$
 Sol. $x-3=5$
 $x=5+3$
 $x=8$
 Verification
 $8-3=5$
 $5=5$
 L.H.S = R.H.S
 iv. $2x+2=14$
 Sol. $2x+2=14$
 $2x=14-2$
 $2x=12$
 $x=\frac{12}{2}$
 $x=6$
 Verification
 $2(6)+2=14$
 $12+2=14$
 $14=14$
 L.H.S = R.H.S
 v. $12x=36$
 Sol. $12x=36$
 $x=\frac{36}{12}$

(9.1) $x=3$
 Verification
 $12(3)=36$
 $36=36$
 L.H.S = R.H.S
 iv. $\frac{x}{6}=3$
 Sol. $\frac{x}{6}=3$
 $x=3 \times 6$
 $x=18$
 Verification
 $\frac{18}{6}=3$
 $3=3$
 L.H.S = R.H.S
 vii. $x+2=2x-1$
 Sol. $x+2=2x-1$
 $x-2x=-1-2$
 $-x=-3$
 $x=3$
 Verification
 $3+2=2(3)-1$
 $5=6-1$
 $5=5$
 L.H.S = R.H.S

viii. $\frac{2y}{3}=-8$
 Sol. $2y=-8 \times 3$
 $2y=-24$
 $y=-\frac{24}{2}$
 $y=-12$
 Verification
 $\frac{2(-12)}{3}=-8$
 $\frac{-24}{3}=-8$
 $-8=-8$
 L.H.S = R.H.S
 ix. $x+4+x-2=0$
 Sol. $x+x+4-2=0$
 $x+x=2-4$
 $2x=-2$
 $x=-1$
 Verification
 $(-1)+(-1)+4-2=0$
 $-1-1+4-2=0$
 $-2+4-2=0$
 $4-4=0$

(9.1) $0=0$
 L.H.S = R.H.S
 x. $m+1+2m+5=0$
 Sol. $m+2m+1+5=0$
 $m+2m=-6$
 $3m=-6$
 $m=\frac{-6}{3}=-2$
 Verification
 $-2+1+2(-2)+5=0$
 $-2+1-4+5=0$
 $-6+6=0$
 $0=0$
 L.H.S = R.H.S
 xi. $2x-4=x$
 Sol. $2x-x=4$
 $x=4$
 Verification
 $2(4)-4=4$
 $8-4=4$
 $4=4$
 L.H.S = R.H.S

ii. The difference of a number and 7 is 9.

Ans. Let the number = x

According to the statement

$$x - 7 = 9$$

iii. Twice of a number is 16.

Ans. Let the number = x

According to the statement

$$2x = 16$$

iv. one third of the number is 2

Ans. Let the number = x

According to the statement.

$$\frac{1}{3}x = 2$$

v. A number increased by 2 is 4.

Ans. Let the number = x

According to the statement.

$$x + 2 = 4$$

vi. A number decreased by 4 is 3.

Ans. Let the number = x

According to the statement

$$x - 4 = 3$$

vii. Twice of a number increased by 3 is 17.

Ans. Let the number = x

According to the statement

$$2x + 3 = 17$$

viii. My age and my brother's age is 20 years by adding.

Ans. Let my age = x

My brother's age = y

According to the statement $x + y = 20$

ix. Twice of my age increased by 7 years is my mother's age.

Ans. Let my age = x

Let my mother's age = y

According to the statement

$$2x + 7 = y$$

x. The price of 6 pens is equal to price of book.

Ans. Let price of one pen = x

Price of one book = y

According to given statement

$$6x = y$$

Q.2. Solve the following equations and verify the solution.

i. $2 + 5x = x$

$$2 + 5x = x$$

$$5x - x = -2$$

$$4x = -2$$

$$x = \frac{-2}{4}$$

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

Verification

Put $x = -\frac{1}{2}$ in given statement

$$2 + 5\left(-\frac{1}{2}\right) = -\frac{1}{2}$$

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

$$\frac{4-5}{2} = -\frac{1}{2}$$

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

L.H.S = R.H.S

ii. $3a - 3 = 0$

Sol.

$$3a - 3 = 0$$

$$3a = 3$$

$$a = \frac{3}{3}$$

$$a = 1$$

Verification

$$3(1) - 3 = 0$$

CHAPTER 9

LINEAR EQUATIONS

Equation

A relationship of equality between two algebraic expressions is called an equation.

Linear Equation in one variable

The equation which contains a single variable with the greatest exponent of 1, is called linear equation in one variable.

Solution of the equation

The value of unknown in the equation is called the solution or root of the equation.

Four steps for solving a problem by using an equation.

- i. What is the required thing?
- ii. Represent the required thing by a variable.
- iii. Write an equation according to the statement.
- iv. Solve the equation and check the solution.

Exercise 9.1

Q.1. Write an equation for each of the followings.

- i. The sum of a number and 8 is 14.

Ans. Let the number = x

According to the statement $x + 8 = 14$

Review Exercise 11

Q.1. Find the perimeter of a square whose area of 676cm^2 .

Sol.

$$\text{Area of square} = 676\text{m}^2$$

$$\text{Area of square} = \text{Length} \times \text{Length}$$

$$676 = 26 \times 26$$

i.e.

$$\text{Length of square} = 26\text{m}$$

$$\text{Perimeter of square} = 4 \times \text{Length}$$

$$= 4 \times 26$$

$$= 104\text{m}$$

Q.2. A room is 4.5m long and 4m wide. The floor of the room is to be covered with square marble tiles with length of 0.5m . Find the cost of flooring at the rate of Rs. 500 per tile.

Sol.

$$\text{Length of room} = 4.5\text{m}$$

$$\text{Width of room} = 4\text{m}$$

$$\text{Length of tile} = 0.5\text{m}$$

No of tiles to be used for room are found as

$$\text{No of tiles used to cover length} = \frac{4.5}{0.5} = 9$$

$$\text{No of tiles used to cover width} = \frac{4}{0.5} = 8$$

$$\text{Total tiles used for floor} = 9 \times 8 = 72$$

$$\text{Cost of one tile} = \text{Rs.}500$$

$$\text{Total cost of 72 tiles} = 72 \times 500$$

$$= \text{Rs.}3600 \quad \text{Ans.}$$

Q.3. Find the cost of repairing of a 2m wide jogging track at the rate of Rs. 50 per square meter. constructed inside of a park, when the length and the breadth of the park are 100m and 60m respectively.

Sol.

$$\text{Outer length} = 100\text{m}$$

$$\text{Outer breadth} = 60\text{m}$$

$$\text{Outer area} = 100\text{m} \times 60\text{m} = 6000\text{m}^2$$

$$\text{Inner length} = \text{outer length} - 2(\text{Width of border})$$

$$= 100\text{m} - 2(2\text{m})$$

$$= 100 - 4\text{m} = 96\text{m}$$

$$\text{Inner breadth} = \text{outer breadth} - 2(\text{width of border})$$

$$= 60 - 2(\text{Width of border})$$

$$= 60 - 2(2) = 60 - 4 = 56\text{m}$$

$$= 96\text{m} \times 56\text{m} = 5376\text{m}^2$$

$$\text{Area of border} = \text{outer area} - \text{inner area}$$

$$= 6000\text{m}^2 - 5376\text{m}^2 = 624\text{m}^2$$

$$\text{Cost of repairing} = (624 \times 50)$$

$$= \text{Rs.}31200 \quad \text{Ans.}$$

Q.4. Calculate the cost of flooring 1m wide verandah at the rate of Rs.100/ m^2 which surrounded a 6m long and a 4m wide room.

Sol.

$$\text{Inner length} = 6\text{m}$$

$$\text{Inner width} = 4\text{m}$$

$$\text{Inner area} = \text{Inner width} \times \text{Inner length}$$

$$= 4\text{m} \times 6\text{m} = 24\text{m}^2$$