Mathematics Class 7

Chapter-1

Integers

Exercise 1.1

1. (a) $(-5, -2)$ one such pair whose sum is -7
because $-5 + (-2) = -7$
(b) $(-2, 8)$ one such pair whose difference is -10 because $-2 - 8 = -10$
(c) $(4, -4)$ one such pair whose sum is zero
i.e., $4 + (-4) = 0$

2. (a) Since, $-2 - (-10) = -2 + 10 = 8$
$\therefore$ Pair $= (-2, -10)$
(b) Since, $(-7) + 2 = -5$
$\therefore$ Pair $= (-7, 2)$
(c) Since, $(-2) - 1 = -2 - 1 = -3$
Pair $= (-2, 1)$

3. Team *A* scored $-40, 10, 0$.
Total score of team $A = -40 + 10 + 0 = -30$
Team *B* scored $10, 0, -40$.
Total score of team $B = 10 + 0 + (-40) = -30$
Thus, scores of both teams are same.
Yes, we can add integers in any order due to Associative property.

4. (i) $(-5) + (-8) = (-8) + (-5)$ (Commutative property)
(ii) $-53 + 0 = -53$ (Additive identity)
(iii) $17 + (-17) = 0$ (Additive inverse)
(iv) $[13 + (-12)] + (-7) = 13 + [(-12) + (-7)]$ (Associative property of addition)
(v) $(-4) + [15 + (-3)] = [-4 + 15] + (-3)$
(Associative property of addition)

Exercise 1.2

1. (a) $3 \times (-1) = -3$
(b) $(-1) \times 225 = -225$
(c) $(-21) \times (-30) = 630$
(d) $(-316) \times (-1) = 316$
(e) $(-15) \times 0 \times (-18)$
$= [(-15) \times 0] \times (-18) = 0$
(f) $(-12) \times (-11) \times (10) = [(-12) \times (-11)] \times 10$
$= (132) \times 10 = 1320$
(g) $9 \times (-3) \times (-6) = [9 \times (-3)] \times (-6)$
$= (-27) \times (-6) = 162$
(h) $(-18) \times (-5) \times (-4) = [(-18) \times (-5)] \times (-4)$
$= 90 \times (-4) = -360$
(i) $(-1) \times (-2) \times (-3) \times 4$
$= [(-1) \times (-2)] \times [(-3) \times 4]$
$= (2) \times (-12) = -24$
(j) $(-3) \times (-6) \times (-2) \times (-1)$
$= [(-3) \times (-6)] \times [(-2) \times (-1)]$
$= 18 \times 2 = 36$

2.
And $[18 \times 7] + [18 \times (-3)] = 126 - 54 = 72$
So, $18 \times [7 + (-3)] = [18 \times 7] + [18 \times (-3)]$
(b) $(-21) \times [(-4) + (-6)] = (-21) \times (-4 - 6)$
$= (-21)(-10) = 210$
And $[(-21) \times (-4)] + [(-21) \times (-6)]$
$= 84 + 126 = 210$
So, $(-21) \times [(-4) + (-6)]$
$= [(-21) \times (-4)] + [(-21) \times (-6)]$

3. (i) $(-1) \times a = -a$ where a is an integer.
(ii) (a) $(-1) \times (-22) = 22$
(b) $(-1) \times 37 = -37$ (c) $(-1) \times 0 = 0$

4. $(-1) \times 5 = -5$
$(-1) \times 4 = -4 = [-5 - (-1)] = -5 + 1$
$(-1) \times 3 = -3 = [-4 - (-1)] = -4 + 1$
$(-1) \times 2 = -2 = [-3 - (-1)] = -3 + 1$
$(-1) \times 1 = -1 = [-2 - (-1)] = -2 + 1$
$(-1) \times 0 = 0 = [-1 - (-1)] = -1 + 1$
$(-1) \times (-1) = 1 = [0 - (-1)] = 0 + 1$

Exercise 1.3

1. (a) $(-30) \div 10 = -3$
(b) $50 \div (-5) = -10$
(c) $(-36) \div (-9) = 36 \div 9 = 4$
(d) $(-49) \div (49) = -1$
(e) $13 \div [(-2) + 1] = 13 \div (-1) = -13$
(f) $0 \div (-12) = 0$
(g) $(-31) \div [(-30) + (-1)] = (-31) \div (-31) = 1$
(h) $[(-36) \div 12] \div 3 = (-3) \div 3 = -1$
(i) $[(-6) + 5] \div [(-2) + 1] = (-6 + 5) \div (-2 + 1)$
$= (-1) \div (-1) = 1$

2. (a) $a \div (b + c) = 12 \div [(-4) + 2]$
$= 12 \div (-4 + 2) = 12 \div (-2) = -6$
And $(a \div b) + (a \div c)$
$= [12 \div (-4)] + [12 \div 2]$
$= -3 + 6 = 3$
So, $a \div (b + c) \neq (a \div b) + (a \div c)$
(b) $a \div (b + c) = (-10) \div (1 + 1)$
$= (-10) \div 2 = -5$

And $(a \div b) + (a \div c)$
$= [(-10) \div 1] + [(-10) \div 1]$
$= (-10) + (-10) = -20$
So, $a \div (b + c) \neq (a \div b) + (a \div c)$

3. (a) $369 \div 1 = 369$
(b) $(-75) \div 75 = -1$ (c) $(-206) \div (-206) = 1$
(d) $(-87) \div (-1) = 87$ (e) $(-87) \div 1 = -87$
(f) $(-48) \div 48 = -1$ (g) $20 \div (-10) = -2$
(h) $(-12) \div 4 = -3$

4. (i) $(-9) \div 3 = -3$
(ii) $9 \div (-3) = -3$
(iii) $(-15) \div (5) = -3$
(iv) $12 \div (-4) = -3$
(v) $(-6) \div 2 = -3$
So, the pairs are $(-9, 3)$ $(9, -3)$, $(-15, 5)$, $(12, -4)$ and $(-6, 2)$.

5. Difference in temperature $= 10° \text{ C} - (-8° \text{ C})$
$= 10° \text{ C} + 8° \text{ C} = 18° \text{ C}$
Since, in the time, temperature decrease $2° \text{ C} = 1 \text{ hr}$
In the time, temperature decrease
$$1° \text{ C} = \frac{1}{2} \text{ hr}$$
So, in the time, the temperature decrease
$18° \text{ C} = \frac{1}{2} \times 18 = 9 \text{ hr}$
Total time = 12 noon + 9 hour = 9 PM
Temperature at mid-night
$= 10° \text{ C} - (2 \times 12° \text{ C})$
$= 10° \text{ C} - 24° \text{ C} = -14° \text{ C}$

6. Marks given for one correct answer = 3
Marks given for one incorrect answer = – 2
(i) Marks given for 12 correct answers
$= 3 \times 12 = 36$ marks
Radhika scored = 20
Marks obtained for incorrect answers
$= 20 - 36 = -16$
Now, of questions attempted incorrectly
$= \frac{-16}{-2} = 8$
(ii) Marks given for 7 correct answers
$= 3 \times 7 = 21$
Mohini scored = – 5
Marks obtained for incorrect answers
$= -5 - 21 = -26$
Marks given for one incorrect answers
$= -2$
Therefore, number of incorrect answers
$= -26 \div (-2) = 13$

7. Difference between two positions
$= 10 \text{ m} - (-350 \text{ m})$
$= 10 \text{ m} + 350 \text{ m} = 360 \text{ m}$
Rate of descend = 6 m per min
$\therefore$ Time taken $= \frac{360}{6}$ min = 60 min = 1 hour
Thus, in one hour, the mine shaft reaches –350 m below the ground.

Chapter-2

Fractions and Decimals

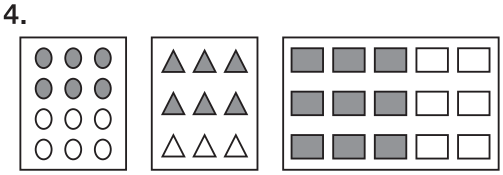
Exercise 2.1

1. (i) (d) Since, $2 \times \frac{1}{5} = \frac{1}{5} + \frac{1}{5}$
(ii) (b) Since, $2 \times \frac{1}{2} = \frac{1}{2} + \frac{1}{2}$
(iii) (a) Since, $3 \times \frac{2}{3} = \frac{2}{3} + \frac{2}{3} + \frac{2}{3}$
(iv) (c) Since, $3 \times \frac{1}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$

2. (i) (c), (ii) (a), (iii) (b)

3. (i) $7 \times \frac{3}{5} = \frac{7 \times 3}{5} = \frac{21}{5} = 4\frac{1}{5}$
(ii) $4 \times \frac{1}{3} = \frac{4 \times 1}{3} = \frac{4}{3} = 1\frac{1}{3}$
(iii) $2 \times \frac{6}{7} = \frac{2 \times 6}{7} = \frac{12}{7} = 1\frac{5}{7}$
(iv) $5 \times \frac{2}{9} = \frac{5 \times 2}{9} = \frac{10}{9} = 1\frac{1}{9}$
(v) $\frac{2}{3} \times 4 = \frac{2 \times 4}{3} = \frac{8}{3} = 2\frac{2}{3}$
(vi) $\frac{5}{2} \times 6 = 5 \times 3 = 15$
(vii) $11 \times \frac{4}{7} = \frac{11 \times 4}{7} = \frac{44}{7} = 6\frac{2}{7}$
(viii) $20 \times \frac{4}{5} = 4 \times 4 = 16$
(ix) $13 \times \frac{1}{3} = \frac{13 \times 1}{3} = \frac{13}{3} = 4\frac{1}{3}$
(x) $15 \times \frac{3}{5} = 3 \times 3 = 9$

4.



(a) (b) (c)

5. (a) (i) $\frac{1}{2}$ of $24 = \frac{1}{2} \times 24 = \frac{1 \times 24}{2} = \frac{24}{2} = 12$

(ii) $\frac{1}{2}$ of 46 $= \frac{1}{2} \times 46 = \frac{1 \times 46}{2} = \frac{46}{2} = 23$

(b) (i) $\frac{2}{3}$ of 18 $= \frac{2}{3} \times 18 = \frac{2 \times 18}{3} = \frac{36}{3} = 12$

(ii) $\frac{2}{3}$ of 27 $= \frac{2}{3} \times 27 = \frac{2 \times 27}{3} = \frac{54}{3} = 18$

(c) (i) $\frac{3}{4}$ of 16 $= \frac{3}{4} \times 16 = \frac{3 \times 16}{4} = \frac{48}{4} = 12$

(ii) $\frac{3}{4}$ of 36 $= \frac{3}{4} \times 36 = \frac{3 \times 36}{4} = \frac{108}{4} = 27$

(d) (i) $\frac{4}{5}$ of 20 $= \frac{4}{5} \times 20 = 4 \times 4 = 16$

(ii) $\frac{4}{5}$ of 35 $= \frac{4}{5} \times 35 = 4 \times 7 = 28$

6. (a) $3 \times 5\frac{1}{5} = 3 \times \left(\frac{5 \times 5 + 1}{5}\right)$

$= 3 \times \left(\frac{25 + 1}{5}\right) = \frac{3 \times 26}{5} = \frac{78}{5} = 15\frac{3}{5}$

(b) $5 \times 6\frac{3}{4} = 5 \times \left(\frac{6 \times 4 + 3}{4}\right)$

$= 5 \times \left(\frac{24 + 3}{4}\right) = \frac{5 \times 27}{4} = \frac{135}{4} = 33\frac{3}{4}$

(c) $7 \times 2\frac{1}{4} = 7 \times \left(\frac{2 \times 4 + 1}{4}\right)$

$= 7 \times \left(\frac{8 + 1}{4}\right) = \frac{7 \times 9}{4} = \frac{63}{4} = 15\frac{3}{4}$

(d) $4 \times 6\frac{1}{3} = 4 \times \left(\frac{6 \times 3 + 1}{3}\right)$

$= 4 \times \left(\frac{18 + 1}{3}\right) = 4 \times \frac{19}{3}$

$= \frac{4 \times 19}{3} = \frac{76}{3} = 25\frac{1}{3}$

(e) $3\frac{1}{4} \times 6 = \left(\frac{3 \times 4 + 1}{4}\right) \times 6 = \left(\frac{12 + 1}{2}\right) \times 3$

$= \frac{13 \times 3}{2} = \frac{39}{2} = 19\frac{1}{2}$

(f) $3\frac{2}{5} \times 8 = \left(\frac{3 \times 5 + 2}{5}\right) \times 8 = \left(\frac{15 + 2}{5}\right) \times 8$

$= \frac{17 \times 8}{5} = \frac{136}{5} = 27\frac{1}{5}$

7. (a) (i) $\frac{1}{2}$ of $2\frac{3}{4} = \frac{1}{2} \times 2\frac{3}{4}$

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

$= \frac{1}{2} \times \left(\frac{8 + 3}{4}\right) = \frac{1}{2} \times \frac{11}{4}$

$= \frac{1 \times 11}{2 \times 4} = \frac{11}{8} = 1\frac{3}{8}$

(ii) $\frac{1}{2}$ of $4\frac{2}{9} = \frac{1}{2} \times 4\frac{2}{9}$

$= \frac{1}{2} \times \left(\frac{4 \times 9 + 2}{9}\right) = \frac{1}{2} \times \left(\frac{36 + 2}{9}\right)$

$= \frac{1}{2} \times \frac{38}{9} = \frac{1 \times 38}{2 \times 9} = \frac{38}{18} = \frac{19}{9} = 2\frac{1}{9}$

(b) (i) $\frac{5}{8}$ of $3\frac{5}{6} = \frac{5}{8} \times 3\frac{5}{6}$

$= \frac{5}{8} \times \left(\frac{3 \times 6 + 5}{6}\right) = \frac{5}{8} \times \left(\frac{18 + 5}{6}\right)$

$= \frac{5}{8} \times \frac{23}{6} = \frac{115}{48} = 2\frac{19}{48}$

(ii) $\frac{5}{8}$ of $9\frac{2}{3} = \frac{5}{8} \times 9\frac{2}{3}$

$= \frac{5}{8} \times \left(\frac{9 \times 3 + 2}{3}\right) = \frac{5}{8} \times \left(\frac{27 + 2}{3}\right)$

$= \frac{5}{8} \times \frac{29}{3} = \frac{145}{24} = 6\frac{1}{24}$

8. Total quantity of water = 5 litres

(i) Water consumed by Vidya $\frac{2}{5}$ of 5 litres

$= \left(\frac{2}{5} \times 5\right) l = (2 \times 1)\, l = 2\, l$

(ii) Remaining quantity of water = Water consumed by Pratap

$= (5 - 2)l = 3l$

Fractions of water quantity drink by Pratap $= \frac{3}{5}$ part

Exercise 2.2

1. (i) (a) $\frac{1}{4}$ of $\frac{1}{4} = \frac{1}{4} \times \frac{1}{4} = \frac{1 \times 1}{4 \times 4} = \frac{1}{16}$

(b) $\frac{1}{4}$ of $\frac{3}{5} = \frac{1}{4} \times \frac{3}{5} = \frac{1 \times 3}{4 \times 5} = \frac{3}{20}$

(c) $\frac{1}{4}$ of $\frac{4}{3} = \frac{1}{4} \times \frac{4}{3} = \frac{1 \times 4}{4 \times 3} = \frac{1}{3}$

(ii) (a) $\frac{1}{7}$ of $\frac{2}{9} = \frac{1}{7} \times \frac{2}{9} = \frac{1 \times 2}{7 \times 9} = \frac{2}{63}$

(b) $\frac{1}{7}$ of $\frac{6}{5} = \frac{1}{7} \times \frac{6}{5} = \frac{1 \times 6}{7 \times 5} = \frac{6}{35}$

(c) $\frac{1}{7}$ of $\frac{3}{10} = \frac{1}{7} \times \frac{3}{10} = \frac{1 \times 3}{7 \times 10} = \frac{3}{70}$

2. (i) $\frac{2}{3} \times 2\frac{2}{3} = \frac{2}{3} \times \left(\frac{2 \times 3 + 2}{3}\right) = \frac{2}{3} \times \left(\frac{6+2}{3}\right)$

$= \frac{2}{3} \times \frac{8}{3} = \frac{16}{9} = 1\frac{7}{9}$

(ii) $\frac{2}{7} \times \frac{7}{9} = \frac{2 \times 1}{1 \times 9} = \frac{2}{9}$

(iii) $\frac{3}{8} \times \frac{6}{4} = \frac{3 \times 3}{8 \times 2} = \frac{9}{16}$

(iv) $\frac{9}{5} \times \frac{3}{5} = \frac{9 \times 3}{5 \times 5} = \frac{27}{25} = 1\frac{2}{25}$

(v) $\frac{1}{3} \times \frac{15}{8} = \frac{1 \times 5}{1 \times 8} = \frac{5}{8}$

(vi) $\frac{11}{2} \times \frac{3}{10} = \frac{11 \times 3}{2 \times 10} = \frac{33}{20} = 1\frac{13}{20}$

(vii) $\frac{4}{5} \times \frac{12}{7} = \frac{4 \times 12}{5 \times 7} = \frac{48}{35} = 1\frac{13}{35}$

3. (i) $\frac{2}{5} \times 5\frac{1}{4} = \frac{2}{5} \times \left(\frac{5 \times 4 + 1}{4}\right)$

$= \frac{2}{5} \times \left(\frac{20+1}{4}\right) = \frac{2}{5} \times \frac{21}{4}$

$= \frac{2 \times 21}{5 \times 4} = \frac{42}{20} = \frac{21}{10} = 2\frac{1}{10}$

(ii) $6\frac{2}{5} \times \frac{7}{9} = \left(\frac{6 \times 5 + 2}{5}\right) \times \frac{7}{9}$

$= \left(\frac{30+2}{5}\right) \times \frac{7}{9} = \frac{32}{5} \times \frac{7}{9}$

$= \frac{32 \times 7}{5 \times 9} = \frac{224}{45} = 4\frac{44}{45}$

(iii) $\frac{3}{2} \times 5\frac{1}{3} = \frac{3}{2} \times \left(\frac{5 \times 3 + 1}{3}\right) = \frac{3}{2} \times \left(\frac{15+1}{3}\right)$

$= \frac{3}{2} \times \frac{16}{3} = \frac{3 \times 16}{2 \times 3} = \frac{48}{6} = 8$

(iv) $\frac{5}{6} \times 2\frac{3}{7} = \frac{5}{6} \times \left(\frac{2 \times 7 + 3}{7}\right)$

$= \frac{5}{6} \times \left(\frac{14+3}{7}\right) = \frac{5}{6} \times \frac{17}{7}$

$= \frac{5 \times 17}{6 \times 7} = \frac{85}{42} = 2\frac{1}{42}$

(v) $3\frac{2}{5} \times \frac{4}{7} = \left(\frac{3 \times 5 + 2}{5}\right) \times \frac{4}{7}$

$= \left(\frac{15+2}{5}\right) \times \frac{4}{7} = \frac{17}{5} \times \frac{4}{7}$

$= \frac{17 \times 4}{5 \times 7} = \frac{68}{35} = 1\frac{33}{35}$

(vi) $2\frac{3}{5} \times 3 = \left(\frac{2 \times 5 + 3}{5}\right) \times 3 = \frac{10+3}{5} \times 3$

$= \frac{13}{5} \times 3 = \frac{13 \times 3}{5} = \frac{39}{5} = 7\frac{4}{5}$

(vii) $3\frac{4}{7} \times \frac{3}{5} = \left(\frac{3 \times 7 + 4}{7}\right) \times \frac{3}{5}$

$= \left(\frac{21+4}{7}\right) \times \frac{3}{5}$

$= \frac{25}{7} \times \frac{3}{5} = \frac{25 \times 3}{7 \times 5} = \frac{75}{35} = 2\frac{5}{35} = 2\frac{1}{7}$

4. (i) $\frac{2}{7}$ of $\frac{3}{4} = \frac{2}{7} \times \frac{3}{4} = \frac{6}{28} = \frac{6 \div 2}{28 \div 2} = \frac{3}{14}$

And $\frac{3}{5}$ of $\frac{5}{8} = \frac{3}{5} \times \frac{5}{8} = \frac{15}{40} = \frac{15 \div 5}{40 \div 5} = \frac{3}{8}$

Since, $\frac{3}{8} > \frac{3}{14}$

So, $\left(\frac{3}{5} \text{ of } \frac{5}{8}\right) > \left(\frac{2}{7} \text{ of } \frac{3}{4}\right)$

(ii) $\frac{1}{2}$ of $\frac{6}{7} = \frac{1}{2} \times \frac{6}{7} = \frac{6}{14} = \frac{6 \div 2}{14 \div 2} = \frac{3}{7}$

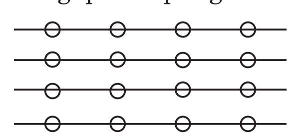
And $\frac{2}{3}$ of $\frac{3}{7} = \frac{2}{3} \times \frac{3}{7} = \frac{6}{21} = \frac{6 \div 3}{21 \div 3} = \frac{2}{7}$

Since, $\frac{3}{7} > \frac{2}{7}$

So, $\left(\frac{1}{2} \text{ of } \frac{6}{7}\right) > \left(\frac{2}{3} \text{ of } \frac{3}{7}\right)$

5. The distance between two adjacent saplings $= \frac{3}{4}$ m

Saili planted 4 saplings in a row, then number of gap in saplings = 3



Therefore, the distance between the first and the last sapling $= 3 \times \frac{3}{4}$ m $= \frac{9}{4}$ m

$= 2\frac{1}{4}$ m

Thus, the distance between the first and the last sapling is $2\frac{1}{4}$ m.

6. Time taken by Lipika to read a book

$= 1\frac{3}{4}$ hour

Number of days = 6

Total time taken by Lipika to read a book in 6 days

$= 6 \times 1\frac{3}{4} = 6 \times \frac{7}{4}$ hours

$= \frac{21}{2}$ hours $= 10\frac{1}{2}$ hours

7. The distance covered by car in 1 litre of petrol = 16 km

Distance covered by car in $2\frac{3}{4}$ litres of petrol

$= 16 \times 2\frac{3}{4}$ km

$= 16 \times \frac{11}{4}$ km

= 44 km

8. (a) (i) Let the numbers put in the box ☐ be x.

$\therefore \quad \frac{2}{3} \times x = \frac{10}{30}$

$\Rightarrow \quad x = \frac{10}{30} \div \frac{2}{3}$

$\Rightarrow \quad x = \frac{10}{30} \times \frac{3}{2}$

$\Rightarrow \quad x = \frac{5}{10}$

$\therefore \quad \frac{2}{3} \times \frac{5}{10} = \frac{10}{30}$

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

(b) (i) Let the number put in the box ☐ be x.

$\therefore \quad \frac{3}{5} \times x = \frac{24}{75}$

$\Rightarrow \quad x = \frac{24}{75} \div \frac{3}{5}$

$\Rightarrow \quad x = \frac{24}{75} \times \frac{5}{3}$

$\Rightarrow \quad x = \frac{8}{15}$

$\therefore \quad \frac{3}{5} \times \frac{8}{15} = \frac{24}{75}$

(ii) HCF of 8 and 15 is 1.

$\therefore$ Simplest form of $\frac{8}{15} = \frac{8}{15}$

Exercise 2.3

1. (i) $12 \div \frac{3}{4} = 12 \times \frac{4}{3} = 4 \times 4 = 16$

(ii) $14 \div \frac{5}{6} = 14 \times \frac{6}{5} = \frac{84}{5} = 16\frac{4}{5}$

(iii) $8 \div \frac{7}{3} = 8 \times \frac{3}{7} = \frac{24}{7} = 3\frac{3}{7}$

(iv) $4 \div \frac{8}{3} = 4 \times \frac{3}{8} = \frac{4 \times 3}{8} = \frac{3}{2} = 1\frac{1}{2}$

(v) $3 \div 2\frac{1}{3} = 3 \div \frac{7}{3} = 3 \times \frac{3}{7} = \frac{9}{7} = 1\frac{2}{7}$

(vi) $5 \div 3\frac{4}{7} = 5 \div \frac{25}{7} = 5 \times \frac{7}{25} = \frac{35}{25}$

$= \frac{35 \div 5}{25 \div 5} = \frac{7}{5} = 1\frac{2}{5}$

2. (i) Reciprocal of $\frac{3}{7} = \frac{7}{3}$ which is an improper fraction

(ii) Reciprocal of $\frac{5}{8} = \frac{8}{5}$ which is an improper fraction

(iii) Reciprocal of $\frac{9}{7} = \frac{7}{9}$ which is a proper fraction

(iv) Reciprocal of $\frac{6}{5} = \frac{5}{6}$ which is a proper fraction

(v) Reciprocal of $\frac{12}{7} = \frac{7}{12}$ which is a proper fraction

(vi) Reciprocal of $\frac{1}{8} = \frac{8}{1} = 8$ which is a whole number

(vii) Reciprocal of $\frac{1}{11} = \frac{11}{1} = 11$ which is a whole number

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

(ii) $\frac{4}{9} \div 5 = \frac{4}{9} \times \frac{1}{5} = \frac{4}{45}$

(iii) $\frac{6}{13} \div 7 = \frac{6}{13} \times \frac{1}{7} = \frac{6}{91}$

(iv) $4\frac{1}{3} \div 3 = \frac{13}{3} \times \frac{1}{3} = \frac{13}{9}$

(v) $3\frac{1}{2} \div 4 = \frac{7}{2} \times \frac{1}{4} = \frac{7}{8}$

(vi) $4\frac{3}{7} \div 7 = \frac{31}{7} \times \frac{1}{7} = \frac{31}{49}$

4. (i) $\frac{2}{5} \div \frac{1}{2} = \frac{2}{5} \times \frac{2}{1} = \frac{4}{5}$

(ii) $\frac{4}{9} \div \frac{2}{3} = \frac{4}{9} \times \frac{3}{2} = \frac{12}{18} = \frac{12 \div 6}{18 \div 6} = \frac{2}{3}$

(iii) $\frac{3}{7} \div \frac{8}{7} = \frac{3}{7} \times \frac{7}{8} = \frac{21}{56} = \frac{21 \div 7}{56 \div 7} = \frac{3}{8}$

(iv) $2\frac{1}{3} \div \frac{3}{5} = \frac{7}{3} \div \frac{3}{5} = \frac{7}{3} \times \frac{5}{3} = \frac{35}{9}$

(v) $3\frac{1}{2} \div \frac{8}{3} = \frac{7}{2} \div \frac{8}{3} = \frac{7}{2} \times \frac{3}{8} = \frac{21}{16}$

(vi) $\frac{2}{5} \div 1\frac{1}{2} = \frac{2}{5} \div \frac{3}{2} = \frac{2}{5} \times \frac{2}{3} = \frac{4}{15}$

(vii) $3\frac{1}{5} \div 1\frac{2}{3} = \frac{16}{5} \div \frac{5}{3} = \frac{16}{5} \times \frac{3}{5} = \frac{48}{25}$

(viii) $2\frac{1}{5} \div 1\frac{1}{5} = \frac{11}{5} \div \frac{6}{5} = \frac{11}{5} \times \frac{5}{6}$

$= \frac{55}{30} = \frac{55 \div 5}{30 \div 5} = \frac{11}{6}$

Exercise 2.4

1. (i) $0.2 \times 6 = \frac{2}{10} \times 6 = \frac{12}{10} = 1.2$

(ii) $8 \times 4.6 = 8 \times \frac{46}{10} = \frac{368}{10} = 36.8$

(iii) $2.71 \times 5 = \frac{271}{100} \times 5 = \frac{1355}{100} = 13.55$

(iv) $20.1 \times 4 = \frac{201}{10} \times 4 = \frac{804}{10} = 80.4$

(v) $0.05 \times 7 = \frac{5}{100} \times 7 = \frac{35}{100} = 0.35$

(vi) $211.02 \times 4 = \frac{21102}{100} \times 4 = \frac{84408}{100}$

$= 844.08$

(vii) $2 \times 0.86 = 2 \times \frac{86}{100} = \frac{172}{100} = 1.72$

2. Length of a rectangle = 5.7 cm

Breadth of a rectangle = 3 cm

Area of a rectangle = length × breadth

$= 5.7\text{ cm} \times 3\text{ cm} = \left(\frac{57}{10} \times 3\right)\text{cm}^2$

$= \frac{171}{10}\text{ cm}^2 = 17.1\text{ cm}^2$

3. (i) $1.3 \times 10 = 13$

(ii) $36.8 \times 10 = 368$

(iii) $153.7 \times 10 = 1537$

(iv) $168.07 \times 10 = 1680.7$

(v) $31.1 \times 100 = 3110$

(vi) $156.1 \times 100 = 15610$

(vii) $3.62 \times 100 = 362$

(viii) $43.07 \times 100 = 4307$

(ix) $0.5 \times 10 = 5$

(x) $0.08 \times 10 = 0.8$

(xi) $0.9 \times 100 = 90$

(xii) $0.03 \times 1000 = 30$

4. Distance covered by the two-wheeler in 1 litre of petrol = 55.3 km

So, distance covered by it in 10 litres of petrol = 55.3 × 10 = 553 km

5. (i) $25 \times 3 = 75$

The decimal point is placed in the product after 2 places from the right most digit.

Hence, $2.5 \times 0.3 = 0.75$

(ii) $1 \times 517 = 517$

The decimal point is placed in the product after 2 places from the right most digit.

Hence, $0.1 \times 51.7 = 5.17$

(iii)
```
 3168
 ×  2
 6336
```

The decimal point is placed in the product after 2 places from the right most digit.

Hence, $0.2 \times 316.8 = 63.36$

(iv)
```
  13
 ×31
  13
 39×
 403
```

The decimal point is placed in the product after 2 places from the right most digit.

Hence, $1.3 \times 3.1 = 4.03$

(v) $5 \times 5 = 25$

The decimal point is placed in the product after 3 places from the right most digit.

Hence, $0.5 \times 0.05 = 0.025$

(vi)
```
  112
  ×15
  560
 112×
 1680
```

The decimal point is placed in the product after 3 places from the right most digit.

Hence, $11.2 \times 0.15 = 1.680$

(vii)
$$\begin{array}{r} 107 \\ \times 2 \\ \hline 214 \end{array}$$

The decimal point is placed in the product after 4 places from the right most digit.

Hence, $1.07 \times 0.02 = 0.0214$

(viii)
$$\begin{array}{r} 1005 \\ \times 105 \\ \hline 5025 \\ 0000\times \\ 1005\times\times \\ \hline 105525 \end{array}$$

The decimal point is placed in the product after 4 places from the right most digit.

Hence, $10.05 \times 1.05 = 10.5525$

(ix)
$$\begin{array}{r} 10101 \\ \times 1 \\ \hline 10101 \end{array}$$

The decimal point is placed in the product after 4 places from the right most digit.

Hence, $101.01 \times 0.01 = 1.0101$

(x)
$$\begin{array}{r} 10001 \\ \times 11 \\ \hline 10001 \\ 10001\times \\ \hline 110011 \end{array}$$

The decimal point is placed in the product after 3 places from the right most digit.

Hence, $100.01 \times 1.1 = 110.011$

Exercise 2.5

1. (i) $0.4 \div 2 = \frac{4}{10} \div 2 = \frac{4}{10} \times \frac{1}{2} = \frac{2}{10} = 0.2$

(ii) $0.35 \div 5 = \frac{35}{100} \div 5$

$= \frac{35}{100} \times \frac{1}{5} = \frac{7}{100} = 0.07$

(iii) $2.48 \div 4 = \frac{248}{100} \div 4$

$= \frac{248}{100} \times \frac{1}{4} = \frac{62}{100} = 0.62$

(iv) $65.4 \div 6 = \frac{654}{10} \div 6$

$= \frac{654}{10} \times \frac{1}{6} = \frac{109}{10} = 10.9$

(v) $651.2 \div 4 = \frac{6512}{10} \div 4 = \frac{6512}{10} \times \frac{1}{4}$

$= \frac{1628}{10} = 162.8$

(vi) $14.49 \div 7 = \frac{1449}{100} \div 7$

$= \frac{1449}{100} \times \frac{1}{7} = \frac{207}{100} = 2.07$

(vii) $3.96 \div 4 = \frac{396}{100} \div 4$

$= \frac{396}{100} \times \frac{1}{4} = \frac{99}{100} = 0.99$

(viii) $0.80 \div 5 = \frac{80}{100} \div 5$

$= \frac{80}{100} \times \frac{1}{5} = \frac{16}{100} = 0.16$

2. (i) $4.8 \div 10 = 0.48$

(ii) $52.5 \div 10 = 5.25$

(iii) $0.7 \div 10 = 0.07$

(iv) $33.1 \div 10 = 3.31$

(v) $272.23 \div 10 = 27.223$

(vi) $0.56 \div 10 = 0.056$

(vii) $3.97 \div 10 = 0.397$

3. (i) $2.7 \div 100 = 0.027$

(ii) $0.3 \div 100 = 0.003$

(iii) $0.78 \div 100 = 0.0078$

(iv) $432.6 \div 100 = 4.326$

(v) $23.6 \div 100 = 0.236$

(vi) $98.53 \div 100 = 0.9853$

4. (i) $7.9 \div 1000 = 0.0079$

(ii) $26.3 \div 1000 = 0.0263$

(iii) $38.53 \div 1000 = 0.03853$

(iv) $128.9 \div 1000 = 0.1289$

(v) $0.5 \div 1000 = 0.0005$

5. (i) $7 \div 3.5 = 7 \div \frac{35}{10} = 7 \times \frac{10}{35} = \frac{70}{35} = 2$

(ii) $36 \div 0.2 = 36 \div \frac{2}{10}$

$= 36 \times \frac{10}{2} = 18 \times 10 = 180$

(iii) $3.25 \div 0.5 = \frac{325}{100} \div \frac{5}{10}$

$= \frac{325}{100} \times \frac{10}{5} = \frac{65}{10} = 6.5$

(iv) $30.94 \div 0.7 = \frac{3094}{100} \div \frac{7}{10}$

$= \frac{3094}{100} \times \frac{10}{7} = \frac{442}{10} = 44.2$

(v) $0.5 \div 0.25 = \frac{5}{10} \div \frac{25}{100} = \frac{5}{10} \times \frac{100}{25} = 2$

(vi) $7.75 \div 0.25 = \frac{775}{100} \div \frac{25}{100}$

$= \frac{775}{100} \times \frac{100}{25} = 31$

(vii) $76.5 \div 0.15 = \frac{765}{10} \div \frac{15}{100}$

$= \frac{765}{10} \times \frac{100}{15} = \frac{765}{15} \times \frac{100}{10}$

$= 51 \times 10 = 510$

(viii) $37.8 \div 1.4 = \frac{378}{10} \div \frac{14}{10}$

$= \frac{378}{10} \times \frac{10}{14} = \frac{378}{14} = 27$

(ix) $2.73 \div 1.3 = \frac{273}{100} \div \frac{13}{10} = \frac{273}{100} \times \frac{10}{13}$

$= \frac{273}{13} \times \frac{10}{100} = 21 \times \frac{1}{10} = 2.1$

6. Total distance covered = 43.2 km

Quantity of petrol used = 2.4 l

Distance covered in one litre petrol

$= \frac{\text{Total distance covered}}{\text{Total quantity of petrol}}$

$= \frac{43.2}{2.4} = 43.2 \div 2.4 = \left(\frac{432}{10} \div \frac{24}{10}\right)$ km

$= \left(\frac{432}{10} \times \frac{10}{24}\right)$ km $= \left(\frac{432}{24}\right)$ km = 18 km

Chapter-3

Data Handling

Exercise 3.1

1. Let the heights of ten students are as follows :

148, 150, 146, 152, 155, 140, 160, 158, 147 and 142

Arranging in ascending order, we have 140, 142, 146, 147, 148, 150, 152, 155, 158 and 160

Range = 160 – 140 = 20

2. Writing the given data (marks) in tabular form, we have :

Writing the given data (marks) in tabular form, we have :

Marks	Tally marks	Frequency	$f_i x_i$
1	|	1	1
2	||	2	4
3	|	1	3
4	|||	3	12
5	~~||||~~	5	25
6	||||	4	24
7	||	2	14
8	|	1	8
9	|	1	9
		$\Sigma f_i = 20$	$\Sigma f_i x_i = 100$

(i) The highest number = 9

(ii) The lowest number = 1

(iii) Range = 9 – 1 = 8

(iv) Mean $= \frac{\Sigma f_i x_i}{\Sigma f_i} = \frac{100}{20} = 5$

3. First five whole numbers are 0, 1, 2, 3 and 4.

Mean $= \frac{0+1+2+3+4}{5} = \frac{10}{5} = 2$

4. Sum of the scores

= 58 + 76 + 40 + 35 + 46 + 45 + 0 + 100

= 400

Number of observations = 8

Mean $= \frac{400}{8} = 50$

5. (i) A's average score per game

$= \frac{14+16+10+10}{4}$

$= \frac{50}{4} = 12.5$

(ii) Mean score of C

$= \frac{8+11+13}{3} = \frac{32}{3} = 10.66$

(iii) Mean score of B

$$= \frac{0+8+6+4}{4} = \frac{18}{4} = 4.5$$

(iv) Here, 12.50 > 10.66 > 4.5

Hence, A is the best player.

6. Writing the given marks in ascending order, we have :

39, 48, 56, 75, 76, 81, 85, 85, 90 and 95

(i) The highest marks = 95

And the lowest marks = 39

(ii) Range = 95 – 39 = 56

(iii) Mean marks

$$= \frac{39+48+56+75+76+81+85+85+90+95}{10}$$

$$= \frac{730}{10} = 73$$

7. Sum of enrolment

$$= 1555 + 1670 + 1750 + 2013 + 2540 + 2820 = 12348$$

$$\therefore \quad \text{Mean} = \frac{12348}{6} = 2058$$

8. (i) Writing the given rainfall in ascending order :

0.0, 0.0, 1.0, 2.1, 5.5, 12.2, 20.5

Range = 20.5 – 0.0 = 20.5

(ii) Sum of rainfall in 7 days

= 0.0 + 0.0 + 1.0 + 2.1 + 5.5 + 12.2 + 20.5

= 41.3 mm

$$\text{Mean rainfall} = \frac{41.3}{7} = 5.9$$

(iii) From the table, we find that on 5 days [Monday, Wednesday, Thursday, Saturday and Sunday] the rainfall was less than the mean rainfall.

9. Writing the heights in ascending order, we have128, 132, 135, 139, 141, 143, 146, 149, 150, 151.

(i) Height of the tallest girl = 151 cm

(ii) Height of the shortest girl = 128 cm

(iii) Range = (151 – 128) = 23 cm

(iv) Mean height

$$= \frac{\text{Sum of the observations}}{\text{Number of observations}}$$

$$= \frac{128+132+135+139+141+143+146+149+150+151}{10}$$

$$= \frac{1414}{10} = 141.4 \text{ cm}$$

(v) Since, 143 cm, 146 cm, 149 cm, 150 cm and 151 cm are greater than 141.4 therefore the height of 5 girls more than the mean height.

Exercise 3.2

1. Ascending order

5, 9, 10, 12, 15, 16, 19, 20, 20, 20, 20, 23, 24, 25, 25

$\because$ Highest occurring observation is 20.

$\therefore$ Mode = 20

Here, $N = 15$ which is odd

$$\therefore \quad \text{Median} = \left(\frac{N+1}{2}\right)\text{th term}$$

$$= \left(\frac{15+1}{2}\right)\text{th} = 8^{\text{th}} \text{ term} = 20$$

Obviously, here the mode and median are the same.

2. $\text{Mean} = \dfrac{\text{Sum of the observations}}{\text{Number of the observations}}$

$$= \frac{6+15+120+50+100+80+10+15+8+10+15}{11}$$

$$= \frac{429}{11} = 39$$

In ascending order,

6, 8, 10, 10, 15, 15, 15, 50, 80, 100, 120

The highest occurring observation is 15.

$\therefore$ Mode = 15

$\because$ $N = 11$ (which is odd)

$$\text{Median} = \left(\frac{N+1}{2}\right)\text{th term}$$

$$= \frac{11+1}{2} = \frac{12}{6} = 6\text{th term} = 15$$

Hence, mean, mode and median are not the same.

3. (i) Ascending order

32, 35, 36, 37, 38 38, 38, 40, 42, 43, 43, 43, 45, 47, 50

The most occurring observations are 38 and 43.

So, mode of the data is 38 and 43.

Now, number of data is odd, *i.e.,* $N = 15$.

$\therefore$ Median $= \left(\frac{N+1}{2}\right)$th term

$= \frac{15+1}{2}$ th term

$= \frac{16}{2}$th term = 8th term = 40

(ii) Yes, there is more than one mode.

4. Arranging the data in ascending order

12, 12, 13, 13, 14, 14, 14, 16, 19

$\because$ The highest occurring observations is 14.

$\therefore$ Mode = 14

Now number of data is odd, *i.e.,* $N = 9$.

$\therefore$ Median $= \left(\frac{N+1}{2}\right)$th term

$= \frac{9+1}{2}$ th term

$= \frac{10}{2}$th term = 5^{th} term = 14

5. (i) True, (ii) False, (iii) False, (iv) False

Exercise 3.3

1. (a) Since, the bar representing that the number of cats is the highest. Cat is the most popular pet.

(b) 8 students have dog as a pet.

2. It is clear from bar diagram.

(i)

Years	Number of books sold
1989	170 (Approximately)
1990	475 (Approximately)
1992	225 (Approximately)

(ii) About 475 books were sold in 1990. About 225 books were sold in 1992.

(iii) Fewer than 250 books were sold in 1989 and 1992.

(iv) The height of the bar for 1989 is slightly less than that for 200 books. Therefore, about 170 books were sold in 1989.

3. (a) The required bar graph is shown below :

Scale : 1 unit = 10 students

(b) (i) In Fifth class there are the maximum number of children, *i.e.,* 135 children.

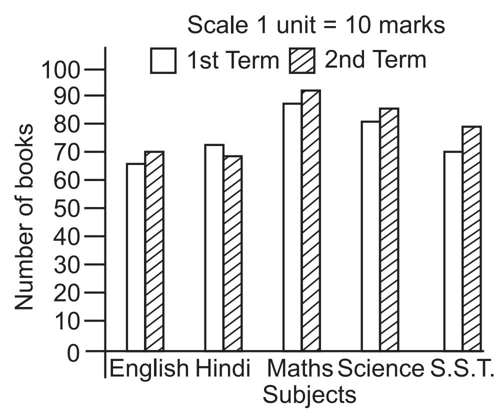
In tenth class there are the minimum number of children, *i.e.,* 80 children.

(ii) Number of students in class sixth = 120

Number of students in eighth class = 100

$\therefore$ Required ratio $= \frac{120}{100} = \frac{6}{5} = 6:5$

4. The required bar graph is given below.



(i) Increase in marks

In English = 70 – 67 = 3

In Hindi = 65 – 72 = – 7

In Maths = 95 – 88 = 7

In Science = 85 – 81 = 4

In Social Science = 75 – 73 = 2

Obviously the performance has improved the most in Maths.

(ii) The performance in Social Science is the least.

(iii) Yes, the performance in Hindi has gone down.

Chapter-4

Simple Equations

Exercise 4.1

1.

S.No.	Equation	Value	Say, whether the equation is satisfied (Yes/No)
(i)	$x+3=0$	$x=3$	No ($\therefore x+3=3+3=6\neq 0$)
(ii)	$x+3=0$	$x=0$	No ($\because x+3=0+3=3\neq 0$)
(iii)	$x+3=0$	$x=-3$	Yes ($\because x+3=-3+3=0$)
(iv)	$x-7=1$	$x=7$	No ($\because x=7-7=0\neq 1$)
(v)	$x-7=1$	$x=8$	Yes ($\because x-7=8-7=1$)
(vi)	$5x=25$	$x=0$	No ($\because 5x=5(0)=0\neq 25$)
(vii)	$5x=25$	$x=5$	Yes ($\because 5x=5(5)=25$)
(viii)	$5x=25$	$x=-5$	No ($\because 5x=5(-5)=-25\neq 25$)
(ix)	$\frac{m}{3}=2$	$m=-6$	No $\left(\because \frac{m}{3}=\frac{-6}{3}=-2\neq 2\right)$
(x)	$\frac{m}{3}=2$	$m=0$	No $\left(\because \frac{m}{3}=\frac{0}{3}=0\neq 2\right)$
(xi)	$\frac{m}{3}=2$	$m=6$	Yes $\left(\because \frac{m}{3}=\frac{6}{3}=2\right)$

2. (a) When $n=1$, then

$$n+5=1+5=6\neq 19$$

So, $n=1$ is not a solution of the equation.

(b) When $n=-2$, then

$$7n+5=7(-2)+5$$
$$=-14+5=-9\neq 19$$

$n=-2$ is not a solution of the equation.

(c) When $n=2$, then

$$7n+5=7\times 2+5=14+5=19$$

So, $n=2$ is a solution of the equation.

(d) When $p=1$, then

$$4p-3=4\times 1-3$$
$$=4-3=1\neq 13$$

So, $p=1$ is not a solution of the equation.

(e) When $p=-4$, then

$$4p-3=4\times(-4)-3$$
$$=-16-3=-19\neq 13$$

So, $p=-4$ is not a solution of the equation.

(f) When $p=0$, then

$$4p-3=4(0)-3$$
$$=0-3=-3\neq 13$$

So, $p=0$ is not a solution of the equation.

3. (i) $5p+2=17$

Putting $p=0$, we get

$$5\times 0+2=2\neq 17$$

Putting $p=1$, we get

$$5\times 1+2=7\neq 17$$

Putting $p=2$, we get

$$5\times 2+2=12\neq 17$$

Putting $p=3$, we get

$$5\times 3+2=17=17$$

Hence, $p=3$ is the solution of the equation.

(ii) $3m-14=4$

Putting $m=0$, we get

$$3\times 0-14=-14\neq 4$$

Putting $m=1$, we get

$$3\times 1-14=-11\neq 4$$

Putting $m=2$, we get

$$3\times 2-14=-8\neq 4$$

Putting $m=3$, we get

$$3\times 3-14=-5\neq 4$$

Putting $m=4$, we get

$$3\times 4-14=-2\neq 4$$

Putting $m=5$, we get

$3 \times 5 - 14 = 1 \neq 4$

Putting $m = 6$, we get

$3 \times 6 - 14 = 4 = 4$

Thus, $m = 6$ is the solution of the equation.

4. The equations for the given statements are as follows :

(i) $x + 4 = 9$

(ii) $y - 2 = 8$

(iii) $10a = 70$

(iv) $b \div 5 = 6$

(v) $\frac{3}{4} \times t = 15$

(vi) $7m + 7 = 77$

(vii) $\frac{1}{4} \times x - 4 = 4$, where x is a number.

(viii) $6y - 6 = 60$

(ix) $\frac{1}{3} \times z + 3 = 30$

5. The statements for given equations are as follows :

(i) The sum of p and 4 is 15.

(ii) 7 substrated from m is 3

(iii) Twice a number m is 7.

(iv) One-fifth of a number m is 3.

(v) Three fifth of a number m is 6.

(vi) 4 added to 3 times a number p is 25.

(vii) 2 subtracted from four times of a number p is 18.

(viii) 2 added to half of a number p is 8.

6. (i) Let Parmit has 'm' marbles.

$\therefore$ 5 times of Parmits marbles = $5m$

Since, Irfan's marbles = 5 times of (Parmit's marbles) + 7 = $5m + 7$

But Irfan has marbles = 37

$\therefore \quad 5m + 7 = 37$

(ii) Let the age of Laxmi = y years

$\therefore$ 3 times of Laxmi's age = $3y$ years

Age of Laxmi's father = 3 times Laxmi's age + 4 years

= $(3y + 4)$ years

But Laxmi's father is 49 years.

$3y + 4 = 49$

(iii) Let the lowest marks be l.

$\therefore$ Twice the lowest marks = $2l$

Since, highest marks = Twice the lowest marks + 7 = $2l + 7$

But highest marks = 87

$\therefore \quad 2l + 7 = 87$

(iv) Let the base angle be $b°$.

Vertex angle = Twice either base angle = $2b°$

$\because$ Sun of three angles of a triangle = 180°

$b + b + 2b = 180°$

$4b° = 180°$

This is the required equation.

Exercise 4.2

1. (a) $x - 1 = 0$

Adding 1 to both sides, we have

$x - 1 + 1 = 0 + 1$

$\Rightarrow \quad x + 0 = 1$

$\Rightarrow \quad x = 1$

Hence, $x = 1$ is the solution of the given equation.

(b) $x + 1 = 0$

Subtracting 1 from both sides, we have

$x + 1 - 1 = 0 - 1$

$\Rightarrow \quad x + 0 = -1$

$\Rightarrow \quad x = -1$

Hence, $x = -1$ is the solution of the given equation.

(c) $x - 1 = 5$

Adding 1 to both sides, we have

$x - 1 + 1 = 5 + 1$

$\Rightarrow \quad x + 0 = 5 + 1$

$\Rightarrow \quad x = 6$

Hence, $x = 6$ is the solution of the given equation.

(d) $x + 6 = 2$

Subtracting 6 from both sides, we have

$\Rightarrow \quad x + 6 - 6 = 2 - 6$

$\Rightarrow \quad x + 0 = -4$

$\Rightarrow \quad x = -4$

Hence, $x = -4$ is the solution of the given equation.

(e) $y - 4 = -7$

Adding 4 to both sides, we have

$\Rightarrow \quad y - 4 + 4 = -7 + 4$

$\Rightarrow \quad y + 0 = -3$

$\Rightarrow \quad y = -3$

Hence, $x = -3$ is the solution of the given equation.

(f) $y - 4 = 4$

Adding 4 to both sides, we have

$y - 4 + 4 = 4 + 4$

$\Rightarrow \quad y + 0 = 8$

$\Rightarrow \quad y = 8$

Hence, $y = 8$ is the solution of the given equation.

(g) $y + 4 = 4$

Subtracting 4 from both sides, we have

$y + 4 - 4 = 4 - 4$

$\Rightarrow \quad y + 0 = 0$

$\Rightarrow \quad y = 0$

Hence, $y = 0$ is the solution of the given equation.

(h) $y + 4 = -4$

Subtracting 4 from both sides, we have

$y + 4 - 4 = -4 - 4$

$\Rightarrow \quad y + 0 = -8$

$\Rightarrow \quad y = -8$

Hence, $y = -8$ is the solution of the given equation.

2. (a) $3l = 42$

Dividing both sides by 3, we have

$$\frac{3l}{3} = \frac{42}{3}$$

$\Rightarrow \quad l = 14$

Hence, $l = 14$ is the required solution.

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

Multiplying both sides by 2, we have

$\Rightarrow \quad \frac{b}{2} \times 2 = 6 \times 2$

$\Rightarrow \quad b = 12$

Hence, $b = 12$ is the required solution.

(c) $\frac{p}{7} = 4$

Multiplying both sides by 7, we have

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

$\Rightarrow \quad p = 28$

Hence, $p = 28$ is the required solution.

(d) $4x = 25$

Dividing both sides by 4, we have

$$\frac{4x}{4} = \frac{25}{4}$$

$\Rightarrow \quad x = 25/4$

Hence, $x = \frac{25}{4}$ is the required solution.

(e) $8y = 36$

Dividing both sides by 8, we have

$$\frac{8y}{8} = \frac{36}{8}$$

$\Rightarrow \quad y = \frac{36}{8} = \frac{9}{2}$

Hence, $y = \frac{9}{2}$ is the required solution.

(f) $\frac{z}{3} = \frac{5}{4}$

Multiplying both sides by 3, we have

$$\frac{z}{3} \times 3 = \frac{5}{4} \times 3$$

$\Rightarrow \quad z = \frac{15}{4}$

Hence, $z = \frac{15}{4}$ is the required solution.

(g) $\frac{a}{5} = \frac{7}{15}$

Multiplying both sides by 5, we have

$$\frac{a}{5} \times 5 = \frac{7}{15} \times 5$$

$\Rightarrow \quad a = \frac{7}{3}$

Hence, $a = \frac{7}{3}$ is the required solution.

(h) $20t = -10$

Dividing both sides by 20, we have

$$\frac{20t}{20} = \frac{-10}{20}$$

$\Rightarrow \quad t = -\frac{1}{2}$

Hence, $t = -\frac{1}{2}$ is the required solution.

3. (a) $3n - 2 = 46$

Adding 2 to both sides, we have

$3n - 2 + 2 = 46 + 2$

$\Rightarrow \quad 3n = 48$

Dividing both sides by 3, we have

$$\frac{3n}{3} = \frac{48}{3}$$

$\Rightarrow \quad n = 16$

Hence, $n = 16$ is required solution.

(b) $5m + 7 = 17$

Subtracting 7 from both sides, we have

$5m + 7 - 7 = 17 - 7$

$\Rightarrow \quad 5m + 0 = 10$

$\Rightarrow \quad 5m = 10$

Dividing both sides by 5, we have

$$\frac{5m}{5} = \frac{10}{5}$$

$\Rightarrow \quad m = 2$

Hence, $m = 2$ is the required solution.

(c) $\frac{20p}{3} = 40$

Multiply both sides by 3, we have

$$\frac{20p}{3} \times 3 = 40 \times 3$$

$\Rightarrow \quad 20p = 120$

Dividing both sides by 20, we have

$$\frac{20p}{20} = \frac{120}{20}$$

$\Rightarrow \quad p = 6$

Hence, $p = 6$ is the required solution.

(d) $\frac{3p}{10} = 6$

Multiplying both sides by 10, we have

$$\frac{3p}{10} \times 10 = 6 \times 10$$

$\Rightarrow \quad 3p = 60$

Dividing both sides by 3, we have

$$\frac{3p}{3} = \frac{60}{3} \Rightarrow p = 20$$

Hence, $p = 20$ is the required solution.

4. (a) $10p = 100$

Dividing both sides by 10, we have

$$\frac{10p}{10} = \frac{100}{10}$$

$\Rightarrow \quad p = 10$

Hence, $p = 10$ is the required solution.

(b) $10p + 10 = 100$

Subtracting 10 from both sides, we have

$$10p + 10 - 10 = 100 - 10$$

$\Rightarrow \quad 10p + 0 = 90$

$\Rightarrow \quad 10p = 90$

Dividing both sides by 10, we have

$\Rightarrow \quad \frac{10p}{10} = \frac{90}{10}$

$\Rightarrow \quad p = 9$

Hence, $p = 9$ is the required solution.

(c) $\frac{p}{4} = 5$

Multiplying both sides by 4, we have

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

$\Rightarrow \quad p = 20$

Hence, $p = 20$ is the required solution.

(d) $\frac{-p}{3} = 5$

Multiplying both sides by –3, we have

$$\frac{-p}{3} \times (-3) = 5 \times (-3)$$

$\Rightarrow \quad (-p) \times (-1) = -15$

$\Rightarrow \quad p = -15$

Hence, $p = -15$ is the required solution.

(e) $\frac{3p}{4} = 6$

Multiplying both sides by $\frac{4}{3}$, we have

$$\frac{3p}{4} \times \frac{4}{3} = 6 \times \frac{4}{3}$$

$\Rightarrow \quad p = \frac{24}{3}$

$\Rightarrow \quad p = 8$

Hence, $p = 8$ is the required solution.

(f) $3s = -9$

Dividing both sides by 3, we have

$\Rightarrow \quad \frac{3s}{3} = \frac{-9}{3}$

$\Rightarrow \quad s = -3$

Hence, $s = -3$ is the required solution.

(g) $3s + 12 = 0$

Subtracting 12 from both sides, we have

$\Rightarrow \quad 3s + 12 - 12 = 0 - 12$

$\Rightarrow \quad 3s = -12$

Dividing both sides by 3, we have

$\Rightarrow \quad \frac{3s}{3} = \frac{-12}{3} \Rightarrow s = -4$

Hence, $s = -4$ is the required solution.

(h) $3s = 0$

Dividing both sides by 3, we have

$\Rightarrow \quad \frac{3s}{3} = \frac{0}{3}$

$\Rightarrow \quad s = 0$

Hence, $s = 0$ is the required solution.

(i) $2q = 6$

Dividing both sides by 2, we have

$\Rightarrow \quad \frac{2q}{2} = \frac{6}{2}$

$\Rightarrow \quad q = 3$

Hence, $q = 3$ is the required solution.

(j) $2q - 6 = 0$

Adding 6 to both sides,

$$2q - 6 + 6 = 0 + 6$$

$$2q = 6$$

Dividing both sides by 2, we have

$$\frac{2q}{2} = \frac{6}{2}$$

$$\Rightarrow \quad q = 3$$

Hence, $q = 3$ is the required solution.

(k) $2q + 6 = 0$

Subtracting 6 from both sides, we have

$$2q + 6 - 6 = 0 - 6$$

$$\Rightarrow \quad 2q + 0 = -6$$

$$\Rightarrow \quad 2q = -6$$

Dividing both sides by 2, we have

$$\frac{2q}{2} = \frac{-6}{2}$$

$$\Rightarrow \quad q = -3$$

Hence, $q = -3$ is the required solution.

(l) $2q + 6 = 12$

Subtracting 6 from both sides, we have

$$2q + 6 - 6 = 12 - 6$$

$$\Rightarrow \quad 2q = 6$$

Dividing both sides by 2, we have

$$\frac{2q}{2} = \frac{6}{2}$$

$$\Rightarrow \quad q = 3$$

Hence, $q = 3$ is the required solution.

Exercise 4.3

1. (a) Let the required number be x.

According to question,

$$8x + 4 = 60$$

$$\Rightarrow \quad 8x + 4 - 4 = 60 - 4$$

$$\Rightarrow \quad 8x = 56$$

$$\Rightarrow \quad \frac{8x}{8} = \frac{56}{8}$$

$$\Rightarrow \quad x = 7$$

Hence, required number = 7

(b) Let required number be x.

The equation is

$$\frac{x}{5} - 4 = 3$$

$$\Rightarrow \quad \frac{x}{5} \times 5 - 4 \times 5 = 3 \times 5$$

$$\Rightarrow \quad x - 20 = 15$$

$$\Rightarrow \quad x - 20 + 20 = 15 + 20$$

$$\Rightarrow \quad x = 35$$

Hence, required number = 35

(c) Let number be y.

The equation is

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

$$\Rightarrow \quad 4 \times \frac{3y}{4} + 4 \times 3 = 21 \times 4$$

$$\Rightarrow \quad 3y + 12 = 84$$

$$\Rightarrow \quad 3y + 12 - 12 = 84 - 12$$

$$\Rightarrow \quad 3y = 72$$

$$\Rightarrow \quad \frac{3y}{3} = \frac{72}{3}$$

$$\Rightarrow \quad y = 24$$

Hence, required number = 24

(d) Let the number be m.

The equation is

$$2m - 11 = 15$$

$$\Rightarrow \quad 2m = 15 + 11$$

$$\Rightarrow \quad 2m = 26$$

$$\Rightarrow \quad \frac{2m}{2} = \frac{26}{2}$$

$$\Rightarrow \quad m = 13$$

Hence, required number = 13

(e) Let Munna has x note books.

The equation is

$$50 - 3x = 8$$

$$\Rightarrow \quad 50 - 3x - 50 = 8 - 50$$

$$\Rightarrow \quad -3x = -42$$

$$\Rightarrow \quad \frac{-3x}{-3} = \frac{-42}{-3}$$

$$\Rightarrow \quad x = 14$$

Hence, the required numbers of note books = 14

(f) Let Ibenhal thinks of a number be x.

The equation is

$$\frac{x + 19}{5} = 8$$

$$\Rightarrow \quad 5 \times \frac{(x + 19)}{5} = 8 \times 5$$

$$\Rightarrow \quad x + 19 = 40$$

$$\Rightarrow \quad x + 19 - 19 = 40 - 19$$

$$\Rightarrow \quad x = 21$$

Hence, Ibenhal thinks of a number = 21

(g) Let the Anwar thinks of a number be x.

The equation is

$$\frac{5x}{2} - 7 = 23$$

$$2 \times \frac{5x}{2} - 7 \times 2 = 23 \times 2$$

$$5x - 14 = 46$$
$\Rightarrow$ $5x - 14 + 14 = 46 + 14$
$\Rightarrow$ $5x = 60$
$\Rightarrow$ $\frac{5x}{5} = \frac{60}{5}$
$\Rightarrow$ $x = 12$

Hence, Anwar thinks a number = 12

2. (a) Let the lowest scored marks be x.

According to the question,

$$2x + 7 = 87$$
$\Rightarrow$ $2x + 7 - 7 = 87 - 7$
$\Rightarrow$ $2x = 80$
$\Rightarrow$ $\frac{2x}{2} = \frac{80}{2}$
$\Rightarrow$ $x = 40$

Thus, the lowest scored marks = 40

(b) Let base angle be $x°$.

Vertex angle = 40°

Since, sum of the interior angles of a triangle is 180.

$\therefore$ $x° + x° + 40° = 180°$
$\Rightarrow$ $2x° + 40° - 40° = 180° - 40°$
$\Rightarrow$ $2x° = 140°$
$\Rightarrow$ $\frac{2x°}{2} = \frac{140°}{2}$
$\Rightarrow$ $x° = 70°$

So, each base angle = 70°

(c) Let the number of runs scored by Rahul be x.

Then, runs scored by Sachin = $2x$

According to the question,

$$x + 2x = 200 - 2$$
$\Rightarrow$ $3x = 198$
$\Rightarrow$ $\frac{3x}{3} = \frac{198}{3}$
$\Rightarrow$ $x = 66$

Runs scored by Rahul = 66

Runs scored by Sachin = $2 \times 66 = 132$

3. (i) Let the number of marbles Parmit has be x.

5 times of $x = 5x$

Number of marbles Irfan has = 37

According to question, we have

$\therefore$ $5x + 7 = 37$
$\Rightarrow$ $5x = 37 - 7$
$\Rightarrow$ $5x = 30$
$\Rightarrow$ $\frac{5x}{5} = \frac{30}{5}$
$\Rightarrow$ $x = 6$

Hence, Parmit has 6 marbles.

(ii) Let Laxmi's age be y years, then her father's age be $(3y + 4)$ years.

Father's age = 49 years

According to the question

$\therefore$ $3y + 4 = 49$
$\Rightarrow$ $3y = 49 - 4$
$\Rightarrow$ $3y = 45$
$\Rightarrow$ $\frac{3y}{3} = \frac{45}{3}$
$\Rightarrow$ $y = 15$

Hence, Laxmi's age = 15 years

(iii) Let the number of fruit trees be x.

Number of non-fruit trees will be $(3x + 2)$

According to the question

Number of non-fruits trees = 77

$$3x + 2 = 77$$
$$3x = 77 - 2$$
$\Rightarrow$ $3x = 77 - 2$
$\Rightarrow$ $\frac{3x}{3} = \frac{75}{3}$
$\Rightarrow$ $x = \frac{75}{3}$
$\Rightarrow$ $x = 25$

Thus, the number of fruit trees = 25

4. Let the required number be x.

According to the question

$$7x + 50 = 3 \times 100 - 40$$
$\Rightarrow$ $7x + 50 = 260$
$\Rightarrow$ $7x = 260 - 50$
$\Rightarrow$ $7x = 210$
$\Rightarrow$ $\frac{7x}{7} = \frac{210}{7}$
$\Rightarrow$ $x = 30$

Hence, the required number is 30.

Chapter-5

Lines and Angles

Exercise 5.1

1. Sum of the complementary angles is 90°.

(i) Complement of 20° = 90°– 20° = 70°

(ii) Complement of $63° = 90° - 63° = 27°$

(iii) Complement of $57° = 90° - 57° = 33°$

2. We know that the sum of two supplementary angles is 180°.

(i) Supplement of $105° = 180° - 105° = 75°$

(ii) Supplement of $87° = 180° - 87° = 93°$

(iii) Supplement of 154° $= 180° - 154° = 26°$

3. (i) Sum of the angles $= 65° + 115° = 180°$

Hence, 65° and 115° are supplementary angles.

(ii) Sum of the angles $= 63° + 27° = 90°$

Hence, 63° and 27° are complementary angles.

(iii) Sum of the angles $= 112° + 68° = 180°$

Hence, 112° and 68° are supplementary angles.

(iv) Sum of the angles $= 130° + 50° = 180°$

Hence, 130° and 50° are supplementary angles.

(v) Sum of the angles $= 45° + 45° = 90°$

Hence, 45° and 45° are complementary angles.

(vi) Sum of the angles $= 80° + 10° = 90°$

Hence, 80° and 10° are complementary angles.

4. Let the required angle be x, then complement of $x = 90° - x$

Now, $x = 90° - x$

$\Rightarrow \quad 2x = 90° \quad \Rightarrow x = \frac{90°}{2} = 45°$

Hence, required angle is 45°.

5. Let the required angle be x.

Then its supplement $= 180° - x$

Now, $x = 180° - x$

$\Rightarrow \quad 2x = 180°$

$\Rightarrow \quad x = \frac{180°}{2}$

$\Rightarrow \quad x = 90°$

Hence, required angle is 90°.

6. In case if $\angle 1$ is decreased, the same amount of degree measure is added to $\angle 2$, *i.e.,* $\angle 2$ will be increased by same amount of degree measure.

7. (i) Since, the sum of two acute angles is always less than 180°.

Hence, two acute angles cannot be supplementary.

(ii) Since, the sum of two obtuse angles is always more than 180°.

Hence, two obtuse angles cannot be supplementary.

(iii) Since, the sum of two right angles is 180°.

Hence, two right angles are supplementary.

8. We know that the sum of one angle and its complement is 90°.

Let one angle be $(45° + x)$.

Its complement $= 90° - (45° + x)$

$= 90° - 45° - x = 45° - x$

Clearly, $45° + x > 45° - x$

Hence, the complementary of an angle greater than 45° is less than 45°.

9. (i) 90° (ii) 180°

(iii) supplementary

(iv) linear pair

(v) equal (vi) obtuse angles

10. (i) $\angle AOD$ and $\angle BOC$ are obtuse vertically opposite angles.

(ii) $\angle BOA$ and $\angle AOE$ are adjacent complementary angles.

(iii) $\angle BOE$ and $\angle EOD$ are equal supplementary angles.

(iv) $\angle BOC$ and $\angle COD$, $\angle EOA$ and $\angle EOC$ are unequal supplementary angles.

(v) (a) $\angle BOA$ and $\angle AOE$

(b) $\angle AOE$ and $\angle EOD$

(c) $\angle EOD$ and $\angle COD$

Exercise 5.2

1. (i) If two parallel lines are intersected by a transversal, then corresponding angles are equal.

(ii) It two given lines are intersected by a transversal such that interior alternate angles are equal, then lines are parallel.

(iii) It two given lines are intersected by a transversal such that the sum of the interior angles on the same side of the transversal is 180°, then lines are parallel.

2. (i) $(\angle 1, \angle 5)$, $(\angle 2, \angle 6)$, $(\angle 3, \angle 7)$ and $(\angle 4, \angle 8)$

(ii) $(\angle 2, \angle 8)$ and $(\angle 3, \angle 5)$

(iii) $(\angle 2, \angle 5)$ and $(\angle 3, \angle 8)$

(iv) $(\angle 1, \angle 3)$ $(\angle 2, \angle 4)$, $(\angle 5, \angle 7)$ and $(\angle 6, \angle 8)$

3. $\angle e + 125° = 180°$ (Linear pair)

$\Rightarrow \quad \angle e = 180° - 125° = 55°$

And $\angle e = \angle f = 55°$

(Vertically opposite angles)

In the figure, $p \parallel q$ and t is a transversal.

$\angle a = \angle f$

(Alternate interior angles)

$\angle a = 55°$ $(\because \angle f = 55°)$

$\angle c = \angle a = 55°$

(Vertically opposite angles)

$\angle d = 125°$ (Corresponding angles)

And $\angle b = \angle d = 125°$

(Vertically opposite angles)

So, $\angle a = 55°$, $\angle b = 125°$, $\angle c = 55°$, $\angle d = 125°$, $\angle e = 55°$ and $\angle f = 55°$.

4. (i) In the figure, $l \parallel m$ and t is a transversal.

$\angle 1 = 110°$

(Corresponding angles)

$\angle x = 180° - 110° = 70°$

(ii) In the figure, $l \parallel m$ and a is a transversal.

$\therefore$ $\angle x = 100°$

(Corresponding angles)

5. (i) In the figure, $AB \parallel ED$ and BC is a transversal.

$\therefore$ $\angle DGC = \angle ABC = 70°$

(Corresponding angles)

$\therefore$ $\angle ABC = 70°$ (Given)

(ii) In the figure $BC \parallel EF$ and ED is a transversal.

$\angle DEF = \angle DGC$

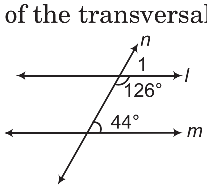
$\angle DGC = \angle DEF = 70°$

(Corresponding angles)

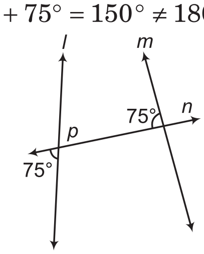
6. (i) So, l and m are not parallel.

Because, $44° + 126° = 170° \neq 180°$

So, the sum of the interior angles or the same side of the transversal is not 180°.

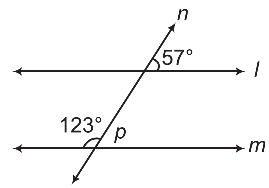


(ii) l is not parallel to m because $\angle p = 75°$. Now, $75° + 75° = 150° \neq 180°$

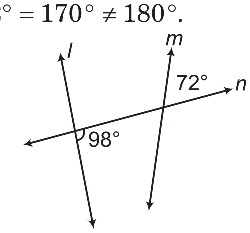


(iii) l is parallel to m because in the figure, corresponding angles are equal.

$\Rightarrow$ $180° - 123° = 57°$



(iv) l and m are not parallel. Because in the figure, the sum of interior angles on the same side of the transversal is not 180°, *i.e.,* $98° + 72° = 170° \neq 180°$.



Chapter-6

The Triangle and its Properties

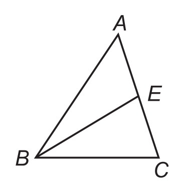
Exercise 6.1

1. (i) $\overline{PM}$ is an altitude of ΔPQR

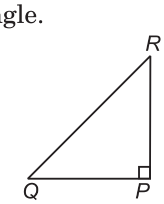
(ii) $\overline{PD}$ is an median of ΔPQR.

(iii) NO, $QM \neq MR$, since M is not mid-point of QR.

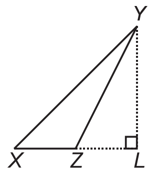
2. (a) In the figure, BE is a median of ΔABC.



(b) In right ΔQPR, $\overline{PQ}$ and $\overline{PR}$ are altitudes of the triangle.

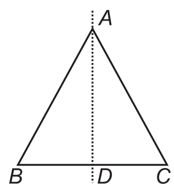


(c) In the figure, YL is the altitude in the exterior of ΔXYZ.



3. Lets draw a line segment BC. By the method of paper folding is made perpendicular. The bend line cuts point D which is mid-point of BC.

On this perpendicular bisector, point A is taken. AB and AC are joined. Thus, ΔABC will be an isosceles triangle in which $AB = AC$.

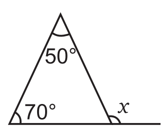


It is clear that D is mid-point of $\overline{BC}$. So, AD is median and AD is altitude on BC.

Hence, the median and altitude of an triangle can be same.

Exercise 6.2

1. (i) The interior opposite angles are 50° and 70°.

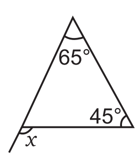


$\therefore$ Using the exterior angle property of a triangle, we have

Exterior angle = Sum of the two interior opposite angles

$\therefore \quad x = 50° + 70° = 120°$

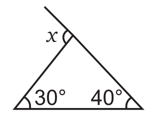
(ii) Interior opposite angles are 65° and 45°.



Exterior angle = Sum of the two interior opposite angles

$\Rightarrow \quad x = 65° + 45° = 110°$

(iii) Interior opposite angles are 30° and 40°.

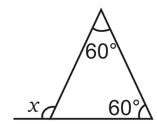


Exterior angle = Sum of two interior opposite angles

$\therefore \quad x = 30° + 40°$

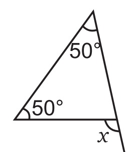
$\Rightarrow \quad x = 70°$

(iv) The interior opposite angles are 60° and 60°.



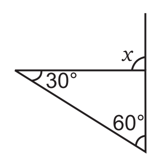
Exterior angle $x = 60° + 60° = 120°$

(v) The interior opposite angles are 50° and 50°.



$\therefore \quad x = 50° + 50° = 100°$

(vi) The interior opposite angles are 30° and 60°.

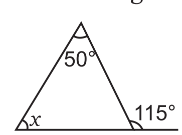


Exterior angle = Sum of two interior opposite angles

$\therefore \quad x = 30° + 60° = 90°$

2. (i) Here, exterior angle = 115°

One of the interior angle = 50°



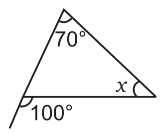
We know that Sum of the two interior opposite angles = Exterior angle

$\therefore \quad x + 50° = 115°$

$\Rightarrow \quad x = 115° - 50° = 65°$

(ii) Here, exterior angle = 100°

One of the interior opposite angle = 70°



We know that

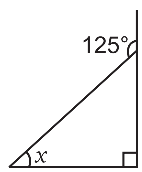
Sum of two interior opposite angles = Exterior angle.

$\therefore \quad x + 70° = 100°$

$\Rightarrow \quad x = 100° - 70° = 30°$

(iii) Here exterior angle = 125°

One of the interior opposite angle = 90°



We know that

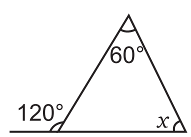
Sum of the two interior opposite angles = Exterior angle.

$\therefore \quad x + 90 = 125°$

$\Rightarrow \quad x = 125° - 90 = 35°$

(iv) Here, interior angle = 120°

One of the opposite interior angle = 60°



We know that

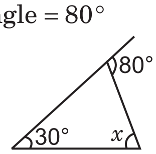
Sum of two opposite interior angles = Exterior angle

$\therefore \quad 60° + x = 120°$

$\Rightarrow \quad x = 120° - 60° = 60°$

(v) Here, one of the interior opposite angle = 30°

Exterior angle = 80°



We know that

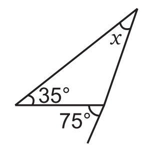
Sum of two opposite interior angles = Exterior angle

$\therefore \quad x + 30° = 80°$

$\Rightarrow \quad x = 80° - 30° = 50°$

(vi) Here, exterior angle = 75°

One of the interior angle = 35°



We know that

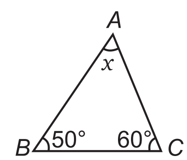
Sum of two opposite interior angles = Exterior angle

$\therefore \quad x + 35° = 75°$

$\Rightarrow \quad x = 75 - 35° = 40°$

Exercise 6.3

1. (i)



We know that

Sum of angles of a triangle is 180°.

In ΔABC, we have

$\angle A + \angle B + \angle C = 180°$

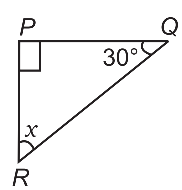
$\Rightarrow \quad x + 50° + 60° = 180°$

$\Rightarrow \quad x = 180° - 50° - 60°$

$\Rightarrow \quad x = 180° - 110°$

$\Rightarrow \quad x = 70°$

(ii)



In ΔPQR, by angle sum property

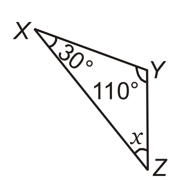
$\angle P + \angle Q + \angle R = 180°$

$90° + 30° + x = 180°$

$x = 180° - 90° - 30°$

$x = 180° - 120° = 60°$

(iii)



In ΔXYZ, by using angle sum property

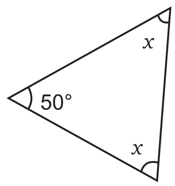
$\angle X + \angle Y + \angle Z = 180°$

$\Rightarrow \quad 30° + 110° + \angle Z = 180°$

$\Rightarrow \quad 140° + \angle Z = 180°$

$\Rightarrow \quad \angle Z = 180 - 140° = 40°$

(iv)

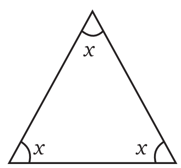


By angle sum property,

$x + x + 50° = 180° \Rightarrow 2x + 50° = 180°$

$\Rightarrow \quad 2x = 180° - 50°$

$\Rightarrow \quad 2x = 130° \Rightarrow x = \dfrac{130}{2} \Rightarrow x = 65°$



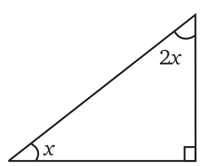
(v) By angle sum proptery,

$x + x + x = 180°$

$\Rightarrow \quad 3x = 180°$

$\Rightarrow \quad x = \dfrac{180°}{3} \Rightarrow x = 60°$

(vi) By angle sum proptery,



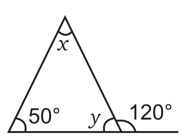
$x + 2x + 90° = 180°$

$\Rightarrow \quad 3x = 180° - 90°$

$\Rightarrow \quad 3x = 90°$

$\Rightarrow \quad x = \dfrac{90°}{3} \Rightarrow x = 30°$

2. (i)



We know that in the triangle exterior angle and adjacent interior angle makes a linear pair.

$\therefore \quad y + 120° = 180°$

$\Rightarrow \quad y = 180° - 120° = 60°$

Sum of the angles of a triangle = 180°

$\therefore \quad x + 50 + y = 180°$

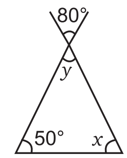
$\Rightarrow \quad x = 180° - 50° - y$

$\Rightarrow \quad x = 130° - 60° \quad [\therefore y = 60°]$

$\Rightarrow \quad x = 70°$

Hence, $x = 70°$ and $y = 60°$

(ii)



Vertically opposite angles are equal, so

$y = 80°$

Sum of the angles of a triangle = 180°

$x + y + 50° = 180°$

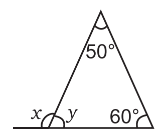
$\Rightarrow \quad x + 80° + 50° = 180° \quad [\because y = 80°]$

$\Rightarrow \quad x + 130° = 180°$

$\Rightarrow \quad x = 180° - 130° \Rightarrow x = 50°$

Hence, $x = 50°$ and $y = 80°$

(iii)



Sum of the angles of a triangle = 180°

$y + 60° + 50° = 180°$

$\Rightarrow \quad y = 180° - 60° - 50°$

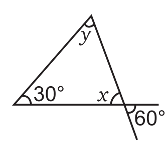
$\Rightarrow \quad y = 180° - 110°$

$\Rightarrow \quad y = 70°$

Exterior angles = Sum of two interior opposite angle $x = 50° + 60° = 110°$

So, $x = 110°$ and $y = 70°$

(iv)



$\because \quad x = 60°$ (Vertically opposite angles)

Since, the sum of three angles of a triangle is 180°.

$\therefore \quad x + y + 30° = 180°$

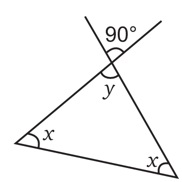
$60° + y + 30° = 180°$

$y = 180° - 60° - 30°$

$= 180° - 90° = 90°$

Hence, $x = 60°$ and $y = 90°$

(v)



$y = 90°$ (Vertically opposite angles)

Since, the sum of the angles of a triangle is 180°.

$\therefore\ x + x + y = 180°$

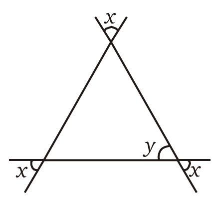
$\Rightarrow\ 2x + 90 = 180°$

$\Rightarrow\ 2x = 180° - 90° \Rightarrow 2x = 90°$

$\Rightarrow\ x = \frac{90°}{2} = 45°$

Hence, $x = 45°$ and $y = 90°$

(vi)



$y = x°$ (Vertically opposite angles)

Since, the sum ofthree angles of a triangle is 180°.

$\therefore\ x + x + y = 180°$

$\Rightarrow\ x + x + x = 180°$ $[\because y = x]$

$\Rightarrow\ 3x = 180°$

$\Rightarrow\ x = \frac{180°}{3} = 60°$

And $y = 60°$

So, $x = 60°$ and $y = 60°$

Exercise 6.4

1. (i) We know that if the sum of the lengths of two sides of a triangle is greater than the length of the third side, then a triangle is possible.

But here, $2 + 3 \not> 5$

Hence, a triangle is not possible with these sides.

(ii) Here, $3 + 6 > 7;\ 3 + 7 > 6$

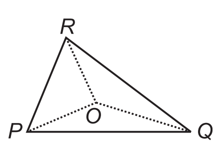
and $6 + 7 > 3$

Hence, a triangle is possible with these sides.

(iii) Here, $6 + 3 > 2$; but $3 + 2 \not> 6$

Hence, a triangle is not possible with these sides.

2.



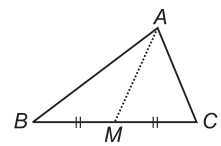
In OPQ, ΔOQR and ΔOPR, we have

(i) $OP + OQ > PQ$

(ii) $OQ + OR > QR$

(iii) $OR + OP > RP$

3. We know that the sum of the lengths of any two sides of a triangle is greater than the length of the third side.



In ΔABM,

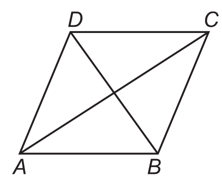
$AB + BM > AM$ ...(i)

In ΔAMC, $AC + MC > AM$ ...(ii)

Adding (i) and (ii), we have

$AB + (BM + MC) + AC > AM + AM$

4. In a quadriteral $ABCD$, AC and BD are its diagonals.



We know that the sum of the lengths of any two sides of a triangle is greater than the length of the third side.

In ΔABC, $AB + BC > AC$ ...(i)

In ΔDAC, $CD + DA > AC$ ...(ii)

In ΔABD, $AB + AD > BD$ ...(iii)

And in ΔCBD, $BC + CD > BD$ ...(iv)

Adding (i), (ii), (iii) and (iv),

$(AB + BC) + (CD + DA) + (AB + AD) + (BC + CD) > AC + AC + BD + BD$

$\Rightarrow 2(AB + BC + CD + DA) > 2(AC + BD)$

$\Rightarrow AB + BC + CD + AD > AC + BD$

5. $ABCD$ is a quadrilateral and diagonal AC and BD cuts each other at point O.

We know that, the sum of the lengths of any two sides of a triangle is greater than the length of the third side.

In ΔOAB, $OA + OB > AB$ ...(i)

In ΔBOC, $OB + OC > BC$ ...(ii)

In ΔCOD, $OC + OD > DC$ ...(iii)

And in ΔAOD, $OD + OA > DA$ ...(iv)

Adding (i), (ii), (iii) and (iv),

$2(OA + OB + OC + OD) > (AB + BC + CD + DA)$

$\Rightarrow \quad 2(OA + OC) + 2(OB + OD) > (AB + BC + CD + DA)$

$\Rightarrow 2(AC + BD) > AB + BC + CD + DA$

$\Rightarrow AB + BC + CD + DA < 2(AC + BD)$

6. The sum of the lengths of any two sides of a triangle is greater than the length of the third side.

Let length of third side be x cm.

$12 + 15 > x,\ x + 12 > 15$ and $x + 15 > 12$

$\Rightarrow 27 > x,\ x > 15 - 12$ and $x > 12 - 15$

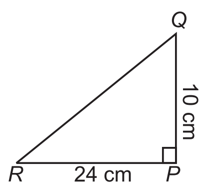
$\Rightarrow 27 > x, x > 3$ and $x > -3$

Hence, the third side should be any length between 3 cm and 27 cm.

Exercise 6.5

1. In right triangle PQR,

Using Pythagoras property,



$(QR)^2 = (PQ)^2 + (PR)^2$

$\Rightarrow \quad (QR)^2 = 24^2 + 10^2$

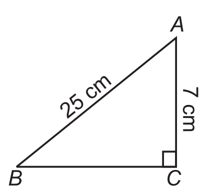
$\Rightarrow \quad (QR)^2 = 576 + 100 = 676$

$\Rightarrow \quad QR = \sqrt{676}$

$\Rightarrow \quad QR = \sqrt{26 \times 26}$

$\Rightarrow \quad QR = 26$ cm

2. In right ΔABC, using Pythagoras theorem,



$(AB)^2 = (AC)^2 + (BC)^2$

$\Rightarrow \quad (BC)^2 = (AB)^2 - (AC)^2$

$\Rightarrow \quad (BC)^2 = 25^2 - 7^2$

$\Rightarrow \quad (BC)^2 = 625 - 49 = 576$

$\Rightarrow \quad BC = \sqrt{576}$

$\Rightarrow \quad BC = \sqrt{24 \times 24}$ cm $\Rightarrow BC = 24$ cm

3. Let AB be a ladder and B is a window.

$AB = 15$ m; $BC = 12$ m

Since, ΔABC is a right angled triangle right angled at C.

By using Pythagoras theorem,

$\therefore\ (AC)^2 = (AB)^2 - (BC)^2 = 15^2 - 12^2$

$\Rightarrow \quad (AC)^2 = 225 - 144 = 81$

$\Rightarrow \quad (AC)^2 = 81$

$\Rightarrow \quad AC = \sqrt{9 \times 9} = 9$ m

Hence, the required distance of the foot of the ladder from the wall is 9 m.

4. (i) Let $a = 2.5$ cm, $b = 6.5$ cm and $c = 6$ cm then by Pythagoras theorem

$a^2 + c^2 = (2.5)^2 + 6^2$

$= 6.25 + 36 = 42.25$

$b = 6.5 \Rightarrow b^2 = 42.25$

$\therefore \quad a^2 + c^2 = b^2$

Hence, given sides can be the side of a right triangle.

(ii) Let $a = 2$ cm, $b = 2$ cm and $c = 5$ cm

$\therefore\ a + b = 2 + 2 = 4 < 5$

$a + b < c$

$\therefore$ Triangle can not be formed.

(iii) Let $a = 1.5$ cm, $b = 2$ cm and $c = 2.5$ cm

Now, $\quad a^2 + b^2 = (1.5)^2 + (2)^2$

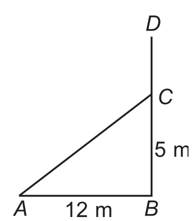
$= 2.25 + 4 = 6.25$

And $c = 2.5 \Rightarrow (c)^2 = (2.5)^2 = 6.25$

$\because \quad a^2 + b^2 = c^2$

Hence, given sides can be the side of right triangle.

5. Let BCD is a tree which is broken at point C and its top point D touches the ground at point A.



So, $\quad CD = AC$

$BC = 5$ m; $AB = 12$ m

In right angled triangle ABC,

$(AC)^2 = (AB)^2 + (BC)^2$

$\Rightarrow \quad (AC)^2 = (12)^2 + (5)^2$

$\Rightarrow \quad (AC)^2 = 144 + 25$

$\Rightarrow \quad (AC)^2 = 169$

$$(AC)^2 = (13)^2$$
$$AC = 13 \text{ m}$$
$$CD = AC = 13 \text{ m}$$

Height of the tree $BD = BC + CD$
$$= 5 \text{ m} + 13 \text{ m} = 18 \text{ m}$$

6. By using angle sum property,

$\angle P + \angle Q + \angle R = 180°$

$\Rightarrow \quad \angle P + 25° + 65° = 180°$

$\Rightarrow \quad \angle P + 90° = 180°$

$\Rightarrow \quad \angle P = 180° - 90° = 90°$

$\therefore$ ΔPQR is a right angled triangle in which $\angle P = 90°$

By using Pythagoras theorem
$$PR^2 + PQ^2 = QR^2$$

Hence, relation (ii) is true.

7. Let $ABCD$ be a rectangle, such that $AB = 40$ cm and $AC = 41$ cm.

In right angled triangle ABC, $\angle B = 90°$

By using Pythagoras theorem,
$$(BC)^2 = (AC)^2 - (AB)^2$$

$\Rightarrow \quad (BC)^2 = (41)^2 - (40)^2$

$\Rightarrow \quad (BC)^2 = (40 + 41)(41 - 40)$

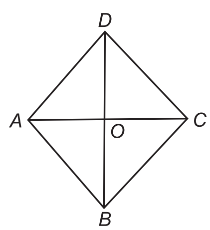
$\Rightarrow \quad (BC)^2 = 81 \times 1 \Rightarrow (BC)^2 = 81$

$\Rightarrow \quad (BC)^2 = (9)^2 \quad \Rightarrow BC = 9$ cm

Perimeter of rectangle $= 2(AB + BC)$

$= 2(40 + 9)$ cm $= 2 \times 49 = 98$ cm

8. Let $ABCD$ be a rhombus such that diagonal $AC = 16$ cm and $BD = 30$ cm.



We know that the diagonals of a rhombus bisect each other at right angles.

In ΔAOB,
$$AO = \frac{1}{2} AC = \frac{1}{2} \times 16 = 8 \text{ cm}$$

And $\quad OB = \frac{1}{2} BD = \frac{1}{2} \times 30 = 15$ cm

In right ΔAOB,
$$(AB)^2 = (OA)^2 + (OB)^2 = 8^2 + 15^2 \text{cm}$$
$$= 64 + 225 = 289$$
$$AB = \sqrt{289}$$
$$AB = \sqrt{17 \times 17} = 17 \text{ cm}$$

Now, perimeter of the rhombus
$$= 4 \times 17 = 68 \text{ cm}$$

Chapter-7

Comparing Quantities

Exercise 7.1

1. (a) $\frac{1}{8} = \frac{\frac{1}{8} \times 100}{100} = \frac{12.5}{100} = 12.5\%$

(b) $\frac{5}{4} = \frac{\frac{5}{4} \times 100}{100} = \frac{125}{100} = 125\%$

(c) $\frac{3}{40} = \frac{\frac{3}{40} \times 100}{100} = \frac{7.5}{100} = 7.5\%$

(d) $\frac{2}{7} = \frac{\frac{2}{7} \times 100}{100} = \frac{\frac{200}{7}}{100} = \frac{28\frac{4}{7}}{100} = 28\frac{4}{7}\%$

2. (a) $0.65 = \frac{0.65 \times 100}{100} = \frac{65}{100} = 65\%$

(b) $2.1 = \frac{2.1 \times 100}{100} = \frac{210}{100} = 210\%$

(c) $0.02 = \frac{0.02 \times 100}{100} = \frac{2}{100} = 2\%$

(d) $12.35 = \frac{12.35 \times 100}{100} = \frac{1235}{100}$

$= 1235\%$

3. (i) $\frac{1}{4}$ part is coloured.

Percentage of coloured part
$$= \left(\frac{1}{4} \times 100\right)\% = 25\%$$

(ii) $\frac{3}{5}$ part is coloured.

Percentage of coloured part $= \left(\frac{3}{5} \times 100\right)\%$
$$= (3 \times 20)\% = 60\%$$

(iii) $\frac{3}{8}$ part is coloured.

Percentage of coloured part $= \left(\frac{3}{8} \times 100\right)\%$
$$= \left(\frac{3}{2} \times 25\right)\% = \frac{75}{2}\%$$
$$= 37.5\%$$

4. (a) 15% of 250 $= \frac{15}{100} \times 250$

$= \frac{15}{4} \times 10 = \frac{150}{4} = 37.5$

(b) 1% of 1 hour = 1% of 60 minutes

$= \frac{1}{100} \times 60 = \frac{6}{10}$ minutes

$= \frac{6}{10} \times 60$ sec = 36 sec

(c) 20% of 2,500 = $\frac{20}{100} \times 2{,}500$

= ₹ 20 × ₹ 25 = ₹ 500

(d) 75% of 1 kg = 75% of 1000 g

$= \frac{75}{100} \times 1000 = 750$ g

= 0.75 kg

5. (a) Let whole quantity be x, then

5% of $x = 600$

$\Rightarrow \frac{5}{100} \times x = 600$

$\Rightarrow x = \frac{600 \times 100}{5}$

$\Rightarrow x = 600 \times 20 = 12000$

Thus, the whole quantity is 12000.

(b) Let the whole quantity be x, then

12% of $x = 1{,}080$

$\Rightarrow \frac{12}{100} \times x = 1{,}080$

$\Rightarrow x = \frac{1{,}080 \times 100}{12}$

$\Rightarrow x = 90 \times 100 =$ ₹ 9,000

Hence, the whole quantity is ₹ 9,000.

(c) Let the whole quantity be x, then

40% of $x = 500$ km

$\Rightarrow \frac{40}{100} \times x = 500$ km

$\Rightarrow x = \left(500 \times \frac{100}{40}\right)$ km

$\Rightarrow x = 25 \times 50 = 1250$ km

Hence, whole quantity is 1250 km.

(d) Let whole quantity be x, then

70% of $x = 14$ minutes

$\Rightarrow \frac{70}{100} \times x = 14$ minutes

$\Rightarrow x = \left(14 \times \frac{10}{7}\right)$ minutes

$\Rightarrow x = (2 \times 10)$ minutes

$\Rightarrow x = 20$ minutes

Hence, the whole quantity is 20 minutes.

(e) Let the whole quantity be x, then

8% of $x = 40$ litres

$\Rightarrow \frac{8}{100} \times x = 40$ litres

$\Rightarrow x = \frac{40 \times 100}{8}$ litres

$\Rightarrow$ = 500 litres

Hence, the whole quantity is 500 litres.

6. (a) $25\% = \frac{25}{100} = \frac{1}{4} = 0.25$

(b) $150\% = \frac{150}{100} = \frac{3}{2} = 1.50$

(c) $20\% = \frac{20}{100} = \frac{1}{5} = 0.20$

(d) $5\% = \frac{5}{100} = \frac{1}{20} = 0.05$

7. Percentage of females in a city = 30%

Percentage of the males = 40%

Percentage of children

= (100 – 30 – 40)%

= (100 – 70)% = 30%

8. Percentage of voters who voted = 60%

Percentage of voters who did not vote = (100 – 60)% = 40%

Total voters = 15,000

Voters who did not vote = 40% of 15,000

$= \frac{40}{100} \times 15{,}000 = 6{,}000$

Hence, 6,000 voters did not vote.

9. Let salary of Meeta be ₹ a.

10% of a = ₹ 4000

$\Rightarrow \frac{10}{100} \times a = 4000$

$\Rightarrow \frac{1}{10} \times a = 4000$

$\Rightarrow a = 10 \times 4000 =$ ₹ 40,000

10. Total number of matches played = 20

No. of matches won = 25% of 20

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

∴ The team won 5 matches.

Exercise 7.2

1. (a) CP of shears = ₹ 250

SP of shears = ₹ 325

∵ SP > CP

$\therefore$ Profit = SP − CP

$= ₹(325 - 250) = ₹75$

$$\text{Profit\%} = \left(\frac{\text{Profit}}{\text{CP}} \times 100\right)\%$$

$$= \frac{75}{250} \times 100 = 30\%$$

(b) CP of refrigerator = ₹ 12,000

SP of refrigerator = ₹ 13,500

$\because$ SP > CP

$\therefore$ Profit $= ₹(13{,}500 - 12{,}000) = ₹1{,}500$

$$\text{Profit\%} = \left(\frac{\text{Profit}}{\text{CP}} \times 100\right)\%$$

$$= \left(\frac{1{,}500}{12{,}000} \times 100\right)\% = 12.5\%$$

(c) CP of cupboard = ₹ 2,500

And SP = ₹ 3,000

$\because$ SP > CP

$\therefore$ Profit = SP − CP

$= 3{,}000 - 2{,}500 = ₹500$

$$\text{Profit\%} = \left(\frac{\text{Profit}}{\text{CP}} \times 100\right)\%$$

$$= \left(\frac{500}{2{,}500} \times 100\right)\% = 20\%$$

2. (a) Given ratio = 3 : 1

Sum of the terms = 3 + 1 = 4

It means Ist part and IInd part are $\frac{3}{4}$ and $\frac{1}{4}$.

$\therefore$ Percentage of the 1st part of the ratio

$$= \left(\frac{3}{4} \times 100\right)\% = 75\%$$

Percentage of the IInd part of the ratio

$$= \left(\frac{1}{4} \times 100\right)\% = 25\%$$

(b) Given ratio = 2 : 3 : 5

Sum of the terms = 2 + 3 + 5 = 10

If means Ist, IInd and IIIrd parts are $\frac{2}{10}$, $\frac{3}{10}$ and $\frac{5}{10}$.

$\therefore$ Percentage of the 1st part

$$= \left(\frac{2}{10} \times 100\right)\% = 20\%$$

Percentage of the IInd part

$$= \left(\frac{3}{10} \times 100\right)\% = 30\%$$

Percentage of the IIIrd part

$$= \left(\frac{5}{10} \times 100\right) = 50\%$$

(c) Given ratio = 1 : 4

Sum of the terms = 1 + 4 = 5

It means Ist and IInd parts are $\frac{1}{5}$ and $\frac{4}{5}$.

Percentage of the Ist part

$$= \left(\frac{1}{5} \times 100\right)\% = 20\%$$

Percentage of the IInd part

$$= \left(\frac{4}{5} \times 100\right)\% = 80\%$$

(d) Given ratio = 1 : 2 : 5

Sum of the terms = 1 + 2 + 5 = 8

It means Ist, IInd and IIIrd parts are $\frac{1}{8}$, $\frac{2}{8}$ and $\frac{5}{8}$.

Percentage of Ist part

$$= \frac{1}{8} \times 100 = 12.5\%$$

Percentage of IInd part

$$= \frac{2}{8} \times 100 = 25\%$$

Percentage of IIIrd part

$$= \frac{5}{8} \times 100 = 62.5\%$$

3. Initial population = 25000

Decreased population = 24500

Decreased in population

$= 25{,}000 - 24{,}500 = 500$

$$\text{Decrease\%} = \left(\frac{500}{25{,}000} \times 100\right)\%$$

$$= 2\%$$

4. Initial cost of a car = ₹ 3,50,000

Increased Cost of a car = ₹ 3,70,000

Increase in cost

$= ₹(3{,}70{,}000 - 3{,}50{,}000)$

$= ₹20{,}000$

$$\text{Increase\%} = \left(\frac{20{,}000}{3{,}50{,}000} \times 100\right)\%$$

$$= \frac{40}{7}\% = 5\frac{5}{7}\%$$

5. CP of a TV = ₹ 10,000

Profit% = 20%

Now, SP of a TV

$$= \frac{(100 + \text{Profit}) \times \text{CP}}{100}$$

$$= ₹\left[\frac{(100 + 20) \times 10{,}000}{100}\right]$$

$$= ₹(120 \times 100) = ₹\,12{,}000$$

Thus, I will get ₹ 12000 for the TV.

6. SP of a washing machine = ₹ 13,500

Loss = 20%

Now, $\text{CP of} = ₹\,\frac{100 \times \text{SP}}{100 - \text{Loss}}\%$

$$\text{CP} = ₹\left(\frac{100 \times 13{,}500}{100 - 20}\right)$$

$$= ₹\,\frac{100 \times 13{,}500}{80} = ₹\,16{,}875$$

Hence, Juhi bought the washing machine for ₹ 16,875.

7. (i) Ratio of calcium, carbon and oxygen in chalk = 10 : 3 : 12

Sum of the ratio = 10 + 3 + 12 = 25

Part of carbon in chalk = $\frac{3}{25}$

∴ Percentage of carbon in chalk

$$= \left(\frac{3}{25} \times 100\right)\%$$

$$= (3 \times 4)\% = 12\%$$

(ii) Let the weight of the stick be x grams.

∴ 12% of the chalk mixture is 3 grams.

∴ 12% of $x = 3$

$$\Rightarrow \quad \frac{12}{100} \times x = 3$$

$$\Rightarrow \quad x = \frac{3 \times 100}{12} = 25 \text{ grams}$$

Hence, the weight of the chalk stick = 25 g

8. CP of a book = ₹ 275

Loss = 15%

$$\text{SP of a book} = \frac{(100 - \text{Loss}) \times \text{CP}}{100}$$

$$= \frac{(100 - 15) \times 275}{100}$$

$$= \frac{85 \times 275}{100} = 85 \times 2.75$$

$$= ₹\,233.75$$

Hence, SP of a book = ₹ 233.75

9. (a) Principal (P) = ₹ 1,200

Rate % (R) = 12% p.a.

Time (T) = 3 years

$$\text{Simple interest (SI)} = \frac{P \times R \times T}{100}$$

$$= ₹\,\frac{1{,}200 \times 12 \times 3}{100}$$

$$= ₹\,432$$

Now, Amount = Principal (P) + Simple interest (SI)

$$= ₹(1{,}200 + 432)$$

$$= ₹\,1{,}632$$

(b) Principal (P) = ₹ 7,500

Rate% (R) = 5% p.a.

Time (T) = 3 years

$$\text{Simple interest} = \frac{P \times R \times T}{100}$$

$$= ₹\left(\frac{7{,}500 \times 5 \times 3}{100}\right) = ₹\,1{,}125$$

Amount = Principal + Simple interest

$$= ₹(7{,}500 + 1{,}125) = ₹\,8{,}625$$

10. Principal (P) = ₹ 56,000

Simple interest = ₹ 280

Time (T) = 2 years, $\text{Rate}\,(R) = \frac{\text{SI} \times 100}{P \times T}$

$$= \left(\frac{280 \times 100}{56{,}000 \times 2}\right)\% = 0.25\%$$

Hence, rate of interest is 0.25% per year.

11. Simple interest (SI) = ₹ 45

Rate (R) = 9% p.a., Time (T) = 1 year

$$\text{Principal}\,(P) = \frac{\text{SI} \times 100}{R \times T} = \frac{45 \times 100}{9 \times 1}$$

$$= ₹\,5 \times 100 = ₹\,500$$

Hence, borrowed sum is ₹ 500.

Chapter-8

Rational Numbers

Exercise 8.1

1. (i) We know that

$$-1 = \frac{-1}{1} = \frac{-1 \times 6}{1 \times 6} = \frac{-6}{6}$$

And $0 = \frac{0}{1} = \frac{0\times 6}{1\times 6} = \frac{0}{6}$

We know that integers between –6 and 0 are $-6 < -5 < -4 < -3 < -2 < -1 < 0$.

$\Rightarrow \frac{-6}{6} < \frac{-5}{6} < \frac{-4}{6} < \frac{-3}{6} < \frac{-2}{6} < \frac{-1}{6} < \frac{0}{6}$

Hence, 5 rational numbers between –1 and 0 are $\frac{-5}{6}, \frac{-4}{6}, \frac{-3}{6}, \frac{-2}{6}$ and $\frac{-1}{6}$ *i.e.,* $\frac{-5}{6}, \frac{-2}{3}, \frac{-1}{2}, \frac{-1}{3}$ and $\frac{-1}{6}$.

(ii) We know that

$-2 = \frac{-2}{1} = \frac{-2\times 6}{1\times 6} = \frac{-12}{6}$

And $-1 = \frac{-1}{1} = \frac{-1\times 6}{1\times 6} = \frac{-6}{6}$

Now, integers between –12 and –6 are $-12 < -11 < -10 < -9 < -8 < -7 < -6$.

$\Rightarrow \frac{-12}{6} < \frac{-11}{6} < \frac{-10}{6} < \frac{-9}{6} < \frac{-8}{6} < \frac{-7}{6} < \frac{-6}{6}$

Hence, 5 rational numbers between –2 and –1 are $\frac{-11}{6}, \frac{-10}{6}, \frac{-9}{6}, \frac{-8}{6}$ and $\frac{-7}{6}$ *i.e.,* $\frac{-11}{6}, \frac{-5}{3}, \frac{-3}{2}, \frac{-4}{3}$ and $\frac{-7}{6}$.

(iii) $\frac{-4}{5} = \frac{-4\times 9}{5\times 9} = \frac{-36}{45}$ and $\frac{-2}{3} = \frac{-2\times 15}{3\times 15} = \frac{-30}{45}$

We know that integers between –36 and –30 are

$-36 < -35 < -34 < -33 < -32 < -31 < -30$.

$\Rightarrow \frac{-36}{45} < \frac{-35}{45} < \frac{-34}{45} < \frac{-33}{45} < \frac{-32}{45} < \frac{-31}{45} < \frac{-30}{45}$

Hence, 5 rational numbers between $\frac{-4}{5}$ and $\frac{-2}{3}$ are $\frac{-35}{45}, \frac{-34}{45}, \frac{-33}{45}, \frac{-32}{45}$ and $\frac{-31}{45}$ *i.e.,* $\frac{-7}{9}, \frac{-34}{45}, \frac{-11}{15}, \frac{-32}{45}$ and $-\frac{31}{45}$.

(iv) $\frac{-1}{2} = \frac{-1\times 3}{2\times 3} = \frac{-3}{6}$ And $\frac{2}{3} = \frac{2\times 2}{3\times 2} = \frac{4}{6}$

We know that integers between –3 and 4 are $-3 < -2 < -1 < 0 < 1 < 2 < 3 < 4$.

$\Rightarrow \frac{-3}{6} < \frac{-2}{6} < \frac{-1}{6} < \frac{0}{6} < \frac{1}{6} < \frac{2}{6} < \frac{3}{6} < \frac{4}{6}$

Hence, 5 rational numbers between $\frac{-1}{2}$ and $\frac{2}{3}$ are $\frac{-2}{6}, \frac{-1}{6}, \frac{0}{6}, \frac{1}{6}$ and $\frac{2}{6}$ *i.e.,* $\frac{-1}{3}, \frac{-1}{6}, \frac{0}{6}, \frac{1}{6}$ and $\frac{1}{3}$.

2. (i) $\frac{-3}{5}, \frac{-6}{10}, \frac{-9}{15}, \frac{-12}{20}, \ldots\ldots\ldots$

Now $\frac{-3}{5} = \frac{(-3)\times 1}{(5)\times 1}$; $\frac{-6}{10} = \frac{(-3)\times 2}{5\times 2}$

$\frac{-9}{15} = \frac{(-3)\times 3}{5\times 3}$; $\frac{-12}{20} = \frac{(-3)\times 4}{5\times 4}$

Next four rational numbers would be :

$\frac{(-3)\times 5}{5\times 5} = \frac{-15}{25}$; $\frac{(-3)\times 6}{5\times 6} = \frac{-18}{30}$

$\frac{(-3)\times 7}{5\times 7} = \frac{-21}{35}$; $\frac{(-3)\times 8}{5\times 8} = \frac{-24}{40}$

Hence, the next four rational numbers are $\frac{-15}{25}, \frac{-18}{30}, \frac{-21}{35}$ and $\frac{-24}{40}$.

(ii) $\frac{-1}{4}, \frac{-2}{8}, \frac{-3}{12}, \ldots$

$\frac{-1}{4} = \frac{(-1)\times 1}{4\times 1}$

$\frac{-2}{8} = \frac{(-1)\times 2}{4\times 2}$; $\frac{-3}{12} = \frac{(-1)\times 3}{4\times 3}$

Next four rational numbers would be

$\frac{(-1)\times 4}{4\times 4} = \frac{-4}{16}$; $\frac{(-1)\times 5}{4\times 5} = \frac{-5}{20}$

$\frac{(-1)\times 6}{4\times 6} = \frac{-6}{24}$; $\frac{(-1)\times 7}{4\times 7} = \frac{-7}{28}$

Hence, the next four rational numbers are $\frac{-4}{16}, \frac{-5}{20}, \frac{-6}{24}$, and $\frac{-7}{28}$.

(iii) $\frac{-1}{6}, \frac{2}{-12}, \frac{3}{-18}, \frac{4}{-24}, \ldots$

$\frac{-1}{6} = \frac{1}{-6} = \frac{1\times 1}{(-6)\times 1}$; $\frac{2}{-12} = \frac{1\times 2}{(-6)\times 2}$

$\frac{3}{-18} = \frac{1\times 3}{(-6)\times 3}$; $\frac{4}{-24} = \frac{1\times 4}{(-6)\times 4}$

Next four rational numbers would be

$\frac{1\times 5}{(-6)\times 5} = \frac{5}{-30}$; $\frac{1\times 6}{(-6)\times 6} = \frac{6}{-36}$

$\frac{1\times 7}{(-6)\times 7} = \frac{7}{-42}$; $\frac{1\times 8}{(-6)\times 8} = \frac{8}{-48}$

Hence, the next four rational numbers are $\frac{5}{-30}, \frac{6}{-36}, \frac{7}{-42}$ and $\frac{8}{-48}$.

(iv) $\frac{-2}{3}, \frac{2}{-3}, \frac{4}{-6}, \frac{6}{-9}, \ldots$

$$\frac{-2}{3} = \frac{2 \times (-1)}{(-3) \times (-1)}; \quad \frac{2}{-3} = \frac{2 \times 1}{(-3) \times 1}$$

$$\frac{4}{-6} = \frac{2 \times 2}{(-3) \times 2}; \quad \frac{6}{-9} = \frac{2 \times 3}{(-3) \times 3}$$

Next four rational numbers are

$$\frac{2 \times 4}{(-3) \times 4} = \frac{8}{-12}; \quad \frac{2 \times 5}{(-3) \times 5} = \frac{10}{-15}$$

$$\frac{2 \times 6}{(-3) \times 6} = \frac{12}{-18}; \quad \frac{2 \times 7}{(-3) \times 7} = \frac{14}{-21}$$

3. (i) We have

$$\frac{-2 \times 2}{7 \times 2} = \frac{-4}{14}, \frac{-2 \times 3}{7 \times 3} = \frac{-6}{21},$$

$$\frac{-2 \times 4}{7 \times 4} = \frac{-8}{28} \text{ and } \frac{-2 \times 5}{7 \times 5} = \frac{-10}{35}$$

Hence, the four rational numbers equivalent to $\frac{-2}{7}$ are $\frac{-4}{14}, \frac{-6}{21}, \frac{-8}{28}$ and $\frac{-10}{35}$.

(ii) We have

$$\frac{5 \times 2}{-3 \times 2} = \frac{10}{-6}, \frac{5 \times 3}{-3 \times 3} = \frac{15}{-9},$$

$$\frac{5 \times 4}{-3 \times 4} = \frac{20}{-12} \text{ and } \frac{5 \times 5}{-3 \times 5} = \frac{25}{-15}$$

Hence, the four rational numbers equivalent to $\frac{5}{-3}$ are $\frac{10}{-6}, \frac{15}{-9}, \frac{20}{-12}$ and $\frac{25}{-15}$.

(iii) We have $\frac{4 \times 2}{9 \times 2} = \frac{8}{18}, \frac{4 \times 3}{9 \times 3} = \frac{12}{27},$

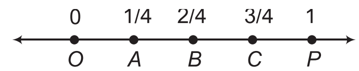
$$\frac{4 \times 4}{9 \times 4} = \frac{16}{36} \text{ and } \frac{4 \times 5}{9 \times 5} = \frac{20}{45}$$

Hence, the four rational numbers equivalent to $\frac{4}{9}$ are $\frac{8}{18}, \frac{12}{27}, \frac{16}{36}$ and $\frac{20}{45}$.

4. (i) To represent the rational number $\frac{3}{4}$ on the number line, draw a number line. Choose a point O on it to represent the rational number zero. Choose a point P to the right of O to represent 1. Then, divide OP, into 4 equal parts such that

$$OA = AB = BC = CP$$

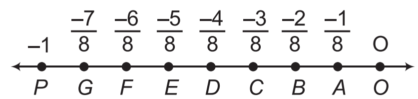
The point C represents $\frac{3}{4}$.



(ii) To represent $\frac{-5}{8}$ on a number line, draw a number line. Take a point O on it to represent the rational number zero.

Now take point P to the left of O to represent −1. Now, divide OA into 8 equal parts such that

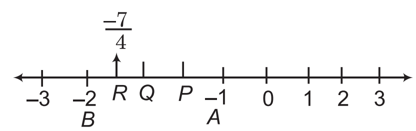
$$OA = AB = BC = CD = DE = EF$$
$$= FG = GP$$



On the number line E represents $\frac{-5}{8}$.

(iii) To represent $\frac{-7}{4}$ on a number line, draw a number line.

Take a point O on it to represent the rational number zero.



$$\frac{-7}{4} = -1 + \frac{-3}{4} \quad \therefore \quad -2 < \frac{-7}{4} < -1$$

Hence, divide AB into 4 equal parts such that $AP = PQ = QR = RB$

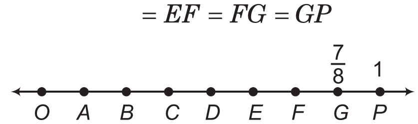
Point R represents $\left(-1 + \frac{-3}{4} = \frac{-7}{4}\right)$

(iv) To represent $\frac{7}{8}$ on a number line, draw a number line.

Take one point O on it to represent the rational number zero. Now, take any point P to the right of O. Such that $OP = 1$

Now, divide OP into eight equal parts such that

$$OA = AB = BC = CD = DE$$
$$= EF = FG = GP$$



Since, OA is $\frac{1}{8}$ part of OP.

Hence, point G represents $\frac{7}{8}$.

5. Since, $AP = PQ = QB$

∴ Distance between 2 and 3 is divided into 3 equal parts. It is clear from the number line.

P represents the rational number

$$= 2 + \frac{1}{3} = \frac{7}{3}$$

Q represents the rational number

$$= 2 + \frac{2}{3} = \frac{8}{3}$$

R represents the rational number

$$-\left(1 + \frac{1}{3}\right) = -1\frac{1}{3} = \frac{-4}{3}$$

S represents the rational number

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

6. (i) We represent these rational numbers in standard form as

$$\frac{-7}{21} = \frac{-7 \div 7}{21 \div 7} = \frac{-1}{3}$$

And $$\frac{3}{9} = \frac{3 \div 3}{9 \div 3} = \frac{1}{3}$$

These rational numbers are not equal.

∴ $$\frac{-7}{21} \neq \frac{3}{9}$$

(ii) We represent these rational numbers in standard form as

$$\frac{-16}{20} = \frac{-16 \div 4}{20 \div 4} = \frac{-4}{5}$$

And $$\frac{20}{-25} = \frac{20 \div (-5)}{(-25) \div (-5)} = \frac{-4}{5}$$

Hence, rational numbers $\frac{-16}{20}$ and $\frac{20}{-25}$ represent the same rational number.

(iii) We represent these rational numbers in standard form as

$$\frac{-2}{-3} = \frac{(-2) \div (-1)}{(-3) \div (-1)} = \frac{2}{3} \quad \text{And } \frac{2}{3} = \frac{2}{3}$$

Hence, rational numbers $\frac{-2}{-3}$ and $\frac{2}{3}$ represent the same rational number.

(iv) We represent these rational numbers in standard form as

$$\frac{-3}{5} = \frac{-3}{5}$$

And $$\frac{-12}{20} = \frac{(-12) \div 4}{20 \div 4} = \frac{-3}{5}$$

Hence, these rational numbers represent the same rational number.

(v) We represent these rational numbers in standard form as

$$\frac{8}{-5} = \frac{8 \div (-1)}{(-5) \div (-1)} = \frac{-8}{5}$$

And $$\frac{-24}{15} = \frac{-24 \div 3}{15 \div 3} = \frac{-8}{5}$$

Hence, these rational numbers represent the same rational number.

(vi) We represent these rational numbers in standard form as

$$\frac{1}{3} = \frac{1}{3} \quad \text{And } \frac{-1}{9} = \frac{-1}{9}$$

These rational numbers do not represent the same rational number.

(vii) We represent these rational numbers in standard form as

$$\frac{-5}{-9} = \frac{(-5) \div (-1)}{(-9) \div (-1)} = \frac{5}{9}$$

And $$\frac{5}{-9} = \frac{-5}{9}$$

Hence, these rational numbers do not represent the same rational number.

7. (i) HCF of 8 and 6 = 2

Now, $$\frac{-8}{6} = \frac{(-8) \div 2}{6 \div 2} = \frac{-4}{3}$$

Hence, the simplest form of $\frac{-8}{6}$ is $\frac{-4}{3}$.

(ii) HCF of 25 and 45 = 5

Now, $$\frac{25}{45} = \frac{25 \div 5}{45 \div 5} = \frac{5}{9}$$

Hence, the simplest form of $\frac{25}{45}$ is $\frac{5}{9}$.

(iii) HCF of 44 and 72 = 4

Now, $$\frac{-44}{72} = \frac{(-44) \div 4}{72 \div 4} = \frac{-11}{18}$$

Hence, the simplest form of $\frac{-44}{72}$ is $\frac{-11}{18}$.

(iv) HCF of 8 and 10 = 2

Now, $$\frac{-8}{10} = \frac{(-8) \div 2}{10 \div 2} = \frac{-4}{5}$$

Hence, the simplest form of $\frac{-8}{10}$ is $\frac{-4}{5}$.

8. (i) We know that the negative rational number is smaller than the positive rational number.

Hence, $\frac{-5}{7} \boxed{<} \frac{2}{3}$

(ii) LCM of denominators 5 and 7 is 35.

$\therefore \quad \frac{-4}{5} = \frac{-4 \times 7}{5 \times 7} = \frac{-28}{35}$

And $\quad \frac{-5}{7} = \frac{-5 \times 5}{7 \times 5} = \frac{-25}{35}$

Comparing the numerators,

Since, $\quad -28 < -25$ So, $\frac{-28}{35} < \frac{-25}{35}$

Hence, $\frac{-4}{5} \boxed{<} \frac{-5}{7}$

(iii) Here, $\frac{14}{-16} = \frac{14 \times (-1)}{(-16) \times (-1)} = \frac{-14}{16}$

LCM of 8 and 16 is 16.

$\therefore \quad \frac{-7}{8} = \frac{-7 \times 2}{8 \times 2} = \frac{-14}{16}$

And $\quad \frac{-14}{16} = \frac{-14}{16}$

Comparing the numerators,

Since, $\quad -14 = -14$ So, $\frac{-14}{16} = \frac{-14}{16}$

$\Rightarrow \quad \frac{-7}{8} \boxed{=} \frac{-14}{16}$

(iv) LCM of 5 and 4 is 20.

Here, $\quad \frac{-8}{5} = \frac{-8 \times 4}{5 \times 4} = \frac{-32}{20}$

And $\quad \frac{-7}{4} = \frac{-7 \times 5}{4 \times 5} = \frac{-35}{20}$

Comparing the numerators,

Since, $\quad -32 > -35$

So, $\quad \frac{-32}{20} \boxed{>} \frac{-35}{20}$

Hence, $\quad \frac{-8}{5} > \frac{-7}{4}$

(v) Here, $\frac{1}{-3} = \frac{1 \times (-1)}{(-3) \times (-1)} = \frac{-1}{3}$

Now, LCM of 3 and 4 is 12.

$$\frac{-1}{3} = \frac{-1 \times 4}{3 \times 4} = \frac{-4}{12}$$

And $\quad \frac{-1}{4} = \frac{-1 \times 3}{4 \times 3} = \frac{-3}{12}$

Comparing the numerators,

Since, $\quad -4 < -3$ So, $\frac{-4}{12} < \frac{-3}{12}$

$\Rightarrow \quad \frac{1}{-3} \boxed{<} \frac{-1}{4}$

(vi) Here, $\frac{5}{-11} = \frac{5 \times (-1)}{(-11) \times (-1)} = \frac{-5}{11}$

$$\frac{-5}{11} = \frac{-5}{11}$$

Comparing the numerators,

Since, $\quad -5 = -5$ So, $\frac{-5}{11} = \frac{-5}{11}$

Hence, $\frac{5}{-11} \boxed{=} \frac{-5}{11}$

(vii) Since, 0 is greater than every negative number.

$\therefore \quad 0 \boxed{>} \frac{-7}{6}$

9. (i) LCM of 3 and 2 is 6.

$\therefore \quad \frac{2}{3} = \frac{2 \times 2}{3 \times 2} = \frac{4}{6}$ And $\frac{5}{2} = \frac{5 \times 3}{2 \times 3} = \frac{15}{6}$

Comparing the numerators,

Since, $\quad 15 > 4$

So, $\quad \frac{15}{6} > \frac{4}{6} \quad \Rightarrow \frac{5}{2} > \frac{2}{3}$

Thus, $\frac{5}{2}$ is a greater rational number.

(ii) LCM of 6 and 3 is 6.

$\therefore \quad \frac{-5}{6} = \frac{-5}{6}$ And $\frac{-4}{3} = \frac{-4 \times 2}{3 \times 2} = \frac{-8}{6}$

Comparing the numerators,

Since, $\quad -5 > -8$

$\Rightarrow \quad \frac{-5}{6} > \frac{-8}{6} \quad \Rightarrow \frac{-5}{6} > \frac{-4}{3}$

Thus, $\frac{-5}{6}$ is a greater rational number.

(iii) LCM of 4 and $3 = 12$

$$\frac{-3}{4} = \frac{-3 \times 3}{4 \times 3} = \frac{-9}{12}$$

$$\frac{2}{-3} = \frac{2 \times (-1)}{(-3) \times (-1)} = \frac{2}{3}$$

$$\frac{2}{-3} = \frac{-2 \times 4}{3 \times 4} = \frac{-8}{12}$$

Comparing the numerators,

Since, $\quad -8 > -9$

$\Rightarrow \quad \frac{-8}{12} > \frac{-9}{12} \quad \Rightarrow \frac{2}{-3} > \frac{-3}{4}$

Hence, $\frac{2}{-3}$ is a greater rational number.

(iv) We know that every positive rational number is greater than every negative rational number.

$\therefore \quad \frac{1}{4} > \frac{-1}{4}$

Hence, $\frac{1}{4}$ is a greater rational nubmer.

(v) LCM of 7 and 5 = 35

$-3\frac{2}{7} = \frac{-23}{7} = \frac{-23 \times 5}{7 \times 5} = \frac{-115}{35}$

And $\quad -3\frac{4}{5} = \frac{-19}{5} = \frac{-19 \times 7}{5 \times 7} = \frac{-133}{35}$

Comparing the numerators,

$-115 > -133$

$\Rightarrow \quad \frac{-115}{35} > \frac{-133}{35} \quad \Rightarrow -3\frac{2}{7} > -3\frac{4}{5}$

Hence, $-3\frac{2}{7}$ is a greater rational number.

10. (i) In the given rational numbers, each denominator is equal and positive.

Since, $\quad -3 < -2 < -1$

$\therefore \quad \frac{-3}{5} < \frac{-2}{5} < \frac{-1}{5}$

Thus, the required ascending order is $\frac{-3}{5}, \frac{-2}{5}, \frac{-1}{5}$.

(ii) Denominators of the given rational numbers are positive.

LCM of 3, 9 and 3 = 9

Now, $\quad \frac{-1}{3} = \frac{-1 \times 3}{3 \times 3} = \frac{-3}{9}$ and $\frac{-2}{9} = \frac{-2}{9}$

And $\quad \frac{-4}{3} = \frac{-4 \times 3}{3 \times 3} = \frac{-12}{9}$

Since, $\quad -12 < -3 < -2$

$\therefore \quad \frac{-12}{9} < \frac{-3}{9} < \frac{-2}{9} \quad \Rightarrow \frac{-4}{3} < \frac{-1}{3} < \frac{-2}{9}$

Thus, the required ascending order is $\frac{-4}{3}, \frac{-1}{3}, \frac{-2}{9}$.

(iii) Denominators of the given rational numbers are positive.

LCM of 7, 2 and 4 = 28

Now, $\quad \frac{-3}{7} = \frac{-3 \times 4}{7 \times 4} = -\frac{12}{28}$

And $\quad \frac{-3}{2} = \frac{-3 \times 14}{2 \times 14} = \frac{-42}{28}$

And $\quad \frac{-3}{4} = \frac{-3 \times 7}{4 \times 7} = \frac{-21}{28}$

Since, $\quad -42 < -21 < -12$

$\therefore \quad \frac{-42}{28} < \frac{-21}{28} < \frac{-12}{28} \quad \Rightarrow \frac{-3}{2} < \frac{-3}{4} < \frac{-3}{7}$

Thus, the required ascending order is $\frac{-3}{2}, \frac{-3}{4}, \frac{-3}{7}$.

Exercise 8.2

1. (i) $\frac{5}{4} + \left(\frac{-11}{4}\right) = \frac{5 + (-11)}{4} = \frac{5 - 11}{4} = \frac{-6}{4} = \frac{-3}{2}$

(ii) $\frac{5}{3} + \frac{3}{5} = \frac{5 \times 5 + 3 \times 3}{15}$

(LCM of 3 and 5 is 15)

$= \frac{25 + 9}{15} = \frac{34}{15}$

(iii) $\frac{-9}{10} + \frac{22}{15} = \frac{-9 \times 3 + 22 \times 2}{30}$

(LCM of 10 and 15 is 30)

$= \frac{-27 + 44}{30} = \frac{17}{30}$

(iv) $\frac{-3}{-11} + \frac{5}{9} = \frac{3}{11} + \frac{5}{9} = \frac{3 \times 9 + 5 \times 11}{99}$

(LCM of 11 and 9 is 99)

$= \frac{27 + 55}{99} = \frac{82}{99}$

(v) $\frac{-8}{19} + \frac{-2}{57} = \frac{-8 \times 3 + (-2) \times 1}{57}$

(LCM of 19 and 57 is 57)

$= \frac{-24 - 2}{57} = \frac{-26}{57}$

(vi) $\frac{-2}{3} + 0 = \frac{-2}{3}$

(vii) $-2\frac{1}{3} + 4\frac{3}{5} = \frac{-7}{3} + \frac{23}{5} = \frac{-7 \times 5 + 23 \times 3}{15}$

(LCM of 3 and 5 is 15)

$= \frac{-35 + 69}{15} = \frac{34}{15}$

2. (i) $\frac{7}{24} - \frac{17}{36} = \frac{7 \times 3 - 17 \times 2}{72}$

(LCM 24 and 36 is 72)

$= \frac{21-34}{72} = \frac{-13}{72}$

(ii) $\frac{5}{63} - \left(\frac{-6}{21}\right) = \frac{5}{63} + \frac{6}{21}$

$= \frac{5+6\times3}{63} = \frac{5+18}{63} = \frac{23}{63}$

(LCM of 21 and 63 is 63)

(iii) $\frac{-6}{13} - \left(\frac{-7}{15}\right) = \frac{-6}{13} + \frac{7}{15}$

$= \frac{-6\times15+7\times13}{195}$

(LCM of 13 and 15 is 195)

$= \frac{-90+91}{195} = \frac{1}{195}$

(iv) $\frac{-3}{8} - \frac{7}{11} = \frac{-3\times11-7\times8}{88}$

(LCM of 8 and 11 is 88)

$= \frac{-33-56}{88} = \frac{-89}{88}$

(v) $-2\frac{1}{9} - 6 = \frac{-19}{9} - \frac{6}{1} = \frac{-19\times1-6\times9}{9}$

(LCM of 9 and 1 is 9)

$= \frac{-19-54}{9} = \frac{-73}{9}$

3. (i) $\frac{9}{2}\times\left(\frac{-7}{4}\right) = \frac{9\times(-7)}{2\times4} = \frac{-63}{8}$

(ii) $\frac{3}{10}\times(-9) = \frac{3\times(-9)}{10} = \frac{-27}{10}$

(iii) $\frac{-6}{5}\times\frac{9}{11} = \frac{(-6)\times9}{5\times11} = \frac{-54}{55}$

(iv) $\frac{3}{7}\times\left(\frac{-2}{5}\right) = \frac{3\times(-2)}{7\times5} = \frac{-6}{35}$

(v) $\frac{3}{11}\times\frac{2}{5} = \frac{3\times2}{11\times5} = \frac{6}{55}$

(vi) $\frac{3}{-5}\times\frac{-5}{3} = \frac{3\times(-5)}{(-5)\times3} = \frac{-15}{-15} = 1$

4. (i) $-4 \div \frac{2}{3} = -4\times\frac{3}{2} = \frac{-4\times3}{2} = \frac{-12}{2} = -6$

(ii) $\frac{-3}{5}\div2 = \frac{-3}{5}\times\frac{1}{2} = \frac{-3\times1}{5\times2} = \frac{-3}{10}$

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

$= \frac{-4\times1}{5\times(-3)} = \frac{-4}{-15} = \frac{4}{15}$

(iv) $\frac{-1}{8}\div\frac{3}{4} = \frac{-1}{8}\times\frac{4}{3} = \frac{-1\times4}{8\times3} = \frac{-4}{24} = \frac{-1}{6}$

(v) $\frac{-2}{13}\div\frac{1}{7} = \frac{-2}{13}\times\frac{7}{1} = \frac{-2\times7}{13\times1} = \frac{-14}{13}$

(vi) $\frac{-7}{12}\div\left(\frac{-2}{13}\right) = \frac{-7}{12}\times\frac{13}{-2}$

$= \frac{-7\times13}{12\times(-2)} = \frac{-91}{-24} = \frac{91}{24}$

(vii) $\frac{3}{13}\div\left(\frac{-4}{65}\right) = \frac{3}{13}\times\frac{65}{-4} = \frac{3\times65}{13\times(-4)}$

$= \frac{3\times5}{1\times(-4)} = \frac{15}{-4} = -\frac{15}{4}$

Chapter-9

Perimeter and Area

Exercise 9.1

1. (a) Base (b) = 7 cm

Height (h) = 4 cm

Area of parallelogram = $b \times h$

$= (7\times4)\text{ cm}^2 = 28\text{ cm}^2$

(b) Base (b) = 5 cm

Height (h) = 3 cm

Area of parallelogram = Base × Height

$= (5\times3)\text{ cm}^2 = 15\text{ cm}^2$

(c) Area of parallelogram

= Base × Height

$= (2.5\times3.5)\text{ cm}^2 = 8.75\text{ cm}^2$

(d) Area of parallelogram

= Base × Height

$= 5\times4.8\text{ cm}^2 = 24\text{ cm}^2$

(e) Area of parallelogram

= Base × Height

$= (2\times4.4)\text{ cm}^2 = 8.8\text{ cm}^2$

2. (a) Area of triangle = $\frac{1}{2}$ Base × Height

$= \left(\frac{1}{2}\times4\times3\right)\text{cm}^2 = \frac{12}{2} = 6\text{ cm}^2$

(b) Area of triangle = $\frac{1}{2}$ Base × Height

$= \left(\frac{1}{2}\times5\times3.2\right)\text{cm}^2$

$= (5\times1.6)\text{ cm}^2 = 8\text{ cm}^2$

(c) Area of triangle = $\frac{1}{2}$ Base × Height

$= \frac{1}{2} \times 3 \times 4 = 6 \text{ cm}^2$

(d) Area of triangle $= \frac{1}{2}$ Base × Height

$= \frac{1}{2} \times 3 \times 2 = 3 \text{ cm}^2$

3. (a) Here, $(b) = 20$ cm

$A = 246 \text{ cm}^2$

Let, the height be h cm.

$\because$ Area of parallelogram $= b \times h$

$\Rightarrow \quad 246 = 20 \times h$

$\Rightarrow \quad h = \frac{246}{20} = 12.3$ cm

(b) Here, $(h) = 15$ cm

Area $(A) = 154.5 \text{ cm}^2$

Let the base be b cm.

$\because \quad A = b \times h$

$b = \frac{A}{h} = \frac{154.5}{15} = 10.3$ cm

(c) Here, $b = ?$, $h = 8.4$ cm and $A = 48.72 \text{ cm}^2$

$\because \quad A = b \times h$

$\Rightarrow \quad b = \frac{A}{h} = \frac{48.72}{8.4} = 5.8$ cm

(d) Here, $b = 15.6$ cm, $A = 16.38$, $h = ?$

Since, $\quad h = \frac{A}{b} = \frac{16.38}{15.6} = 1.05$ cm

S.No.	Base	Height	Area of parallelogram
a.	20 cm	12.3 cm	246 cm^2
b.	10.3 cm	15 cm	154.5 cm^2
c.	5.8 cm	8.4 cm	48.72 cm^2
d.	15.6 cm	1.05 cm	16.38 cm^2

4. (i) Given, $b = 15$ cm and $A = 87 \text{ cm}^2$

Here, $\quad h = ?$

Since, $\quad A = \frac{1}{2} b \times h$

$\Rightarrow \quad h = \frac{2A}{b} = \frac{2 \times 87}{15} = 11.6$ cm

(ii) Here, $b = ?$

Given, $\quad h = 31.4$ mm, $A = 1256 \text{ mm}^2$

Since, $\quad A = \frac{1}{2} bh$

$\Rightarrow \quad b = \frac{2A}{h} = \frac{2 \times 1256}{31.4} = 80$ mm

(iii) Given, $b = 22$ cm, $A = 170.5 \text{ cm}^2$

Here, $\quad h = ?$

Since, $\quad A = \frac{1}{2} bh$

$\Rightarrow \quad h = \frac{2A}{b} = \frac{2 \times 170.5}{22} = 15.5 \text{ cm}^2$

Base	Height	Area of triangle
15 cm	11.6 cm	87 cm^2
80 cm	31.4 mm	1256 mm^2
22 cm	15.5 cm	170.5 cm^2

5. (a) Here, base $(SR) = 12$ cm

Height $(QM) = 7.6$ cm

Area of parallelogram $PQRS = b \times h$

$= SR \times QM = (12 \times 7.6) \text{ cm}^2 = 91.2 \text{ cm}^2$

(b) Area of the parallelogram $= 91.2 \text{ cm}^2$

Base $(PS) = 8$ cm; Height $(QN) = ?$

$PS \times QN =$ Area of parallelogram $PQRS$

$\Rightarrow \quad 8 \times QN = 91.2$

$\Rightarrow \quad QN = \frac{91.2}{8} = 11.4$ cm

6. Given, area of parallelogram $= 1470 \text{ cm}^2$

$AB = 35$ cm and $AD = 49$ cm

Area of $ABCD = AD \times BM$

$\Rightarrow \quad 1470 = 49 \times BM$

$\Rightarrow \quad BM = \frac{1470}{49} = 30$ cm

Area of $ABCD = AB \times DL$

$\Rightarrow \quad 1470 = 35 \times DL$

$\Rightarrow \quad DL = \frac{1470}{35} = 42$ cm

7. Here, $AB = 5$ cm

$BC = 13$ cm

$AC = 12$ cm

Area of $\Delta ABC = \frac{1}{2} \times AB \times AC$

$= \frac{1}{2} \times 5 \times 12 = \frac{1}{2} \times 60 = 30 \text{ cm}^2$

Again, area of $\Delta ABC = \frac{1}{2} \times BC \times AD$

$\Rightarrow \quad 30 = \frac{1}{2} \times 13 \times AD \Rightarrow 30 = \frac{13\,AD}{2}$

$\therefore \quad AD = \frac{30 \times 2}{13} = \frac{60}{13} \text{ cm} = 4\frac{8}{13}$ cm

8. Area of $\Delta ABC = \frac{1}{2} \times BC \times AD$

$= \frac{1}{2} \times 9 \times 6 = \frac{54}{2} = 27 \text{ cm}^2$

Again, Area of $\Delta ABC = \frac{1}{2} \times AB \times \text{Height}$

$$27 = \frac{1}{2} \times 7.5 \times \text{Height}$$

$\therefore$ Height $(CE) = \frac{27 \times 2}{7.5} = 7.2$ cm

Exercise 9.2

1. We know that the circumference of the circle $= 2\pi r$

(a) Given, radius $(r) = 14$ cm

$\therefore$ Circumference $= 2\pi r = 2 \times \frac{22}{7} \times 14 = 88$ cm

(b) Given, radius $(r) = 28$ mm

$\therefore$ Circumference $= 2\pi r = 2 \times \frac{22}{7} \times 28$

$= 2 \times 22 \times 4 = 176$ mm

(c) Given, radius $(r) = 21$ cm

$\therefore$ Circumference $= 2\pi r = 2 \times \frac{22}{7} \times 21$

$= 2 \times 22 \times 3 = 132$ cm

2. (a) Given, $r = 14$ mm

Area of circle $= \pi r^2$

$$= \left(\frac{22}{7} \times 14^2\right) \text{mm}^2$$

$$= \left(\frac{22}{7} \times 14 \times 14\right) \text{mm}^2$$

$$= (22 \times 14 \times 2)\ \text{mm}^2 = 616\ \text{mm}^2$$

(b) Given, diameter = 49 m

$\therefore$ Radius $r = \frac{49}{2}$ m

Area of the circle $= \pi r^2$

$$= \left(\frac{22}{7} \times \frac{49}{2} \times \frac{49}{2}\right) \text{m}^2$$

$$= \left(\frac{11 \times 7 \times 49}{1 \times 2}\right) \text{m}^2$$

$$= \left(\frac{3773}{2}\right) \text{m}^2 = 1886.5\ \text{m}^2$$

(c) Given, radius $r = 5$ cm

Area of the circle $= \pi r^2$

$$= \left(\frac{22}{7} \times 5 \times 5\right) \text{cm}^2 = \frac{550}{7}\ \text{cm}^2$$

3. Let the radius of the circle $= r$

Circumference = 154 m

$\Rightarrow \quad 2\pi r = 154$

$\Rightarrow \quad 2 \times \frac{22}{7} \times r = 154$

$\Rightarrow \quad r = 154 \times \frac{7}{44}$ m

$= \frac{49}{2}$ m $= 24.5$ m

Area of the circle $= \pi r^2$

$$= \left(\frac{22}{7} \times \frac{49}{2} \times \frac{49}{2}\right) \text{m}^2$$

$$= \left(\frac{11}{1} \times 7 \times \frac{49}{2}\right) \text{m}^2$$

$$= \frac{3773}{2}\ \text{m}^2 = 1886.5\ \text{m}^2$$

4. Given, diameter = 21 m, Radius $(r) = \frac{21}{2}$ m

Circumference of circular garden $= 2\pi r$

$$= \left(2 \times \frac{22}{7} \times \frac{21}{2}\right) \text{m}$$

$$= (22 \times 3)\ \text{m} = 66\ \text{m}$$

Since, length of the rope for one round

= 66 m

$\therefore$ Length of the rope for 2 rounds

$= (2 \times 66)$ m $= 132$ m

Cost of the rope at the rate of ₹ 4 per meter

$=$ ₹ $(4 \times 132) =$ ₹ 528

5. Outer radius $(R) = 4$ cm

Inner radius $(r) = 3$ cm

Area of remaining sheet

= Outer area – Inner area

$= \pi(R^2 - r^2) = 3.14\ (4^2 - 3^2)\ \text{cm}^2$

$= 3.14\ (16 - 9)\ \text{cm}^2$

$= 3.14 \times 7\ \text{cm}^2 = 21.98\ \text{cm}^2$

6. Diameter = 1.5 m

$\therefore$ Radius $(r) = \frac{1.5}{2}$ m

Length of lace required

= Circumference of circular table

$= 2\pi r \qquad \left(\because r = \frac{1.5}{2} = 0.75\ \text{m}\right)$

$= (2 \times 3.14 \times 0.75)$ m $= 4.71$ m

The cost of lace for 1 m = ₹ 15

Hence, cost of lace of 4.71 m

= ₹ 15 × 4.71 = ₹ 70.65

7. Diameter of the semi-circle = 10 cm

$\therefore$ Radius $= \frac{10}{2} = 5$ cm

Perimeter of the figure
= Circumference of semi-circle + Diameter

$= \left(\frac{1}{2} \times 2\pi r + 2r\right)$ cm

where, $r = 5$ cm

$= \left(\frac{1}{2} \times 2 \times \frac{22}{7} \times 5 + 2 \times 5\right)$ cm

$= \left(\frac{110}{7} + 10\right)$ cm

$= \left(\frac{110 + 70}{7}\right)$ cm

$= \frac{180}{7}$ cm = 25.7 cm (approx.)

8. Diameter of the circular table top = 1.6 m

Radius $(r) = \frac{1.6}{2} = 0.8$ m

Now area of the circular table top

$\pi r^2 = (3.14 \times 0.8 \times 0.8)$ m^2

= 2.0096 m^2

Since, rate of polishing = ₹ 15 per m^2

∴ Total cost of polishing the circular table top = ₹ (15 × 2.0096)

= ₹ 30.144 (approx.)

9. Let the radius of circle = r

Circumference = $2\pi r$

Circumference = Length of wire

$2\pi r = 44$

$\Rightarrow \quad 2 \times \frac{22}{7} \times r = 44$

$r = \frac{44 \times 7}{2 \times 22} = 7$ cm

Area of circle = $\pi r^2 = \frac{22}{7} \times 7 \times 7$ cm^2

= 154 cm^2

Let the side of the square = x cm

Perimeter of the square = Length of the wire

$4 \times x = 44$ cm $\Rightarrow x = \frac{44}{4} = 11$ cm

Area of square = (Side)^2

= (11 cm)^2 = 121 cm^2

Hence, circle encloses greater area.

10. Radius of circular sheet = 14 cm

Area of sheet = πr^2

$= \frac{22}{7} \times (14)^2 = 616$ cm^2

Now, radius of a small circle = 3.5 cm

Area of small circle = $\frac{22}{7} \times 3.5 \times 3.5$

= 22 × 0.5 × 3.5

Area of two small circles = 2 × 22 × 0.5 × 3.5

= 22 × 3.5 = 77 cm^2

Length of small rectangle = 3 cm

Breadth of small rectangle = 1 cm

Area of the small rectangle = 3 × 1 = 3 cm^2

Total area removed from the sheet

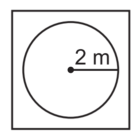
= 77 cm^2 + 3 cm^2 = 80 cm^2

Hence, area of remaining sheet

= 616 cm^2 – 80 cm^2 = 536 cm^2

Thus, the required area of the remaining sheet = 536 cm^2

11. Side of square = 6 cm



Area of square = (Side)^2 = (6)^2 = 36 cm^2

Area of circular sheet = πr^2

= 3.14 × 2 × 2 cm^2 = 12.56 cm^2

Area of remaining sheet = Area of square sheet – Area of circular sheet

= (36 – 12.56) cm^2 = 23.44 cm^2

12. Let the radius of the circle be r cm.

Circumference = 31.4 cm

$\Rightarrow \quad 2\pi r = 31.4$

$\Rightarrow \quad 2 \times 3.14 \times r = 31.4$

$\therefore \quad r = \frac{31.4}{2 \times 3.14} = 5$ cm

∴ Area of circle = $\pi r^2 = 3.14 \times 5^2$

= 3.14 × 25 = 78.5 cm^2

13. Diameter = 66 m

Radius = $\frac{66}{2}$ m = 33 m

Since, width of the surrounding path = 4 m

∴ Radius of outer circle

$(R) = (33 + 4)$ m = 37 m

Area of the path = $[\pi(37)^2 - \pi(33)^2]$ m^2

$= \pi(37^2 - 33^2)$ m^2

$= \pi\,(1369 - 1089)$ m^2

$= \pi\,(280)$ m^2 = (3.14 × 70 × 4) m^2

$= 879.20 \text{ m}^2$

14. Let the radius of the garden = r m

Area = 314 m^2

$\Rightarrow \quad \pi r^2 = 314$

$\Rightarrow 3.14 \times r^2 = 314$

$\Rightarrow \quad r^2 = \left(\frac{314}{3.14}\right)$

$\Rightarrow \quad r^2 = 100$

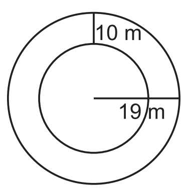
$\Rightarrow \quad r = 10$ m

Now, radius of the area covered by the sprinkler = 12 m

$\because \quad$ 12 m > 10 m

Hence, the sprinkler covers an area beyond the garden or we can say, yes, the entire garden covered by the sprinkler.

15. Outer radius (R) = 19 m



And inner radius (r) = (19 – 10) m = 9 m

Circumference of inner circle = $2\pi r$

$= (2 \times 3.14 \times 9)$ m = 56.52 m

Circumference of outer circle = $2\pi R$

$= (2 \times 3.14 \times 19)$

$= 119.32$ m

16. Radius of the wheel (r) = 28 cm

Circumference of the wheel

$= 2\pi r = \left(2 \times \frac{22}{7} \times 28\right)$ cm

$= 176$ cm

So, the wheel can cover 176 cm of distance in one rotation.

Total distance to be covered = 352 m

$= 352 \times 100$ cm

$\therefore$ Number of rotations $= \frac{352 \times 100}{176}$

$= 200$

Thus, the distance of 352 m will be covered in 200 turns.

17. Length of minute hand = 15 cm

Hence, $\quad r = 15$ cm

Distance covered = Circumference = $2\pi r$

$= (2 \times 3.14 \times 15)$ cm = 94.2 cm

Chapter-10

Algebraic Expressions

Exercise 10.1

1. In the given situations, algebraic expressions are as follows :

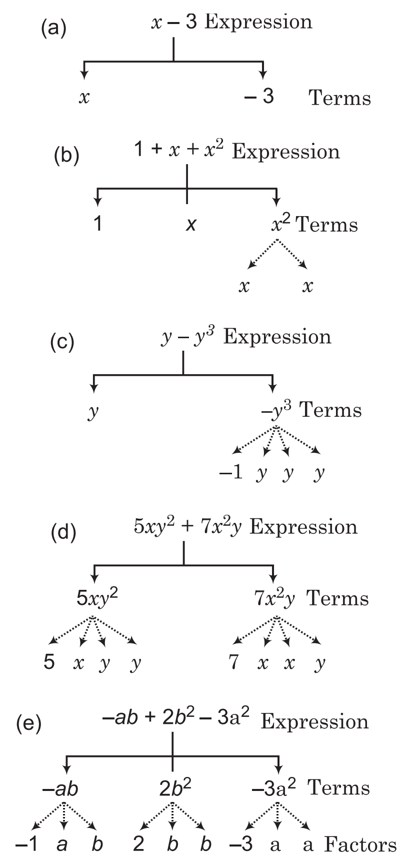
(i) $y - z$ (ii) $\frac{1}{2}(x + y)$

(iii) $z \times z$ or z^2 (iv) $\frac{1}{4}pq$

(v) $x^2 + y^2$ (vi) $3mn + 5$

(vii) $10 - yz$ (viii) $ab - (a + b)$

2. (i) The terms and factors in the expressions are shown by tree diagram as follows :



(ii)

S.No.	Expressions	Terms	Factors
(a)	$-4x + 5$	$-4x$ 5	$-4, x$ 5
(b)	$-4x + 5y$	$-4x$ $5y$	$-4, x$ 5, y

(c)	$5y + 3y^2$	$5y$ $3y^2$	5, y 3, y, y
(d)	$xy + 2x^2y^2$	xy $2x^2y^2$	x, y 2, x, x, y, y
(e)	$pq + q$	pq q	p, q q
(f)	$1.2ab - 2.4b + 3.6a$	$1.2ab$ $-2.4b$ $3.6a$	1.2, a, b, -2.4, b 3.6, a
(g)	$\frac{3}{4}x + \frac{1}{4}$	$\frac{3}{4}x$ $\frac{1}{4}$	$\frac{3}{4}$, x $\frac{1}{4}$
(h)	$0.1p^2 + 0.2q^2$	$0.1p^2$ $0.2q^2$	0.1, p, p 0.2, q, q

3.

S.No.	Expressions	Term (Other than constants)	Numerical coefficients
(i)	$5 - 3t^2$	$-3t^2$	-3
(ii)	$1 + t + t^2 + t^3$	t t^2 t^3	1 1 1
(iii)	$x + 2xy + 3y$	x $2xy$ $3y$	1 2 3
(iv)	$100m + 1000n$	$100m$ $1000n$	100 1000
(v)	$-p^2q^2 + 7pq$	$-p^2q^2$ $7pq$	-1 7
(vi)	$1.2a + 0.8b$	$1.2a$ $0.8b$	1.2 0.8
(vii)	$3.14r^2$	$3.14r^2$	3.14
(viii)	$2(l + b)$	$2l$ $2b$	2 2
(ix)	$0.1y + 0.01y^2$	$0.1y$ $0.01y^2$	0.1 0.01

4. (a)

S.No.	Expressions	Term containing x	Coefficient of x
(i)	$y^2x + y$	y^2x	y^2
(ii)	$13y^2 - 8yx$	$-8yx$	$-8y$
(iii)	$x + y + 2$	x	1
(iv)	$5 + z + zx$	zx	z
(v)	$1 + x + xy$	x xy	1 y
(vi)	$12xy^2 + 25$	$12xy^2$	$12y^2$
(vii)	$7 + xy^2$	xy^2	y^2

(b)

S.No.	Expressions	Term containing y^2	Coefficient of y^2
(i)	$8 - xy^2$	$-xy^2$	$-x$
(ii)	$5y^2 + 7x$	$5y^2$	5
(iii)	$2x^2y - 15xy^2 + 7y^2$	$-15xy^2$ $7y^2$	$-15x$ 7

5. (i) Binomial (ii) Monomial
(iii) Trinomial (iv) Monomial
(v) Trinomial (vi) Binomial
(vii) Binomial (viii) Monomial
(ix) Trinomial (x) Binomial
(xi) Binomial (xii) Trinomial

6. (i) Like terms (ii) Like terms
(iii) Unlike terms (iv) Like terms
(v) Unlike terms (vi) Unlike terms

7. (a) The like terms are as follows :
$-xy^2$, $2xy^2$; $-4yx^2$, $20x^2y$; $8x^2$, $-11x^2$, $-6x^2$; $7y$, y; $-100x$, $3x$ and $-11yx$, $2xy$
(b) The like terms are as follows :
$10pq$, $-7qp$, $78qp$; $7p$, $2405p$; $8q$, $-100q$; $-p^2q^2$, $12q^2p^2$; -23, 41; $-5p^2$, $701p^2$ and $13p^2q$, qp^2

Exercise 10.2

1. Putting $m = 2$, we have
(i) $m - 2 = 2 - 2 = 0$
(ii) $3m - 5 = 3 \times 2 - 5 = 6 - 5 = 1$
(iii) $9 - 5m = 9 - 5 \times 2 = 9 - 10 = -1$
(iv) $3m^2 - 2m - 7 = 3(2)^2 - 2 \times 2 - 7$
$= 3(4) - 4 - 7 = 12 - 11 = 1$
(v) $\frac{5m}{2} - 4 = \frac{5 \times 2}{2} - 4 = 5 - 4 = 1$

2. Putting $p = -2$, we have
(i) $4p + 7 = 4(-2) + 7 = -8 + 7 = -1$
(ii) $-3p^2 + 4p + 7 = -3(-2)^2 + 4(-2) + 7$
$= -3(4) - 8 + 7$
$= -12 - 1 = -13$
(iii) $-2p^3 - 3p^2 + 4p + 7$

$= -2(-2)^3 - 3(-2)^2 + 4(-2) + 7$
$= -2(-8) - 3(4) - 8 + 7$
$= 16 - 12 - 8 + 7$
$= (16 + 7) - (12 + 8)$
$= 23 - 20 = 3$

3. Putting $x = -1$, we have
(i) $2x - 7 = 2(-1) - 7 = -2 - 7 = -9$
(ii) $-x + 2 = -(-1) + 2 = 1 + 2 = 3$
(iii) $x^2 + 2x + 1 = (-1)^2 + 2(-1) + 1$
$= 1 - 2 + 1 = 0$
(iv) $2x^2 - x - 2 = 2(-1)^2 - (-1) - 2$
$= 2(1) + 1 - 2 = 2 + 1 - 2 = 1$

4. Putting $a = 2$ and $b = -2$, we have
(i) $a^2 + b^2 = (2)^2 + (-2)^2 = 4 + 4 = 8$
(ii) $a^2 + ab + b^2 = (2)^2 + (2)(-2) + (-2)^2$
$= 4 - 4 + 4 = 4$
(iii) $a^2 - b^2 = (2)^2 - (-2)^2 = 4 - 4 = 0$

5. Putting $a = 0$ and $b = -1$, we have
(i) $2a + 2b = 2(0) + 2(-1) = 0 - 2 = -2$
(ii) $2a^2 + b^2 + 1 = 2(0)^2 + (-1)^2 + 1$
$= 0 + 1 + 1 = 2$
(iii) $2a^2b + 2ab^2 + ab$
$= 2(0)^2(-1) + 2(0)(-1)^2 + (0)(-1)$
$= 0 + 0 + 0 = 0$
(iv) $a^2 + ab + 2 = (0)^2 + (0)(-1) + 2$
$= 0 + 0 + 2 = 2$

6. (i) $x + 7 + 4(x - 5) = x + 7 + 4x - 20$
$= (x + 4x) + (7 - 20) = 5x - 13$
Putting $x = 2$, we have
$= 5(2) - 13 = 10 - 13 = -3$
(ii) $3(x + 2) + 5x - 7 = 3x + 6 + 5x - 7$
$= (3x + 5x) + (6 - 7) = 8x - 1$
Putting $x = 2$, we have
$= 8(2) - 1 = 16 - 1 = 15$
(iii) $6x + 5(x - 2)$
$= 6x + 5x - 10 = 11x - 10$
Putting $x = 2$, we have
$= 11 \times 2 - 10 = 22 - 10 = 12$
(iv) Here, $4(2x - 1) + 3x + 11$
$= 8x - 4 + 3x + 11$
$= (8x + 3x) + (-4 + 11)$
$= 11x + 7$
Putting $x = 2$, we have
$= 11 \times 2 + 7 = 22 + 7 = 29$

7. (i) $3x - 5 - x + 9 = 2x + 4$
Putting $x = 3$, we have
$= 2(3) + 4 = 6 + 4 = 10$
(ii) $2 - 8x + 4x + 4 = 6 - 4x$
Putting $x = 3$, we have
$= 6 - 4(3) = 6 - 12 = -6$
(iii) $3a + 5 - 8a + 1 = 6 - 5a$
Putting $a = -1$, we have
$= 6 - 5 \times (-1) = 6 + 5 = 11$
(iv) Here, $10 - 3b - 4 - 5b = 6 - 8b$
Putting $b = -2$, we have
$6 - 8b = 6 - 8(-2) = 6 + 16 = 22$
(v) Here, $2a - 2b - 4 - 5 + a = 3a - 2b - 9$
Putting $a = -1$ and $b = -2$ we have
$3a - 2b - 9 = 3(-1) - 2(-2) - 9$
$= -3 + 4 - 9 = -8$

8. (i) Putting $z = 10$, we have
$z^3 - 3(z - 10) = (10)^3 - 3(10 - 10)$
$= 1000 - 3(0)$
$= 1000 - 0 = 1000$
(ii) Putting $p = -10$, we have
$p^2 - 2p - 100 = (-10)^2 - 2(-10) - 100$
$= 100 + 20 - 100 = 20$

9. Given, $2x^2 + x - a = 5$
Putting $x = 0$, we have
$2(0) + 0 - a = 5 \Rightarrow 0 + 0 - a = 5$
$\Rightarrow -a = 5 \Rightarrow a = -5$

10. Given,
$2(a^2 + ab) + 3 - ab = 2a^2 + 2ab + 3 - ab$
$= 2a^2 + 2ab - ab + 3$
$= 2a^2 + ab + 3$
Putting $a = 5$ and $b = -3$, we have
$= 2(5)^2 + (5 \times -3) + 3$
$= 2 \times 25 + (-15) + 3$
$= 50 + 3 - 15 = 38$

Chapter-11

Exponents and Powers

Exercise 11.1

1. (i) $2^6 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$
(ii) $9^3 = 9 \times 9 \times 9 = 729$
(iii) $11^2 = 11 \times 11 = 121$
(iv) $5^4 = 5 \times 5 \times 5 \times 5 = 625$

2. (i) $6 \times 6 \times 6 \times 6 = 6^4$

(ii) $t \times t = t^2$

(iii) $b \times b \times b \times b = b^4$

(iv) $5 \times 5 \times 7 \times 7 \times 7 = 5^2 \times 7^3$

(v) $2 \times 2 \times a \times a = 2^2 \times a^2 = (2a)^2 = 4a^2$

(iv) $a \times a \times a \times c \times c \times c \times c \times d$
$= a^3 \times c^4 \times d$

3. (i)

2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$\therefore 512 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^9$

Thus, exponential form of 512 is 2^9.

(ii)

7	343
7	49
7	7
	1

$\therefore$ 343
$= 7 \times 7 \times 7 = 7^3$

Thus, the exponential form of 343 is 7^3.

(iii)

3	729
3	243
3	81
3	27
3	9
3	3
	1

$\therefore 729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^6$

Hence, exponential form of 729 is 3^6.

(iv)

5	3125
5	625
5	125
5	25
5	5
	1

$\therefore 3125 = 5 \times 5 \times 5 \times 5 \times 5 = 5^5$

Hence, exponential form of 3125 is 5^5.

4. (i) Here, $4^3 = 4 \times 4 \times 4 = 64$

And $3^4 = 3 \times 3 \times 3 \times 3 = 81$

Clearly, $81 > 64$

Hence, 3^4 is greater than 4^3.

(ii) Here, $5^3 = 5 \times 5 \times 5 = 125$

And $3^5 = 3 \times 3 \times 3 \times 3 \times 3 = 243$

Clearly, $243 > 125$

Hence, 3^5 is greater than 5^3.

(iii) Here,

$2^8 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$
$= 256$

And $8^2 = 8 \times 8 = 64$

Clearly, $256 > 64$

Hence, 2^8 is greater than 8^2.

(iv) Here, $2^{100} = (2^{10})^{10} = (1024)^{10}$

Since, $(1024)^{10} > (100)^2$

Here, 2^{100} is greater than 100^2.

(v) $2^{10} = (2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2)$
$= 1024$

And $10^2 = 10 \times 10 = 100$

Clearly, $1024 > 100$

Here, 2^{10} greater than 10^2.

5. (i) Prime factorisation of 648 with the help of division method :

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

$\therefore 648 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3$
$= 2^3 \times 3^4$

(ii) Prime factorisation of 405 by division method :

3	405
3	135
3	45
3	15
5	5
	1

$\therefore 405 = 3 \times 3 \times 3 \times 3 \times 5 = 3^4 \times 5$

(iii) Prime factorisation of 540 by division method :

2	540
2	270
3	135
3	45
3	15
5	5
	1

∴ $540 = 2 \times 2 \times 3 \times 3 \times 3 \times 5$

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

(iv) Prime factorisation of 3600 by division method :

2	3600
2	1800
2	900
2	450
3	225
3	75
5	25
5	5
	1

∴ $3600 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5$

$= 2^4 \times 3^2 \times 5^2$

6. (i) $2 \times 10^3 = 2 \times 10 \times 10 \times 10 = 2000$

(ii) $7^2 \times 2^2 = (7 \times 2)^2$

$= 14 \times 14 = 196$

(iii) $2^3 \times 5 = 2 \times 2 \times 2 \times 5$

$= 8 \times 5 = 40$

(iv) $3 \times 4^4 = 3 \times 4 \times 4 \times 4 \times 4$

$= 3 \times 256 = 768$

(v) $0 \times 10^2 = 0$

(vi) $5^2 \times 3^3 = 5 \times 5 \times 3 \times 3 \times 3$

$= 25 \times 27 = 675$

(vii) $2^4 \times 3^2 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$

$= 16 \times 9 = 144$

(viii) $3^2 \times 10^4 = 3 \times 3 \times 10 \times 10 \times 10 \times 10$

$= 9 \times 10000 = 90000$

7. (i) $(-4)^3 = (-4) \times (-4) \times (-4) = -64$

(ii) $(-3) \times (-2)^3 = (-3) \times (-2) \times (-2) \times (-2)$

$= (-3) \times (-8) = 24$

(iii) $(-3)^2 \times (-5)^2$

$= (-3) \times (-3) \times (-5) \times (-5)$

$= 9 \times 25 = 225$

(iv) $(-2)^3 \times (-10)^3$

$= (-2) \times (-2) \times (-2)$

$\times (-10) \times (-10) \times (-10)$

$= (-8) \times (-1000) = 8000$

8. (i) $2.7 \times 10^{12} = 2.7 \times 10^4 \times 10^8$

$= 2.7 \times 10000 \times 10^8$

$= 27000 \times 10^8$

Clearly, $27000 \times 10^8 > 1.5 \times 10^8$

So, $2.7 \times 10^2 > 1.5 \times 10^8$

(ii) $\because 3 \times 10^{17} = 3 \times 10^3 \times 10^{14}$

$= 3 \times 1000 \times 10^{14}$

$= 3000 \times 10^{14}$

Clearly, $3000 \times 10^{14} > 4 \times 10^{14}$

So, $4 \times 10^{14} < 3 \times 10^{17}$

Exercise 11.2

1. (i) $3^2 \times 3^4 \times 3^8 = 3^{2+4+8} = 3^{14}$

(ii) $6^{15} \div 6^{10} = 6^{15-10} = 6^5$

(iii) $a^3 \times a^2 = a^{3+2} = a^5$

(iv) $7^x \times 7^2 = 7^{x+2}$

(v) $(5^2)^3 \div 5^3 = 5^{2\times 3} \div 5^3 = 5^6 \div 5^3$

$= 5^{6-3} = 5^3$

(vi) $2^5 \times 5^5 = (2 \times 5)^5 = 10^5$

(vii) $a^4 \times b^4 = (ab)^4$

(viii) $(3^4)^3 = 3^{4\times 3} = 3^{12}$

(ix) $(2^{20} \div 2^{15}) \times 2^3 = (2^{20-15}) \times 2^3$

$= 2^{5+3} = 2^8$

(x) $8^t \div 8^2 = 8^{t-2}$

2. (i) $\frac{2^3 \times 3^4 \times 4}{3 \times 32} = \frac{2^3 \times 3^4 \times 2^2}{3 \times 2^5}$

[$\because 4 = 2 \times 2 = 2^2$

and $32 = 2 \times 2 \times 2 \times 2 \times 2 = 2^5$]

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

$= 2^{5-5} \times 3^{4-1} = 2^0 \times 3^3$

$= 1 \times 3^3 = 3^3$

(ii) $[(5^2)^3 \times 5^4] \div 5^7$

$= (5^{2\times 3} \times 5^4) \div 5^7$

$= 5^{6+4} \div 5^7 = 5^{10} \div 5^7$

$= 5^{10-7} = 5^3$

(iii) $25^4 \div 5^3 = (5^2)^4 \div 5^3$

$= 5^{2\times 4} \div 5^3 = 5^8 \div 5^3$

$= 5^{8-3} = 5^5$

(iv) $\frac{3 \times 7^2 \times 11^8}{21 \times 11^3} = \frac{3 \times 7^2 \times 11^8}{3 \times 7 \times 11^3}$

$= 3^{1-1} \times 7^{2-1} \times 11^{8-3}$

$= 3^0 \times 7^1 \times 11^5 = 7 \times 11^5$

(v) $\frac{3^7}{3^4 \times 3^3} = \frac{3^7}{3^{4+3}} = \frac{3^7}{3^7}$

$= 3^{7-7} = 3^0 = 1$

(vi) $2^0 + 3^0 + 4^0 = 1 + 1 + 1 = 3$

(vii) $2^0 \times 3^0 \times 4^0 = 1 \times 1 \times 1 = 1$

(viii) $(3^0 + 2^0) \times 5^0 = (1 + 1) \times 1 = 2 \times 1 = 2$

(ix) $\frac{2^8 \times a^5}{4^3 \times a^3} = \frac{2^8 \times a^5}{(2^2)^3 \times a^3} = \frac{2^8 \times a^5}{2^6 \times a^3}$

$= 2^{8-6} \times a^{5-3}$

$= 2^2 \times a^2 = (2 \times a)^2 = (2a)^2$

(x) $\left(\dfrac{a^5}{a^3}\right) \times a^8 = (a^{5-3}) \times a^8$

$= a^2 \times a^8 = a^{2+8} = a^{10}$

(xi) $\dfrac{4^5 \times a^8 b^3}{4^5 \times a^5 b^2} = 4^{5-5} \times a^{8-5} \times b^{3-2}$

$= 4^0 \times a^3 \times b^1$

$= 1 \times a^3 \times b = a^3 b$

(xii) $(2^3 \times 2)^2 = (2^{3+1})^2 = (2^4)^2 = 2^8$

3. (i) $10 \times 10^{11} = 10^{1+11} = 10^{12}$

And $100^{11} = (10^2)^{11} = 10^{2\times 11} = 10^{22}$

Since, $10^{12} \neq 10^{22}$

So, the statement is false.

(ii) $2^3 = 2 \times 2 \times 2 = 8$

And $5^2 = 5 \times 5 = 25$

Since, $8 \not> 25$

So, the statement is false.

(iii) $2^3 \times 3^2 = 8 \times 9 = 72$

$6^5 = 6 \times 6 \times 6 \times 6 \times 6 = 7776$

Since, $72 \neq 7776$

So, the statement is false.

(iv) $3^0 = 1$ and $(1000)^0 = 1$

Since, $1 = 1$

So, the statement is true.

4. (i) By prime factorisation

$$\begin{array}{r|r} 2 & 108 \\ \hline 2 & 54 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array} \qquad \begin{array}{r|r} 2 & 192 \\ \hline 2 & 96 \\ \hline 2 & 48 \\ \hline 2 & 24 \\ \hline 2 & 12 \\ \hline 2 & 6 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$\therefore\ 108 \times 192 = (2 \times 2 \times 3 \times 3 \times 3)$
$\times (2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3)$
$= 2^2 \times 3^3 \times 2^6 \times 3^1$
$= 2^{2+6} \times 3^{3+1} = 2^8 \times 3^4$

(ii) By prime factorisation,

$$\begin{array}{r|r} 2 & 270 \\ \hline 3 & 135 \\ \hline 3 & 45 \\ \hline 3 & 15 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$\therefore\ 270 = 2 \times 3 \times 3 \times 3 \times 5 = 2 \times 3^3 \times 5$

(iii) By prime factorisation,

$$\begin{array}{r|r} 3 & 729 \\ \hline 3 & 243 \\ \hline 3 & 81 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array} \qquad \begin{array}{r|r} 2 & 64 \\ \hline 2 & 32 \\ \hline 2 & 16 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline 2 & 2 \\ \hline & 1 \end{array}$$

$\therefore\ 729 \times 64 = (3 \times 3 \times 3 \times 3 \times 3 \times 3)$
$\times (2 \times 2 \times 2 \times 2 \times 2 \times 2)$
$= 3^6 \times 2^6$

(iv) By prime factorisation,

$$\begin{array}{r|r} 2 & 768 \\ \hline 2 & 384 \\ \hline 2 & 192 \\ \hline 2 & 96 \\ \hline 2 & 48 \\ \hline 2 & 24 \\ \hline 2 & 12 \\ \hline 2 & 6 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$\therefore\ 768 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$
$\times 2 \times 3$
$= 2^8 \times 3$

5. (i) $\dfrac{(2^5)^2 \times 7^3}{8^3 \times 7} = \dfrac{2^{10} \times 7^3}{(2^3)^3 \times 7} = \dfrac{2^{10} \times 7^3}{2^9 \times 7}$

$= 2^{10-9} \times 7^{3-1} = 2^1 \times 7^2$

$= 2 \times 49 = 98$

(ii) $\dfrac{25 \times 5^2 \times t^8}{10^3 \times t^4} = \dfrac{5^2 \times 5^2 \times t^8}{(2 \times 5)^3 \times t^4}$

$= \dfrac{5^4 \times t^8}{2^3 \times 5^3 \times t^4} = \dfrac{5^{4-3} \times t^{8-4}}{2^3}$

$= \dfrac{5 \times t^4}{2^3} = \dfrac{5t^4}{8}$

(iii) $\dfrac{3^5 \times 10^5 \times 25}{5^7 \times 6^5} = \dfrac{3^5 \times (2 \times 5)^5 \times (5 \times 5)}{5^7 \times (2 \times 3)^5}$

$= \dfrac{3^5 \times 2^5 \times 5^5 \times 5^2}{5^7 \times 2^5 \times 3^5}$

$= \dfrac{3^5 \times 2^5 \times 5^7}{5^7 \times 2^5 \times 3^5}$

$= 3^{5-5} \times 2^{5-5} \times 5^{7-7}$

$= 3^0 \times 2^0 \times 5^0$

$= 1 \times 1 \times 1 = 1$

Exercise 11.3

1. The expanded forms of the following numbers are as follows :

(i) $279404 = 2 \times 100000 + 7 \times 10000 + 9 \times 1000 + 4 \times 100 + 0 \times 10 + 4 \times 1$
$= 2 \times 10^5 + 7 \times 10^4 + 9 \times 10^3 + 4 \times 10^2 + 0 \times 10^1 + 4 \times 10^0$

(ii) $3006194 = 3 \times 1000000 + 0 \times 100000 + 0 \times 10000 + 6 \times 1000 + 1 \times 100 + 9 \times 10 + 4 \times 1$
$= 3 \times 10^6 + 0 \times 10^5 + 0 \times 10^4 + 6 \times 10^3 + 1 \times 10^2 + 9 \times 10^1 + 4 \times 10^0$

(iii) $2806196 = 2 \times 1000000 + 8 \times 100000 + 0 \times 10000 + 6 \times 1000 + 1 \times 100 + 9 \times 10 + 6 \times 1$
$= 2 \times 10^6 + 8 \times 10^5 + 0 \times 10^4 + 6 \times 10^3 + 1 \times 10^2 + 9 \times 10^1 + 6 \times 10^0$

(iv) $120719 = 1 \times 100000 + 2 \times 10000 + 0 \times 1000 + 7 \times 100 + 1 \times 10 + 9 \times 1$
$= 1 \times 10^5 + 2 \times 10^4 + 0 \times 10^3 + 7 \times 10^2 + 1 \times 10^1 + 9 \times 10^0$

(v) $20068 = 2 \times 10000 + 0 \times 1000 + 0 \times 100 + 6 \times 10 + 8 \times 1$
$= 2 \times 10^4 + 0 \times 10^3 + 0 \times 10^2 + 6 \times 10^1 + 8 \times 10^0$

2. (a) $8 \times 10^4 + 6 \times 10^3 + 0 \times 10^2 + 4 \times 10^1 + 5 \times 10^0$
$= 8 \times 10000 + 6 \times 1000 + 0 \times 100 + 4 \times 10 + 5 \times 1$
$= 86045$

(b) $4 \times 10^5 + 5 \times 10^3 + 3 \times 10^2 + 2 \times 10^0$
$= 4 \times 100000 + 5 \times 1000 + 3 \times 100 + 2 \times 1$
$= 405302$

(c) $3 \times 10^4 + 7 \times 10^2 + 5 \times 10^0$
$= 3 \times 10000 + 7 \times 100 + 5 \times 1$
$= 30705$

(d) $9 \times 10^5 + 2 \times 10^2 + 3 \times 10^1$
$= 9 \times 100000 + 2 \times 100 + 30$
$= 900230$

3. (i) $5,00,00,000 = 5 \times 10000000 = 5 \times 10^7$

(ii) $70,00,000 = 7 \times 1000000 = 7 \times 10^6$

(iii) $3,18,65,00,000 = 3.1865 \times 1000000000$
$= 3.1865 \times 10^9$

(iv) $3,90,878 = 3.90878 \times 100000$
$= 3.90878 \times 10^5$

(v) $39087.8 = 3.90878 \times 10000$
$= 3.90878 \times 10^4$

(vi) $3908.78 = 3.90878 \times 1000$
$= 3.90878 \times 10^3$

4. (a) The distance between Moon and Earth
$= 384,000,000$ m
$= 3.84 \times 100000000$ m $= 3.84 \times 10^8$ m

(b) Speed of light in vacuum
$= 300,000,000$ m/s
$= 3.0 \times 100,000,000$ m/s $= 3.0 \times 10^8$ m/s

(c) Diameter of Earth
$= 1,27,56,000$ m
$= 1.2756 \times 10000000$ m $= 1.2756 \times 10^7$ m

(d) Diameter of Sun $= 1,400,000,000$ m
$= 1.4 \times 1000000000$ m $= 1.4 \times 10^9$ m

(e) The no. of average stars in the galaxy
$= 100,000,000,000$
$= 1 \times 100,000,000,000$
$= 1.0 \times 10^{11}$ stars

(f) The universe estimated to be about 12,000,000,000 years old
$= 1.20 \times 10000000000$
$= 1 \times 10^{10}$years $= 1.2 \times 10^{10}$years

(g) Distance of the Sun from the center of the Milky way galaxy
$= 300,000,000,000,000,000,000$ m
$= 3.0 \times 100000000000000000000$ m
$= 3.0 \times 10^{20}$ m

(h) A drop of water weighing 1.8 gm
$= 60,230,000,000,000,000,000,000$
$= 6.023 \times 10000000000000000000000$
$= 6.023 \times 10^{22}$ molecules

(i) The Earth has 1,353,000,000 km^3 of sea water
$= 1.353 \times 1000000000$
$= 1.353 \times 10^9$ km^3

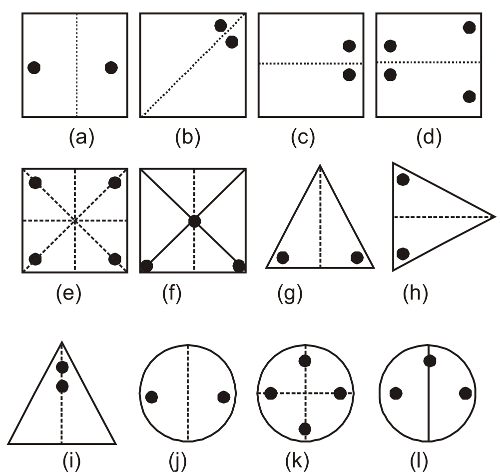
(j) The population of India in Macch, 2001 was $= 1,027,000,000$
$= 1.027 \times 1000000000 = 1.027 \times 10^9$

Chapter-12

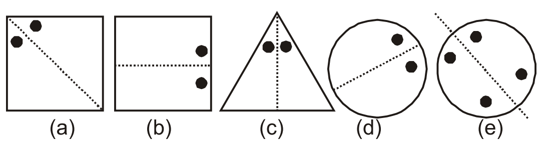
Symmetry

Exercise 12.1

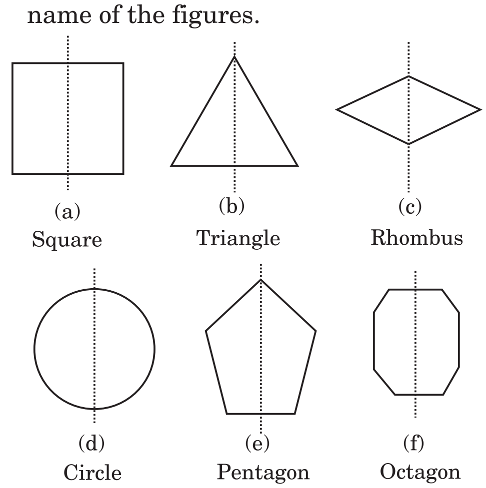
1. The axes of symmetry are shown by the doted lines in the following figures.



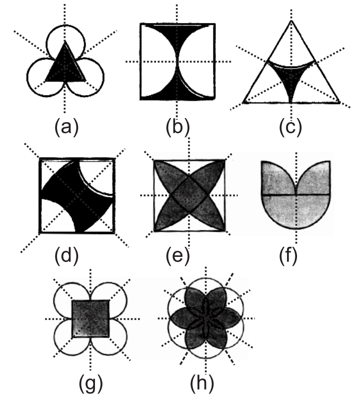
2. The figures with other holes are given below.



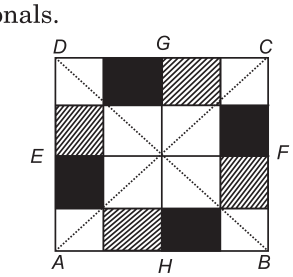
3. The completed figures (*i.e.*, the reflected figures) are given below alongwith the name of the figures.



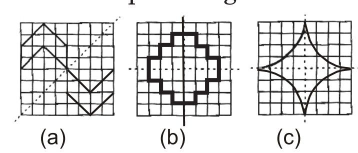
4. The multiple lines of symmetry are shown below.



5. Let the vertex of square be A, B, C and D. Let us take the diagonal as AC and shade the squares as shown in the figure. This figure is symmetric about AC. Since the figure is symmetric about EF and GH also. Thus, there are more than one way to make it symmetric. The figure is symmetric about the diagonal BD also. Hence, the figure is symmetric about both the diagonals.



6. The completed figures are as follows :



7.

	Figure	Number of lines of symmetry
(a)	An equilateral triangle	3
(b)	An isosceles triangle	1
(c)	A scalene triangle	0
(d)	A square	4
(e)	A rectangle	2
(f)	A rhombus	2
(g)	A parallelogram	0
(h)	A quadrilateral	0

(i)	A regular hexagon	6
(j)	A circle	Infinite

8. (a) Letters of the English alphabet having reflectional symmetry about a vertical mirror are A, H, I, M, O, T, U, V, W, X and Y.

(b) Letters of the English alphabet having reflectional symmetry about a horizontal mirror are B, C, D, E, H, I, O and X.

(c) Letters of the english alphabet having reflectional symmetry about both horizontal and vertical mirrors are O, X, I and H.

9. Three examples of shapes with no line of symmetry are :

(i) A scalene triangle

(ii) A parallelogram

(iii) The letter F

10. Other name of the line of symmetry are :

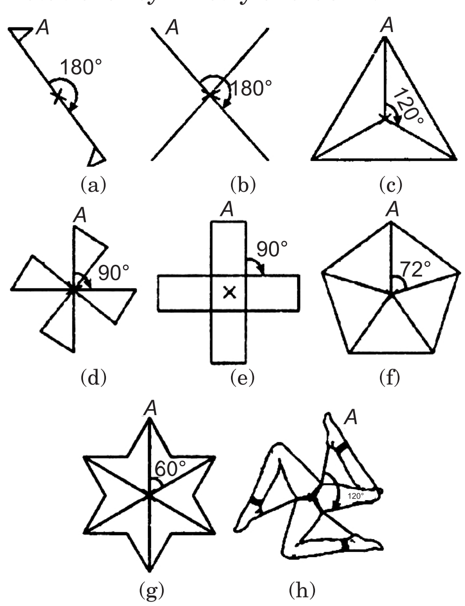
(a) Median in an isosceles triangle

(b) Diameter of a circle

Exercise 12.2

1. The figures (a), (b), (d), (e) and (f) have rotational symmetry of order more than 1.

2. (a) Let no mark a point A as shown in the figure (a). It requires two rotations each through 180° about the point (×) to come back to its original position. It has a rotational symmetry of order 2.



(b) Mark a point A as shown in figure (b). It requires two rotations, each through an angle of 180° about the marked point (×) to come back to its original position. Thus, it has a rotational symmetry of order 2.

(c) Mark a point A as shown in figure (c). It requires three rotations, each through an angle of 120° about the marked point (×) to come back to its original position. Thus, it has a rotational symmetry of order 3.

(d) Mark a point A as shown in figure (d). It requires four rotations, each through an angle of 90°, about the marked point (×) to come back to its original position. Thus, it has a rotational symmetry of order 4.

(e) The figure requires four rotations each of 90°, about the marked point (×) to come back to its original position. So, it has a rotational symmetry of order 4.

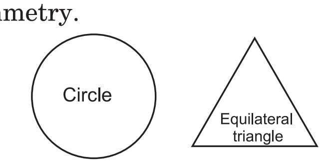
(f) The figure is a regular pentagon. It requires five rotations, each through an angle of 72°, about the marked point (×) to come back to its original position. Hence, it has a rotational symmetry of order 5.

(g) The given figures requires six rotations, each through an angle of 60°, about the marked point (×), to come back to its original position. So, it has a rotational symmetry of order 6.

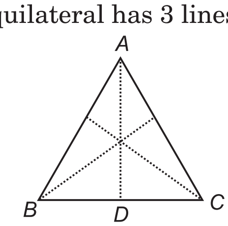
(h) The given figure requires three rotations, each through an angle of 120°, about the marked point (×) to come back to its original position. So, it has a rotational symmetry of order 3.

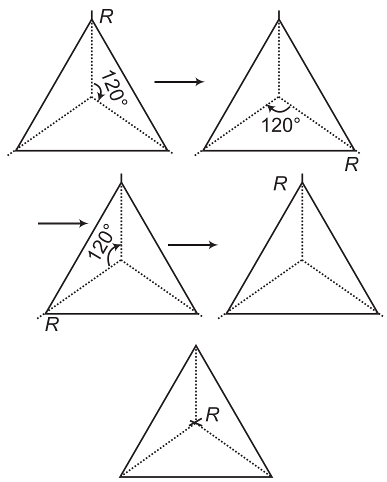
Exercise 12.3

1. A circle and an equilateral triangle have both line symmetry and rotational symmetry.



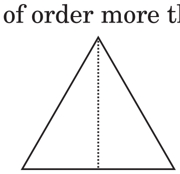
2. (i) An equilateral has 3 lines of symmetry.



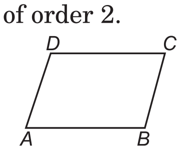


Rotational symmetry of order 3.

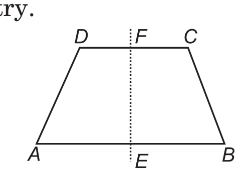
(ii) One line of symmetry but no rotational symmetry of order more than 1.



(iii) No line of symmetry but rotational symmetry of order 2.



(iv) One line of symmetry but no rotational symmetry.



3. Yes.

4.

Shape	Centre of rotation	Order of rotation	Angle of rotation
Square	Yes	4	90°
Rectangle	Yes	2	180°
Rhombus	Yes	2	180°
Equilateral Triangle	Yes	3	120°
Regular Hexagon	Yes	6	60°
Circle	Yes	Infinite	Every angle
Semi-circle	Yes	4	90°

5. The rectangle, square and a rhombus are the quadrilaterals having both line symmetry and rotational symmetry.

6. The figure will look exactly the same as its original position at 120°, 180°, 240°, 300° and 360°.

7. (i) Yes, (ii) No

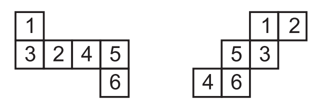
Chapter-13

Visualising Solid Shapes

Exercise 13.1

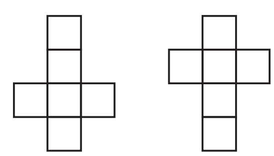
1. (ii), (iii), (iv) and (vi) can be used to make cubes.

2. The suitable numbers in the blanks are as follows :



3. No, because one pair of opposite faces will have 1 and 4 on them whose total is not equal to 7.
Another faces are having 3 and 6 on them whose total is also not equal to 7.

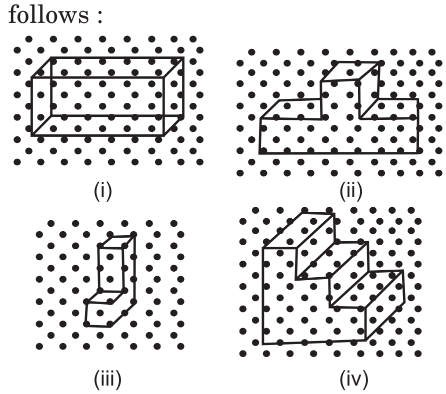
4.



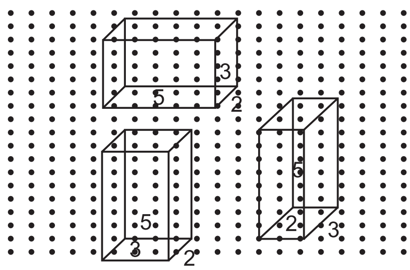
5. (a) → (ii), (b) → (iii), (c) → (iv), (d) → (i)

Exercise 13.2

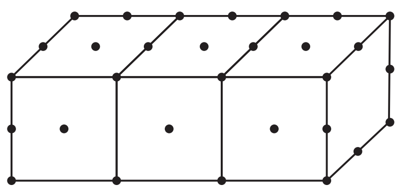
1. An isometric sketch for each shape areas follows :



2. The three different isometric sketches are as follows :

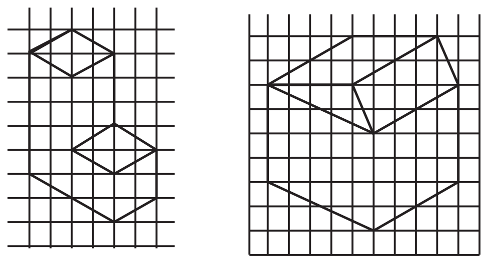


3.

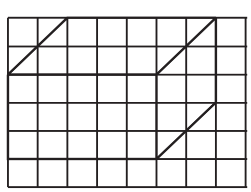


The figure is an isometric sketch of a cuboid formed by placing three cubes each of 2 cm edge side by side.

4. The oblique sketch are as follows :

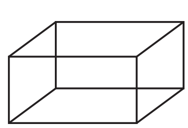


5. (a) (i) An oblique sketch of a cuboid of dimensions 5 cm, 3 cm and 2 cm is as follows.

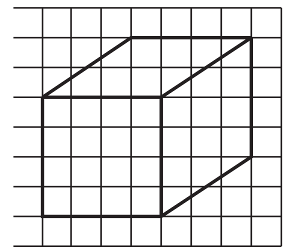


This sketch is not unique.

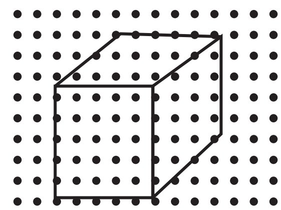
(ii) An isometric sketch of cuboid.



(b) (i) An oblique sketch of cube with side 4 cm.



(ii) An isometric sketch of cube.



Exercise 13.3

1.

Name of solid		Shape of cross section	
		For vertical cut	For horizontal cut
(a)	A brick	Rectangle	Rectangle
(b)	A round apple	Circle	Circle
(c)	A dice	Square	Square
(d)	A circular pipe	Rectangle	Circle
(e)	An ice cream cone	Triangle	Circle

Exercise 13.4

1. When light falls just above the solid, *i.e.,*

(i) A ball, the shadow looks a circle.

(ii) A cylindrical pipe, the shadow looks like a rectangle.

(iii) A book, the shadow looks like nearly a rectangle.

2. (i) The given shadow corresponds to a sphere.

(ii) The given shadow corresponds to a cube.

(iii) The given shadow corresponds to a cone.

(iv) The given shadow corresponds to a cuboid or a cylinder.