

7

MathsTime

A Textbook of Mathematics

Unit-I : Number System

1.

Integers

Exercise

1. Second Number

x	-4	-3	-2	-1	0	1	2	3	4
-4	16	12	8	4	0	-4	-8	-12	-16
-3	12	9	6	3	0	-3	-6	-9	-12
-2	8	6	4	2	0	-2	-4	-6	-8
-1	4	3	2	1	0	-1	-2	-3	-4
0	0	0	0	0	0	0	0	0	0
1	-4	-3	-2	-1	0	1	2	3	4
2	-8	-6	-4	-2	0	2	4	6	8
3	-12	-9	-6	-3	0	3	6	9	12
4	-16	-12	-8	-4	0	4	8	12	16

First Number

Yes; Yes;
 $a \times b = b \times a$

2. (i) Positive (ii) Positive (iii) Negative (iv) Negative
3. (i) $(1569 \times 887) - (569 \times 887) \Rightarrow 887(1569 - 569)$
 $= 887 \times 1000 = \mathbf{887000}$
 (ii) 0 (iii) 18300 (iv) 1894600 (v) -1562500 (vi) -4800
4. (i) $x \times (-1) = -40 \Rightarrow (-40) \times (-1) = \mathbf{40}$
 (ii) -46, (iii) 0
5. (i) $(8 + 9) \times 10$ and $8 + 9 \times 10$
 17×10 and $8 + 90$
 $\mathbf{170 > 98}$
 So, $(8 + 9) \times 10 > 8 + 9 \times 10$
 (ii) $(8 - 9) \times 10$, (iii) $[(-2) - (5)] \times (-6)$
6. Do it yourself.
7. $a \times (-1) = -30 \Rightarrow a = (-1) \times (-30) = \mathbf{30}$
8. $a \times (-1) = 30 \Rightarrow 30 \times (-1) = \mathbf{-30}$
 So it is negative.
9. (i) $18 \div (-3) = (18) \times \frac{1}{-3} = \mathbf{-6}$
 (ii) $(-18) \div 3 = (-18) \times \frac{1}{3} = \mathbf{-6}$
 (iii) $(-18) \div (-3) = -18 \times \frac{1}{-3} = \mathbf{6}$

(iv) -4 (v) 3 (vi) 0 (vii) -144 (viii) 125 (ix) 9 (x) -10569

(xi) $200000 \div (-100) = 200000 \times \frac{1}{-100} = -\mathbf{2000}$

(xii) (-1)

10. (i) 1 (ii) -3785 (iii) 0 (iv) -3065 (v) -312 (vi) -567

11. (i) T (ii) F (iii) F (iv) T (v) F . (vi) F .

12. (i) $10 \times 10 \times 10 \times 10 = \mathbf{10^4}$

(ii) $(-13) \times (-13) \times (-13) \times (-13) \times (-13) \times (-13)$
 $= (-13)^6 = \mathbf{13^6}$

13. (i) $50^2 = 50 \times 50 = \mathbf{2500}$ (ii) $(-1)^{51} = \mathbf{1}$

(iii) $1^{100} = \mathbf{1}$

(iv) 1 (v) 256 (vi) 72

(vii) $2^3 \times 2^5 = 2^{3+5} = 2^8 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$
 $= 2^8 = \mathbf{256}$

(viii) 16 (ix) -64 (x) 432 (xi) -100 (xii) 576 .



2.

Fractions

Exercise 2.1

1. (i) $\frac{9}{30} + \frac{11}{30} = \frac{15}{30} = \frac{9+11+15}{30} = \frac{35}{30} = \frac{7}{6}$

(ii) 1 , (iii) $\frac{37}{10}$,

(iv) $\frac{7}{10} + \frac{14}{25} + \frac{8}{15} = \frac{15 \times 7 \times 6 \times 14 + 10 \times 8}{150}$
 $= \frac{105 + 84 + 80}{150} = \frac{\mathbf{269}}{\mathbf{150}}$

(v) $8\frac{17}{26}$, (vi) $8\frac{2}{45}$

2. (i) $\frac{8}{17} - \frac{5}{17} = \frac{8-5}{17} = \frac{\mathbf{3}}{\mathbf{17}}$

(ii) $\frac{2}{19}$, (iii) $\frac{1}{12}$, (iv) $\frac{17}{50}$

(v) $3\frac{2}{5} - 1\frac{3}{10} = \frac{17}{5} - \frac{13}{10} = \frac{17 \times 2 - 13 \times 1}{10} = \frac{34 - 13}{10} = \frac{\mathbf{21}}{\mathbf{10}}$

(vi) $\frac{1}{2}$

$$3. \text{ (i) } \frac{3}{4} + \frac{15}{16} - \frac{13}{8} = \frac{3 \times 4 + 15 \times 1 - 13 \times 2}{16} \\ = \frac{12 + 15 - 26}{16} = \frac{27 - 26}{16} = \frac{1}{16}$$

$$\text{(ii) } \frac{119}{240} \text{ (iii) } 4\frac{9}{10} \text{ (iv) } 4\frac{13}{15} \text{ (v) } 3\frac{3}{4} \text{ (vi) } 7\frac{3}{20}$$

$$4. 2\frac{5}{7} + x = 4\frac{1}{14} \\ x = \frac{57}{14} - \frac{19}{7} = \frac{57 - 19 \times 2}{14} = \frac{57 - 38}{14} = \frac{19}{14} = 1\frac{5}{14}$$

$$5. 5\frac{2}{19} - x = 3\frac{5}{38} \\ x = \frac{97}{19} - \frac{119}{38} = \frac{194 - 119}{38} = \frac{75}{38} = 1\frac{37}{38}$$

$$6. \text{ Cost of a book} = ₹ 85\frac{1}{5}$$

$$\text{Cost of a notebook} = ₹ 25\frac{1}{4}$$

$$\text{The total cost of both items} = ₹ 85\frac{1}{5} + ₹ 25\frac{1}{4} \\ = (85 + 25) + \left(\frac{1}{5} + \frac{1}{4}\right) \\ = 110 + \left(\frac{4 + 5}{20}\right) = 110 + \frac{9}{20} = ₹ 110\frac{9}{20}$$

$$7. \frac{4}{7}\text{th}, \frac{5}{8}\text{th} \\ \frac{32, 35}{56} \text{ Since } 35 > 32.$$

(So his daughter got more of his property.)

$$8. \text{ Megha by } \frac{3}{20} \text{ m}$$

$$9. \frac{1}{17}, \frac{3}{19}, \frac{5}{21} \\ \frac{399, 1071, 1615}{6783} \text{ Since } 399 < 1017 < 1615$$

So, Soap C has most and soap A has least incence.

$$10. 11\frac{1}{20} \text{ kg}$$

$$11. \text{ Length of pencil} = 17\frac{3}{4} = \frac{71}{4} \text{ cm}$$

$$\text{It is sharpened} = 2\frac{1}{3} = \frac{7}{3} \text{ cm}$$

$$\text{Remaining length} = \frac{71}{4} - \frac{7}{3} = \frac{213 - 28}{12} = \frac{185}{12} = \mathbf{15\frac{5}{12} \text{ cm}}$$

12. Naman walks to go school = $5\frac{1}{2} \text{ km} = \frac{11}{2} \text{ km}$

$$\text{Naman sides to bus} = 12\frac{3}{4} \text{ km} = \frac{51}{4} \text{ km}$$

$$\text{Naman walks again} = 1\frac{2}{3} = \frac{5}{3} \text{ km}$$

$$\begin{aligned} \text{Total distance} &= \frac{11}{2} + \frac{51}{4} + \frac{5}{3} \\ &= \frac{66 + 153 + 20}{12} = \frac{239}{12} = \mathbf{19\frac{11}{12} \text{ km}} \end{aligned}$$

Exercise 2.2

1. (i) $\frac{5}{11} \times \frac{11}{5} = \frac{55}{55} = \mathbf{1}$

(ii) 1, (iii) $\frac{2}{9}$

(iv) $3\frac{1}{5} \times \frac{25}{32} = \frac{16}{5} \times \frac{25}{32} = \frac{5}{2} = \mathbf{2\frac{1}{2}}$

(v) $2\frac{1}{3}$ (vi) 24 (vii) 8 (viii) $17\frac{1}{15}$ (ix) 264 (x) $5\frac{1}{7}$

2. (i) $\frac{5}{6} \times \frac{32}{25} \times \frac{3}{2} = \frac{8}{5} = \mathbf{1\frac{3}{5}}$

(ii) $1\frac{13}{15}$ (iii) $\frac{2}{15}$ (iv) $\frac{27}{70}$ (v) $\frac{36}{175}$ (vi) $\frac{16}{77}$

3. (i) One-half of ₹ 124 = $\frac{1}{2}$ of ₹ 124 = $\frac{1}{2} \times ₹ 124 = ₹ \mathbf{62}$

(ii) 2 (iii) 3 (iv) 24 minutes

4. Cost of 1 kg rice = ₹ $44\frac{2}{3} = ₹ \frac{134}{3}$

$$\text{Cost of } 3\frac{1}{3} \text{ kg rice} = \frac{134}{3} \times 3\frac{1}{3} = \frac{134}{3} \times \frac{10}{3} = ₹ \mathbf{148\frac{8}{9}}$$

5. Speed of fox = $150\frac{2}{3} \text{ mile/hour} = \frac{452}{3} \text{ mile/hour}$

$$\text{Speed of panther} = \frac{452}{3} \times 10 = \frac{4520}{3} = \mathbf{1506\frac{2}{3} \text{ mile/hour}}$$

6. A farmer can put up a fence in one day = $\frac{1}{3} \text{ km}$

A farmer can put up a fence in $6\frac{2}{3}$ days = $\frac{1}{3} \times \frac{20}{3} = \frac{20}{9} = 2\frac{2}{9}$ km

7. Johnny spends on food and rent = $\frac{3}{5}$

Remaining part of his salary = $1 - \frac{3}{5} = \frac{2}{5}$

Now, $\frac{1}{5}$ of $\frac{2}{5} = \frac{1}{5} \times \frac{2}{5} = \frac{2}{25}$

$\frac{2}{25}$ of ₹ 40,000 = ₹ **3200**

So, Johnny donates ₹ 3200.

8. weight of 1 marble = $10\frac{1}{2}$ grams = $\frac{21}{2}$ grams

weight of 230 marbles = $\frac{21}{2} \times 230$ gram = **2415 grams**

9. A car can run in 1 L of petrol = $16\frac{1}{4}$ km OR $\frac{65}{4}$ km

A car can run in $5\frac{2}{3}$ L of petrol = $\frac{65}{4} \times \frac{17}{3} = \frac{1105}{12} = 92\frac{1}{12}$ km

Exercise 2.3

1. (i) The reciprocal of $\frac{3}{2} = \frac{2}{3}$

(ii) $-\frac{1}{5}$ (iii) $\frac{1}{100}$ (iv) 1 (v) $\frac{3}{20}$

2. (i) $\frac{4}{5} \div \frac{7}{15} \Rightarrow \frac{4}{5} \times \frac{15}{7} = \frac{12}{7} = 1\frac{5}{7}$

(ii) $1\frac{3}{4}$ (iii) $\frac{3}{4}$ (iv) 12 (v) $\frac{4}{25}$

(vi) $3\frac{4}{7} \div 1\frac{5}{14} \Rightarrow \frac{25}{7} \div \frac{19}{4} \Rightarrow \frac{25}{7} \times \frac{4}{19} = \frac{50}{19} = 2\frac{12}{19}$

(vii) $10\frac{5}{7}$ (viii) 80 (ix) $\frac{17}{22}$

3. A factory produced steel in a month = $6000\frac{5}{12} = \frac{72005}{12}$ tons

A factory produced steel in a day = $\frac{72005}{12} \div 30$

= $\frac{72005}{12} \times \frac{1}{30} = \frac{14401}{72}$

= **200 $\frac{1}{72}$ tons**

4. The product of two numbers = $5\frac{2}{3} = \frac{17}{3}$

One of them = $2\frac{4}{15} = \frac{34}{15}$

Other number = $\frac{17}{3} \div \frac{34}{15} = \frac{17}{3} \times \frac{15}{34} = 2\frac{1}{2}$

5. The number should be multiplied $\frac{5}{6} \div 3\frac{4}{7}$

$= \frac{5}{6} \div \frac{25}{7} = \frac{5}{6} \times \frac{7}{25} = \frac{7}{30}$

6. A boat can carry = 690 kg

A box weight = $7\frac{2}{3} = \frac{23}{3}$ kg

Thus the boat can carry = $690 \div \frac{23}{3} = \frac{690 \times 3}{23} = 90$ boxes

7. Speed = $\frac{\text{Distance}}{\text{Time}} = \frac{420\frac{2}{5}}{4\frac{1}{5}} = \frac{\frac{2102}{5}}{\frac{21}{5}} = \frac{2102}{21} = 100\frac{2}{21}$ km/hr

8. Area of rectangle = $83\frac{3}{4} \text{ m}^2 = \frac{335}{4} \text{ m}^2$

One side of rectangle = $12\frac{1}{2} \text{ m} = \frac{25}{2} \text{ m}$

Other side of rectangle = $\frac{335}{4} \div \frac{25}{2} = \frac{335}{4} \times \frac{2}{25} = \frac{67}{10} = 6\frac{7}{10} \text{ m}$

9. Number of cans of juice = $\frac{20}{1\frac{1}{3}} = \frac{20 \times 3}{4} = 15$ cans

10. 160. □

3.

Decimal

Exercise 3.1

1. (i) 4.0300, 4.0303, 0.4000, 0.0400
(ii) 1.2100, 56.0000, 0.2359, 12.1000, 0.0120
2. (i) 3.9129, 39.0129, 39.129, 39.219
(ii) 0.0501, 0.5019, 2.05019, 2.5019
(iii) 0.0004, 0.00234, 0.0034, 0.02340
(iv) 30.0506, 32.0056, 32.0506, 32.05061
(v) 0.00123, 0.00124, 0.00213, 0.00412

3. (i) 1.11, 1.101, 1.1, 1.0101, 1.01
 (ii) 2.43, 2.4, 2.34, 2.3, 2
 (iii) 99.09, 9.09, 0.990, 0.909, 0.099.

Exercise 3.2

1. (i) $\frac{5}{4}$ (ii) $\frac{189}{25}$ (iii) $\frac{528}{25}$ (iv) $\frac{401}{25}$ (v) $\frac{19}{5}$ (vi) $\frac{1057}{20}$ (vii) $\frac{359}{25}$
 (viii) $\frac{99}{1000}$
2. (i) 3.75 (ii) 8.875 (iii) 30.1875 (iv) 4.44
3. (i) 0.05 (ii) 0.02 (iii) 38.5 (iv) 0.0052 (v) 0.00517 (vi) 0.000111
 (vii) 49.0.

Exercise 3.3

1. (i) 15.2 (ii) 4.26 (iii) 0.8 (iv) 45.039 (v) 1.30 (vi) 103.51 (vii) 0.1
 (viii) 9.31
2. (i) 3.58 (ii) 1.67 (iii) 77.64 (iv) 19.79 (v) 33.00
3. (i) 33.46 (ii) 90.159 (iii) 290.088 (iv) 863.954
4. (i) 555.55 (ii) 920.034
5. (i) 10.81 (ii) 28.901 (iii) 238.77 (iv) 5.7746
6. Twinkle had thread = 100 m
 Thread broke = 12.03 m
 Left thread = 100 m – 12.03 m = **87.97 m**
7. Rahim was standing from a plane mirror = 5.36 ft
 The distance of image from him = 5.36 ft + 5.36 ft = **10.72 ft**
8. Mrs. Saasha bought flour = 4 kg 250 g
 Mrs. Saasha bought nuts = 3 kg 50 g
 Mrs. Saasha bought olive oil = 350 g
 Total weight did she buy = 4 kg 250 g + 3 kg 50 g + 350 g
 = **7 kg 650 g**
9. The length of triathlon = 10 km
 Kunal ran = 5.1 km
 Kunal cycled = 4.2 km
 Total of running and cycling = 5.1 km + 4.2 km = 9.3 km
 Rest distance = 10 km – 9.3 km = **0.7 km**
 So, Kunal swam 0.7 km.
10. It must be added = 301.5 – 294.315 = **7.185**
11. It must be subtracted = 90.1 – 9.09 = **81.01**

Exercise 3.4

- (i) 253.6 (ii) 40.5 (iii) 0.31 (iv) 1456 (v) 150.4 (vi) 1603.5
(vii) 251.92 (viii) 1052 (ix) 22.3 (x) 1330 (xi) 0.56 (xii) 5010
(xiii) 10 (xiv) 321150 (xv) 5.6 (xvi) 50560 (xvii) 103056.1
(xviii) 35600
- (i) 276.6 (ii) 135.9 (iii) 28.88 (iv) 44.226 (v) 8603.96
(vi) 6565.02 (vii) 15.75 (viii) 590.9418 (ix) 8.4048 (x) 1.4706
(xi) 0.03542 (xii) 483.242 (xiii) 0.096768 (xiv) 660.6072
(xv) 204.308
- (i) 27.9 (ii) 16.65 (iii) 1094.445 (iv) 0.02037 (v) 731.432701
- A fan rotates per minute = 123.5
The fan adjusted 3.5 times more = 123.5×3.5
= 432.25 per minute
- A box of wood weighs = 13.3 kg
15 boxes of wood weigh = 13.3×15 kg = **199.5 kg**
- Motor bike goes in 1 L petrol = 67.33 km
Motor bike goes in 3.25 L of petrol = 67.33×3.25
= 218.8225 km
- Charges for one unit = ₹ 4.28
Charges for 49 units = ₹ 4.28×49 = ₹ **209.72**
- Mohan spent for rice = ₹ 36.30×2.5 = ₹ 90.75
Mohan spent for apples = ₹ 50.50×4 = ₹ 202.00
Mohan spent for petrol = ₹ 12.39×79.03 = ₹ 979.18
Mohan spent total = ₹ 90.75 + ₹ 202.00 + ₹ 979.18 = ₹ **1271.93**

Exercise 3.5

- (i) 5.6 (ii) 2.35 (iii) 0.0051 (iv) 0.093 (v) 0.832 (vi) 0.007
- (i) 1.3265 (ii) 2.5912 (iii) 0.732 (iv) 0.005 (v) 0.07 (vi) 5.629
(vii) 0.27321 (viii) 0.0052 (ix) 0.0006
- (i) 3.5 (ii) 117.25 (iii) 2.56 (iv) 17.475 (v) 0.625 (vi) 0.9375
- (i) 3.2 (ii) 56.24 (iii) 566.47 (iv) 0.0234 (v) 0.0049 (vi) 45.63
(vii) 0.89 (viii) 0.079 (ix) 2.354
- (i) 5.4 (ii) 0.56 (iii) 13.56 (iv) 23.278 (v) 0.0467 (vi) 0.0489
- Cost of 31 toffees = ₹ 173.60
Cost of 1 toffee = ₹ $173.60 \div 31$ = ₹ **5.60**
- Number of sweet balls = $588.38 \text{ g} \div 45.26$ = **13**
- Total of rainfall in one month = 37.02 mm
Rainfall in one day = $37.02 \text{ mm} \div 30$ = **1.234 mm**



4.

Rational Numbers

Exercise 4.1

1. (i) F (ii) T (iii) F (iv) T (v) F (vi) F

2. (i) 12 (ii) 6 (iii) -15 (iv) -67

3. (i) 7 (ii) 49 (iii) -9 (iv) -9

4. (i) $\frac{1}{4} \times \frac{5}{5} = \frac{5}{20}$

(ii) $\frac{1 \times 9}{4 \times 9} = \frac{9}{36}$

(iii) $\frac{-20}{-80}$

(iv) $\frac{1 \times 1000}{4 \times 1000} = \frac{1000}{4000}$

(iv) $\frac{1 \times -25}{4 \times -25} = \frac{-25}{-100}$

5. (i) $\frac{2}{10} = \frac{2 \times 1}{2 \times 5} = \frac{1}{5}$

(ii) $\frac{-36}{180} = \frac{-2 \times 2 \times 3 \times 3}{2 \times 2 \times 3 \times 3 \times 5} = \frac{-1}{5}$

$$\begin{array}{r|l} 2 & 36 \\ \hline 2 & 18 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 180 \\ \hline 2 & 90 \\ \hline 3 & 45 \\ \hline 3 & 15 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

(iii) $\frac{1}{4}$, (iv) $\frac{3}{5}$

6. (i) $\frac{2}{3} = \frac{x}{135}$

By cross multiplication

$$2 \times 135 = 3 \times x$$
$$x = \frac{2 \times 135}{3}$$

OR

$$x = 2 \times 45 \quad x = \mathbf{90}$$

(ii) $\frac{5}{x} = \frac{90}{216}$

By cross multiplication

$$90 \times x = 5 \times 216$$
$$x = \frac{5 \times 216}{90} \Rightarrow x = \mathbf{12}$$

(iii) 7, (iv) 8

$$(v) \frac{72}{81} = \frac{8}{x}$$

By cross multiplication

$$72 \times x = 8 \times 81$$

$$\text{i.e., } x = \frac{8 \times 81}{72} \quad \text{OR } x = \frac{81}{9} \quad x = \mathbf{9}$$

$$7. (i) \frac{-144}{-504} = \frac{144}{504} = \frac{2 \times 2 \times 2 \times 2 \times 3 \times 3}{2 \times 2 \times 2 \times 3 \times 3 \times 7} = \frac{\mathbf{2}}{\mathbf{7}}$$

$$\begin{array}{r|l} 2 & 144 \\ \hline 2 & 72 \\ \hline 2 & 36 \\ \hline 2 & 18 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 504 \\ \hline 2 & 252 \\ \hline 2 & 126 \\ \hline 3 & 63 \\ \hline 3 & 21 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$(ii) \frac{2}{7}$$

$$(iii) \frac{240}{-840} = \frac{24}{-84} = \frac{2 \times 2 \times 2 \times 3}{-2 \times 2 \times 3 \times 7} = \frac{\mathbf{2}}{\mathbf{-7}}$$

$$\begin{array}{r|l} 2 & 24 \\ \hline 2 & 12 \\ \hline 2 & 6 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 84 \\ \hline 2 & 42 \\ \hline 3 & 21 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$(iv) \frac{225}{625} = \frac{3 \times 3 \times 5 \times 5}{5 \times 5 \times 5 \times 5} = \frac{\mathbf{9}}{\mathbf{25}}$$

$$\begin{array}{r|l} 5 & 225 \\ \hline 5 & 45 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 5 & 625 \\ \hline 5 & 125 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

Exercise 4.2

1. (i) F (ii) F (iii) F (iv) T (v) F (vi) F (vii) T

$$2. (i) \frac{2 \times -28}{5 \times -28} = \frac{-\mathbf{56}}{-\mathbf{140}} \quad (ii) \frac{2 \times 77}{5 \times 77} = \frac{\mathbf{154}}{\mathbf{385}}$$

$$(iii) \frac{2 \times -375}{5 \times -375} = \frac{-750}{-1875}$$

$$(iv) \frac{2 \times 250}{5 \times 250} = \frac{500}{1250}$$

$$(v) \frac{-6250}{-15625}$$

3. (i) $\frac{5}{6}$ and $\frac{7}{9}$

LCM of 6 and 9 is 18.

$$\begin{aligned} & \frac{5}{6}, \frac{7}{9} \\ &= \frac{5 \times 3, 7 \times 2}{18} = \frac{15}{18}, \frac{14}{18} \end{aligned}$$

(ii) $\frac{8}{12}, \frac{10}{12}$ and $\frac{7}{12}$

(iii) $\frac{4}{5}, \frac{17}{20}, \frac{23}{40}$ and $\frac{11}{16}$

LCM of 5, 20, 40 and 16 is 80.

$$\begin{aligned} &= \frac{4 \times 16, 17 \times 4, 23 \times 2, 11 \times 5}{80} \\ &= \frac{64, 68, 46, 55}{80} = \frac{64}{80}, \frac{68}{80}, \frac{46}{80}, \frac{55}{80} \end{aligned}$$

4. Do it yourself.

5. (i) $\frac{-9}{12}$ and $\frac{8}{-12}$

Because numerators are not equal.

Therefore $\frac{-9}{12} \neq \frac{8}{-12}$

(ii) $\frac{-16}{20}$ and $\frac{20}{-25}$

LCM of 20 and 25 is 100.

$$= \frac{-16 \times 5, -20 \times 4}{100} = \frac{-80, -80}{100}$$

or $\frac{-80}{100}, \frac{-80}{100}$

Clearly $\frac{-80}{100} = \frac{-80}{100}$

Therefore $\frac{-16}{20} = \frac{20}{-25}$

(iii) $\frac{-7}{21} \neq \frac{3}{9}$

$$(iv) \frac{-8}{-4} \text{ and } \frac{13}{21}$$

LCM of 14 and 21 is 42.

$$= \frac{8 \times 3, 13 \times 2}{42} = \frac{24}{42}, \frac{26}{42}$$

$$\frac{24}{42} \neq \frac{26}{42}$$

[\therefore Numerators are not equal]

$$\text{Therefore } \frac{-8}{-14} \neq \frac{13}{21}$$

$$6. (i) -\frac{4}{11}, \frac{3}{11} \Rightarrow \frac{3}{11} > \frac{-4}{11} \quad \because 3 > -4$$

$$(ii) -\frac{5}{8}, \frac{3}{4}$$

LCM of 4 and 8 is 8.

$$= \frac{-5 \times 1, -3 \times 2}{8} = \frac{-5}{8}, \frac{-6}{8}, \Rightarrow \frac{-5}{8} > \frac{-3}{4}$$

$$(iii) \frac{-7}{12} > \frac{5}{-8}$$

$$(iv) \frac{-4}{9}, \frac{-3}{-7}$$

LCM of 7 and 9 is 63.

$$\frac{(-4) \times 7, 9 \times 3}{63} = \frac{-28, 27}{63} = \frac{-28}{63}, \frac{27}{63}$$

$$\text{Hence, } \frac{3}{7} > \frac{-4}{9}$$

$$7. (i) \frac{-4}{7}, \frac{5}{-7}$$

$$\frac{-4}{7}, \frac{-5}{7}$$

$$\therefore -5 < -4$$

$$\therefore \frac{-5}{7} < \frac{-4}{7}$$

$$(ii) \frac{6}{13}$$

$$(iii) \frac{16}{-5}, \frac{3}{1}$$

LCM of 5 and 1 is 5.

$$= \frac{-16, 3 \times 5}{5} = \frac{-16}{5}, \frac{15}{5}$$

$$\begin{aligned} \therefore & -16 < 15 \\ \therefore & \frac{16}{-5} < \frac{15}{5} \Rightarrow \frac{16}{-5} < 3 \end{aligned}$$

$$(iv) \frac{4}{-3}$$

$$8. (i) \frac{3}{-2}, \frac{3}{8}, \frac{-7}{4}, \frac{1}{10}$$

LCM of 2, 4, 8 and 10 is 40.

$$\frac{-3 \times 20, 3 \times 5, -7 \times 10, 1 \times 4}{40} \\ \frac{-60}{40}, \frac{15}{40}, \frac{-70}{40}, \frac{4}{40} = \frac{-7}{4}, \frac{3}{-2}, \frac{1}{10}, \frac{3}{8}$$

$$(ii) \frac{-7}{10}, \frac{8}{-15}, \frac{1}{2}, \frac{3}{5}$$

$$9. (i) \frac{-7}{2}, \frac{2}{-3}, \frac{5}{6}, \frac{2}{3}$$

LCM of 2, 3, 6 is 6.

$$\frac{-7 \times 3, -2 \times 2, 5 \times 1, 2 \times 2}{6} \\ \frac{-21}{6}, \frac{-4}{6}, \frac{5}{6}, \frac{4}{6} = \frac{5}{6}, \frac{2}{3}, \frac{2}{-3}, \frac{-7}{2}$$

$$(ii) \frac{8}{9}, \frac{13}{45}, 0, \frac{-15}{27}$$

$$10. (i) > (ii) < (iii) = (iv) >$$

11. Do it yourself.

$$12. (i) \left| \frac{2}{5} - \frac{8}{9} \right|$$

LCM of 5 and 9 is 45.

$$\left| \frac{9 \times 2 - 8 \times 5}{45} \right| = \left| \frac{18 - 40}{45} \right| = \left| \frac{-22}{45} \right| = \frac{22}{45}$$

$$(ii) \left| \frac{7}{3} - \left(\frac{-8}{15} \right) \right| = \left| \frac{7}{3} + \frac{8}{15} \right|$$

LCM of 3 and 15 is 15.

$$= \left| \frac{7 \times 5 + 8 \times 3}{15} \right| = \left| \frac{35 + 24}{15} \right| = \left| \frac{59}{15} \right| = 3 \frac{14}{15}$$

$$(iii) \left| -10 - \left(\frac{10}{-3} \right) \right| = \left| -10 + \frac{10}{3} \right| = \left| \frac{-30 + 10}{3} \right| = \left| \frac{-20}{3} \right| = \frac{20}{3} = 6 \frac{2}{3}$$

□

5. Operations on Rational Numbers

Exercise 5.1

1. (i) $\frac{7}{13} + \frac{(-6)}{13}$

$$\frac{7-6}{13} = \frac{1}{13}$$

(ii) $\frac{10}{7}$, (iii) $\frac{-5}{17}$

(iv) $\frac{-23}{28} + \frac{5}{-28} = \frac{-23}{28} + \frac{-5}{28}$
 $= \frac{-23 + (-5)}{28} = \frac{-23 - 5}{28} = \frac{-28}{28} = -1$

2. (i) $\frac{-6}{8} + \frac{2}{3}$

The LCM of 8 and 3 is 24.

$$= \frac{-6 \times 3 + -8 \times 2}{78} = \frac{-18 + 16}{24} = \frac{-2}{24} = \frac{-1}{12}$$

(ii) $-\frac{1}{36}$, (iii) $-\frac{26}{57}$

(iv) $\frac{-7}{26} + \frac{-11}{39}$

The LCM of 26 and 39 is 78.

$$= \frac{(-7) \times 3 + (-11) \times 2}{78} = \frac{-21 + (-22)}{78}$$
$$= \frac{-21 - 22}{78} = \frac{-43}{78}$$

3. (i) $\frac{4}{11} + \frac{-5}{8} = \frac{-5}{8} + \frac{4}{11}$

$$\frac{32 - 55}{88} = \frac{-55 + 32}{88} = \frac{-23}{88} = \frac{-23}{88}$$

LHS = RHS

(ii), (iii), (iv) Do it yourself.

4. (i) $\frac{-3}{4} + \left(\frac{2}{5} + \frac{-4}{7}\right) = \left(\frac{-3}{4} + \frac{2}{5}\right) + \frac{-4}{7}$

$$\frac{-3}{4} + \frac{(14 - 20)}{35} = \frac{(-15 + 8)}{20} + \frac{-4}{7}$$

$$\frac{-3}{4} - \frac{6}{35} = \frac{-7}{20} - \frac{4}{7}$$

$$\frac{-105 - 24}{140} = \frac{-49 - 80}{140}$$

$$\frac{-129}{140} = \frac{-129}{140}$$

LHS = RHS

(ii), (iii), (iv) Do it yourself.

5. (i) $\frac{2}{5} + \frac{8}{3} + \frac{-11}{15} + \frac{4}{5} + \frac{-2}{3}$

LCM of 3, 5 and 15 is 15.

$$= \frac{2 \times 3 + 8 \times 5 + (-11) + 4 \times 3 + (-2) \times 5}{15}$$

$$= \frac{6 + 40 - 11 + 12 - 10}{15} = \frac{37}{15}$$

(ii) $\frac{-86}{63}$

6. (i) The additive inverse of $\frac{1}{4}$ is $-\frac{1}{4}$.

(ii) The additive inverse of $-\frac{3}{4}$ is $\frac{3}{4}$.

(iii) The additive inverse of $-\frac{7}{9}$ is $\frac{7}{9}$.

(iv) The additive inverse of $\frac{16}{-15}$ is $\frac{16}{15}$.

7. (i) $0 + \frac{9}{11} = \frac{9}{11}$

(ii) $\frac{16}{17}$ (iii) $\frac{2}{5}$ (iv) $-\frac{12}{5}$

Exercise 5.2

1. (i) F (ii) T (iii) T (iv) T

2. (i) $\frac{13}{15} - \frac{12}{25}$

LCM of 15 and 25 is 75.

$$= \frac{13 \times 5 - 12 \times 3}{75} = \frac{65 - 36}{75} = \frac{29}{75}$$

(ii) $\frac{-17}{72}$ (iii) $\frac{29}{63}$

(iv) $\frac{-6}{13} - \frac{-7}{15} = \frac{-6}{13} + \frac{7}{15}$

The LCM of 13 and 15 is 195.

$$= \frac{(-6) \times 15 + 7 \times 13}{195} = \frac{-90 + 91}{195} = \frac{1}{195}$$

$$3. \text{ (i) } \frac{7}{8} - \frac{5}{8} = \frac{7-5}{8} = \frac{2}{8} = \frac{1}{4}$$

$$\frac{5}{8} - \frac{7}{8} = \frac{5-7}{8} = \frac{-2}{8} = \frac{-1}{4}$$

$$\frac{1}{4} \neq -\frac{1}{4}$$

$$\text{(ii) } \frac{3}{8} \neq \frac{-3}{8}$$

$$\text{(iii) } \frac{8}{33} - \frac{5}{22}$$

The LCM of 22 and 33 is 66.

$$= \frac{8 \times 2 - 5 \times 3}{66} = \frac{16 - 15}{66} = \frac{1}{66}$$

$$\frac{5}{22} - \frac{8}{33} = \frac{15 - 16}{66} = \frac{-1}{66}$$

$$\Rightarrow \frac{1}{66} \neq -\frac{1}{66}$$

4. Let the other number be x .

$$x + \frac{-15}{7} = -8$$

$$x - \frac{15}{7} = -8 \Rightarrow x = -8 + \frac{15}{7}$$

$$x = \frac{-56 + 15}{7} = \frac{-41}{7}$$

5. Suppose we add $\frac{a}{b}$ to $\frac{-7}{8}$ to make it $\frac{5}{9}$

$$\frac{a}{b} + \frac{-7}{8} = \frac{5}{9}$$

$$\frac{a}{b} = \frac{5}{9} + \frac{7}{8} = \frac{40 + 63}{72} = \frac{103}{72}$$

6. Suppose we subtract $\frac{a}{b}$ from $\frac{26}{33}$ to make it $\frac{-5}{11}$

$$\frac{26}{33} - \frac{a}{b} = \frac{-5}{11}$$

$$\frac{26}{33} + \frac{5}{11} = \frac{a}{b}$$

$$\frac{26 + 5 \times 3}{33} = \frac{a}{b}$$

$$\Rightarrow \frac{a}{b} = \frac{26 + 15}{33} = \frac{41}{33}$$

$$7. (i) \left(\frac{-8}{9} - \frac{11}{4} \right) - \frac{-4}{12}, \frac{-8}{9} - \left(\frac{11}{4} - \frac{-4}{12} \right)$$

$$\text{LHS} = \left(\frac{-8 \times 4 - 11 \times 9}{36} \right) + \frac{4}{12} = \frac{-32 - 99}{36} + \frac{4}{12}$$

$$= \frac{-32 - 99 + 12}{36} = \frac{-119}{36}$$

$$\text{RHS} = \frac{-8}{9} - \left(\frac{11}{4} - \frac{-4}{12} \right) = \frac{-8}{9} - \left(\frac{11}{4} + \frac{4}{12} \right)$$

$$= \frac{-8}{9} - \left(\frac{11 \times 3 + 4 \times 1}{12} \right) = \frac{-8}{9} - \left(\frac{33 + 4}{12} \right)$$

$$= \frac{-8}{9} - \frac{37}{12} = \frac{-8 \times 4 - 37 \times 3}{36} = \frac{-32 - 111}{36} = \frac{-143}{36}$$

Thus,

LHS \neq RHS

$$(ii) \frac{67}{63} \neq \frac{76}{63}$$

$$8. (i) \frac{-2}{3} + \frac{5}{9} - \frac{-7}{6} = \frac{-2}{3} + \frac{5}{9} + \frac{7}{6}$$

The LCM of 3, 6 and 9 is 18.

$$= \frac{-2 \times 6 + 5 \times 2 + 7 \times 3}{18} = \frac{-12 + 10 + 21}{18}$$

$$= \frac{31 - 12}{18} = \frac{19}{18}$$

$$(ii) \frac{41}{72}, (iii) -\frac{1}{10}, (iv) \frac{-35}{72}$$

$$9. (i) \frac{-4}{13} - \frac{-3}{26} = \frac{-4}{13} + \frac{3}{26} = \frac{(-4) \times 2 + 3 \times 1}{26} = \frac{-8 + 3}{26} = \frac{-5}{26}$$

$$(ii) \frac{-5}{14} + x = -1$$

$$\frac{-5}{14} + 1 = -x \quad \frac{5}{14} - 1 = x \quad x = \frac{5 - 14}{14} = \frac{-9}{14}$$

$$(iii) \frac{-7}{9} + x = 3$$

$$x = 3 + \frac{7}{9} \quad x = \frac{27 + 7}{9} = \frac{34}{9}$$

$$(iv) x + \frac{15}{23} = 4$$

$$x = 4 - \frac{15}{23} \quad x = \frac{4 \times 23 - 15}{23} = \frac{92 - 15}{23} = \frac{77}{23}$$

Exercise 5.3

1. (i) $\frac{3}{11}$ by $\frac{2}{5} \Rightarrow \frac{3}{11} \times \frac{2}{5} = \frac{\mathbf{6}}{\mathbf{55}}$

(ii) $\frac{-6}{35}$, (iii) 12

(iv) $\frac{25}{-9}$ by $\frac{3}{-10}$

$$\frac{25}{-9} \times \frac{3}{-10} = \frac{75}{95} = \frac{\mathbf{5}}{\mathbf{6}}$$

(v) $-\frac{24}{13}$

(vi) $\left(\frac{9}{-11}\right)$ by $\frac{22}{-27} = \frac{9}{-11} \times \frac{22}{-27} = \frac{9}{11} \times \frac{22}{27} = \frac{\mathbf{2}}{\mathbf{3}}$

(vii) $\frac{1}{10}$, (viii) 48.

2. (i) $\frac{3}{20} \times \frac{4}{5} = \frac{\mathbf{3}}{\mathbf{25}}$ (ii) $\frac{-1}{12}$

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

(iv) 2

3. (i) $\frac{4}{15} \times \frac{9}{5} \times \frac{50}{3} = 4 \times 2 = \mathbf{8}$

(ii) $-\frac{1}{6}$

(iii) $\left(\frac{-3}{2} \times \frac{4}{5}\right) + \left(\frac{9}{5} \times \frac{-10}{3}\right) - \left(\frac{1}{2} \times \frac{3}{4}\right) = \frac{-6}{5} + \frac{(-6)}{1} - \frac{3}{8}$
 $= \frac{-6}{5} - \frac{6}{1} - \frac{3}{8} = -\left(\frac{6}{5} + \frac{6}{1} + \frac{3}{8}\right)$
 $= -\left(\frac{48 + 240 + 15}{40}\right) = \frac{-303}{40} = -7\frac{\mathbf{23}}{\mathbf{40}}$

(iv) 2

4. $\left(\frac{2}{9} + \frac{-3}{11}\right) \times \left(\frac{5}{2} + \frac{7}{8}\right) = \left(\frac{22 - 27}{99}\right) \times \left(\frac{20 + 70}{8}\right) = \frac{-5 \times 27}{99 \times 8} = \frac{-\mathbf{15}}{\mathbf{88}}$

5. $\left(\frac{-3}{2} - \frac{4}{15}\right) \times \left(\frac{3}{4} - \frac{7}{12}\right) = \left(\frac{-3 \times 15 - 4 \times 2}{30}\right) \times \left(\frac{9 - 7}{12}\right)$
 $= \left(\frac{-45 - 8}{30}\right) \times \left(\frac{2}{12}\right) = \frac{-53}{30} \times \frac{2}{12} = \frac{-\mathbf{53}}{\mathbf{180}}$

$$6. (i) \left(\frac{12}{8} \times \frac{16}{10} \right) + \left(\frac{-3}{9} \times \frac{18}{-16} \right) = \frac{12}{5} + \frac{3}{8} = \frac{12 \times 8 + 3 \times 5}{40}$$

$$= \frac{96 + 15}{40} = \frac{\mathbf{111}}{\mathbf{40}}$$

$$(ii) \frac{-104}{15}$$

$$(iii) \left(\frac{-4}{15} \times \frac{-5}{-8} \right) - \left(\frac{3}{5} \times \frac{6}{-15} \right) + \left(\frac{5}{-8} \times \frac{16}{15} \right)$$

$$= \frac{-1}{6} + \frac{6}{25} - \frac{2}{3} = -\left(\frac{1}{6} + \frac{2}{3} \right) + \frac{6}{25}$$

$$= -\left(\frac{1}{6} + \frac{2}{3} \right) + \frac{6}{25} = -\left(\frac{1+4}{6} \right) + \frac{6}{25}$$

$$= \frac{-5}{6} + \frac{6}{25} = \frac{-125 + 36}{150} = \frac{\mathbf{-89}}{\mathbf{150}}$$

$$(iv) \frac{17}{20}$$

$$7. \text{ Cost of } 3\frac{5}{7} \text{ L milk} = 3\frac{5}{7} \times 16\frac{1}{2} = \frac{26}{7} \times \frac{33}{2} = \frac{13 \times 33}{7} = ₹ \mathbf{61\frac{2}{7}}$$

$$8. \text{ Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$65\frac{1}{3} = \frac{x}{6\frac{1}{2}}$$

$$\Rightarrow \frac{196}{3} = \frac{x}{\frac{13}{2}} \Rightarrow \frac{196}{3} = \frac{2x}{13}$$

$$x = \mathbf{424\frac{2}{3} \text{ km}}$$

Exercise 5.4

1. (i) T (ii) F (iii) T (iv) T (v) T (vi) F (vii) T (viii) F

2. Verify the property

$$x \times y = y \times x$$

$$(i) x = \frac{-1}{5}, y = \frac{2}{7}$$

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

$$\frac{\mathbf{-2}}{\mathbf{35}} = \frac{\mathbf{-2}}{\mathbf{35}}$$

(ii), (iii), (iv) Do it yourself.

3. Verify the property

$$a \times (b \times c) = (a \times b) \times c$$

(i) $a = \frac{1}{3}, b = \frac{-2}{3}, c = \frac{4}{3}$

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

$$\frac{1}{3} \times \frac{-2}{3} \times \frac{4}{3} = \frac{1}{3} \times \frac{-2}{3} \times \frac{4}{3} \quad \frac{-8}{27} = \frac{-8}{27}$$

(ii), (iii), (iv) Do it yourself.

4. Verify the property

$$a \times (b + c) = (a \times b) + (a \times c)$$

(i) $a = \frac{5}{6}, b = \frac{-3}{4}, c = \frac{7}{8}$

$$\frac{5}{6} \times \left(\frac{-3}{4} + \frac{7}{8} \right) = \left(\frac{5}{6} \times \frac{-3}{4} \right) + \left(\frac{5}{6} \times \frac{7}{8} \right)$$

$$\frac{5}{6} \times \left(\frac{-6 + 7}{8} \right) = \left(\frac{-5}{8} \right) + \frac{35}{48}$$

$$\frac{5}{6} \times \frac{1}{8} = \frac{-5}{8} + \frac{35}{48}$$

$$\frac{5}{48} = \frac{35 - 30}{48} \Rightarrow \frac{5}{48} = \frac{5}{48}$$

(ii) Do it yourself.

5. $x \times (y - z) = x \times y - x \times z$

(i) $x = \frac{1}{2}, y = \frac{3}{4}, z = \frac{-4}{5}$

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

$$\frac{1}{2} \times \left(\frac{15 + 16}{20} \right) = \frac{3}{8} + \frac{4}{10}$$

$$\frac{31}{40} = \frac{15 + 16}{40} \quad \frac{31}{40} = \frac{31}{40}$$

(ii) Do it yourself.

6. (i) Multiplicative inverse of 15 is $\frac{1}{15}$.

(ii) Multiplicative inverse of -16 is $\frac{1}{-16}$.

(iii) Multiplicative inverse of $\frac{5}{6}$ is $\frac{6}{5}$.

(iv) Multiplicative inverse of $\frac{3}{7} \times \frac{4}{9}$ is $\frac{21}{4}$.

$$7. \text{ (i) } \left(\frac{1}{-4}\right)^{-1} = -4 \qquad \text{(ii) } \left(\frac{-4}{6} \times \frac{3}{5}\right)^{-1} = \left(\frac{-2}{5}\right)^{-1} = \frac{5}{-2}$$

$$\text{(iii) } \left(\frac{-7}{3}\right)^{-1} = \frac{3}{-7}$$

Exercise 5.5

1. (i) F (ii) F (iii) F (iv) T (v) T

$$2. \text{ (i) } \frac{-4}{6} \div \frac{3}{2} = \frac{-4}{6} \times \frac{2}{3} = \frac{-4}{9} \qquad \text{(ii) } \frac{16}{-15}$$

$$\text{(iii) } \frac{-15}{7} \div \frac{-30}{1} = \frac{-15}{7} \times \frac{1}{-30} = \frac{1}{14}$$

$$\text{(iv) } -25 \div \left(\frac{-5}{6}\right) = \frac{-25}{1} \times \frac{6}{-5} = 30$$

$$\text{(v) } \frac{4}{3}$$

$$\text{(vi) } \left(\frac{-16}{35}\right) \div \left(\frac{-15}{14}\right) = \frac{-16}{35} \times \frac{14}{-15} = \frac{16 \times 14}{35 \times 15} = \frac{32}{75}$$

$$\text{(vii) } \frac{21}{10}$$

$$\text{(viii) } \left(\frac{-7}{12}\right) \div \left(\frac{-2}{3}\right) = \frac{-7}{12} \times \frac{3}{-2} = \frac{7}{8}$$

3. Let the other number be x .

$$-\frac{4}{15} \times x = \frac{-8}{9}$$

$$x = \frac{-8}{9} \times \frac{15}{-4} \quad x = \frac{10}{3}$$

$$4. \quad x \times \frac{-15}{28} = \frac{-5}{7}$$

$$x = \frac{-5}{7} \times \frac{28}{-15} \quad x = \frac{4}{3}$$

5. Verify that $(x \div y) \times z \neq x \div (y \times z)$

Taking $x = \frac{8}{15}, y = \frac{2}{3}, z = \frac{4}{10}$

$$\left(\frac{8}{15} \div \frac{2}{3}\right) \times \frac{4}{10} \neq \frac{8}{15} \div \left(\frac{2}{3} \times \frac{4}{10}\right)$$

$$\left(\frac{8}{15} \times \frac{3}{2}\right) \times \frac{4}{10} \neq \frac{8}{15} \div \frac{4}{15}$$

$$\frac{8}{25} \neq 2$$

$$6. \text{ (i) } \frac{13}{5} \div \frac{26}{15} = \frac{26}{15} \div \frac{13}{5}$$

$$\frac{13}{5} \times \frac{15}{26} = \frac{26}{15} \times \frac{5}{13} \quad \frac{3}{2} \neq \frac{2}{3}$$

(ii), (iii) Do it yourself.

$$\text{(iv) } \left(\frac{-6}{15}\right) \div \left(\frac{7}{30}\right) = \left(\frac{7}{30}\right) \div \left(\frac{-6}{15}\right)$$

$$-\frac{6}{15} \times \frac{30}{7} = \frac{7}{30} \times \frac{15}{-6}$$

$$\frac{-12}{7} \neq \frac{7}{-12}$$

$$7. \text{ Sum} = \frac{65}{13} + \frac{5}{7}$$

$$= 5 + \frac{5}{7}$$

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

$$\text{Subtract} = \frac{65}{13} - \frac{5}{7}$$

$$= 5 - \frac{5}{7}$$

$$= \frac{35-5}{7} = \frac{30}{7}$$

$$\text{Divide} = \frac{40}{7} \div \frac{30}{7} = \frac{40}{7} \times \frac{7}{30} = \frac{4}{3}$$

$$8. \text{ Sum} = \frac{13}{5} + \frac{-6}{15}$$

$$= \frac{13}{5} - \frac{6}{15} = \frac{13}{5} - \frac{2}{5}$$

$$= \frac{11}{5}$$

$$\text{Product} = \frac{-29}{7} \times \frac{1}{-2} = \frac{29}{4}$$

$$\text{Divide} = \frac{11}{5} \div \frac{29}{14}$$

$$= \frac{11}{5} \times \frac{14}{29} = \frac{154}{145}$$

$$9. \frac{-35}{6} \div x = \frac{-15}{2}$$

$$\frac{35}{6} \times \frac{1}{x} = \frac{15}{2}$$

$$x = \frac{35 \times 2}{6 \times 15} \quad x = \frac{7}{9}$$

$$10. \text{ Cost of per meter cloth} = \frac{65\frac{1}{2}}{3\frac{2}{5}} = \frac{\frac{131}{2}}{\frac{17}{5}} = \frac{131}{2} \times \frac{5}{17}$$

$$= \frac{655}{34} = ₹ 19 \frac{9}{34}$$

$$11. \text{ Length of cloth required for each pair} = \frac{60}{25} = 2.4 \text{ metre.}$$

12. (i) $\frac{9}{8} \div x = \frac{6}{5}$

$$\frac{9}{8} \times \frac{1}{x} = \frac{6}{5}$$

$$8 \times 6 \times x = 9 \times 5 \quad x = \frac{9 \times 5}{6 \times 8} = \frac{15}{16}$$

(ii) $\frac{-3}{7}$, (iii) $\frac{5}{2}$

(iv) $(-15) \div x = \frac{-6}{5}$

$$-15 \times \frac{1}{x} = \frac{-6}{5}$$

$$-6 \times x = 5x - 15 \quad x = \frac{5 \times 15}{6} \quad x = \frac{25}{2}$$

13. Verify $(x \times y)^{-1} = x^{-1} \times y^{-1}$

(i) $x = \frac{11}{23}$, $y = \frac{-17}{5}$

$$\left(\frac{11}{23} \times \frac{-17}{5}\right)^{-1} = \left(\frac{11}{23}\right)^{-1} \times \left(\frac{-17}{5}\right)^{-1}$$

$$\frac{23}{11} \times \frac{5}{-17} = \frac{23}{11} \times \frac{5}{-17}$$

(ii) Do it yourself.

Exercise 5.6

1. (i) T (ii) T (iii) T (iv) T (v) F (vi) T (vii) T (viii) F (ix) F (x) F

2. The rational number between -5 and $4 = \frac{-5 - 4}{2} = \frac{-9}{2}$

3. The rational number between -7 and $-6 = \frac{-7 - 6}{2} = \frac{-13}{2}$

Now a rational number between $\frac{-13}{2}$ and -6 .

$$\frac{1}{2} \left\{ \frac{-13}{2} - 6 \right\} = \frac{1}{2} \left\{ \frac{-25}{2} \right\} = \frac{-25}{4}$$

A rational number between $\frac{-13}{2}$ and -7 .

$$\frac{1}{2} \left\{ \frac{-13}{2} - 7 \right\} = \frac{1}{2} \left\{ \frac{-27}{2} \right\} = \frac{-27}{4}$$

The desired rational numbers are $\frac{-27}{4}$, $\frac{-13}{2}$, $\frac{-25}{4}$.

4. The rational number between -1 and $1 = \frac{-1+1}{2} = \frac{0}{2} = 0$

Now a rational number between -1 and 0 .

$$= \frac{1}{2}\{-1 + 0\} = \frac{-1}{2}$$

$$-1 < \frac{-1}{2} < 0 < 1$$

A rational number between 0 and $1 = \frac{0+1}{2} = \frac{1}{2}$

$$-1 < -\frac{1}{2} < 0 < \frac{1}{2} < 1$$

A rational number between $\frac{1}{2}$ and $0 = \frac{\frac{1}{2} + 0}{2} = \frac{1}{4}$

$$-1 < -\frac{1}{2} < 0 < \frac{1}{4} < \frac{1}{2} < 1$$

A rational number between 0 and $-\frac{1}{2} = \frac{0 - \frac{1}{2}}{2} = \frac{-1}{4}$

$$-1 < \frac{-1}{2} < \frac{-1}{4} < 0 < \frac{1}{4} < \frac{1}{2} < 1$$

The desired rational numbers are $\frac{-1}{2}, \frac{-1}{4}, 0, \frac{1}{4}, \frac{1}{2}$.

5. 4 rational numbers between $\frac{3}{4}$ and $\frac{2}{3}$, firstly equating the denominator of both, we get $\frac{9}{12}$ and $\frac{8}{12}$

$\frac{8}{12} < \frac{9}{12}$, the rational number could be $\frac{8+9}{12 \times 2} = \frac{17}{24}$, equating

denominator of both, we get $\frac{16}{24} < \frac{17}{24} < \frac{18}{24}$ other is $\frac{17+18}{24 \times 2} = \frac{35}{48}$,

another is $\frac{16+17}{24 \times 2} = \frac{33}{48}$ another is $\frac{33+34}{48 \times 2} = \frac{67}{96}$

The desired four rational numbers are $\frac{17}{24}, \frac{35}{48}, \frac{33}{48}$ and $\frac{23}{32}$.

□

6. Exponents and Powers

Exercise 6.1

1. (i) T (ii) T (iii) T (iv) F (v) T (vi) F

$$2. \text{ (i) } \left(\frac{3}{7}\right)^2 = \frac{3 \times 3}{7 \times 7} = \frac{\mathbf{9}}{\mathbf{49}} \qquad \text{(ii) } \frac{243}{1024}$$

$$\text{(iii) } \left(\frac{-2}{3}\right)^4 = \frac{-2 \times -2 \times -2 \times -2}{3 \times 3 \times 3 \times 3} = \frac{\mathbf{16}}{\mathbf{81}}$$

$$3. \text{ (i) } \left(\frac{3}{5}\right)^4 \times \left(\frac{1}{3}\right)^3 = \frac{3 \times 3 \times 3 \times 3 \times 1 \times 1 \times 1}{5 \times 5 \times 5 \times 5 \times 3 \times 3 \times 3} = \frac{\mathbf{3}}{\mathbf{625}}$$

$$\text{(ii) } -\frac{1}{12}$$

$$\text{(iii) } \left(\frac{1}{3}\right)^4 \div \left(\frac{1}{9}\right)^6 = \frac{1 \times 1 \times 1 \times 1}{3 \times 3 \times 3 \times 3} \times \frac{9 \times 9 \times 9 \times 9 \times 9 \times 9}{1 \times 1 \times 1 \times 1 \times 1 \times 1} = \mathbf{6561}$$

$$\begin{aligned} \text{(iv) } (-2)^5 \div \left(\frac{-1}{3}\right)^3 &= (-2)^5 \times \left(\frac{-3}{1}\right)^3 \\ &= -2 \times -2 \times -2 \times -2 \times -2 \times -2 \times -2 \times -3 \times -3 \times -3 \\ &= 32 \times 27 = \mathbf{864} \end{aligned}$$

$$4. \text{ (i) } \left(\frac{3}{4}\right)^3 \times \left(\frac{2}{3}\right)^2 = \frac{3 \times 3 \times 3 \times 2 \times 2}{4 \times 4 \times 4 \times 3 \times 3} = \frac{\mathbf{3}}{\mathbf{16}}$$

$$\text{(ii) } \left(-\frac{1}{2}\right)^3 \times 2^3 \times \left(\frac{3}{4}\right)^2 = \frac{-1}{8} \times 8 \times \frac{9}{16} = \frac{\mathbf{-9}}{\mathbf{16}}$$

$$\text{(iii) } \left[\left(\frac{1}{2}\right)^2 - \left(\frac{1}{4}\right)^3\right] \times 2^3 = \left[\frac{1}{4} - \frac{1}{64}\right] \times 8 = \frac{15}{64} \times 8 = \frac{\mathbf{15}}{\mathbf{8}}$$

$$\text{(iv) } (3^2 - 2^2) \div \left(\frac{1}{5}\right)^2 = (9 - 4) \div \frac{1}{5 \times 5} = 5 \div \frac{1}{25} = 5 \times \frac{25}{1} = \mathbf{125}$$

$$5. \text{ (i) } \frac{1}{243} = \frac{1}{3^5} = \left(\frac{\mathbf{1}}{\mathbf{3}}\right)^5 \qquad \text{(ii) } \frac{-16}{729} = -\left(\frac{\mathbf{4}}{\mathbf{27}}\right)^2$$

$$\text{(iii) } \frac{-625}{14641} = -\left(\frac{\mathbf{5}}{\mathbf{11}}\right)^4 \qquad \text{(iv) } \frac{-2401}{-256} = \frac{2401}{256} = \left(\frac{\mathbf{7}}{\mathbf{4}}\right)^4$$

$$6. \text{ (i) } (-3)^5 = -243 \qquad \text{(ii) } \frac{256}{81}$$

$$\text{Reciprocal} = \frac{-1}{243}$$

$$\text{(iii) } \left(-\frac{1}{5}\right)^8 \div \left(\frac{1}{5}\right)^2 = \left(+\frac{1}{5}\right)^6 = \frac{1}{15625}$$

$$\text{Reciprocal} = \mathbf{15625}$$

$$(iv) \left(\frac{3}{7}\right)^3 \times \left(\frac{7}{3}\right)^5 = \left(\frac{3}{7}\right)^3 \times \left(\frac{3}{7}\right)^{-5} = \left(\frac{3}{7}\right)^{-2} \times \left(\frac{7}{3}\right)^2 = \frac{49}{9}$$

$$\text{Reciprocal} = \frac{9}{49}$$

7. (i) $2^3 \times 2^4 = 2^x$

$$2^{3+4} = 2^x$$

$$2^7 = 2^x \quad x = 7$$

(ii) 11, (iii) 11

(iv) $(-4)^9 \div (-4)^3 = (-4)^x$

$$(-4)^{9-3} = (-4)^x$$

$$(-4)^6 = (-4)^x \quad x = 6$$

(v) $\frac{8^{13}}{8^{19}} = \frac{1}{8^x}$

By cross multiplication, we get.

$$8^{13+x} = 8^{19}$$

$$\Rightarrow 13 + x = 19 \text{ [Comparing]}$$

$$\Rightarrow x = 19 - 13 = 6$$

(vi) $(-4)^{11} \div (-4)^{15} = \frac{1}{(-4)^x}$

$$(-4)^{11-15} = \frac{1}{(-4)^x} \Rightarrow (-4)^{-4} = \frac{1}{(-4)^x}$$

$$\Rightarrow \frac{1}{(-4)^4} = \frac{1}{(-4)^x} \Rightarrow x = 4$$

Exercise 6.2

1. (i) $3.27 \times 10^6 = \mathbf{3270000}$

(ii) 0.00465, (iii) 749000

(iv) $3.127 \times 10^{-7} = \mathbf{0.000003127}$

(v) 43500

2. (i) $476000 = \mathbf{4.76 \times 10^5}$

(ii) $8460 \times 10^3 = \mathbf{8.46 \times 10^6}$

(iii) $0.00025 = \mathbf{2.5 \times 10^4}$

(iv) $\frac{4}{100000} = \frac{4}{10^5} = \mathbf{4 \times 10^{-5}}$

(v) $3246 = \mathbf{3.246 \times 10^3}$

3. (i) $6.5 \times 10^{-6} = \mathbf{0.0000065}$
(ii) $5.6146929 \times 10^7 = \mathbf{56146929}$
(iv) 580000000000, (v) 1001000000
4. (i) $98000000, n = 8 = \mathbf{9.8 \times 10^8}$
(ii) 9.7×10^{-11} , (iii) 55×10^{-14}
(iv) $1070000000, n = 9 = \mathbf{10.7 \times 10^9}$
5. (i) $1050000 = \mathbf{1.05 \times 10^6}$
(ii) $1353000000 = \mathbf{1.353 \times 10^9}$
 $136100000 = \mathbf{1.361 \times 10^9}$
(iii) $102700000 = \mathbf{1.027 \times 10^9}$
 $531200000 = \mathbf{5.312 \times 10^8}$
 $495800000 = \mathbf{4.958 \times 10^8}$
(iv) $\frac{1}{1000000} = \frac{1}{10^6} = \mathbf{1 \times 10^{-6}}$

□

Unit-II : Algebra

7. Algebraic Expressions

Exercise 7.1

1. (i) 3 (ii) $\frac{-7}{2}$ (iii) 5 (iv) -1
2. (i) x^2 (ii) x (iii) xy^2 (iv) xyz (v) x^4
3. (i) $\frac{3}{5}$ (ii) -7 (iii) $\frac{1}{2}$ (iv) 1
4. (i) binomial (ii) trinomial (iii) monomial (iv) trinomial
(v) binomial
5. (i) $-2x^2, x^2, 3x^2, -15x^2$ (ii) $-5ab, ab, -ab, 2ab$
(iii) $mn, -mn, 2mn, -2mn$ (iv) $xy^2, -xy^2, 2xy^2, -2xy^2$
(v) $px, -px, 2px, -2px$.

Exercise 7.2

1. (i) $7x \times 5x^2 = \mathbf{35x^3}$
(ii) $-5x^3 \times 7x^2 = -\mathbf{35x^5}$
(iii) $20x \times (-25x^2y) = -\mathbf{500x^3y}$

$$(iv) 2a^2bc \times 4ab^2 = \mathbf{8a^3b^3c}$$

$$(v) \frac{5}{7} \times x^3 \times \frac{-28}{45} x^4 = \frac{-4}{9} x^7$$

$$(vi) \frac{-8}{5} a^3b \times \frac{15}{6} abc^2 = \frac{-3}{2} a^4b^2c^2$$

$$(vii) 12x^3y^2z$$

$$(viii) \left(-\frac{1}{27} a^2b^2\right) \times \left(-\frac{9}{2} a^3b^2c^2\right) = \frac{1}{6} a^5b^4c^2$$

$$(ix) 3.2x^6y^3 \times 5x^2y^2 = \frac{32}{10} x^6y^3 \times 5x^2y^2 = \mathbf{16x^8y^5}$$

$$(x) x^{-6} \times x^7 \times (-2x) = -2x^{-6+7+1} = \mathbf{-2x^2}$$

$$(xi) (-2x^2) \times (7x^2) \times (6x^3) = \mathbf{-84x^7}$$

Put $x = 1$ in both sides

$$(-2 \times 1^2)(7 \times 1^2)(6 \times 1^3) = -84 \times 1$$

$$-84 = -84 \quad \text{Hence proved.}$$

$$(xii) 2ab \times (-5a^2) \times (-4.4a^2b) = 44a^{2+1+2}b^{1+1} = \mathbf{44a^5b^2}$$

When $a = -1, b = 2$

$$= 44 \times (-1)^5 \times (2)^2 = 44 \times 4 = \mathbf{-176}$$

$$(xiii) a = 1, b = 2$$

$$\begin{aligned} &= (5a^6)(-10ab^2)(-2a^2b^3) \\ &= 100a^{6+2+1}b^{2+3} = 100a^9b^5 \\ &= 100 \times (1)^9 \times (2)^5 \\ &= 100 \times 1 \times 32 = \mathbf{3200} \end{aligned}$$

$$2. (i) a^7 \times a^{10} \times a^{-3} = a^{7+10+3} = a^{17+7} = \mathbf{a^{14}}$$

$$(ii) x^{-5} \times (-2x^3) \times 7x^5 = -14x^{-5+3+5} = \mathbf{-14x^3}$$

Exercise 7.3

$$1. (i) 5a(a^2 + a + 3) = 5a \times a^2 + 5a \times a + 5a \times 3 \\ = \mathbf{5a^3 + 5a^2 + 15a}$$

$$(ii) x^7 + 7x^6 + 9x^5$$

$$(iii) 0.1a(0.01a + 0.0016) = \frac{1}{10} a \left(\frac{a}{100} + \frac{16}{10000} \right) \\ = \frac{a^2}{1000} + \frac{16a}{100000}$$

$$2. (i) (3x + 5) \times 7x = 3x \times 7x + 5 \times 7x \\ = \mathbf{21x^2 + 35x}$$

$$(ii) 2x^2y - xy^2, (iii) 5m^2 - 10m$$

$$(iv) (5x^2 + 7x) \times 5x^2 = \mathbf{25x^4 + 35x^3}$$

$$(v) \left(\frac{1}{2}x - \frac{1}{3}y\right) \times 6xy = \frac{1}{2} \times 6x^2y - \frac{6}{3}xy^2 \\ = \mathbf{3x^2y - 2xy^2}$$

$$(vi) (0.2a - 0.1b) \times 0.3b = 0.2a \times 0.3b - 0.1b \times 0.3ab \\ = \mathbf{0.06a^2b - 0.03ab^2}$$

$$3. (i) (2x + 9) \times (6x + 5) = 2x \times 6x + 6x \times 9 + 5 \times 2x + 5 \times 9 \\ = 12x^2 + 54x + 10x + 45$$

$$= \mathbf{12x^2 + 64x + 45}$$

$$(ii) 3x^2 - 17x - 56, (iii) 6p^2q^2 + 13pq^3 + 6q^4$$

$$(iv) (2.5a + 2.3b) \times (2.5a - 2.3b) = (2.5a)^2 - (2.3b)^2 \\ = \mathbf{6.25a^2 - 5.29b^2}$$

$$4. (i) a(a - b) + b(a - b) = a^2 - ab + ab - b^2 = \mathbf{a^2 - b^2}$$

$$(ii) (a + b)(2a - b)$$

$$(iii) a(a^2 + 1) + b(b^2 + 1) - (a + b) = a^3 + a + b^3 + b - a - b \\ = \mathbf{a^3 + b^3}$$

$$(iv) -3p(p + 17)$$

$$5. (i) (2x - 5) \times (7 + 4x) = 2x \times 7 - 5 \times 7 + 2x \times 4x - 5 \times 4x \\ = 14x - 35 + 8x^2 - 20x$$

$$= \mathbf{8x^2 - 6x - 35}$$

$$\text{If } (x = 2) = 8(2)^2 - 6(2) - 35$$

$$= 8 \times 4 - 12 - 35 = 32 - 12 - 35 = \mathbf{-15}$$

$$(ii) 7x^2 + 6xy - y^2, (iii) a^2b^2 + a^3 + b^3 + ab$$

$$(iv) (p^2 - q^2)(p - q)^2 = p^3 - pq^2 - p^2q + q^3$$

$$\text{If } p = 2, q = 0 = (2)^3 - (2) \times 0 - (2)^2 \times 0 + 0 = 8$$

$$6. (i) (2x + 3y)(4x^2y + 5xy^2)$$

$$= 8x^3y + 12x^2y^2 + 10x^2y^2 + 15xy^3$$

$$= \mathbf{8x^3y + 22x^2y^2 + 15xy^3}$$

$$(ii) (a^5 + 5)(b^3 + 3) + 4 = a^2b^3 + 5b^3 + 3a^5 + 15 + 4$$

$$= a^5b^3 + 5b^3 + 3a^5 + 19$$

$$(iii) (a + bcd)(a^3 + b^3c^3d^3)$$

$$= \mathbf{a^4 + ab^3c^3d^3 + a^3bcd + b^4c^4d^4}$$

$$(iv) (t^2 + s^2)(t^2 - s^2) \text{ is of the form } (a + b)(a - b) = a^2 - b^2$$

$$= (t^2)^2 - (s^2)^2 = \mathbf{t^4 - s^4}$$

7. (i) $-x^2yz(xy^2z - x^2z) = -x^3y^3z^2 + x^4yz^2$

$$\text{If } x = -1, y = 1, z = 2$$

$$= -(-1)^3(1)^3(2)^2 + (-1)^4(1)(2)^2$$

$$= 1 \cdot 1 \cdot 4 + 1 \cdot 1 \cdot 4 = 4 + 4 = 8$$

(ii) -244

8. (i) $(1.5x - 4y)(1.5x + 4y + 3)$

$$= 1.5x \times (1.5x + 4y + 3) - 4y(1.5x + 4y + 3)$$

$$= 2.25x^2 + 6xy + 4.5x - 6xy - 16y^2 - 12y$$

$$= \mathbf{2.25x^2 - 16y^2 + 4.5x - 12y}$$

(ii) $m^2p^2 - m^2n^2 - n^4 + p^4$

9. (i) $(3x + 4)(2x - 3) + (5x - 4)(x + 2)$

$$= 3x(2x - 3) + 4(2x - 3) + 5x(x + 2) - 4(x + 2)$$

$$= 6x^2 - 9x + 8x - 12 + 5x^2 + 10x - 4x - 8$$

$$= \mathbf{11x^2 + 5x - 20}$$

(ii) $8x^2 - 10y^2$

(iii) $(x^2 - 5x + 6)(2x - 3) - (3x^2 + 4x - 5)(x - 2)$

$$= 2x(x^2 - 5x + 6) - 3(x^2 - 5x + 6) - x(3x^2 + 4x - 5)$$

$$\quad \quad \quad + 2(3x^2 + 4x - 5)$$

$$= 2x^3 - 10x^2 + 12x - 3x^2 + 15x - 18 - 3x^3 - 4x^2$$

$$\quad \quad \quad + 5x + 6x^2 + 8x - 10$$

$$= (2x^3 - 3x^3) + (-10x^2 - 3x^2 - 4x^2 + 6x^2)$$

$$\quad \quad \quad + (12x + 15x + 5x + 8x) - 18 - 10$$

$$= \mathbf{-x^3 - 11x^2 + 40x - 28}$$

10. (i) $(x + 2y) \times (2x - 9y + 7)$

$$= 2x^2 - 9xy + 7x + 4xy - 18y^2 + 14y$$

$$= \mathbf{2x^2 - 18y^2 - 5xy + 7x + 14y}$$

(ii) $\frac{3}{2}x^2 - \frac{163}{8}xy + 16x - 4y + 5y^2$

(iii) $x^3 + x^3y + x^2y + xy^2 + y^3 + xy^3$

(iv) $(a + b + c) \times (a^3 - b^3)$

$$= \mathbf{a^4 - ab^3 + a^3b - b^4 + a^3c - cb^3}$$

11. (i) $(x + y)(x^2 - xy + y^2) = x(x^2 - xy + y^2)$

$$\quad \quad \quad + y(x^2 - xy + y^2)$$

$$= x^3 - x^2y + xy^2 + x^2y - xy^2 + y^3$$

$$= \mathbf{x^3 + y^3}$$

$$(ii) x^2 + (3x - y)(3x + y + y^2)$$

$$= x^2 + 9x^2 + 3xy + 3xy^2 - 3xy - y^2 - y^3$$

$$= \mathbf{10x^2 - y^2 - y^3 + 3xy^2}$$

$$(iii) x(x + y^2) + z + y^2(x + y + z) - z(z + y^2)$$

$$= x^2 + xy^2 + zx + xy^2 + y^3 + y^2z - zx - zy^2$$

$$= \mathbf{x^2 + 2xy^2 + y^3}$$

Exercise 7.4

1. (i) $4x + 6$

Putting $x = 3$ in the given algebraic expression $4 \times 3 + 6 = 18$

(ii) 16 (iii) 1 (iv) 70

2. (i) $5a^3 + 2a^2 - 3$

Putting $a = -2$ in the given expression

$$5(-2)^3 + 2 \times (-2)^2 - 3$$

$$5 \times -8 + 2 \times 4 - 3$$

$$-40 + 8 - 3 = -35$$

(ii) 16 (iii) -48 (iv) -74

3. (i) -3

(ii) $a^2 + 4ab + b^2$

$$m = 2, n = -1, a = 3 \quad m = 3 \times 2 = 6$$

$$b = 5n = 5 \times -1 = -5$$

Putting the value of a and b in the given expression, we get

$$6^2 + 4 \times 6 \times -5 + (-5)^2$$

$$= 36 - 120 + 25$$

$$= 61 - 120 = -59$$

(iii) -158, (iv) 3

4. $5y^2 + 6y - a = 8$

Putting $y = 2$ in the given algebraic expression, we get

$$5 \times 2^2 + 6 \times 2 - a = 8$$

$$5 \times 4 + 12 - a = 8$$

$$a = 20 + 12 - 8$$

$$a = 24$$

5. -1

6. (i) $8a = 35^2 - 27^2$

$$8a = (35)^2 - (27)^2$$

$$8a = (35 + 27)(35 - 27)$$

$$8a = 62 \times 8$$

$$a = \frac{62 \times 8}{8} = \mathbf{62}$$

(ii) 143



8. Linear Equations in One Variable

Exercise 8.1

1. $5x - 3 = 3x - 5$

$$5x - 3x = -5 + 3 \Rightarrow 2x = -2$$

$$x = \frac{-2}{2} = \mathbf{-1}$$

2. $\frac{x}{5} + 1 = \frac{1}{15}$

$$\frac{x}{5} = \frac{1}{15} - 1 \Rightarrow \frac{x}{5} = \frac{1 - 15}{15} \Rightarrow \frac{x}{5} = \frac{-14}{15} \Rightarrow x = \frac{\mathbf{-14}}{\mathbf{3}}$$

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

4. $\frac{x - 8}{3} = \frac{x - 3}{5}$

$$5(x - 8) = 3(x - 3) \Rightarrow 5x - 40 = 3x - 9$$

$$5x - 3x = -9 + 40 \Rightarrow 2x = 31$$

$$x = \frac{\mathbf{31}}{\mathbf{2}}$$

5. $m = \frac{7}{5}$

6. $x + 7 - \frac{16x}{3} = 12 - \frac{7x}{2}$

$$x - \frac{16x}{3} + \frac{7x}{2} = 12 - 7$$

$$x \left(1 - \frac{16}{3} + \frac{7}{2} \right) = 5 \Rightarrow x \left[\frac{6 - 32 + 21}{6} \right] = 5$$

$$x \left(\frac{27 - 32}{6} \right) = 5 \Rightarrow x(-5) = 30$$

$$x = \mathbf{-6}$$

$$7. p = \frac{17}{9}$$

$$8. \frac{3t-2}{3} + \frac{2t+3}{3} = t + \frac{7}{6}$$

$$\frac{3t}{3} - \frac{2}{3} + \frac{2t}{3} + \frac{3}{3} = t + \frac{7}{6} \Rightarrow t - \frac{2}{3} + \frac{2t}{3} + 1 = t + \frac{7}{6}$$

$$t + \frac{2t}{3} - t = \frac{7}{6} + \frac{2}{3} - 1 \Rightarrow t \left(1 + \frac{2}{3} - 1 \right) = \frac{7+4-6}{6}$$

$$\frac{2}{3}t = \frac{11-6}{6} \Rightarrow \frac{2}{3}t = \frac{5}{6}$$

$$t = \frac{5}{6} \times \frac{3}{2} \Rightarrow t = \frac{5}{4}$$

$$9. 3(x-3) = 5(2x+1) \Rightarrow 3x-9 = 10x+5$$

$$7x+14=0$$

\Rightarrow

$$x = -2$$

$$10. 15(y-4) - 2(y-9) + 5(y+6) = 0$$

$$15y - 60 - 2y + 18 + 5y + 30 = 0$$

$$15y - 2y + 5y = 60 - 30 - 18$$

$$y(15 - 2 + 5) = 60 - 48$$

$$18y = 12 \Rightarrow y = \frac{12}{18}$$

\Rightarrow

$$y = \frac{2}{3}$$

$$11. x = -96$$

$$12. 4(3w+2) - 5(6w-1) = 2(w-8) - 6(7w-4) + 4w$$

$$12w + 8 - 30w + 5 = 2w - 16 - 42w + 24 + 4w$$

$$(12w - 30w - 2w + 42w - 4w) = -8 - 5 - 16 + 24$$

$$w(12 + 42 - 30 - 2 - 4) = -5$$

$$18w = -5 \Rightarrow w = \frac{-5}{18}$$

$$13. 0.25(4y-3) = 0.5y - 9$$

$$\frac{25}{100}(4y-3) = \frac{5}{10}y - 9$$

$$\frac{25 \times 4y}{100} - \frac{25 \times 3}{100} = \frac{5y}{10} - 9$$

$$y - \frac{y}{2} = -9 + \frac{3}{4} \Rightarrow \frac{y}{2} = \frac{-36+3}{4}$$

$$\frac{y}{2} = \frac{-33}{4} \Rightarrow y = \frac{-33}{2}$$

14. $0.16(5x - 2) = 0.4x + 7$

$$0.16 \times 5x - 0.16 \times 2 = 0.4x + 7$$

$$\frac{16 \times 5x}{100} - \frac{16 \times 2}{100} = \frac{4x}{10} + 7$$

$$\frac{80x}{100} - \frac{4x}{10} = 7 + \frac{32}{100}$$

$$x \left(\frac{8}{10} - \frac{4}{10} \right) = \frac{732}{100} \Rightarrow \frac{4x}{10} = \frac{732}{100}$$

$$\Rightarrow 4x = \frac{732}{10} \Rightarrow x = \frac{183}{10}$$

$$\Rightarrow x = \mathbf{18.3}$$

15. $2.25(2z + 8) = 5z - 3$

$$4.50z + 18.00 = 5z - 3 \Rightarrow 18 + 3 = (5 - 4.5)z$$

$$21 = 0.5z \Rightarrow \frac{21}{0.5} = z$$

or

$$z = \mathbf{42}$$

16. $x = 18$

17. $\frac{x}{2} - \frac{1}{4} = \frac{x}{3} + \frac{1}{2}$

$$\frac{x}{2} - \frac{x}{3} = \frac{1}{2} + \frac{1}{4} \Rightarrow \frac{3x - 2x}{6} = \frac{2 + 1}{4}$$

$$\frac{x}{6} = \frac{3}{4} \Rightarrow x = \frac{3 \times 6}{4} = \frac{\mathbf{9}}{\mathbf{2}}$$

18. $2x - 3(x + 1) = 5x - 7$

$$2x - 3x - 3 = 5x - 7 \Rightarrow 5x - 2x + 3x = -3 + 7$$

$$6x = 4 \Rightarrow x = \frac{\mathbf{2}}{\mathbf{3}}$$

19. $\frac{4z - 3}{4} - 3 = \frac{5z - 7}{3} - 4z - 1$

$$\frac{4z}{4} - \frac{3}{4} - 3 = \frac{5z}{3} - \frac{7}{3} - 4z - 1$$

$$z - \frac{5}{3}z + 4z = \frac{3}{4} + 3 - \frac{7}{3} - 1$$

$$\frac{3z - 5z + 12z}{3} = \frac{9 + 36 - 28 - 12}{12}$$

$$\frac{10z}{3} = \frac{5}{12} \Rightarrow \frac{2z}{1} = \frac{1}{4}$$

$$\Rightarrow z = \frac{\mathbf{1}}{\mathbf{8}}$$

$$20. 18y + 3y - \frac{3}{5} = 21 + 5y - 2y$$

$$18y + 3y - 5y + 2y = 21 + \frac{3}{5}$$

$$18y = \frac{108}{5} \Rightarrow y = \frac{108}{5 \times 18}$$

$$\Rightarrow y = \frac{6}{5}$$

Exercise 8.2

1. Let the one number be x and other $95 - x$

$$x + 3 = 95 - x \Rightarrow 2x = 95 - 3$$

$$2x = 92 \Rightarrow x = \frac{92}{2} \quad x = 46$$

Therefore the number are **46** and **49**.

2. Let the number be x , $x + 1$ and $x + 2$

$$x + x + 1 + x + 2 = 24$$

$$3x + 3 = 24 \Rightarrow 3x = 24 - 3$$

$$3x = 21 \Rightarrow x = 7$$

Therefore the number are 7 , $7 + 1$, $7 + 2 = \mathbf{7, 8}$ and **9**.

3. Let the number be x .

$$2x + 7 = 49 \Rightarrow 2x = 49 - 7$$

$$\Rightarrow 2x = 42 \Rightarrow x = \frac{42}{2}$$

$$\Rightarrow \mathbf{x = 21}$$

4. Let the number be x

$$3x - 22 = 68 \Rightarrow 3x = 68 + 22$$

$$3x = 90 \Rightarrow x = \frac{90}{3} \Rightarrow x = \mathbf{30}$$

5. Let the number be x

$$7x - 3 = 53 \Rightarrow 7x = 56$$

$$x = \mathbf{8}$$

6. Let x be the no. of 10 rupee note and y that of 50 rupee note.

$$\text{Given that, } 10x + 50y = 250 \quad \dots(i)$$

$$\text{And } x = y + 1 \quad \dots(ii)$$

Putting the value of x from equation (ii) in equation (i).

$$\text{We get, } 10y(y + 1) + 50y = 250$$

$$10y + 10 + 50y = 250$$

$$60y = 240$$

$$y = \frac{240}{60} = 4$$

From equation (iii), $x = y + 1$, $x = 4 + 1 = 5$

No. of 10 rupee note = **5**, no. of 50 rupee note = **4**

7. Let the breadth = x

And Length = $2x + 2$

Perimeter of rectangle = $2 \times (l + b)$

$$28 = 2 \times (x + 2x + 2)$$

$$\Rightarrow 14 = 3x + 2 \Rightarrow 3x = 12$$

$$\Rightarrow x = 4$$

Breadth = **4 cm**, Length = **10 cm**

8. Let Subramaniam's age = x

Mother's age = $6x$

After 5 years $x + 5 + 20 = 6x + 5$

$$x + 25 = 6x + 5 \Rightarrow 25 - 5 = 6x - x$$

$$20 = 5x \Rightarrow x = 4$$

Subramaniam's age = **4 years** and his mother's age = **24 years.**

9. Let breadth be x and length be $x + 4$

Perimeter of the rectangle = $2 \times (\text{length} + \text{breadth})$

$$84 = 2 \times (x + 4 + x)$$

$$42 = 2x + 4$$

$$42 - 4 = 2x$$

$$\Rightarrow 38 = 2x \Rightarrow x = 19$$

Breadth = **19** Length = **23 m**

10. Let the present age of Sheela be x .

After 15 years

$$x + 15 = 4x \Rightarrow 3x = 15$$

$$x = 5$$

\therefore Present age of Sheela is **5 years.**

11. Let the one prize = x , and other prize = $(63 - x)$

$$100x + (63 - x) \times 25 = 3000$$

$$100x + 1575 - 25x = 3000$$

$$75x = 1425$$

$$\Rightarrow x = \frac{1425}{75} = 19$$

$$19, 63 - 19 = 44$$

No. of 100 rupee prizes = **19**, No. of 25 rupee prizes = **44**

12. No. of 500 rupee prizes = 75,

No. of 100 rupee prizes = 125

13. Let the total worth of Shanti Lal's property be x

$$\text{Son's share} = \frac{x}{5}$$

$$\text{Daughter's share} = \frac{x}{5}$$

$$\text{Wife's share} = \frac{3x}{5}$$

If wife's share = 288000

$$288000 = \frac{3x}{5} \Rightarrow 3x = 288000 \times 5$$

$$x = \frac{288000 \times 5}{3} = \mathbf{480000}$$

₹ **480000** is total worth of Shanti Lal's property.

- 14.** Let one part = x and other part $x + 10$

$$\frac{x}{x+10} = \frac{3}{5} \Rightarrow 5x = 3x + 30$$

$$5x - 3x = 30 \Rightarrow 2x = 30$$

\Rightarrow

$$x = 15$$

First part = **15** and other = **25**

Total number = $15 + 25 = \mathbf{40}$

- 15.** Let the number of boys = x , and the number of girls = $\frac{2x}{5}$

$$\frac{2x}{5} + x = 35 \Rightarrow \frac{2x + 5x}{5} = 35$$

$$\Rightarrow \frac{7x}{5} = 35 \Rightarrow x = \frac{35 \times 5}{7}$$

\Rightarrow

$$x = \mathbf{25}$$

Boys = **25**

- 16.** Let the distance covered by Sarita = x km

The distance covered by Julie = $(18 - x)$ km

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\frac{5}{2} = \frac{18 - x}{t} \Rightarrow t = \frac{36 - 2x}{5}$$

And

$$2 = \frac{x}{t} \Rightarrow t = \frac{x}{2}$$

According to the condition

$$\frac{36 - 2x}{5} = \frac{x}{2} \Rightarrow 72 - 4x = 5x$$

\Rightarrow

$$x = 8$$

\Rightarrow

$$t = \frac{8}{2} = \mathbf{4 \text{ hours}}$$

17. Let the number be x .

$$\begin{aligned} \left(x - \frac{1}{2}\right) \times 4 &= 5 & \Rightarrow & x - \frac{1}{2} = \frac{5}{4} \\ \Rightarrow x &= \frac{5}{4} + \frac{1}{2} & \Rightarrow & x = \frac{5+2}{4} = \frac{7}{4} \end{aligned}$$

18. length = 100 m, breadth = 50 m.



Unit-III : Commercial Mathematics

9. Applications of Percentage

Exercise 9.1

1. (i) $b \times \frac{1}{2} = 50 \Rightarrow b = 2 \times 50 \times 100 = \text{₹ } 10000$

(ii) ₹ 300

(iii) $\frac{3.4 \times b}{100} = 68 \Rightarrow b = \frac{68 \times 100}{3.4} = \text{₹ } 2000$

2. Let the school opened for x days, then

$$\frac{x \times 90}{100} = 216 \Rightarrow 90 \times x = 216 \times 100$$

$$x = \frac{216 \times 100}{90} = 240$$

$x = \text{240 days.}$

3. Let the monthly income be x , then

$$x \times \frac{15}{100} = 600 \Rightarrow 15 \times x = 600 \times 100$$

$$x = \frac{600 \times 100}{15} = 4000$$

$x = \text{₹ } 4000$

4. 800

5. The population of the town in 2010 be x

$$\frac{5 \times x}{100} = 8820 \Rightarrow x = \frac{8820 \times 100}{5} = 176400$$

6. Let the Kishan's monthly salary be x

spend on food = 30%

donates = 3%

then total spent in percentage = $(30 + 3) = 33\%$

$$x \times \frac{33}{100} = 2310$$

$$x \times 33 = 2310 \times 100$$

$$x = \frac{2310 \times 100}{33}$$

$$x = ₹ 70 \times 100 = ₹ \mathbf{7000}$$

7. Let the school strength be x

$$x \times \frac{8}{100} = 160 \quad \Rightarrow \quad x = \mathbf{2000}$$

The new strength = $2000 + 160 = \mathbf{2160}$

8. Let the total number of matches played the team during the year be x .

Then
$$\frac{x \times 60}{100} = 12$$

$$x = \frac{12 \times 100}{60} = \frac{100}{5} = \mathbf{20}$$

9. 1200

10. Let the Manjul's income be x

$$\text{Monika's income} = \frac{x \times 60}{100} = \frac{3x}{5}$$

$$x + \frac{3x}{5} = \frac{8x}{5}$$

\therefore If Monika's income is $\frac{8x}{5}$, then Manjul's income = $\frac{3x}{5}$

\therefore Monika's income is 1, then Manjul's income = $\frac{3x \times 5}{5 \times 8x}$

\therefore Monika's income is 100, then Manjul's income = $\frac{100 \times 3x \times 5}{5 \times 8x}$

$$= \frac{100 \times 3}{8} = \frac{300}{8} = \frac{75}{2} = \mathbf{37.5\%}$$

11. 800000, 288000

12. If total number of students is 100, number of girls are 60

Number of boys = 40

If number of girls = 60, then total number of students = 100

If number of girls = 1, then total number of students = $\frac{100}{60}$

If number of girls = 690, then total number of students

$$= \frac{100}{60} \times 690 = 1150$$

Total number of students = $\mathbf{1150}$

$$\text{Number of boys} = 40\% \text{ of total number of students} = \frac{40}{100} \times 1150$$

$$\text{Number of boys} = \mathbf{460}$$

Exercise 9.2

1. (i) CP = ₹ 250, Loss = ₹ 15, SP = ₹ 235
 (ii) CP = ₹ 450, SP = ₹ 540, Profit = 20%
 (iii) SP = ₹ 3038, Loss = 2% overhead expenses = ₹ 100
 (iv) CP = ₹ 30000, Profit = ₹ 6000, Profit = 20%
 (v) Profit = ₹ 72, SP = ₹ 972, Purchased at ₹ 400

2. Cost price includes the over head charges also

$$\text{Therefore, CP} = ₹ (70000 + 5000) = 75000$$

$$\text{SP} = 67500$$

$$\text{SP} < \text{CP}$$

$$\text{Loss} = \text{CP} - \text{SP} = 75000 - 67500 = ₹ 7500$$

$$\text{Loss \%} = \frac{\text{Loss} \times 100}{\text{CP}} = \frac{7500 \times 100}{75000} = \frac{100}{10} = \mathbf{10\%}$$

3. Cost price includes the over head charges also

$$\text{Therefore, CP} = ₹ (15 + 5) = ₹ 20$$

$$\text{SP} = ₹ 24$$

$$\text{SP} > \text{CP}$$

$$\text{Profit} = \text{SP} - \text{CP} = 24 - 20 = 4$$

$$\text{Profit \%} = \frac{\text{Profit} \times 100}{\text{CP}} = \frac{4 \times 100}{20} = \frac{100}{5} = \mathbf{20\%}$$

4. Cost price includes the overhead charges also. Therefore

$$= ₹ (150 \times 20 + 200)$$

$$= ₹ (3000 + 200) = ₹ 3200$$

$$\text{SP} = (150 \times 12 \times 2.40)$$

$$= ₹ 4320$$

$$\text{SP} > \text{CP}$$

$$\text{Profit \%} = ₹ (4320 - 3200) = ₹ 1120$$

$$\text{Profit} = \frac{1120 \times 100}{3200} = \mathbf{35\%}$$

5. Let the CP be ₹ x . Then

$$\text{SP} = ₹ 990$$

$$\text{Profit} = \frac{x \times 10}{100} = \frac{x}{10}$$

$$\text{SP} = x + \frac{x}{10} = \frac{11x}{10}$$

$$\frac{11x}{10} = 990 \Rightarrow x = \frac{990 \times 10}{11} \Rightarrow x = ₹ \mathbf{900}$$

6. Profit = 25%
 7. 25%
 8. Let the CP be ₹ x , then

$$\begin{aligned} \text{SP} &= 10240 \\ \text{Loss} &= \frac{x \times 20}{100} = \frac{x}{5} \\ \text{SP} &= x - \frac{x}{5} = \frac{4x}{5} \end{aligned}$$

Then $\frac{4x}{5} = 10240 \Rightarrow$ or $x = \frac{10240 \times 5}{4}$

$$x = \text{₹ } \mathbf{12800}$$

9. Let the CP be ₹ x , then

$$\begin{aligned} \text{SP} &= \text{₹ } 240 \\ \text{Loss} &= \frac{x \times 20}{100} = \frac{x}{5} \\ \text{SP} &= x - \frac{x}{5} = \frac{4x}{5} \end{aligned}$$

$$\frac{4x}{5} = 240 \Rightarrow x = \text{₹ } 300$$

$$\text{CP} = \text{₹ } 300 \text{ and } \text{SP} = \text{₹ } 360$$

$$\text{Profit} = \text{SP} - \text{CP} = \text{₹ } (360 - 300) = \text{₹ } 60$$

$$\begin{aligned} \text{Profit \%} &= \frac{\text{Profit} \times 100}{300} = \mathbf{20\%} \\ &= \text{₹ } \frac{60 \times 100}{300} = \mathbf{20\%} \end{aligned}$$

10. SP = ₹ 135

If new SP = ₹ 165

$$\text{Gain \%} = ?$$

$$\text{Loss \%} = \frac{\text{CP} - \text{SP}}{\text{CP}} \times 100$$

$$\frac{10}{100} = \left(1 - \frac{\text{₹ } 135}{\text{CP}} \right)$$

$$\frac{\text{₹ } 135}{\text{CP}} = 1 - \frac{1}{10} = \frac{9}{10}$$

$$\text{CP} = \frac{\text{₹ } 135 \times 10}{9} = 15 \times 10 = \text{₹ } 150$$

$$\text{SP} = \text{₹ } 165$$

$$\text{Profit} = \text{SP} - \text{CP} = \text{₹ } 165 - 150 = \text{₹ } 15$$

$$\text{Profit \%} = \frac{\text{Profit}}{\text{CP}} \times 100 = \frac{\text{₹ } 15}{\text{₹ } 150} \times 100 = \mathbf{10\%}$$

11. SP = ₹ 198, gain = 10%

$$\begin{aligned}\text{Then, } CP &= \frac{100}{100 + \text{Profit \%}} \times SP \\ &= \frac{100 \times 198}{110} = ₹ 180\end{aligned}$$

Second calculator SP = ₹ 198, Loss = 10%

$$\begin{aligned}CP &= \frac{100}{100 - \text{Loss \%}} \times SP = \frac{100}{100 - 10} \times ₹ 198 \\ &= \frac{100 \times 198}{90} = ₹ 10 \times 22 = ₹ 220\end{aligned}$$

Total SP

$$\begin{aligned}&= ₹ 198 \times 2 = ₹ 396 \\ CP &= ₹ (180 + 220) = ₹ 400 \\ CP &> SP \\ \text{Loss} &= ₹ (400 - 396) = ₹ 4 \\ \text{Loss \%} &= \frac{\text{Loss} \times 100}{CP} = \frac{4 \times 100}{400} = \frac{100}{100} = 1\end{aligned}$$

Loss = 1%

12. CP = ₹ 960, Profit = 5%

$$\begin{aligned}SP &= \frac{100 + \text{Profit \%}}{100} \times CP = \frac{100 + 5}{100} \times 960 \\ &= \frac{105 \times 960}{100} = ₹ \frac{100800}{100} = ₹ 1008\end{aligned}$$

Again Subramaniam sold it to Mukul at a profit of 10%

$$\begin{aligned}SP &= \frac{100 + \text{Profit \%}}{100} \times CP = \frac{100 + 10}{100} \times 1008 \\ &= \frac{110 \times 1008}{100} = ₹ \frac{110880}{100} = \mathbf{1108.80}\end{aligned}$$

13. SP = 150, Loss % = 4%

$$\begin{aligned}CP &= \frac{100}{100 - \text{Loss \%}} \times SP \\ &= \frac{100}{100 - 4} \times 150 = ₹ \frac{100}{96} \times 150 = ₹ 156.25\end{aligned}$$

Again

$$\begin{aligned}SP &= \frac{100 + \text{Profit \%}}{100} \times CP \\ SP &= \frac{100 + 20}{100} \times 156.25 \\ &= \frac{120 \times 156.25}{100} = ₹ \mathbf{187.50}\end{aligned}$$

14. CP = 200, Profit = 30%

$$\begin{aligned} \text{SP} &= \frac{100 + \text{Profit \%}}{100} \times \text{CP} \\ &= \frac{100 + 30}{100} \times \text{CP} = \frac{130 \times 200}{100} = ₹ 260 \end{aligned}$$

Cost price of 20 orange = ₹ 20 × 2 = ₹ 40

CP = ₹ 40, Profit = 5%

$$\begin{aligned} \text{SP} &= \frac{100 + \text{Profit \%}}{100} \times \text{CP} = \frac{(100 + 5)}{100} \times ₹ 40 \\ &= ₹ \frac{105 \times 40}{100} = 10.5 \times 4 = ₹ 42 \end{aligned}$$

Cost of remaining orange CP = 80 × 2 = 160

$$\text{SP} = (260 - 42) = ₹ 218$$

$$\text{SP} > \text{CP}$$

$$\text{Profit} = ₹ (218 - 160) = ₹ 58$$

$$\begin{aligned} \text{Profit \%} &= \frac{\text{Profit} \times 100}{\text{CP}} \\ &= \frac{₹ 58 \times 100}{160} = 36.25\% = \mathbf{36.25\%} \end{aligned}$$

Exercise 9.3

1. (i) $P = ₹ 500, R = 12\%, T = 3$ years

$$\text{SI} = \frac{P \times R \times T}{100} = \frac{500 \times 12 \times 3}{100} = ₹ \mathbf{180}$$

(ii) ₹ 210, (iii) ₹ 810

(iv) $P = ₹ 560, \text{Time} = \frac{73}{365}$ years, $\text{SI} = ₹ 14$

$$R = \frac{\text{SI} \times 100}{P \times T} = \frac{14 \times 100 \times 365}{560 \times 73} = \mathbf{12.5\%}$$

(v) ₹ 8.00, ₹ 488.00

(vi) $P = ₹ 720, R = 4\%, \text{SI} = ₹ 72$

$$\text{Time} = \frac{\text{SI} \times 100}{R \times P} = \frac{72 \times 100}{4 \times 720} = \frac{100}{40} = 2 \frac{1}{2} \text{ years}$$

$$\text{Amount} = P + \text{SI} = ₹ 720 + ₹ 72 = ₹ \mathbf{792}$$

2. (i) $\text{SI} = ₹ 192, A = ₹ 992$, (ii) $\text{SI} = ₹ 162, A = ₹ 612$

(iii) $P = ₹ 600, R = 2\%, T = \frac{20}{12} = \frac{5}{3}$ years

$$\text{SI} = \frac{P \times R \times T}{100} = \frac{600 \times 2 \times 5}{3 \times 100} = ₹ 20$$

$$\text{Amount} = P + \text{SI} = ₹ (600 + 20) = ₹ \mathbf{620}$$

3. (i) $2\frac{1}{2}$, (ii) $\frac{1}{2}$ year

(iii) $SI = ₹ 12600$

$R = 18\%$ per annum

$P = 10000$

$$T = \frac{SI \times 100}{P \times R} = \frac{12600 \times 100}{10000 \times 18} = \mathbf{7 \text{ years.}}$$

4. (i) $SI = ₹ 36$, $R = 3\%$ and $T = 3$ years

$$P = \frac{SI \times 100}{R \times T} = ₹ \mathbf{400}$$

(ii) ₹ 350, (iii) ₹ 9600

5. (i) $P = ₹ 500$, $SI = ₹ 150$, $T = 4$ years

$$R = \frac{SI \times 100}{P \times T} = \frac{150 \times 100}{500 \times 4} = \frac{30}{4} = \mathbf{7.5\%}$$

(ii) 13%

(iii) $P = 700$, $SI = ₹ 168$, $T = \frac{16}{12}$ years

$$R = \frac{SI \times 100}{P \times T} = \frac{168 \times 100 \times 12}{700 \times 16} = \mathbf{18\%}$$

6. $P = ₹ 7200$, $R = 15\%$, $T = 4\frac{1}{2}$ years = $\frac{9}{2}$ years

$$SI = \frac{P \times R \times T}{100} = \frac{7200 \times 15 \times 9}{2 \times 100}$$

$$= 36 \times 15 \times 9 = 4860$$

$$A = SI + P = 4860 + 7200 = ₹ \mathbf{12060}$$

7. ₹ 1050

8. $SI = ₹ 83.20$, $A = ₹ 603.20$,

9. ₹ 1600

10. Let P be x , $R = 10\%$, $T = 4$ years, $A = ₹ 2520$

$$A = SI + P$$

$$2520 - x = SI \quad \left[\because P = \frac{SI \times 100}{R \times T} \right]$$

$$x = \frac{(2520 - x) \times 100}{10 \times 4}$$

$$4x = 25200 - 10x$$

$$14x = 25200 \Rightarrow x = \frac{25200}{14} \quad x = ₹ \mathbf{1800}$$

11. ₹ 7100

12. Let P be x , $R = 9\%$, $SI = 594$, $T = 3$ years

$$P = \frac{SI \times 100}{R \times T}$$

$$= \frac{594 \times 100}{9 \times 3} = 22 \times 100 = \text{₹ } 2200$$

Exercise 9.4

1. $P = \text{₹ } 1500$, $A = \text{₹ } 2625$, $SI = A - P = \text{₹ } 1155$, $T = \frac{7}{2}$ years

$$R = \frac{SI \times 100}{P \times T} = \frac{1155 \times 100 \times 2}{1500 \times 7} = \frac{2310}{105} = \mathbf{22\%}$$

2. Let P be x and amount $= \frac{7x}{4}$

$$SI = \text{Amount} - \text{Principal} = \frac{7x}{4} - x = \frac{3x}{4}$$

$$P = x, SI = \frac{3x}{4}, T = 6 \text{ years}$$

$$R = \frac{SI \times 100}{P \times T} = \frac{3x \times 100}{4 \times x \times 6} = \mathbf{12.5\%}$$

3. ₹ 2400, 10%

4. Let $P = x$, $A = 2x$, $SI = 2x - x = x$, $R = \frac{25}{2}\%$, $T = ?$

$$T = \frac{SI \times 100}{P \times R} = \frac{x \times 100 \times 2}{x \times 25} = \mathbf{8 \text{ years}}$$

7. For Rajiv, $P = \text{₹ } 4500$, $T = 1$ year, $A = \text{₹ } 5265$

$$SI = \text{₹ } (5265 - 4500) = \text{₹ } 765$$

$$R = ?$$

$$R = \frac{SI \times 100}{P \times T}$$

$$= \frac{765 \times 100}{4500 \times 1} = \frac{765}{45} = 17\%$$

For Sanjiv

$$P = \text{₹ } 4500, T = 3, R = 17\%, SI = ?$$

$$SI = \frac{P \times R \times T}{100} = \frac{4500 \times 17 \times 3}{100} = \text{₹ } 2295$$

$$\text{Amount} = \text{Principal} + SI$$

$$= \text{₹ } 4500 + \text{₹ } 2295 = \text{₹ } 6795$$

8. ₹ 600, 12%



Unit-IV : Geometry

10. Lines and Angles

Exercise 10.1

1. (i) 35° (ii) 60° (iii) 120° 2. 90°
3. (i) supplementary (ii) complementary (iii) supplementary
(iv) supplementary (v) complementary (vi) complementary
4. (i) 65° (ii) 27° (iii) 33°
5. (i) 75° (ii) 93° (iii) 38°
6. $(x + 4)^\circ + (2x - 7)^\circ = 90^\circ \Rightarrow 3x - 3^\circ = 90^\circ \Rightarrow x = \frac{93^\circ}{3} = 31^\circ$
7. $40^\circ, 140^\circ$
8. (i) 45° (ii) 90°
9. (i) Yes (ii) No (iii) Yes (iv) Yes
10. (i) No (ii) Yes (iii) No (iv) Yes
11. Let the angles are $2x, 3x$ and $7x$
$$2x + 3x + 7x = 180^\circ \Rightarrow 12x = 180^\circ$$
$$x = 15^\circ$$

Therefore, angles are $2 \times 15^\circ, 3 \times 15^\circ, 7 \times 15^\circ$ or $30^\circ, 45^\circ, 105^\circ$
12. $(27.4)^\circ = 27^\circ 24'$
13. $10\% \text{ of } x + 40\% \text{ of } 2x = 90^\circ$
$$\frac{10}{100} \times x + \frac{40}{100} \times 2x = 90^\circ$$
$$\frac{x + 8x}{10} = 90^\circ \Rightarrow 9x = 90 \times 10$$
$$x = 100^\circ$$
14. 15° and 75°
15. 40° and 140°
16. 600°
17. According to the figure,
 $4x^\circ + 3x^\circ + 2x^\circ + x^\circ = 180^\circ \Rightarrow 10x^\circ = 180^\circ$
$$x^\circ = \frac{180^\circ}{10} = 18^\circ$$

Supplement of $18^\circ = 180^\circ - 18^\circ = 162^\circ$

Exercise 10.2

1. (i) Interior alternate angles (ii) Adjacent angles
(iii) Corresponding angles (iv) Exterior alternate angles

- (v) Co-interior (allied) angles (vi) Exterior alternate angles
 (vii) Corresponding angles (viii) Vertically opposite angles
 (ix) Adjacent angles

2. (i) property of corresponding angles (ii) property of alternate interior angles (iii) property of co-interior angles are supplementary

3. $a = 110^\circ, b = 70^\circ, c = 70^\circ, d = 110^\circ, e = 70^\circ, f = 110^\circ, g = 70^\circ$

4. (i) $x = 100^\circ$ [Corresponding angles], (ii) $x = 70^\circ$, (iii) $x = 70^\circ$

5. (i) $(2x + 6)^\circ + (3x + 54)^\circ = 180^\circ$ [Co-interior angles]

$$5x + 60^\circ = 180^\circ \Rightarrow x = \frac{120}{5} = 24^\circ$$

(ii) 27°

6. (i) $\angle a = \angle b = \angle c$ (ii) $x = y = l = n = r$ and $k = m = q$

7. (ii), (iv) and in (v) l_2 and l_4

8. (i) $z + 60^\circ = 180^\circ$ [Co-interior angles] $\Rightarrow z = 120^\circ$

$$x + y = 60^\circ \text{ [Alternate interior angles]} \quad \dots(1)$$

$$y + z = 143^\circ \text{ [Alternate interior angles]} \quad \dots(2)$$

Putting $z = 120^\circ$ in eq. (2), we get

$$y + 120^\circ = 143^\circ \Rightarrow y = 23^\circ$$

Putting $y = 23^\circ$ in eq. (1), we get $x = 37^\circ$

(ii) $a = 55^\circ, b = 53^\circ, c = 72^\circ$

(iii) $a = 105^\circ, b = 75^\circ, c = 75^\circ, d = 75^\circ$

9. (i) No (ii) No (iii) Yes



11. Centroid, Orthocentre, Incentre and Circumcentre of a Triangle

Exersie 11.1

1. (ii) yes 2. Point C
 3. (i) Yes (ii) Outside
 4. Yes, $DR = RE, FR$ is a median of the $\triangle DEF$
 5. Do it yourself 6. Do it yourself
 7. No 8. Yes
 9. Yes
 10. (i) line segment, perpendicular (ii) Orthocentre (iii) Outside
 (iv) AC and BC (v) AC (vi) Concurrent (vii) Centroid (viii) AB
 (ix) Interior.

Exercise 11.2

1. Do it yourself
2. No
3. Yes
4. Yes
5. Do it yourself
6. Do it yourself
7. (i) Concurrent (ii) Perpendicular bisectors (iii) Concurrent
(iv) Angle bisectors (v) $\angle A$.



12.

Quadrilaterals

Exercise 12.1

1. $\triangle ACD$, $\triangle ACB$, two triangles
2. Four triangles, $\triangle AOB$, $\triangle BOC$, $\triangle COD$, $\triangle DOA$
3. (i) Four— PQ and QR , QR and RS , RS and SP , SP and PQ
(ii) Two— PQ and RS , PS and QR
(iii) Four— $\angle P$ and $\angle Q$, $\angle Q$ and $\angle R$, $\angle R$ and $\angle S$, $\angle S$ and $\angle P$
(iv) Two— $\angle P$ and $\angle R$, $\angle Q$ and $\angle S$
4. (i) Vertices— A , B , C , D
(ii) Angles— $\angle A$, $\angle B$, $\angle C$, $\angle D$
(iii) Diagonals— AC and BD
(iv) Adjacent sides— AB and BC , BC and CD , CD and DA ,
 DA and AB
(v) Adjacent angles— $\angle A$ and $\angle B$, $\angle B$ and $\angle C$, $\angle C$ and $\angle D$,
 $\angle D$ and $\angle A$
(vi) Opposite sides— AB and CD , BC and DA
(vii) Opposite angles— $\angle A$ and $\angle C$, $\angle B$ and $\angle D$
5. Yes, one point

Exercise 12.2

1. Let fourth angle of quadrilateral = x°
By the angle sum property of a quadrilateral = 360°
 $65^\circ + 65^\circ + 135^\circ + x^\circ = 360^\circ \Rightarrow x^\circ = 360^\circ - 265^\circ$
 $x = 95^\circ$
2. 90°
3. 115°
4. In quadrilateral $ABCD$, $\angle D = 150^\circ$
Let $\angle A = \angle B = \angle C = x^\circ$

By the angle sum property of a quadrilateral,

$$\angle A + \angle B + \angle C + \angle D = 360^\circ$$

$$\Rightarrow x^\circ + x^\circ + x^\circ + 150^\circ = 360^\circ$$

$$3x^\circ = 360^\circ - 150^\circ = 210^\circ \Rightarrow x = 70^\circ$$

5. No, sum of the four angles is greater than 360° .

6. Let the measures of the four angles be $3x^\circ$, $5x^\circ$, $7x^\circ$ and $9x^\circ$

$$3x^\circ + 5x^\circ + 7x^\circ + 9x^\circ = 360^\circ$$

[Angle sum property of quadrilateral]

$$24x^\circ = 360^\circ \Rightarrow x^\circ = 15^\circ$$

\therefore The angles of the quadrilateral are

$$3 \times 15^\circ = 45^\circ, 5 \times 15^\circ = 75^\circ, 7 \times 15^\circ = 105^\circ, 9 \times 15^\circ = 135^\circ$$

7. 75°

8. $36^\circ, 72^\circ, 108^\circ, 144^\circ$

9. 110°



13.

Circle

Exercise 13.1

1. Do it yourself
2. Do it yourself
3. 60° , Since angles formed in the same segment are equal
4. Do it yourself
5. All angles are equal (90°)
6. $\angle ACD = \angle APD = 75^\circ$
7. $\angle ACB = 90^\circ, \angle ABC = 30^\circ$
8. $\angle RQS = 50^\circ, \angle RPS = 50^\circ$
9. 70°
10. $\angle DFE = 45^\circ, \angle FED = 85^\circ$



14.

Symmetry

Exercise 14.1

1. Draw yourself
2. (i) one (ii) two (iii) none (iv) one (v) two (vi) two
3. (i) bold (ii) dotted (iii) bold (iv) dotted (v) dotted (vi) bold.

Exercise 14.2

1. (i) 2, (ii) 2, (iii) 3, (iv) 4, (v) 4, (vi) 5, (vii) 6, (viii) 3
2. (i), (ii), (iv), (v), (vi).

Exercise 14.3

- 1. to
- 2. Capital Letter H and rectangle;
- 3. Do it yourself
- 4. 3 and 3;
- 5. 1 (perpendicular bisector of its diameter); No.;
- 6. Isosceles triangle;
- 7. A scalene triangle;
- 8. 6; 60°
- 9. M.



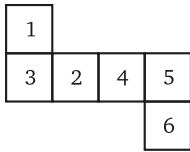
Unit-V : Mensuration

15. Visualizing Solid Shapes

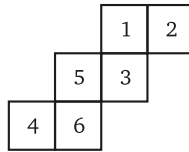
Exercise - 15.1

- 1. (i) 6, 12 (ii) 1, 1 (iii) No, 2 (iv) 3, 2 (v) 6, 4
- 2. Nets in (ii), (iii), (iv) and (vi) from cubes

3.



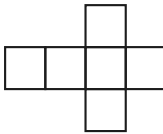
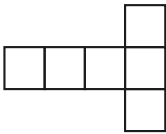
(i)



(ii)

- 4. (i) (c), (ii) (d), (iii) (a), (iv) (e), (v) (b);
- 5. Do it yourself.
- 6. (i) Yes (ii) No; because one pair of opposite faces will have 1 and 4 on them whose total is not 7, and another pair of opposite faces will have 3 and 6 on them whose total is also not 7.

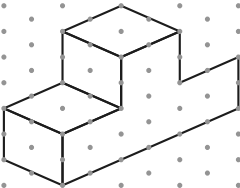
7.



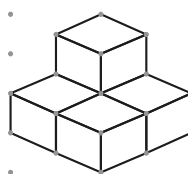
; Three faces

Exercise 15.2

1.



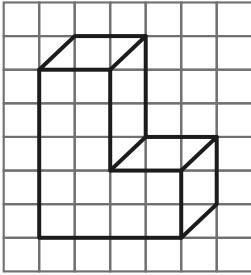
(i)



(ii)

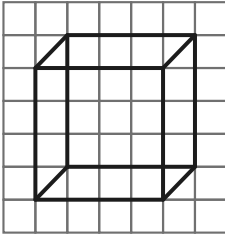
- 2. Do it yourself.

3.

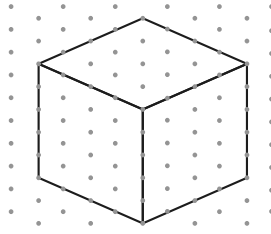


4. Do it yourself.

5. (a)

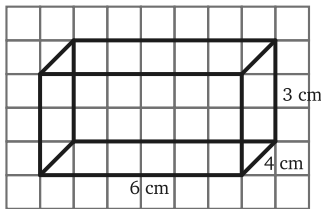


(i)

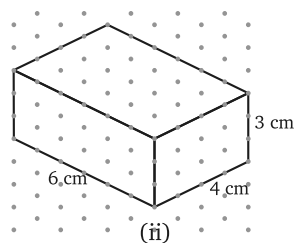


(ii)

(b)



(i)



(ii)

6. Do it yourself

7. (a) (i) Rectangle (ii) Rectangle (b) (i) Circle (ii) Circle

(c) (i) Square (ii) Square (d) (i) Rectangle (ii) Circle

(e) (i) Triangle (ii) Circle (f) (i) Triangle (ii) Square

8. (i) 30 (ii) 20 (iii) 46

9. Do it yourself.



16.

Perimeter and Area

Exercise 16.1

1. (i) Area of the parallelogram = Base \times Height
 $= 8 \text{ cm} \times 4.5 \text{ cm} = 36 \text{ cm}^2$

(ii) 8.8 cm^2 , (iii) 8.75 cm^2

2. Area of a parallelogram = 200 cm^2

One side of parallelogram = 12 cm

Area of parallelogram = Base \times Height

$$\text{Height} = \frac{200}{12} = \frac{50}{3} \text{ cm} = 16.67 \text{ cm}$$

3. $24 \text{ cm}, 12 \text{ cm}$

4. (i) 18 cm^2 (ii) 4.5 cm

Exercise 16.2

1. (i) 7 cm

Circumference of the circle = $2\pi r = 2 \times \frac{22}{7} \times 7 = 44 \text{ cm}$

(ii) 132 cm (iii) 176 mm (iv) 22 cm

2. (i) Radius = 14 mm

$$\begin{aligned} \text{Area of circle} &= \pi r^2 = \frac{22}{7} \times 14^2 = \frac{22}{7} \times 14 \times 14 \\ &= 22 \times 28 = 616 \text{ mm}^2 \end{aligned}$$

(ii) Diameter = $49 \text{ m} \Rightarrow$ Radius = $\frac{\text{Diameter}}{2} = \frac{49}{2}$

$$\begin{aligned} \text{Area of circle} &= \pi r^2 = \frac{22}{7} \times \left(\frac{49}{2}\right)^2 = \frac{22}{7} \times \frac{49}{2} \times \frac{49}{2} \\ &= 11 \times 7 \times \frac{49}{2} = 1886.5 \text{ m}^2 \end{aligned}$$

(iii) 75.46 m^2 (iv) $\frac{550}{7} \text{ cm}^2$

3. The minute hand of a tower clock is long = 1.4 m

Then, the tip of the hand move in 1 hour = $2\pi r$

$$= 2 \times \frac{22}{7} \times 1.4 \quad [\because r = 1.4 \text{ m}]$$

$$= 8.8 \text{ m}$$

4. Let, radius of circle = r

Then, Diameter = $2r$ and circumference = $2r + 30$

$$\therefore 2\pi r = 2r + 30 \Rightarrow 2\pi r - 2r = 30$$

$$2r \left(\frac{22}{7} - 1 \right) = 30 \Rightarrow 2r = 30 \times \frac{7}{15} = 14$$

$$r = 7 \text{ cm}$$

5. Radius of a circle = 20 cm

$$\therefore \text{Area of a circle} = \pi r^2 = 3.14 \times 20 \times 20 = 1256 \text{ cm}^2$$

$$\text{Circumference of circle} = 2\pi r = 2 \times 3.14 \times 20 = 125.60 \text{ cm}$$

6. Given that area of circle = $144\pi \text{ cm}^2$

$$\therefore \pi r^2 = 144\pi$$

$$r = 12 \text{ cm}$$

Then, circumference of circle = $2\pi r = 2\pi \times 12 = 24\pi \text{ cm}$

7. Outer circumference of a circle park = 396 m

$$\therefore 2\pi r_1 = 396 \quad [\text{Here, } r_1 \text{ is outer radius}]$$

$$r_1 = 63 \text{ m}$$

Then, $r_2 = 63 - 3.5 = 59.5 \text{ cm}$

$$\therefore \text{Area of the path} = \pi [r_1^2 - r_2^2] = [63^2 - 59.5^2]$$

$$= \pi [3969 - 3540.25]$$

$$= \frac{22}{7} \times 428.75 = 1347.50 \text{ m}^2$$

and cost of gravelling the path = $1347.5 \times 4.15 = ₹ 5592.13$

8. A truck wheel moves in 12,000 revolutions = 26.4 km

$$\therefore \text{Truck wheel moves in 1 revolutions} = \frac{26400}{12000} \text{ m}$$

Circumference of a truck wheel is = 2.2 m

Then, $2\pi r = 2.2$

$$2r = \frac{2.2}{\pi} = \frac{7}{10} \text{ m}$$

Diameter of the wheel = 70 cm

9. 220 m

10. 14 cm

11. Diameter of wheel of a car is = 56 cm

Circumference of wheel of a car is = $2\pi r = 176 \text{ cm}$

Then, Distance cover in a rotate by wheel = 176 cm

No. of rotate by wheel in a journey of 88 km

$$= \frac{8800000 \text{ cm}}{176 \text{ cm}} = 50,000$$

12. 3.96 km

13. Total length of wire = 18.7 cm + 14.3 cm + 18.7 cm + 14.3 cm
= 66 cm

If this wire is reshaped and bent in the form of circle

Then, circumference of circle = 66 cm

$$\therefore 2\pi r = 66 \text{ cm}$$

$$r = 10.5 \text{ cm}$$

and area of circle = $\pi r^2 = \frac{22}{7} \times 10.5 \times 10.5 = 346.5 \text{ cm}^2$

14. 2.1 cm

15. Let, inner radius of circle = r m

Then, outer radius of circle = $(r + 2)$ m

\therefore Outer circumference of circle = 44 m

$$2\pi(r + 2) = 44$$

$$r = 5 \text{ m, outer radius} = 7 \text{ m}$$

Inner circumference of the circular path = $2\pi r = 2 \times \frac{22}{7} \times 5$

$$= 31\frac{3}{7} \text{ m}$$

Area of the path = $\pi [7^2 - 5^2]$

$$= \frac{22}{7} [49 - 25] = \frac{22}{7} \times 24 = 75\frac{3}{7} \text{ m}$$

16. 536 cm^2

17. Solve it as question 13.

18. ₹ 231000

19. Outer radius of circle = 21 cm

Let, inner radius of circle = r cm

\therefore Area of concentric circles = 770 cm^2

$$\therefore \pi [21^2 - r^2] = 770$$

$$441 - r^2 = 245$$

$$r^2 = 441 - 245 = 196$$

$$r = 14 \text{ cm}$$

20. 132 m; ₹ 528

21. 5 cm; 78.5 cm^2



17. Volumes and Surface Areas

Exercise 17.1

1. (i) Faces of cuboid :

$PQRS, TUVW, PSTW, QRUV, STUR, PQVW$

(ii) edges of cuboid : $PS, QR, PQ, SR, ST, RU, TU, TW, UV, WV, PW, QV$

2. $AB = CD = GH = x, AD = BC = EH = y, AE = BE = DH = z$

3. EA or FB or HD or GC

4. $ABFE, ADHE, BCGF, CDHG$

5. (i) $BFGC$ (ii) $EFGH, ABFE, ABCD, CDHG$

6. $ABCD, ABFE, AEHD$, vertex G ,

Yes, these are four diagonals AG, BH, CE, DF

7. (i) Cuboid : butter box, lunch box, chalk box, air conditioner
(ii) Cube : Ice cubes, sugar cubes, dice, cubical blocks.
8. Cube
9. Cuboid
10. (i) 6 (ii) 12 (iii) Edge (iv) Dimensions (v) 4 (vi) Cube (vii) 8
(viii) Vertex (ix) Congruent squares (x) 3 (xi) 90° (xii) 4.

Exercise 17.2

1. (i) Volume of cube = (side)³
 $(15)^3 = \mathbf{3375 \text{ mm}^3}$
(ii) 1953.125 m^3 (iii) 17.576 m^3 (iv) 5.088448 m^3
2. (i) length = 12 cm, breadth = 10 cm, height = 8 cm
Volume of cuboid = length \times breadth \times height
 $= 12 \text{ cm} \times 10 \text{ cm} \times 8 \text{ cm} = \mathbf{960 \text{ cm}^3}$
(ii) 1760.22 cm^3 (iii) 1672704 mm^3 (iv) 445.295 m^3
(v) 5.04 m^3 (vi) 56250 cm^3
3. Volume of cuboidal wood = 36 cm^3
Length = 4 cm, Breadth = 3 cm
Height = $\frac{\text{Volume}}{\text{Length} \times \text{Breadth}} = \frac{36}{4 \times 3} \text{ cm} = \mathbf{3 \text{ cm}}$
4. 6 m
5. One match box volume = $4 \text{ cm} \times 2.5 \text{ cm} \times 1.5 \text{ cm}$
Such 12 match box volume = $12 \times 4 \text{ cm} \times 2.5 \text{ cm} \times 1.5 \text{ cm}$
 $= \mathbf{180 \text{ cm}^3}$
6. Volume of cuboidal water tank = $6 \text{ m} \times 5 \text{ m} \times 4.5 \text{ m} = 135 \text{ m}^3$
Quantity of water tank = 135 kL [$\therefore 1 \text{ m}^3 = 1 \text{ kL}$]
 $= 135000 \text{ L}$
7. Volume of wooden plank = 0.25 m^3
Length \times Width \times thickness = 0.25 m^3
Length $\times 2.5 \text{ m} \times 0.025 \text{ m} = 0.25 \text{ m}^3$
Length = $\frac{0.25}{2.5 \times 0.025} = 4 \text{ m}$
8. Volume of cuboidal pit = $8 \text{ m} \times 6 \text{ m} \times 3 \text{ m} = 144 \text{ m}^3$
Cost of digging = $144 \times ₹ 30 = ₹ \mathbf{4320}$
9. Total required water of population of village = 150×4000
 $= 600000 \text{ L}$
 $1000 \text{ L} = 1 \text{ m}^3$

$$600000 \text{ L} = 600 \text{ m}^3$$

$$\text{Days} = \frac{20 \times 15 \times 6}{600} = \frac{6}{2} = \mathbf{3 \text{ days}}$$

10. $1000 \text{ L} = 1 \text{ m}^3$

$$50000 \text{ L} = \frac{50000}{1000} = 50 \text{ m}^3$$

Volume of cuboid = Length \times Breadth \times Height

$$50 = 2.5 \times 10 \times \text{Breadth}$$

$$\text{Breadth} = \frac{50}{2.5 \times 10} = \mathbf{2 \text{ m}}$$

11. Joined to two cubes end to end then

Length = 12 cm, Breadth = 6 cm,

Height = 6 cm

$$\text{Volume of cuboid} = 12 \times 6 \times 6 \text{ cm}^3 = \mathbf{432 \text{ cm}^3}$$

12. Number of wooden crates which can be put in the godown

$$= \frac{(40 \times 25 \times 15) \text{ m}^3}{(1.5 \times 1.25 \times 0.5) \text{ m}^3} = \mathbf{16000 \text{ crates}}$$

13. Side of cube = x

Volume of cube = x^3

(i) Doubled then $2x$

$$\text{Volume of cube} = (2x)^3 = 8x^3 = \mathbf{8 \text{ times}}$$

(ii) $\left(\frac{1}{8}\right)^{\text{th}}$ times (iii) 27 times

14. 4000 blocks

15. Number of cubical blocks = $\frac{3.60 \times 3.60 \times 3.60}{0.12 \times 0.12 \times 0.12} = \mathbf{27000 \text{ blocks}}$

Exercise 17.3

1. Surface area of cube = $6a^2$

$$= 6 \times (11)^2 = 6 \times 121 = \mathbf{726 \text{ cm}^2}$$

(ii) 8.64 m^2 (iii) 4374 cm^2

2. (i) 120640 cm^2 (ii) ₹ 241.28

3. Total surface area of lunch box = $2(l \times b + b \times h + h \times l)$

$$= 2(15 \times 9 + 9 \times 8 + 8 \times 15)$$

$$= 2 \times 327 = \mathbf{654 \text{ cm}^2}$$

4. 544 cm^2

5. 4750 cm^2

6. ₹ 110800

6. 7

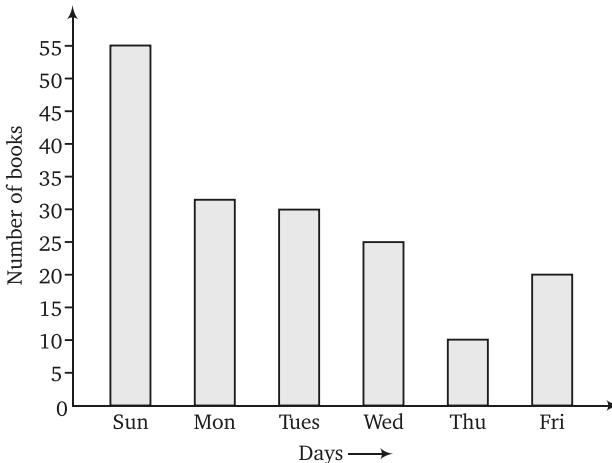
7. 8.28

8. 21

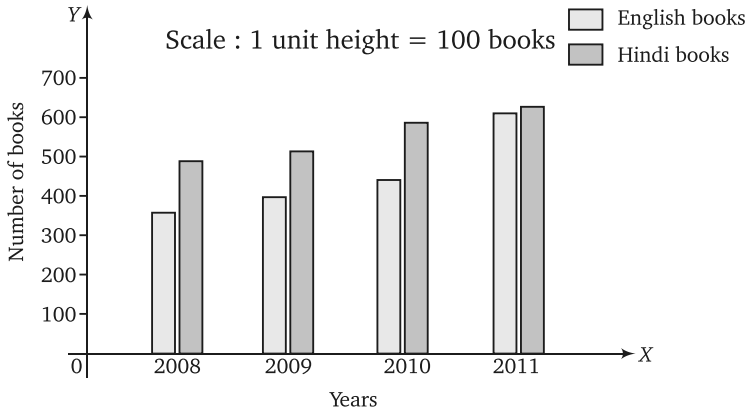
9. 15.

Exercise 18.2

1. (i) No. of student who getting the highest marks = 10
Then, required money for distributing the prizes
 $= ₹ 10 \times 10 = ₹ 100$
- (ii) No. of student who getting the lowest marks = 25
Then, total problems solve per day = $25 \times 5 = 125$
2. (i) Total no. of students have their heights more than 150 cm
 $= 17 + 13 + 5 = 35$
Percentage (No. of student) = $\frac{35}{50} \times 100 = 70\%$
- (ii) No. of student have heights above 150 cm but below 160 cm
 $= 17 + 13 = 30$
3. (i) Number of newspapers read in Hindi = 800, Punjabi = 400, Urdu = 200, Marathi = 300, Tamil = 100
- (ii) Excess of the number of newspapers read in Hindi over those of English = $800 - 500 = 300$
- (iii) Tamil
- (iv) In increasing order
Tamil = 100, Urdu = 200, Marathi = 300, Punjabi = 400, English = 500, Hindi = 800
4. Let the horizontal axis represent the days and the vertical axis represent the number of bulbs sold.
We take a scale 1 unit = 5 bulbs



5. Do it yourself.
6. (i) $466\frac{2}{3}\%$ (ii) 5950
7. Take a different years along x-axis and no. of books along y-axis. English books represent by 1 and Hindi books represent by 2.



- (i) 2011
- (ii) Yes; Increase in sale of English books = $620 - 350 = 170$ and increase in sale of Hindi books = $650 - 500 = 150$
8. (i) Cricket (ii) Watching



Half Yearly Model Test Paper

1. (i) Positive, (ii) Positive, (iii) Negative, (iv) Negative
2. (i) 1, (ii) -3785, (iii) 0, (iv) -3065, (v) -312, (vi) -567
3. Work in 1 day = $\frac{1}{3}$ of a km

$$\text{Work in } 6\frac{2}{3} \text{ day} = \frac{20}{3} \times \frac{1}{3} = \frac{20}{9} = 2\frac{2}{9} \text{ km}$$

4. (i) $\frac{2}{3}$, (ii) $-\frac{1}{5}$ (iii) $\frac{1}{100}$, (iv) 1, (v) $\frac{3}{20}$
5. (i) $\frac{5}{20}$ (ii) $\frac{9}{36}$ (iii) $\frac{-20}{-80}$ (iv) $\frac{1000}{4000}$ (v) $\frac{-25}{-100}$
6. (i) $\frac{-144}{-504} = \frac{144}{504}$

$$= \frac{2 \times 2 \times 2 \times 2 \times 3 \times 3}{2 \times 2 \times 2 \times 3 \times 3 \times 7} = \frac{2}{7}$$

$$\begin{array}{r|l}
 2 & 144 \\
 \hline
 2 & 72 \\
 \hline
 2 & 36 \\
 \hline
 2 & 18 \\
 \hline
 3 & 9 \\
 \hline
 3 & 3 \\
 \hline
 & 1
 \end{array}$$

$$\begin{array}{r|l}
 2 & 504 \\
 \hline
 2 & 252 \\
 \hline
 2 & 126 \\
 \hline
 3 & 63 \\
 \hline
 3 & 21 \\
 \hline
 7 & 7 \\
 \hline
 & 1
 \end{array}$$

(ii) $\frac{2}{7}$ (iii) $-\frac{2}{7}$ (iv) $\frac{9}{25}$

7. (i) $\frac{1}{4}, -\frac{1}{4}$, No (ii) $\frac{3}{8}, -\frac{3}{8}$, No (iii) $\frac{1}{66}, -\frac{1}{66}$, No

8. (i) $\frac{4}{15} \times \frac{9}{5} \times \frac{50}{3} = 4 \times 2 = 8$

(ii) $\frac{-1}{6}$

$$\begin{aligned}
 \text{(iii)} \left(\frac{-3}{2} \times \frac{4}{5} \right) + \left(\frac{9}{5} \times \frac{-10}{3} \right) - \left(\frac{1}{2} \times \frac{3}{4} \right) &= \frac{-6}{5} + \frac{(-6)}{1} - \frac{3}{8} \\
 &= \frac{-6}{5} - \frac{6}{1} - \frac{3}{8} = -\left(\frac{6}{5} + \frac{6}{1} + \frac{3}{8} \right) \\
 &= \left(\frac{48 + 240 + 15}{40} \right) = \frac{-303}{40} = -7 \frac{23}{40}
 \end{aligned}$$

(iv) 2

9. (i) $\frac{1}{243} = \frac{1}{3^5} = \left(\frac{1}{3} \right)^5$

(ii) $\frac{-16}{729} = -\left(\frac{4}{27} \right)^2$

(iii) $\frac{-625}{14641} = -\left(\frac{5}{11} \right)^4$

(iv) $\frac{-2401}{-256} = \frac{2401}{256} = \left(\frac{7}{4} \right)^4$

10. (i) 1.05×10^6 (ii) $1.353 \times 10^9, 1.361 \times 10^9$

(iii) $1.027 \times 10^9, 5.312 \times 10^8, 4.958 \times 10^8$ (iv) 1×10^{-6}

11. (i) binomial (ii) trinomial (iii) monomial (iv) trinomial (v) binomial

12. Let the total worth of Shanti Lal's property be x

Son's share = $\frac{x}{5}$

Daughter's share = $\frac{x}{5}$

Wife's share = $\frac{3x}{5}$

If wife's share = 288000

$$288000 = \frac{3x}{5} \Rightarrow 3x = 288000 \times 5$$

$$x = \frac{288000 \times 5}{3} = \mathbf{480000}$$

₹ **480000** is total worth of Shanti Lal's property.

13. The population of the town in 2010 be x

$$\frac{5 \times x}{100} = 8820 \Rightarrow x = \frac{8820 \times 100}{5}$$

$$x = \mathbf{176400}$$

14. (i) CP = ₹ 250, Loss = ₹ 15, SP = ₹ 235
(ii) CP = ₹ 450, SP = ₹ 540, Profit = 20%
(iii) SP = ₹ 3038, Loss = 2% overhead expenses = ₹ 100
(iv) CP = ₹ 30000, Profit = ₹ 6000, Profit = 20%
(v) Profit = ₹ 72, SP = ₹ 972, Purchased at ₹ 400

15. (i) SI = ₹ 192, A = ₹ 992 (ii) SI = ₹ 162, A = ₹ 612

(iii) $P = ₹ 600, R = 2\%, T = \frac{20}{12} = \frac{5}{3}$ years

$$SI = \frac{P \times R \times T}{100} = \frac{600 \times 2 \times 5}{3 \times 100} = ₹ 20$$

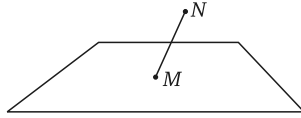
$$\text{Amount} = P + SI = ₹ (600 + 20) = ₹ \mathbf{620}$$

□

Annual Model Test Paper

- Supplementary : (i), (iii), (iv)
Complementary : (ii), (v), (vi)
- (i) Property of corresponding angles
(ii) Property of alternate interior angles
(iii) Property of co-interior angles are supplementary
- (i) line segment (ii) outside (iii) AC (iv) concurrent (v) contoid
- Do it yourself.
- (i) Four : PQ and QR, QR and RS, RS and SP, SP and PQ
(ii) Two : PQ and RS, PS and QR
(iii) Four : $\angle P$ and $\angle Q$, $\angle Q$ and $\angle R$, $\angle R$ and $\angle S$, $\angle S$ and $\angle P$
(iv) Two : $\angle P$ and $\angle R$, $\angle Q$ and $\angle S$.
- Do it yourself.
- Do it yourself.
- Capital Letter H and Rectangle.

9. Yes, one point.



10. Joined to two cubes end to end then

Length = 12 cm, Breadth = 6 cm,

Height = 6 cm

$$\text{Volume of cuboid} = 12 \times 6 \times 6 \text{ cm}^3 = \mathbf{432 \text{ cm}^3}$$

11. (i) 2, (ii) 2, (iii) 3, (iv) 4, (v) 4, (vi) 5, (vii) 6, (viii) 3

12. Total length of wire = 4.4 cm + 4.4 cm + 4.4 cm = 13.2 cm

\therefore Circumference of wire is rebent to form of a circle = 13.2 cm

$$2\pi r = 13.2$$

$$r = \frac{13.2}{2\pi} = 2.1 \text{ cm}$$

$$\text{Area of circle} = \pi r^2 = \frac{22}{7} \times 2.1 \times 2.1 = 13.86 \text{ cm}^2$$

13. (i) Area of the tin sheet required to make 20 such tins

$$= 20 \times 2[lb + bh + hl]$$

$$= 20 \times 2[26 \times 26 + 26 \times 45 + 45 \times 26]$$

$$= 40[676 + 1170 + 1170]$$

$$= 40[3016] = 40 \times 3016 = 120640 \text{ cm}^2$$

(ii) Cost of the tin sheet for making these tins

$$= 12.0640 \text{ m}^2 \times 20 = ₹ 241.28$$

14. (i) Arrange in ascending order :

2, 2, 3, 5, 7, 9, 9, 10, 11

Here $n = 9$, which is odd.

$$\therefore \text{Median} = \text{Value of } \frac{1}{2}(9 + 1)^{\text{th}} \text{ term}$$

$$= \text{Value of } 5^{\text{th}} \text{ term} = 7$$

(ii) 16 (iii) 16

15. (i) ₹ 100, (ii) 125

□