



# ADVANCE MATHEMATICS

Teacher's  
Resource Book



Class 7



# Advance Mathematics-7

## Revision

3. (i)  $461 \times 999 + 461 = 461(999 + 1) = 461 \times 1000 = \mathbf{461000}$

(ii)  $887 \times 10 \times 461 - 361 \times 8870$   
 $= 8870 \times 461 - 361 \times 8870 = 8870(461 - 361)$   
 $= 8870 \times 100 = \mathbf{887000}$

4. Let the number  $x$ .

$$35 \times 20 + 18 = x$$

$$700 + 18 = x$$

$$x = \mathbf{718}$$

5. 24 radio sets cost = ₹ 18720.

$$\text{One radio set cost} = \frac{\text{₹ } 18720}{24} = \text{₹ } \mathbf{780}$$

7.  $10000001 - 9999998 = \mathbf{3}$

8. First number  $\times$  second number = HCF  $\times$  LCM

$$16428 = \text{LCM} \times 37$$

$$\text{LCM} = \frac{16428}{37} = \mathbf{444}$$

9.  $398 - 7 = 391$

$$436 - 11 = 425$$

$$542 - 15 = 527$$

$$391, 425, 527$$

$$\text{HCF} = \mathbf{17}$$

$$391 \overline{)425}(1$$

$$\underline{391}$$

$$34 \overline{)391}(11$$

$$\underline{374}$$

$$17 \overline{)34}(2$$

$$\underline{34}$$

$$\underline{\times}$$

$$17 \overline{)527}(31$$

$$\underline{51}$$

$$\underline{17}$$

$$\underline{17}$$

$$\underline{\times}$$

11. (i)  $-307 = |-307| = \mathbf{307}$ ,

(ii)  $|225| = \mathbf{225}$

(iii)  $|0| = \mathbf{0}$ ,

(iv)  $|-a + 7| = \mathbf{a - 7}$

12. (i)  $50 - 10 \times 2 \text{ of } 5 + (40 - 4) \div 9$

$$= 50 - 10 \times 2 \times 5 + (36) \div 9$$

$$= 50 - 100 + 4 = 54 - 100 = \mathbf{-46}$$

(ii)  $121 - \{27 \div (3 \times 3) - (-3)\}$

$$= 121 - \{27 \div (9) + 3\}$$

$$= 121 - \left\{ \frac{27}{9} + 3 \right\}$$

$$= 121 - \{3 + 3\} = 121 - 6 = \mathbf{115}$$

13. Hari's share = ₹ 500 - ₹ 300 = ₹ 200

$$\text{Ram : Hari} \Rightarrow 300 : 200 = \mathbf{3 : 2}$$

14.  $81 \times 16 = 48 \times x \Rightarrow x = \frac{81 \times 16}{48} = \frac{81}{3} = \mathbf{27}$

15.  $\frac{3}{4}$  or  $\frac{5}{6}$

$$\frac{3 \times 6}{4 \times 6} = \frac{18}{24}, \quad \frac{5 \times 4}{6 \times 4} = \frac{20}{24}$$

$$\frac{5}{6} > \frac{3}{4}$$

16. (i)  $\frac{12.5}{100} = \frac{125}{1000} = \mathbf{0.125}$

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

17. Remaining kerosene =  $250 - 5 = 245$

$$= \frac{245 \times 100}{250} = \frac{49 \times 10}{5} = \mathbf{98\%}$$

18. We calculate the gain or loss for  $12 \times 10 = 120$  Oranges purchased

CP of 12 Oranges = ₹ 10

CP of 120 Oranges = ₹  $\frac{10 \times 120}{12} = ₹ 100$

Again, SP of 10 Oranges = ₹ 12

SP of 120 Oranges = ₹  $\frac{12 \times 120}{10} = ₹ 144$

Gain = SP - CP = ₹ 144 - ₹ 100 = ₹ 44

This gain of ₹ 44 is on CP ₹ 100

⇒ Gain = **44%**

19. If the CP was ₹ 100, Gain = 14%

SP would be ₹  $(100 + 14) = ₹ 114$

If the SP would be ₹ 114 then CP = ₹ 100

If the SP would be ₹ 1 then CP = ₹  $\frac{100}{114}$

If the SP would be ₹ 570 then CP =  $\frac{100 \times 570}{114}$

$$= 100 \times 5 = \mathbf{₹ 500}$$

20. Amount =  $2x$ , Principal =  $x$ , SI =  $2x - x = x$

$$\text{Rate} = \frac{SI \times 100}{P \times T}$$

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

21.  $2x^2 - 2xy + y^2 + x^2 - y^2 + 2xy + y^2 + x^2$

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

$$= \mathbf{4x^2 + y^2}$$

22.  $a^2 + 2ab + y^2 + A = 3a^2 - ab$

$$A = 3a^2 - ab - a^2 - 2ab - y^2$$

$$= \mathbf{2a^2 - 3ab - y^2}$$

$$\begin{aligned}
 \mathbf{23.} \quad & x^4 - x^3 + x^2 + x^3 + x - 3 - x^4 - x^2 + x \\
 & = 2x - 3 \\
 & = 2x - 3 - (x^4 - x^3 - x + 4) \\
 & = 2x - 3 - x^4 + x^3 + x - 4 \\
 & = -x^4 + x^3 + 3x - 7
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{24.} \quad & 2ab^3 - 7a^2b^2 + 5bc^3 \text{ putting the value of } a = 2, b = 3 \text{ and } c = -1. \\
 & = 2 \times 2 \times (3)^3 - 7 \times (2)^2 \times (3)^2 + 5(3) \times (-1)^3 \\
 & = 4 \times 27 - 7 \times 36 + 15 \times (-1) \\
 & = 108 - 252 - 15 \\
 & = 108 - 267 = \mathbf{-159}
 \end{aligned}$$

$$\mathbf{25.} \quad \frac{x+y+z}{xyz} = \frac{-2 + \frac{7}{2} + \frac{1}{2}}{(-2) \times \frac{7}{2} \times \frac{1}{2}}; \text{ Putting the value of } x = -2, y = 3\frac{1}{2} \text{ and } z = \frac{1}{2}.$$

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

$$\begin{aligned}
 \mathbf{26.} \quad \text{(i)} \quad & 9 - \{x - 4(x - 3) + 8\} = 9 - \{x - 4x + 12 + 8\} \\
 & = 9 - \{-3x + 20\} \\
 & = 9 + 3x - 20 \\
 & = \mathbf{3x - 11}
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii)} \quad & 1 - \{2 - x(5 - x) + 5\} = 1 - \{2 - 5x + x^2 + 5\} \\
 & = 1 - \{7 - 5x + x^2\} \\
 & = 1 - 7 + 5x - x^2 \\
 & = \mathbf{-x^2 + 5x - 6}
 \end{aligned}$$

(iii), (iv) Do yourself.

**27.** Let the numbers  $(x + 1)$  and  $(x + 3)$

$$\begin{aligned}
 & x + 1 + x + 3 = 76 \\
 \Rightarrow & \quad \quad \quad 2x + 4 = 76 \\
 \Rightarrow & \quad \quad \quad 2x = 76 - 4 \\
 \Rightarrow & \quad \quad \quad 2x = 72 \\
 \Rightarrow & \quad \quad \quad x = 36
 \end{aligned}$$

So, the numbers are **37** and **39**.

$$\begin{aligned}
 \mathbf{29.} \quad & \frac{9}{5}c + 32 = \frac{9 \times 35}{5} + 32 \because \text{ Put the value of } c = 35. \\
 & = 9 \times 7 + 32 = \mathbf{95}
 \end{aligned}$$

$$\mathbf{30.} \quad 3p - 2q + 2r + 5p + 3q - 2r - 4p + 2q - 3r$$

$$= 3p + 5p - 4p - 2q + 3q + 2q + 2r - 2r - 3r$$

$$= 4p + 3q - 3r \quad \dots(i)$$

$$\text{and } 2p - 3q - 3r + 4p - q - r + 3p - 2q - 3r$$

$$= 2p + 4p + 3p - 3q - q - 2q - 3r - r - 3r$$

$$= 9p - 6q - 7r \quad \dots(ii)$$

$$\text{eq. (ii) - eq. (i)}$$

$$= 9p - 6q - 7r - (4p + 3q - 3r)$$

$$= 9p - 6q - 7r - 4p - 3q + 3r = \mathbf{5p - 9q - 4r}$$

**31.** The CP of 150 dozens =  $150 \times 20 = 3000$

$$1 \text{ dozen} = 12$$

$$150 \text{ dozen} = 150 \times 12 = 1800$$

$$\text{The SP of 1800 pencil} = 1800 \times 2.50$$

$$= ₹ 4500$$

$$\text{Profit} = \text{SP} - \text{CP}$$

$$= 4500 - 3000 = ₹ 1500$$

$$\text{Profit \%} = \frac{1500 \times 100}{3000} = \frac{100}{2} = \mathbf{50\%}$$

**32.** Total CP of a machine =  $4450 + 150 + 400$

$$= ₹ 5000$$

$$\text{SP} = ₹ 6200$$

$$\text{Profit \%} = ₹ (6200 - 5000) = ₹ 1200$$

$$\text{Profit \%} = \frac{1200 \times 100}{5000} = \mathbf{24\%}$$

**33.** Shalini % =  $\frac{548 \times 100}{800} = \frac{548}{8} = \mathbf{68.5\%}$

$$\text{Sushmita \%} = \frac{460 \times 100}{600} = \frac{460}{6} = \mathbf{76.7\%}$$

Sushmita's performance is better.

**34.** Increase population =  $\frac{90 \times 10000000 \times 2}{100} = 18000000$

$$\text{Population after one year} = 900000000 + 18000000$$

$$= \mathbf{91 \text{ crore } 80 \text{ lakh}}$$

**35.** Perimeter of rectangular =  $2(l + b)$

$$2 \times (25 + 8) = 2 \times 33 = \mathbf{66 \text{ m}}$$

**36.** Perimeter of rectangular =  $2 \times (l + b)$

$$360 = 2 \times (116 + x)$$

$$180 = 116 + x \Rightarrow x = \mathbf{64 \text{ cm}}$$

**37.** (i) Perimeter of square  $4a \Rightarrow 100 = 4a \Rightarrow a = \mathbf{25}$

(ii) Do yourself.

**38.** Number of tiles =  $\frac{\text{Area of bathroom}}{\text{Area of tiles}}$

$$= \frac{3 \times 3 \times 10000}{25 \times 25} = \mathbf{144}$$

- 39.** (i) Area of rectangle = length  $\times$  breadth  
 $= 24 \times 16 = 384 \text{ cm}^2$   
(ii) Area of square = (side)<sup>2</sup> = (21)<sup>2</sup> = 441 cm<sup>2</sup>  
Square, Difference = (441 - 384) cm<sup>2</sup> = **57 cm<sup>2</sup>**
- 41.**  $100 \times 100 \text{ cm}^2 = \mathbf{10000 \text{ cm}^2}$
- 42.** (i) Perimeter = Sum of four sides = 52.5 cm  $\times$  4 = **210.0 cm<sup>2</sup>**  
(ii), (iii) Do yourself.
- 43.** Perimeter of park = 2  $\times$  (300 + 200)  
 $= (2 \times 500)$   
 $= 1000 \text{ cm}$   
Cost of fencing = 1000  $\times$  24 = ₹ **24000**
- 44.**  $\angle BOC + \angle AOC = 180^\circ \Rightarrow \angle BOC = 180^\circ - 45^\circ = \mathbf{135^\circ}$
- 45.** (i)  $90^\circ - 32^\circ = \mathbf{58^\circ}$   
(ii), (iii), (iv) Do yourself.
- 46.** (i)  $180^\circ - 25^\circ = \mathbf{155^\circ}$  (ii), (iii), (iv) Do yourself.
- 47.** Let the angle is  $x$ , then its supplementary angle =  $3x$   
Now  $x + 3x = 180^\circ$   $x = \frac{180^\circ}{4} = 45^\circ$   
So, angles are  $45^\circ$  and  $45^\circ \times 3 = \mathbf{135^\circ}$
- 48.** (i)  $\angle x = 180^\circ - 135^\circ = \mathbf{45^\circ}$   
(ii)  $\angle x = \mathbf{60^\circ}$
- 50.** Sum of angles of triangle =  $180^\circ$   
 $\Rightarrow 25^\circ + 75^\circ + x^\circ = 180^\circ$   
 $\Rightarrow x^\circ = 180^\circ - 100^\circ = 80^\circ$   
 $\Rightarrow x^\circ = \mathbf{80^\circ}$
- 52.** (i)  $40^\circ + 65^\circ + x^\circ = 180^\circ$   
 $\Rightarrow x^\circ = 180^\circ - 105^\circ = \mathbf{75^\circ}$   
(ii)  $4x^\circ + 5x^\circ + 108^\circ = 180^\circ$   
 $9x^\circ = 72^\circ$   
 $\Rightarrow x^\circ = \frac{72}{9}$   
 $\Rightarrow x^\circ = \mathbf{8^\circ}$
- 54.** Radius =  $\frac{\text{Diameter}}{2} = \frac{12}{2} = \mathbf{6 \text{ cm}}$
- 55.** Diameter = 2  $\times$  radius = 5  $\times$  2 = **10 cm**
- 58.**  $(x + 20)^\circ + 64^\circ = 180^\circ \Rightarrow x^\circ + 84^\circ = 180^\circ$ ,  $x = \mathbf{96^\circ}$
- 59.**  $120^\circ + 130^\circ + 45^\circ + x = 360^\circ$   
 $295^\circ + x^\circ = 360^\circ$   
 $\Rightarrow x^\circ = \mathbf{65^\circ}$

60.  $5x^\circ + 30^\circ + 3x + 30^\circ = 180^\circ$   
 $\Rightarrow 8x^\circ + 60^\circ = 180^\circ \Rightarrow 8x^\circ = 120^\circ$   
 $x^\circ = 15^\circ$   
 $5x^\circ + 30^\circ + y^\circ = 180^\circ$   
 $75^\circ + 30^\circ + y^\circ = 180^\circ$   
 $\Rightarrow y^\circ = 75^\circ$   
 $\angle y = \angle z$   
 $75^\circ = \angle z$  or  $\angle z = 75^\circ$
62.  $x^\circ + 45^\circ + 55^\circ = 180^\circ$   
 $x^\circ = 180^\circ - 100^\circ = 80^\circ$   
 $\angle x = 80^\circ, y = \angle A = 55^\circ, z = 180^\circ - (80^\circ + 55^\circ)$   
 $= 180^\circ - 135^\circ = 45^\circ$

## Unit-I : Number System

# 1.

# Integers

### EXERCISE 1

3. (i)  $2 \times (-15) = -(2 \times 15) = -30$   
(ii)  $(-17) \times (-20) = +(17 \times 20) = 340$   
(iii)  $3 \times (-8) \times 5 = -(3 \times 8 \times 5) = -120$   
(iv), (v), (vi), (vii), (viii), (ix), (x), (xi), (xii) Do yourself.
4. (i)  $(1569 \times 887) - (569 \times 887) \Rightarrow 887(1569 - 569)$   
 $= 887 \times 1000 = 887000$   
(ii), (iii), (iv), (v), (vi) Do yourself.
5. (i)  $x \times (-1) = -40 \Rightarrow (-40) \times (-1) = -40$   
(ii), (iii) Do yourself.
6. (i)  $(8 + 9) \times 10$  and  $8 + 9 \times 10$   
 $17 \times 10$  and  $8 + 90$   
**170 > 98**  
So,  $(8 + 9) \times 10 > 8 + 9 \times 10$   
(ii), (iii) Do yourself.
8.  $a \times (-1) = -30 \Rightarrow a = (-1) \times (-30) = 30$   
So, it is positive.
9.  $a \times (-1) = 30 \Rightarrow 30 \times (-1) = -30$   
So it is negative.
11. (i)  $18 \div (-3) = (18) \times \frac{1}{-3} = -6$   
(ii)  $(-18) \div 3 = (18) \times \frac{1}{-3} = -6$

$$(iii) (-18) \div (-3) = -18 \times \frac{1}{-3} = \mathbf{6}$$

(iv), (v), (vi), (vii), (viii), (ix), (x) Do yourself.

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

(xii) Do yourself.

**12., 13.** Do yourself.

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

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

**15.** (i)  $50^2 = 50 \times 50 = \mathbf{2500}$

(ii)  $(-1)^{51} = \mathbf{-1}$

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

(iv), (v), (vi) Do yourself.

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

(viii), (ix), (x), (xi), (xii) Do yourself.

## 2.

## Fractions

### EXERCISE 2.1

**1.**  $\frac{4}{7}, \frac{8}{9}$  and  $\frac{2}{11}$   
406, 616, 126  
693

So,  $\frac{4}{7}, \frac{8}{9}$  and  $\frac{2}{11} = \frac{\mathbf{406}}{\mathbf{693}}, \frac{\mathbf{616}}{\mathbf{693}}$  and  $\frac{\mathbf{126}}{\mathbf{693}}$

**2.** (i)  $\frac{2}{3}$  and  $\frac{5}{7}$

by cross multiplication  $2 \times 7 = 14$  and  $3 \times 5 = 15$

$14 < 15$  so  $\frac{\mathbf{2}}{\mathbf{3}} < \frac{\mathbf{5}}{\mathbf{7}}$

(ii) and (iii) Do yourself.

**3.** (i)  $\frac{1}{2}, \frac{3}{4}, \frac{2}{3}, \frac{5}{6}, \frac{4}{5}$   
30, 45, 40, 50, 48  
60

We know  $30 < 40 < 45 < 48 < 50$

So  $\frac{\mathbf{1}}{\mathbf{2}} < \frac{\mathbf{2}}{\mathbf{3}} < \frac{\mathbf{3}}{\mathbf{4}} < \frac{\mathbf{5}}{\mathbf{6}} < \frac{\mathbf{4}}{\mathbf{5}}$

(ii) Do yourself.



4. Do yourself.

5. (i)  $\frac{7}{8} + \frac{5}{8} = \frac{7+5}{8} = \frac{12}{8} = \frac{3}{2} = 1\frac{1}{2}$

(ii)  $\frac{11}{12} + \frac{7}{15}$

$$\frac{55+28}{60} = \frac{83}{60} = 1\frac{23}{60}$$

(iii), (iv), (v) Do yourself.

(vi)  $5\frac{1}{3} + 2\frac{1}{9} + 7\frac{5}{6} = \frac{16}{3} + \frac{19}{9} + \frac{47}{6}$

$$\frac{96+38+141}{18} = \frac{275}{18} = 15\frac{5}{18}$$

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

$$\frac{14-15}{6} = -\frac{1}{6}$$

(ii), (iii) Do yourself.

7. (i)  $\frac{11}{8} - \frac{5}{8} = \frac{11-5}{8}$

$$= \frac{6}{8} = \frac{3}{4}$$

(ii), (iii), (iv), (v), (vi) Do yourself.

8. (i)  $\frac{2}{5} - \frac{3}{10} + \frac{7}{15}$

$$\frac{12-9+14}{30} = \frac{17}{30}$$

(ii), (iii), (iv), (v), (vi) Do yourself.

9.  $\frac{4}{7}$ th,  $\frac{5}{8}$ th

$$\frac{32, 35}{56} \quad \text{Since } 35 > 32.$$

(So his daughter got more of his property.)

10.  $\frac{1}{17}, \frac{3}{19}, \frac{5}{21}$

$$\frac{399, 1071, 1615}{6783} \quad \text{Since } 399 < 1071 < 1615$$

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

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

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

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

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

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

Praseen walks again =  $1\frac{2}{3}$  =  $\frac{5}{3}$  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), (iii) Do yourself.

(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), (vi), (vii), (viii), (ix), (x) Do yourself.

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

(ii), (iii), (iv), (v), (vi) Do yourself.

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

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

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

Cost of  $3\frac{1}{3}$  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 =  $150\frac{2}{3}$  mile/hour =  $\frac{452}{3}$  mile/hour

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 =  $\frac{1}{3}$  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. 1 marble weigh =  $10\frac{1}{2}$  grams =  $\frac{21}{2}$  grams

230 marbles weighs =  $\frac{21}{2} \times 230$  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 =  $\frac{65}{4} \times \frac{17}{65} = \frac{1105}{12} = 92\frac{1}{12}$  km

### **EXERCISE 2.3**

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

(ii), (iii), (iv) and (v) Do yourself.

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), (iii), (iv), (v) Do yourself.

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

(vii), (viii), (ix) Do yourself.

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

A factory produced steel in a day =  $\frac{72005}{12} \div 30$   
 $= \frac{72005}{12} \times \frac{1}{30} = \frac{12401}{72}$   
 $= 200\frac{1}{72}$  tons

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

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

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

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 =  $690 \div \frac{23}{3}$

$$= \frac{690 \times 3}{23} = \mathbf{90 \text{ boxes}}$$

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 =  $\frac{20}{1\frac{1}{3}} = \frac{20 \times 3}{4} = \mathbf{15 \text{ cans}}$

10. Do yourself.

## 3.

## Decimal

### EXERCISE 3.3

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 + 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 =  $90.1 - 9.09 = \mathbf{81.01}$

### EXERCISE 3.4

4. A fan rotates per minute = 123.5  
 The fan adjusted 3.5 times more =  $123.5 \times 3.5$   
 = **432.25 per minute**
5. A box of wood weighs = 13.3 kg  
 15 boxes of wood weigh =  $13.3 \times 15$  kg = **199.5 kg**
6. Motor bike goes in 1 L = 67.33 km  
 Motor bike goes in 3.25 L =  $67.33 \times 3.25 = \mathbf{218.825}$  km
7. Charges for one unit = ₹ 4.28  
 Charges for 49 units = ₹  $4.28 \times 49 = \mathbf{209.72}$
8. Mohan spent for rice = ₹  $36.30 \times 2.5 = \mathbf{90.75}$   
 Mohan spent for apples = ₹  $50.50 \times 4 = \mathbf{202.00}$   
 Mohan spent for petrol = ₹  $12.39 \times 79.03 = \mathbf{979.18}$   
 Mohan spent total = ₹  $90.75 + \mathbf{202.00} + \mathbf{979.18}$   
 = ₹ **1271.93**

### EXERCISE 3.5

6. Cost of 31 eggs = ₹ 173.60  
 Cost of 1 egg = ₹  $173.60 \div 31 = \mathbf{5.60}$
7. Numbr of sweet balls =  $588.38 \text{ g} \div 45.26 = \mathbf{13}$
8. 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

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

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

(iii) Do yourself.

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

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

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

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

2	36
2	18
3	9
3	3
	1

2	180
2	90
3	45
3	15
5	5
	1

(iii), (iv) Do yourself.

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

By cross multiplication

$$2 \times 135 = 3 \times x$$

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

OR

$$x = 2 \times 45$$

$$x = \mathbf{90}$$

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

By cross multiplication

$$90 \times x = 5 \times 216$$

$$x = \frac{5 \times 216}{90}$$

⇒

$$x = \mathbf{12}$$

(iii), (iv) Do yourself.

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

By cross multiplication

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

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

$$\text{OR } x = \frac{81}{9}$$

$$x = 9$$

$$7. \text{ (i) } \frac{-144}{-504} = \frac{144}{504}$$

$$= \frac{2 \times 2 \times 2 \times 2 \times 3 \times 3}{2 \times 2 \times 2 \times 3 \times 3 \times 7} = \frac{2}{7}$$

2	144
2	72
2	36
2	18
3	9
3	3
	1

2	504
2	252
2	126
3	63
3	21
7	7
	1

(ii) Do yourself.

$$(iii) \frac{240}{-840} = \frac{24}{-84}$$

$$= \frac{2 \times 2 \times 2 \times 3}{-2 \times 2 \times 3 \times 7} = \frac{2}{-7}$$

2	24
2	12
2	6
3	3
	1

2	84
2	42
3	21
7	7
	1

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

5	225
5	45
3	9
3	3
	1

5	625
5	125
5	25
5	5
	1

### EXERCISE 4.2

$$2. \text{ (i) } \frac{2 \times -28}{5 \times -28} = \frac{-56}{-140}$$

$$(ii) \frac{2 \times 77}{5 \times 77} = \frac{154}{385}$$

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

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

(v) Do yourself.

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) Do yourself.

(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 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) Do yourself.

(iv)  $\frac{-8}{-14}$  and  $\frac{13}{21}$



LCM of 14 and 21 is 42.

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

$$\frac{24}{42} \neq \frac{26}{42} \quad [ \because \text{Numerators are not equal}]$$

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) Do yourself.

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

LCM of 7 and 9 is 63.

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

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) Do yourself.

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

LCM of 5 and 1 is 5.

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

$\therefore -16 < 15$

$\therefore \frac{-16}{5} < \frac{15}{5}$

(iv) Do yourself.

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) Do yourself.

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) Do 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), (iii) Do yourself.

$$\begin{aligned}
 \text{(iv)} \quad \frac{-23}{28} + \frac{5}{-28} &= \frac{-23}{28} + \frac{-5}{28} \\
 &= \frac{-23 + (-5)}{28} \\
 &= \frac{-23 - 5}{28} = \frac{-28}{28} = -1
 \end{aligned}$$

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

The LCM of 8 and 3 is 24.

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

(ii), (iii) Do yourself.

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

The LCM of 26 and 39 is 78.

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

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

$$\begin{aligned}
 &\frac{32 - 55}{88} = \frac{-55 + 32}{88} \\
 &= \frac{-23}{88} = \frac{-23}{88}
 \end{aligned}$$

**LHS = RHS**

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

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

$$\begin{aligned}
 \frac{-3}{4} + \frac{(14 - 20)}{35} &= \frac{(-15 + 8)}{20} + \frac{-4}{7} \\
 \frac{-3}{4} - \frac{6}{35} &= \frac{-7}{20} - \frac{4}{7} \\
 \frac{-105 - 24}{140} &= \frac{-49 - 80}{140} \\
 \frac{-129}{140} &= \frac{-129}{140}
 \end{aligned}$$

**LHS = RHS**

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

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

### EXERCISE 5.2

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), (iii) Do yourself.

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

The L.C.M. of 13 and 15 is 195.

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

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

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

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

(ii) Do yourself.

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

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

$$= \frac{-32 - 99}{36} + \frac{4}{12}$$

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

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

$$\begin{aligned}
&= \frac{-8}{9} - \left( \frac{11}{4} + \frac{4}{12} \right) \\
&= \frac{-8}{9} - \left( \frac{11 \times 3 + 4 \times 1}{12} \right) \\
&= \frac{-8}{9} - \left( \frac{33 + 4}{12} \right) \\
&= \frac{-8}{9} - \frac{37}{12} \\
&= \frac{-8 \times 4 - 37 \times 3}{36} \\
&= \frac{-32 - 111}{36} = \frac{-143}{36}
\end{aligned}$$

Thus,

**LHS  $\neq$  RHS**

(ii) Do yourself

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.

$$\begin{aligned}
&= \frac{-2 \times 6 + 5 \times 2 + 7 \times 3}{18} = \frac{-12 + 10 + 21}{18} \\
&= \frac{31 - 12}{18} = \frac{19}{18}
\end{aligned}$$

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

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

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

$$\frac{5}{14} - 1 = x$$

$\Rightarrow$

$$x = \frac{5 - 14}{14} = \frac{-9}{14}$$

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

$$x = 3 + \frac{7}{9}$$

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

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

$$\begin{aligned} x &= 4 - \frac{15}{23} \\ x &= \frac{4 \times 23 - 15}{23} \\ &= \frac{92 - 15}{23} = \frac{77}{23} \end{aligned}$$

### **EXERCISE 5.3**

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

(ii), (iii), Do yourself.

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

$$\frac{25}{-9} \times \frac{3}{-10} = \frac{75}{90} = \frac{5}{6}$$

(v) Do yourself.

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

(vii), (viii) Do yourself.

2. (i)  $\frac{3}{20} \times \frac{4}{5} = \frac{3}{25}$

(ii) Do yourself.

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

(iv) Do yourself.

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

(ii) Do yourself.

(iii)  $\left(\frac{-3}{2} \times \frac{4}{5}\right) + \left(\frac{9}{5} \times \frac{-10}{3}\right) - \left(\frac{1}{2} \times \frac{3}{4}\right)$   
 $= \frac{-6}{5} + \frac{(-6)}{1} - \frac{3}{8}$   
 $= \frac{-6}{5} - \frac{6}{1} - \frac{3}{8}$   
 $= -\left(\frac{6}{5} + \frac{6}{1} + \frac{3}{8}\right)$

$$= -\left(\frac{48 + 240 + 15}{40}\right)$$

$$= \frac{-303}{40} = -7 \frac{23}{40}$$

(iv) Do yourself.

4.  $\left(\frac{2}{9} + \frac{-3}{11}\right) \times \left(\frac{5}{2} + \frac{7}{8}\right)$

$$= \left(\frac{2 \times 11 - 9 \times 3}{99}\right) \times \left(\frac{20 + 7}{8}\right)$$

$$= \frac{22 - 27}{99} \times \frac{27}{8}$$

$$\frac{-5 \times 27}{99 \times 8} = \frac{-15}{88}$$

5.  $\left(\frac{-3}{2} - \frac{4}{15}\right) \times \left(\frac{3}{4} - \frac{7}{12}\right)$

$$= \left(\frac{-3 \times 15 - 4 \times 2}{30}\right) \times \left(\frac{9 - 7}{12}\right)$$

$$= \left(\frac{-45 - 8}{30}\right) \times \left(\frac{2}{12}\right)$$

$$= \frac{-53}{30} \times \frac{2}{12} = \frac{-53}{180}$$

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

$$= \frac{12}{5} + \frac{3}{8} = \frac{12 \times 8 + 3 \times 5}{40}$$

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

(ii) Do yourself.

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

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

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

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

(iv) Do yourself.

7.  $3 \frac{5}{7} \times 16 \frac{1}{2} = \frac{26}{7} \times \frac{33}{2} = \frac{13 \times 33}{7} = ₹ 61 \frac{2}{7}$



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

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

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

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

### **EXERCISE 5.4**

2. Verify the property

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

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

$$\begin{aligned} \frac{-1}{5} \times \frac{2}{7} &= \frac{2}{7} \times \frac{-1}{5} \\ \frac{-2}{35} &= \frac{-2}{35} \end{aligned}$$

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

3. Verify the property

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

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

$$\begin{aligned} \frac{1}{3} \times \left( \frac{-2}{3} \times \frac{4}{3} \right) &= \left( \frac{1}{3} \times \frac{-2}{3} \right) \times \frac{4}{3} \\ \frac{1}{3} \times \frac{-2}{3} \times \frac{4}{3} &= \frac{1}{3} \times \frac{-2}{3} \times \frac{4}{3} \\ \frac{-8}{27} &= \frac{-8}{27} \end{aligned}$$

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

4. Verify the property

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

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

$$\begin{aligned} \frac{5}{6} \times \left( \frac{-3}{4} + \frac{7}{8} \right) &= \left( \frac{5}{6} \times \frac{-3}{4} \right) + \left( \frac{5}{6} \times \frac{7}{8} \right) \\ \frac{5}{6} \times \left( \frac{-6+7}{8} \right) &= \left( \frac{-5}{8} \right) + \frac{35}{48} \\ \frac{5}{6} \times \frac{1}{8} &= \frac{-5}{8} + \frac{35}{48} \end{aligned}$$

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

$$\Rightarrow \frac{5}{48} = \frac{5}{48}$$

(ii) Do yourself.

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

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

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

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

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

$$\frac{31}{40} = \frac{31}{40}$$

(ii) Do 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. (i)  $\left( \frac{1}{-4} \right)^{-1} = -4$

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

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

### **EXERCISE 5.5**

2. (i)  $\frac{-4}{6} \div \frac{3}{2} = \frac{-4}{6} \times \frac{2}{3} = \frac{-4}{9}$

(ii) Do yourself.

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

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

(v) Do yourself.

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

(vii) Do yourself.

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

3. Let the other number be  $x$ .

$$\begin{aligned} -\frac{4}{15} \times x &= \frac{-8}{9} \\ x &= \frac{-8}{9} \times \frac{15}{-4} \\ x &= \frac{\mathbf{10}}{\mathbf{3}} \end{aligned}$$

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

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

$$x = \frac{\mathbf{4}}{\mathbf{3}}$$

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

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

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

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

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

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

$$\frac{13}{5} \times \frac{15}{26} = \frac{26}{15} \times \frac{5}{13}$$

$$\frac{\mathbf{3}}{\mathbf{2}} \neq \frac{\mathbf{2}}{\mathbf{3}}$$

(ii), (iii) Do yourself.

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

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

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

$$\begin{aligned}
 7. \text{ Sum} &= \frac{65}{13} + \frac{5}{7} \\
 &= 5 + \frac{5}{7} \\
 &= \frac{40}{7}
 \end{aligned}$$

$$\begin{aligned}
 \text{Subtract} &= \frac{65}{13} - \frac{5}{7} \\
 &= 5 - \frac{5}{7} \\
 &= \frac{35-5}{7} = \frac{30}{7}
 \end{aligned}$$

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

$$\begin{aligned}
 8. \text{ Sum} &= \frac{13}{5} + \frac{-6}{15} \\
 &= \frac{13}{5} - \frac{6}{15} = \frac{13}{5} - \frac{2}{5} \\
 &= \frac{11}{5}
 \end{aligned}$$

$$\text{Product} = \frac{-29}{7} \times \frac{1}{-2} = \frac{29}{14}$$

$$\begin{aligned}
 \text{Divide} &= \frac{11}{5} \div \frac{29}{14} \\
 &= \frac{11}{5} \times \frac{14}{29} = \frac{154}{145}
 \end{aligned}$$

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

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

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

$$x = \frac{7}{9}$$

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

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

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

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

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

$$8 \times 6 \times x = 9 \times 5$$

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

$$= \frac{15}{16}$$

(ii), (iii) Do yourself.

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

$$\begin{aligned}
 -15 \times \frac{1}{x} &= \frac{-6}{5} \\
 -6 \times x &= 5 \times -15 \\
 x &= \frac{5 \times 15}{6} \\
 x &= \frac{\mathbf{25}}{\mathbf{2}}
 \end{aligned}$$

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

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

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

(ii) Do yourself.

### EXERCISE 5.6

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  $-6$ .

$$\begin{aligned}
 \frac{1}{2} \left\{ \frac{-13}{2} - 6 \right\} &= \frac{1}{2} \left\{ \frac{-25}{2} \right\} \\
 &= \frac{-25}{4}
 \end{aligned}$$

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

$$\begin{aligned}
 \frac{1}{2} \left\{ \frac{-13}{2} - 7 \right\} &= \frac{1}{2} \left\{ \frac{-27}{2} \right\} \\
 &= \frac{-27}{4}
 \end{aligned}$$

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

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

$$-1 < 0 < 1$$

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  $\frac{23}{32}$ .

### **Let's Recall**

3. (b) The required rational number

$$\frac{-7}{11} \times x = \frac{28}{33} \quad \Rightarrow \quad x = \frac{28}{33} \times \frac{11}{-7}$$

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

Rational number is  $\frac{-4}{3}$ .

# 6. Exponents and Powers

## EXERCISE 6.1

2. (i)  $\left(\frac{3}{7}\right)^2 = \frac{3 \times 3}{7 \times 7} = \frac{9}{49}$

(ii) Do yourself.

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

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

(ii) Do yourself.

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

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

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

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

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

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

$$5. (i) \frac{1}{243} = \frac{1}{3^5} = \left(\frac{1}{3}\right)^5$$

$$(ii) \frac{-16}{729} = \frac{-(2)^4}{(3)^6}$$

$$(iii) \frac{-625}{14641} = -\left(\frac{5}{11}\right)^4$$

$$(iv) \frac{-2401}{-256} = \frac{2401}{256} = \left(\frac{7}{4}\right)^4$$

$$6. (i) (-3)^5 = -243$$

(ii) Do yourself.

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

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

Reciprocal = **15625**

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

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

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

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

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

$$2^7 = 2^x$$

$$x = 7$$

(ii), (iii) Do yourself.

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

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

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

$$x = 6$$

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

By cross multiplication, we get.

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

$$\Rightarrow 13 + x = 19$$

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

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

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



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

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

$$\Rightarrow x = 4$$

### **EXERCISE 6.2**

1. (i)  $3.27 \times 10^6 = \mathbf{3270000}$   
 (ii), (iii) Do yourself.  
 (iv)  $3.127 \times 10^{-7} = \mathbf{0.0000003127}$   
 (v) Do yourself.
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) Do yourself.  
 (iii)  $5.6146929 \times 10^7 = \mathbf{56146929}$   
 (iv), (v) Do yourself.
4. (i)  $980000000, n = 8 = \mathbf{9.8 \times 10^8}$   
 (ii), (iii) Do yourself.  
 (iv)  $10700000000, n = 9 = \mathbf{10.7 \times 10^9}$
5. (i)  $1050000 = \mathbf{1.05 \times 10^6}$   
 (ii)  $1353000000 = \mathbf{1.353 \times 10^9}$   
 $1361000000 = \mathbf{1.361 \times 10^9}$   
 (iii)  $1027000000 = \mathbf{1.027 \times 10^9}$   
 $531200000 = \mathbf{5.312 \times 10^8}$   
 $495800000 = \mathbf{4.958 \times 10^8}$   
 (iv)  $\frac{1}{1000000} = \frac{1}{10^6} = \mathbf{1 \times 10^{-6}}$

### **Let's Recall**

6. (b)  $\left[ \frac{1}{x^x} + \frac{1}{y^y} \right]$       If  $x = 2$  and  $y = 3$

$$= \left[ \frac{1}{2^2} + \frac{1}{3^3} \right]$$

Putting the value of  $x$  and  $y$ , we get

$$= \left[ \frac{1}{4} + \frac{1}{27} \right]$$

$$= \left[ \frac{27+4}{108} \right] = \frac{31}{108}$$

## Unit-II : Algebra

# 7. Algebraic Expressions

### EXERCISE 7.1

6. (i) Add  $9a, -5a, 6a, -4a$  and  $7a$

$$= 9a - 5a + 6a - 4a + 7a$$

$$= 9a + 6a + 7a - 5a - 4a$$

$$= a(9 + 6 + 7) - a(5 + 4)$$

$$= 22a - 9a = \mathbf{13a}$$

(ii) Do yourself.

- (iii)  $2 - 3x^2, 2x - x^3, 1 - 3x + x^2$

$$= 2 - 3x^2 + 2x - x^3 + 1 - 3x + x^2$$

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

$$= 3 - 2x^2 - x - x^3$$

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

- (iv)  $\frac{2}{3}x^2 - \frac{1}{3}x + 5, \frac{4}{3}x^2 + \frac{2}{3}x - 3, \frac{5}{3}x^2 - \frac{4}{3}x + 1$

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

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

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

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

- (v)  $x^2 + y^2 + z^2, x^2 - 3y^2 - 2z^2, -5x^2 + 4y^2 + 2z^2$

$$= x^2 + y^2 + z^2 + x^2 - 3y^2 - 2z^2 - 5x^2 + 4y^2 + 2z^2$$

$$= x^2 + x^2 - 5x^2 + y^2 - 3y^2 + 4y^2 + z^2 - 2z^2 + 2z^2$$

$$= x^2(1 + 1 - 5) + y^2(1 - 3 + 4) + z^2(1 - 2 + 2)$$

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

7. (i)  $-5xy$  from  $15xy$

$$= 15xy - (-5xy)$$

$$\begin{aligned}
 &= 15xy + 5xy \\
 &= xy(15 + 5) \\
 &= \mathbf{20xy}
 \end{aligned}$$

(ii), (iii) Do yourself.

$$\begin{aligned}
 \text{(iv)} \quad & \frac{3}{5}bc - \frac{4}{5}ca - \left( \frac{ab}{7} - \frac{35}{3}bc + \frac{6}{5}ca \right) \\
 &= \frac{3}{5}bc - \frac{4}{5}ca - \frac{ab}{7} + \frac{35}{3}bc - \frac{6}{5}ca \\
 &= \frac{-ab}{7} + \frac{3}{5}bc + \frac{35}{3}bc - \frac{4}{5}ca - \frac{6}{5}ca \\
 &= \frac{-ab}{7} + bc \left( \frac{3}{5} + \frac{35}{3} \right) - ca \left( \frac{10}{5} \right) \\
 &= -\frac{ab}{7} + \frac{184}{15}bc - 2ca
 \end{aligned}$$

$$\begin{aligned}
 \text{(v)} \quad & (7 - x + x^2) - (x - x^2 + 5) \\
 &= 7 - x + x^2 - x + x^2 - 5 \\
 &= 2x^2 - 2x + 2 \\
 &= \mathbf{2(x^2 - x + 1)}
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{8.} \quad \text{(i)} \quad & x^2 - 3x + 5 - \frac{1}{2}(3x^2 - 5x + 7) \\
 &= x^2 - 3x + 5 - \frac{3}{2}x^2 + \frac{5}{2}x - \frac{7}{2} \\
 &= x^2 - \frac{3}{2}x^2 - 3x + \frac{5}{2}x + 5 - \frac{7}{2} \\
 &= x^2 \left( 1 - \frac{3}{2} \right) + x \left( \frac{5}{2} - 3 \right) + \left( 5 - \frac{7}{2} \right) \\
 &= -\frac{x^2}{2} - \frac{x}{2} + \frac{3}{2} \\
 &= \frac{-1}{2}(\mathbf{x^2 + x - 3})
 \end{aligned}$$

(ii) Do yourself.

$$\begin{aligned}
 \text{(iii)} \quad & \left( \frac{1}{4}y^2 - \frac{3}{5}y + 7 \right) - \left( \frac{y}{9} - 5 + 5y^2 \right) - \left( \frac{3}{7}y - \frac{2}{3}y^2 + 2 \right) \\
 &= \frac{1}{4}y^2 - \frac{3}{5}y + 7 - \frac{y}{9} + 5 - 5y^2 - \frac{3}{7}y + \frac{2}{3}y^2 - 2 \\
 &= y^2 \left( \frac{1}{4} - 5 + \frac{2}{3} \right) + y \left( \frac{-3}{5} - \frac{1}{9} - \frac{3}{7} \right) + (7 + 5 - 2) \\
 &= y^2 \left( -\frac{49}{12} \right) + y \left( -\frac{359}{315} \right) + 10
 \end{aligned}$$

$$\begin{aligned}
&= \frac{-49}{12}y^2 - \frac{359}{315}y + 10 \\
\text{(iv)} &-\frac{1}{2}a^2b^2c + \frac{1}{3}ab^2c - \frac{1}{4}abc^2 - \frac{1}{5}a^2b^2c + \frac{1}{6}cb^2a \\
&\qquad\qquad\qquad -\frac{1}{7}c^2ab + \frac{1}{8}ca^2b \\
&= -\frac{1}{2}a^2b^2c - \frac{1}{5}a^2b^2c + \frac{1}{3}ab^2c + \frac{1}{6}ab^2c - \frac{1}{4}abc^2 \\
&\qquad\qquad\qquad -\frac{1}{7}abc^2 + \frac{1}{8}a^2bc \\
&= -a^2b^2c\left(\frac{1}{2} + \frac{1}{5}\right) + ab^2c\left(\frac{1}{3} + \frac{1}{6}\right) - abc^2\left(\frac{1}{4} + \frac{1}{7}\right) + \frac{1}{8}a^2bc \\
&= \frac{-7}{10}a^2b^2c + \frac{1}{2}ab^2c - \frac{11}{28}abc^2 + \frac{1}{8}a^2bc \\
&= -\frac{7}{10}a^2b^2c + \frac{1}{2}ab^2c + abc\left(\frac{a}{8} - \frac{11}{28}c\right)
\end{aligned}$$

9.  $(3x^2 - 6x - 7) + A = 4x^2 + x - 2$

$$A = 4x^2 + x - 2 - (3x^2 - 6x - 7)$$

$$A = 4x^2 + x - 2 - 3x^2 + 6x + 7$$

$$A = 4x^2 - 3x^2 + x + 6x - 2 + 7$$

$$A = x^2(4 - 3) + x(1 + 6) + 5$$

$$A = x^2 + 7x + 5$$

10.  $0 - A = x^2 - x + 3$

$$A = -(x^2 - x + 3)$$

### EXERCISE 7.2

1. (i)  $7x \times 5x^2 = 35x^3$

(ii)  $-5x^3 \times 7x^2 = -35x^5$

(iii)  $20x \times (-25x^2y) = -500x^3y$

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

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

(vi)  $\frac{-8}{5}a^3b \times \frac{15}{16}abc^2 = \frac{-3}{2}a^4b^2c^2$

(vii) Do yourself.

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

$$= \frac{160}{100} x^8 y^5 = \frac{8}{5} x^8 y^5$$

$$= \mathbf{1.6 x^8 y^5}$$

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

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

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  $a = -1, b = 2$

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

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

$$= (5a^6)(-10ab^2)(-2a^2b^3)$$

$$= 100a^{6+2+1}b^{2+3} = 100a^9b^5$$

$$= 100 \times (1)^9 \times (2)^5$$

$$= 100 \times 1 \times 32 = \mathbf{3200}$$

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

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

### 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) Do yourself.

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

$$= \frac{\mathbf{a^2}}{\mathbf{1000}} + \frac{\mathbf{16a}}{\mathbf{100000}}$$

$$2. (i) (3x + 5) \times 7x = 3x \times 7x + 5 \times 7x$$

$$= \mathbf{21x^2 + 35x}$$

(ii), (iii) Do yourself.

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

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

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

$$(vi) (0.2a - 0.1b) \times 0.3ab = 0.2a \times 0.3ab - 0.1b \times 0.3ab$$

$$= \mathbf{0.06a^2b - 0.03ab^2}$$

$$\begin{aligned}
 \mathbf{3. (i)} \quad (2x + 9) \times (6x + 5) &= 2x \times 6x + 6x \times 9 + 5 \times 2x + 45 \\
 &= 12x^2 + 54x + 10x + 45 \\
 &= \mathbf{12x^2 + 64x + 45}
 \end{aligned}$$

(ii), (iii) Do yourself.

$$\begin{aligned}
 \text{(iv)} \quad (2.5a + 2.3b) \times (2.5a - 2.3b) &= (2.5a)^2 - (2.3b)^2 \\
 &= \mathbf{6.25a^2 - 5.29b^2}
 \end{aligned}$$

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

(ii) Do yourself.

$$\begin{aligned}
 \text{(iii)} \quad a(a^2 + 1) + b(b^2 + 1) - (a + b) &= a^3 + a + b^3 + b - a - b \\
 &= \mathbf{a^3 + b^3}
 \end{aligned}$$

(iv) Do yourself.

$$\begin{aligned}
 \mathbf{5. (i)} \quad (2x - 5) \times (7 + 4x) &= 2x \times 7 - 35 + 2x \times 4x - 5 \times 4x \\
 &= 14x - 35 + 8x^2 - 20x \\
 &= \mathbf{8x^2 - 6x - 35}
 \end{aligned}$$

$$\begin{aligned}
 \text{If} \quad (x = 2) &= 8(2)^2 - 6(2) - 35 \\
 &= 8 \times 4 - 12 - 35 = 32 - 12 - 35 = \mathbf{-15}
 \end{aligned}$$

(ii), (iii) Do yourself.

$$\text{(iv)} \quad (p^2 - q^2)(p - q) = p^3 - pq^2 - p^2q + q^3$$

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

$$\begin{aligned}
 \mathbf{6. (i)} \quad (2x + 3y)(4x^2y + 5xy^2) \\
 &= 8x^3y + 12x^2y^2 + 10x^2y^2 + 15xy^3 \\
 &= \mathbf{8x^3y + 22x^2y^2 + 15xy^3}
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii)} \quad (a^5 + 5)(b^3 + 3) + 4 &= a^5b^3 + 5b^3 + 3a^5 + 15 + 4 \\
 &= \mathbf{a^5b^3 + 5b^3 + 3a^5 + 19}
 \end{aligned}$$

$$\begin{aligned}
 \text{(iii)} \quad (a + bcd)(a^3 + b^3c^3d^3) \\
 &= \mathbf{a^4 + ab^3c^3d^3 + a^3bcd + b^4c^4d^4}
 \end{aligned}$$

$$\begin{aligned}
 \text{(iv)} \quad (t^2 + s^3)(t^2 - s^3) \text{ is of the form } (a + b)(a - b) &= a^2 - b^2 \\
 &= (t^2)^2 - (s^3)^2 = \mathbf{t^4 - s^6}
 \end{aligned}$$

$$\mathbf{7. (i)} \quad -x^2yz(xy^2z - x^2z) = -x^3y^3z^2 + x^4yz^2$$

$$\begin{aligned}
 \text{If } x = -1, y = 1, z = 2 \\
 &= -(-1)^3(1)^3(2)^2 + (-1)^4(1)(2)^2 \\
 &= 1 \cdot 1 \cdot 4 + 1 \cdot 1 \cdot 4 \\
 &= 4 + 4 = 8
 \end{aligned}$$

(ii) Do yourself.

$$\begin{aligned}
 \mathbf{8. (i)} \quad (1.5x - 4y)(1.5x + 4y + 3) \\
 &= 1.5x \times (1.5x + 4y + 3) - 4y(1.5x + 4y + 3) \\
 &= 2.25x^2 + 6xy + 4.5x - 6xy - 16y^2 - 12y \\
 &= \mathbf{2.25x^2 - 16y^2 + 4.5x - 12y}
 \end{aligned}$$

(ii) Do yourself.

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) Do yourself.

(iii)  $(x^2 - 5x + 6)(2x - 3) - (3x^2 + 4x - 5)(x - 2)$   
 $= 2x(x^2 - 5x + 6) - 3(x^2 - 5x + 6) - x(3x^2 + 4x - 5)$   
 $\qquad\qquad\qquad + 2(3x^2 + 4x - 5)$   
 $= 2x^3 - 10x^2 + 12x - 3x^2 + 15x - 18 - 3x^3 - 4x^2$   
 $\qquad\qquad\qquad + 5x + 6x^2 + 8x - 10$   
 $= (2x^3 - 3x^3) + (-10x^2 - 3x^2 - 4x^2 + 6x^2)$   
 $\qquad\qquad\qquad + (12x + 15x + 5x + 8x) - 18 - 10$   
 $= \mathbf{-x^3 - 11x^2 + 40x - 28}$

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), (iii) Do yourself.

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

11. (i)  $(x + y)(x^2 - xy + y^2) = x(x^2 - xy + y^2) + y(x^2 - xy + y^2)$   
 $= x^3 - x^2y + xy^2 + x^2y - xy^2 + y^3$   
 $= \mathbf{x^3 + y^3}$

(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)  $(a - 5) \times (a - 5) = (a - 5)^2 = \mathbf{a^2 + 25 - 10a}$

(ii) Do yourself.

(iii)  $\left(\frac{5}{2}x - 7\right) \times \left(\frac{5}{2}x - 7\right) = \left(\frac{5}{2}x - 7\right)^2 = \mathbf{\frac{25}{4}x^2 + 49 - 35x}$

2. (i)  $(x + 3)(x + 3) = (x + 3)^2 = \mathbf{x^2 + 9 + 6x}$

(ii)  $(2y + 5)(2y + 5) = (2y + 5)^2 = \mathbf{4y^2 + 25 + 20y}$

(iii) Do yourself.

$$\begin{aligned} \text{(iv)} \quad & (1.1m + 2.1)(1.1m + 2.1) \\ & = (1.1m + 2.1)^2 = (1.1m)^2 + (2.1)^2 + 2 \times (1.1m) \times (2.1) \\ & = \mathbf{1.21m^2 + 4.41 + 4.62m} \end{aligned}$$

(v), (vi), Do yourself.

$$\mathbf{3. (i) (6x + 7)(6x - 7) = (6x)^2 - (7)^2 = 36x^2 - 49}$$

(ii), (iii) Do yourself.

$$\mathbf{4. (i) (6x - 8y)(6x + 8y) = (6x)^2 - (8y)^2 = 36x^2 - 64y^2}$$

Another method : By multiplication

$$\begin{aligned} & (6x - 8y)(6x + 8y) \\ & = 6x(6x - 8y) + 8y(6x - 8y) \\ & = 36x^2 - 48xy + 48xy - 64y^2 \\ & = \mathbf{36x^2 - 64y^2} \end{aligned}$$

(ii), (iii) Do yourself.

$$\begin{aligned} \text{(iv)} \quad & (1.7p^3 + 1.2q^3)(1.7p^3 - 1.2q^3) \\ & = (1.7p^3)^2 - (1.2q^3)^2 \\ & = \mathbf{2.89p^6 - 1.44q^6} \end{aligned}$$

Another method : By multiplication.

$$\begin{aligned} & (1.7p^3 + 1.2q^3)(1.7p^3 - 1.2q^3) \\ & = 2.89p^6 + 2.04p^3q^3 - 2.04p^3q^3 - 1.44q^6 \\ & = \mathbf{2.89p^6 - 1.44q^6} \end{aligned}$$

$$\begin{aligned} \mathbf{5. (i) (a - 5)^2} & = a^2 + (5)^2 - 2 \times 5 \times a \\ & = a^2 + 25 - 10a \end{aligned}$$

Another Method : By expanding.

$$\begin{aligned} (a - 5)(a - 5) & = a(a - 5) - 5(a - 5) \\ & = a^2 - 5a - 5a + 25 \\ & = \mathbf{a^2 + 25 - 10a} \end{aligned}$$

(ii), (iii) Do yourself.

$$\begin{aligned} \mathbf{6. (i) (a^2 - b^2)^2} & = (a^2)^2 + (b^2)^2 - 2a^2b^2 \\ & = \mathbf{a^4 + b^4 - 2a^2b^2} \end{aligned}$$

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

**7.** (i), (ii), (iii) Do yourself.

$$\begin{aligned} \text{(iv)} \quad & \left(2r^2 - \frac{1}{400}t^2\right)^2 - \left(2r^2 + \frac{1}{400}t^2\right)^2 \\ & = \left\{ (2r^2)^2 + \left(\frac{1}{400}t^2\right)^2 + 2 \cdot 2r^2 \cdot \frac{1}{400}t^2 \right\} \end{aligned}$$



$$\begin{aligned}
& - \left\{ (2r^2)^2 + \left( \frac{1}{400} t^2 \right)^2 - 2 \cdot 2r^2 \cdot \frac{1}{400} t^2 \right\} \\
& = 4r^4 + \frac{1}{160000} t^4 - \frac{r^2 t^2}{100} - 4r^4 - \frac{1}{160000} t^4 - \frac{r^2 t^2}{100} \\
& = -\frac{1}{50} r^2 t^2
\end{aligned}$$

8. (i)  $71^2 = (70 + 1)^2$   
 $= (70)^2 + (1)^2 + 2 \times 70 \times 1$   
 $= 4900 + 1 + 140 = \mathbf{5041}$

(ii), (iii) Do yourself.

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

(ii) Do yourself.

10. (i)  $(3x + 7)^2 - 84x = (3x)^2 + (7)^2 + 2 \times 3x \times 7 - 84x$   
 $= 9x^2 + 49 + 42x - 84x$   
 $= 9x^2 + 49 - 42x$   
 $= (3x)^2 + (7)^2 - 2 \times 3x \times 7$   
 $= \mathbf{(3x - 7)^2}$

(ii)  $(89p - 5q)^2 + 1780pq$   
 $= 7921p^2 + 25q^2 - 890pq + 1780pq$   
 $= \mathbf{(89p + 5q)^2}$

11. (i)  $(x - 1)(x + 1)(x^2 + 1)(x^4 + 1) = (x^2 - 1)(x^2 + 1)(x^4 + 1)$   
 $= (x^4 - 1)(x^4 + 1)$   
 $= (x^4)^2 - (1)^2$   
 $= \mathbf{x^8 - 1}$

(ii) Do yourself.

12. (i)  $5x = (45)^2 - (30)^2$   
 $5x = (45 + 30)(45 - 30)$   
 $5x = 75 \times 15$   
 $x = \frac{75 \times 15}{5}$   
 $x = 75 \times 3 = \mathbf{225}$

(ii) Do yourself.

13. (i)  $105 \times 95 = (100 + 5)(100 - 5)$   
 $= (100)^2 - (5)^2$   
 $= 10000 - 25$   
 $= \mathbf{9975}$

(ii) Do yourself.

$$\begin{aligned}
 \text{(iii)} \quad 297 \times 303 &= (300 - 3) \times (300 + 3) \\
 &= (300)^2 - (3)^2 \\
 &= 90000 - 9 \\
 &= \mathbf{89991}
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{14.} \quad \text{(i)} \quad 51^2 - 49^2 &= (51)^2 - (49)^2 \\
 &= (51 + 49)(51 - 49) \\
 &= 100 \times 2 \\
 &= \mathbf{200}
 \end{aligned}$$

(ii) Do yourself.

$$\begin{aligned}
 \text{(iii)} \quad 233^2 - 227^2 &= (233)^2 - (227)^2 \\
 &= (233 + 227)(233 - 227) \\
 &= 460 \times 6 \\
 &= \mathbf{2760}
 \end{aligned}$$

$$\mathbf{15.} \quad \text{(i)} \quad 8a = 35^2 - 27^2$$

$$\begin{aligned}
 8a &= (35)^2 - (27)^2 \\
 8a &= (35 + 27)(35 - 27) \\
 8a &= 62 \times 8 \\
 a &= \frac{62 \times 8}{8} = \mathbf{62}
 \end{aligned}$$

(ii) Do yourself.

## 8. Linear Equations In One Variable

### EXERCISE 8.1

$$\mathbf{1.} \quad 5x - 3 = 3x - 5$$

$$\begin{aligned}
 5x - 3x &= -5 + 3 \\
 2x &= -2 \\
 x &= \frac{-2}{2} = \mathbf{-1}
 \end{aligned}$$

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

$$\begin{aligned}
 \frac{x}{5} &= \frac{1}{15} - 1 \\
 \frac{x}{5} &= \frac{1 - 15}{15} \\
 \frac{x}{5} &= \frac{-14}{15}
 \end{aligned}$$

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

3. Do yourself.

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

$$5(x-8) = 3(x-3)$$

$$5x-40 = 3x-9$$

$$5x-3x = -9+40$$

$$2x = 31$$

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

5. Do yourself.

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

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

$$x\left(1 - \frac{16}{3} + \frac{7}{2}\right) = 5$$

$$x\left[\frac{6-32+21}{6}\right] = 5$$

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

$$x(-5) = 30$$

$$x = -6$$

7. Do yourself.

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

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

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

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

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

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

$$\frac{2}{3}t = \frac{5}{6}$$

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

$$\Rightarrow t = \frac{5}{4}$$

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

$$7x+14 = 0$$

$$\Rightarrow x = -2$$

$$\mathbf{10.} \quad 15(y-4) - 2(y-9) + 5(y+6) = 0$$

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

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

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

$$18y = 12$$

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

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

**11.** Do yourself.

$$\mathbf{12.} \quad 4(3w+2) - 5(6w-1) = 2(w-8) - 6(7w-4) + 4w$$

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

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

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

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

$$\mathbf{13.} \quad 0.25(4y-3) = 0.5y-9$$

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

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

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

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

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

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

$$\mathbf{14.} \quad 0.16(5x-2) = 0.4x+7$$

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

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

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

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

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

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

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

$$4.50z + 18.00 = 5z - 3$$

$$18 + 3 = (5 - 4.5)z$$

$$21 = 0.5z$$

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

$$z = \mathbf{42}$$

or

**16.** Do yourself.

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

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

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

$$\frac{x}{6} = \frac{3}{4}$$

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

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

$$2x - 3x - 3 = 5x - 7$$

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

$$6x = 4$$

$$x = \mathbf{\frac{2}{3}}$$

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

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

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

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

$$\frac{10z}{3} = \frac{5}{12}$$

$$\Rightarrow \frac{2z}{1} = \frac{1}{4}$$

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

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

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

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

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

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

### **EXERCISE 8.2**

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

$$x + 3 = 95 - x$$

$$2x = 95 - 3$$

$$2x = 92$$

$$x = \frac{92}{2}$$

$$x = 46$$

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

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

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

$$3x + 3 = 24$$

$$3x = 24 - 3$$

$$3x = 21$$

$$x = 7$$

Therefore the numbers are  $7$ ,  $7 + 1$ ,  $7 + 2 =$  **7**, **8** and **9**.

3. Let the number be  $x$ .

$$2x + 7 = 49$$

$$2x = 49 - 7$$

$$\Rightarrow 2x = 42$$

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

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

4. Let the number be  $x$

$$3x - 22 = 68$$

$$3x = 68 + 22$$

$$3x = 90$$

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

$$\Rightarrow x = \mathbf{30}$$

5. Let the number be  $x$

$$7x - 3 = 53$$

$$7x = 56$$

$$x = \mathbf{8}$$

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

Given that,  $10x + 50y = 250$  ... (i)

And  $x = y + 1$  ... (ii)

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

We get,  $10(y + 1) + 50y = 250$

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

$$60y = 240$$

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

From equation 2.  $x = y + 1$ ,  $x = 4 + 1 = 5$

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

7. Let the breadth =  $x$

And Length =  $2x + 2$

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

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

$$14 = 3x + 2$$

$$\Rightarrow 3x = 12$$

$$\Rightarrow x = 4$$

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

8. Let Subramaniam's age =  $x$

Mother's age =  $6x$

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

$$x + 25 = 6x + 5$$

$$25 - 5 = 6x - x$$

$$20 = 5x$$

$$\Rightarrow x = 4$$

**4 years** and  $6 \times 4 = \mathbf{24 years}$ .

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

$$x + 15 = 4x$$

$$3x = 15$$

$$x = 5$$

$\therefore$  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. Do yourself.

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

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

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

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

$$\text{If wife's share} = 288000$$

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

$$3x = 288000 \times 5$$

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

$$= \mathbf{480000}$$

**₹ 480000** is total worth of Shanti Lal.

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

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

$$5x = 3x + 30$$

$$5x - 3x = 30$$

$$2x = 30$$

$$\Rightarrow x = 15$$

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

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



15. Let the boys =  $x$ , and 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

$$\frac{36 - 2x}{5} = \frac{x}{2}$$

$$72 - 4x = 5x$$

$$72 = 9x$$

$$\Rightarrow x = 8$$

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

17. Let the number be  $x$ .

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

$$x - \frac{1}{2} = \frac{5}{4}$$

$$\Rightarrow x = \frac{5}{4} + \frac{1}{2}$$

$$x = \frac{5 + 2}{4} = \frac{7}{4}$$

18. Do yourself.

### Let's Recall

3. (b)  $3x - 13 = 8$

$$3x = 13 + 8$$

$$3x = 21$$

$$x = 7$$

The value of  $x - 1 = 7 - 1 = 6$

5. (c) Let a number be  $x$  then,

According to question,

$$\frac{1}{4} \times x + 3 = 4$$

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

$$\Rightarrow \frac{x}{4} = 1$$

$$\Rightarrow x = 4$$

6. (c)  $4t + 5 = -t + 15$

$$4t + t = 15 - 5$$

$$5t = 10$$

$$t = 2$$

## Unit- III : Commercial Mathematics

# 9. Direct and Inverse Variations

### EXERCISE 9.1

1. (ii)

$x$	7	9	13	21	25
$y$	21	27	39	63	75

(i), (iii) Do yourself.

2.

Time (in minutes)	3	4	7	25	155
Height of the ballon (in metres)	36	48	84	300	1860

3.

Sale

$$1000 \downarrow$$

$$100 \downarrow$$

Commission

$$73 \downarrow$$

$$x \downarrow$$

It is a direct variation

$$\frac{1000}{100} = \frac{73}{x}$$

$$x = \frac{73}{10} = ₹ 7.30$$

4. Children

$$\begin{array}{c} 5 \downarrow \\ 40 \downarrow \end{array}$$

Bottles

$$\begin{array}{c} 8 \downarrow \\ x \downarrow \end{array}$$

It is a direct variation

$$\frac{x}{8} = \frac{40}{5}$$

⇒

$$x = \frac{40 \times 8}{5}$$

⇒

$$x = 8 \times 8 = \mathbf{64 \text{ bottles}}$$

5. Cost (₹)

$$\begin{array}{c} 18 \downarrow \\ 36 \downarrow \end{array}$$

Stamps

$$\begin{array}{c} 15 \downarrow \\ x \downarrow \end{array}$$

It is a direct variation

$$\frac{x}{15} = \frac{36}{18}$$

⇒

$$x = \mathbf{30 \text{ stamps}}$$

6. Hours

$$\begin{array}{c} 5 \downarrow \\ 20 \downarrow \end{array}$$

Tools

$$\begin{array}{c} 120 \downarrow \\ x \downarrow \end{array}$$

It is a direct variation

$$\frac{x}{120} = \frac{20}{5}$$

$$x = \frac{120 \times 20}{5} = 24 \times 20 = 480$$

$$x = \mathbf{480 \text{ tools}}$$

7. Time

$$\begin{array}{c} 30 \downarrow \\ 6 \downarrow \end{array}$$

Words

$$\begin{array}{c} 540 \downarrow \\ x \downarrow \end{array}$$

It is a direct variation

$$\frac{x}{540} = \frac{6}{30}$$

⇒

$$x = \mathbf{108 \text{ words}}$$

8. Steps

$$\begin{array}{c} 125 \downarrow \\ 315 \downarrow \end{array}$$

Distance

$$\begin{array}{c} 100 \downarrow \\ x \downarrow \end{array}$$

It is a direct variation.

$$\frac{x}{100} = \frac{315}{125}$$

⇒

$$x = \frac{315 \times 100}{125}$$

⇒

$$x = \mathbf{252}$$

9. Do yourself.

10. Plastic  
93 ↓  
105 ↓

Cost  
1395 ↓  
x ↓

It is a direct variation

$$\begin{aligned} \frac{x}{1395} &= \frac{105}{93} \\ \Rightarrow x &= \frac{105 \times 1395}{93} \\ x &= ₹ \mathbf{1575} \end{aligned}$$

### EXERCISE 9.2

3. Pumps

20 ↑  
45 ↑

Hours  
12 ↓  
x ↓

It is inverse variation

$$\begin{aligned} \frac{x}{12} &= \frac{20}{45} \\ \Rightarrow x &= \frac{20 \times 12}{45} = \frac{4 \times 12}{9} \\ x &= \frac{16}{3} \\ \Rightarrow x &= \mathbf{5\frac{1}{3} \text{ hours}} \end{aligned}$$

5. Days

40 ↑  
24 ↑

Persons  
1800 ↓  
x ↓

It is a inverse variation

$$\begin{aligned} \frac{x}{1800} &= \frac{40}{24} \\ \Rightarrow x &= \frac{1800 \times 40}{24} \\ x &= \mathbf{3000 \text{ persons}} \end{aligned}$$

6. Do yourself.

7. Months

9 ↑  
7 ↑

Persons  
560 ↓  
x ↓

It is a inverse variation

$$\begin{aligned} \frac{x}{560} &= \frac{9}{7} \\ \Rightarrow x &= \mathbf{720 \text{ persons}} \end{aligned}$$

Required persons =  $720 - 560 = 160$  persons

8. Time Speed  
20 ↑ 12 ↓  
15 ↑ x ↓

It is an inverse variation

$$\frac{x}{12} = \frac{20}{15}$$

$$x = 16 \text{ km/h}$$

9. Cost Bats  
58 ↑ 39 ↓  
78 ↑ x ↓

It is an inverse variation

$$\frac{x}{39} = \frac{58}{78}$$

$$\Rightarrow 78 \times x = 58 \times 39$$
$$x = \frac{58 \times 39}{78} = 29$$

$$x = 29 \text{ bats}$$

10. Do yourself.

### Let's Recall

1. (d) Cost Price Quantity of Rice (in quintals)  
20,000 ↓ 40 ↓  
24,000 ↓ x ↓

It is a direct variation

$$\frac{x}{40} = \frac{24,000}{20,000}$$

$$\Rightarrow x = \frac{24,000 \times 40}{20,000}$$

$$x = 48 \text{ (quintals)}$$

2. (c) Bags Weight  
12 ↓ 90 ↓  
20 ↓ x ↓

It is a direct variation

$$\frac{x}{90} = \frac{20}{12}$$

$$\Rightarrow 12x = 20 \times 90$$

$$x = \frac{20 \times 90}{12}$$

$$x = 150 \text{ kg (Weight) of sugar.}$$

3. (c) Persons

40 ↑  
60

Days

30 ↓  
x

It is an inverse variation

$$\frac{x}{30} = \frac{40}{60}$$
$$\Rightarrow x = \frac{40 \times 30}{60}$$

$$x = \mathbf{20 \text{ days}}$$

4. (b) Length (in metre)

↓ 36  
↓ 108

Persons

↓ 25  
↓ x

It is a direct variation

$$\frac{x}{25} = \frac{108}{36}$$
$$\Rightarrow x = \frac{108 \times 25}{36}$$

$$x = \mathbf{75 \text{ persons}}$$

## 10. Time and Work, Time and Distance

### EXERCISE 10

1. Distance = Speed × Time

$$= \frac{48(8 \times 60 + 48)}{60} = \frac{4 \times 528}{5} = \frac{2112}{5}$$
$$= \mathbf{422.4 \text{ km}}$$

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

$$= \frac{18 \times 2}{9} = \mathbf{4 \text{ km/hr}}$$

3. Time

60 ↓  
12 ↓

Distance

50 ↓  
x ↓

It is a direct variation

$$\frac{x}{50} = \frac{12}{60}$$
$$\Rightarrow 60 \times x = 12 \times 50$$
$$x = \frac{12 \times 50}{60} = \frac{12 \times 5}{6} = 10$$

$$\text{Distance} = \mathbf{10 \text{ km}}$$

$$4. \text{ Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\begin{aligned} 6 &= \frac{19.5}{t} \\ \Rightarrow 6t &= 19.5 \\ t &= \frac{195}{6 \times 10} \\ t &= \mathbf{3\frac{1}{4} \text{ hours}} \end{aligned}$$

$$5. X\text{'s 1 hr work} = \frac{1}{10}$$

$$Y\text{'s 1 hr work} = \frac{1}{15}$$

$$X \text{ and } Y\text{'s 1 hr work} = \frac{1}{10} + \frac{1}{15} = \frac{3+2}{30} = \frac{5}{30} = \frac{1}{6}$$

So, X and Y together fill the tank in **6 hrs.**

$$6. A\text{'s 1 day's work} = \frac{1}{8}$$

$$B\text{'s 1 day's work} = \frac{1}{12}$$

$$C\text{'s 1 day's work} = \frac{1}{15}$$

$$\begin{aligned} \therefore (A+B+C)\text{'s 1 day's work} &= \frac{1}{8} + \frac{1}{12} + \frac{1}{15} \\ &= \frac{15+10+8}{120} = \frac{33}{120} = \frac{11}{40} \end{aligned}$$

The complete work finished in  **$3\frac{7}{11}$  days.**

$$7. \text{ Ram and Arjun's one day's work} = \frac{1}{12}$$

$$\text{Arjun's one day's work} = \frac{1}{30}$$

$$\begin{aligned} \text{Ram's one day's work} &= \frac{1}{12} - \frac{1}{30} \\ &= \frac{5-2}{60} = \frac{3}{60} = \frac{1}{20} \end{aligned}$$

Ram alone finish the work in **20 days.**

$$8. X\text{'s one hour work} = \frac{1}{12}$$

$$Y\text{'s one hour work} = \frac{1}{15}$$

$$\text{Both } X \text{ and } Y\text{'s one hour work} = \frac{1}{12} + \frac{1}{15} = \frac{5+4}{60} = \frac{9}{60} = \frac{3}{20}$$

Hence,  $X$  and  $Y$  together can finish the work in **6 hours 40 minutes.**

**9., 10., 11.** Do yourself.

**12.** Persons

$$\begin{array}{c} 50 \uparrow \\ 75 \uparrow \end{array}$$

Days

$$\begin{array}{c} 18 \downarrow \\ x \downarrow \end{array}$$

$$\frac{x}{18} = \frac{50}{75}$$

$\Rightarrow$

$$x = \frac{50 \times 18}{75} = 2 \times 6 = \mathbf{12 \text{ days}}$$

**13.** Do yourself.

**14.** When a train crosses a tree, entire length of the train passes the tree, *i.e.*, a distance of 270 m is covered.

$$\text{Speed} = \frac{40.5 \times 5}{18} \text{ m/s} = \frac{45}{4} \text{ m/s}$$

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

$$\frac{45}{4} = \frac{270}{t}$$

$\Rightarrow$

$$t = \frac{270 \times 4}{45}$$

$$t = \mathbf{24 \text{ seconds}}$$

**15., 16.** Do yourself.

**17.** Speed =  $\frac{\text{Distance}}{\text{Time}}$

$$80 = \frac{x}{4.5}$$

$\Rightarrow$

$$80 = \frac{10 \times x}{45}$$

$$x = \frac{45 \times 80}{10} = 45 \times 8$$

$\Rightarrow$

$$x = 360 \text{ km.}$$

Again

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

$$= \frac{360}{3}$$

$$= \mathbf{120 \text{ km/hr}}$$

**18.** Speed =  $\frac{55 \times 5}{18} = \frac{275}{18}$



To cross the platform, the train will have to cover  $(250+520)\text{m}$   
 $= 770\text{ m}$

$$\begin{aligned}\text{Time} &= \frac{\text{Distance}}{\text{speed}} \\ &= \frac{770 \times 18}{275} = \mathbf{50.4 \text{ seconds}}\end{aligned}$$

### **Let's Recall**

**2. (d)** Given : A can finish the work in 15 days.

B can finish the work in 20 days.

$$A\text{'s one day's work} = \frac{1}{15}$$

$$B\text{'s one day's work} = \frac{1}{20}$$

$$\text{Both (A and B)'s one day's work} = \frac{1}{15} + \frac{1}{20} = \frac{4+3}{60} = \frac{7}{60}$$

$$\text{Both (A and B)'s 4 day's work} = \frac{4 \times 7}{60} = \frac{7}{15}$$

$$\text{The remaining work} = 1 - \frac{7}{15} = \frac{8}{15}$$

**3. (a)** Let distance be  $x$

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

$$\text{Time} = \frac{x}{10} \quad \dots(\text{i})$$

According to question,

$$\text{Time} = \frac{x+20}{14} \quad \dots(\text{ii})$$

$$\frac{x}{10} = \frac{x+20}{14} \quad \text{From eq. (i) and (ii)}$$

$$14x = 10x + 200$$

$$14x - 10x = 200$$

$$4x = 200$$

$$x = \frac{200}{4}$$

$$x = 50 \text{ km.}$$

Actual distance traveled by him is 50 km.

**4. (d)** Distance covered by an aeroplane  $= 240 \times 5 = 1200 \text{ km.}$

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

$$1200 = \text{Speed} \times 1\frac{2}{3}$$

$$1200 = \text{Speed} \times \frac{5}{3}$$

$$\text{Speed} = \frac{1200 \times 3}{5}$$

$$\text{Speed} = 720 \text{ km/hr.}$$

# 11. Percentage, Profit and Loss

## EXERCISE 11.1

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

(ii) Do yourself.

(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

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

$$90 \times x = 216 \times 100$$

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

$x = \text{240 days.}$

3. Let the monthly income be  $x$ , then

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

$\Rightarrow$

$$15 \times x = 600 \times 100$$

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

$x = \text{4000}$

$x = \text{₹ } 4000$

4. Do yourself.

5. The population of the town in 2010 be  $x$

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

$\Rightarrow$

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

$x = \text{176400}$

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  $x$

$$x \times \frac{8}{100} = 160$$

$$x = \mathbf{2000}$$

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

8. Let the total number of matches played by 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. Do yourself.

10. Let the Manjul's income be  $x$

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

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

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

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

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

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

$$= \mathbf{37.5\%}$$

11. Do yourself.

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 = **1150**

Number of boys = 40% of total number of students

$$= \frac{40}{100} \times 1150$$

Number of boys = **460**

### **EXERCISE 11.2**

2. Cost price includes the over head charges also

Therefore,

$$CP = ₹ (70000 + 5000)$$

$$= 75000$$

$$SP = 67500$$

$$SP < CP$$

$$\text{Loss} = CP - SP$$

$$= 75000 - 67500 = ₹ 7500$$

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

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

3. Cost price includes the over head charges also

Therefore,

$$CP = ₹ (15 + 5) = ₹ 20$$

$$SP = ₹ 24$$

$$SP > CP$$

$$\text{Profit} = SP - CP$$

$$= 24 - 20 = 4$$

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

4. Cost price includes the overhead charge also. Therefore

$$= ₹ (150 \times 20 + 200)$$

$$= ₹ (3000 + 200) = ₹ 3200$$

$$SP = (150 \times 12 \times 2.40)$$

$$= ₹ 4320$$

$$SP > CP$$

$$\text{Profit\%} = ₹ (4320 - 3200)$$

$$= ₹ 1120$$

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

5. Let the CP be ₹ x. Then

$$SP = ₹ 990$$

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

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

$$\frac{11x}{10} = 990$$

$\Rightarrow$

$$x = \frac{990 \times 10}{11}$$

$\Rightarrow$

$$x = \text{₹ } 900$$

6., 7. Do yourself.

8. Let the CP be ₹  $x$ , Then

$$\text{SP} = 10240$$

$$\text{Loss} = \frac{x \times 20}{100} = \frac{x}{5}$$

$$\text{SP} = x - \frac{x}{5} = \frac{4x}{5}$$

Then

$$\frac{4x}{5} = 10240$$

or

$$x = \frac{10240 \times 5}{4}$$

$$x = \text{₹ } 12800$$

9. Let the CP be ₹  $x$ , then

$$\text{SP} = \text{₹ } 240$$

$$\text{Loss} = \frac{x \times 20}{100} = \frac{x}{5}$$

$$\text{SP} = x - \frac{x}{5} = \frac{4x}{5}$$

$$\frac{4x}{5} = 240$$

$\Rightarrow$

$$x = \text{₹ } 300$$

$$\text{CP} = \text{₹ } 300 \text{ and S.P.} = \text{₹ } 360$$

$$\text{Profit} = \text{SP} - \text{CP}$$

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

$$\text{Profit \%} = \frac{\text{Profit} \times 100}{\text{CP}}$$

$$= \text{₹ } \frac{60 \times 100}{300} = \mathbf{20\%}$$

10. SP = ₹ 135

If new SP = ₹ 165

Gain % = ?

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

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

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

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

$$\text{SP} = \text{₹ } 165$$

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

$$\text{Profit\%} = \frac{\text{Profit}}{\text{CP}} \times 100$$

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

11. SP = ₹ 198, gain = 10%

Then,

$$\text{CP} = \frac{100}{100 + \text{Profit\%}} \times \text{SP}$$

$$= \text{₹ } \frac{100 \times 198}{110} = \text{₹ } 180$$

Second calculator

$$\text{SP} = \text{₹ } 198, \text{ Loss} = 10\%$$

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

$$= \frac{100}{100 - 10} \times \text{₹ } 198$$

$$= \text{₹ } \frac{100 \times 198}{90} = \text{₹ } 10 \times 22$$

$$= \text{₹ } 220$$

$$\text{Total SP} = \text{₹ } 198 \times 2 = \text{₹ } 396$$

$$\text{CP} = \text{₹ } (180 + 220) = \text{₹ } 400$$

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

$$\text{Loss} = \text{₹ } (400 - 396) = \text{₹ } 4$$

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

$$= \frac{4 \times 100}{400} = \frac{100}{100} = 1$$

$$\text{Loss} = \mathbf{1\%}$$

12. CP = ₹ 960, Profit = 5%

$$\text{SP} = \frac{100 + \text{Profit\%}}{100} \times \text{CP}$$

$$= \frac{100 + 5}{100} \times 960$$

$$= \frac{105 \times 960}{100} = \text{₹ } \frac{100800}{100} = \text{₹ } 1008$$

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%

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

Cost price of 20 orange

$$= ₹ 20 \times 2 = ₹ 40$$

CP = 40, Profit = 5%

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

Cost of remaining orange CP =  $80 \times 2 = 160$

$$SP = (260 - 42) = ₹ 218$$

$$SP > CP$$

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

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

### **EXERCISE 11.3**

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

$$\begin{aligned}\text{S.I.} &= \frac{P \times R \times T}{100} \\ &= \frac{500 \times 12 \times 3}{100} = \text{₹ } \mathbf{180}\end{aligned}$$

(ii), (iii) Do yourself.

- (iv)  $P = \text{₹ } 560, \text{ Time} = \frac{73}{365} \text{ years, S.I.} = \text{₹ } 14$

$$\begin{aligned}R &= \frac{\text{S.I.} \times 100}{P \times T} \\ &= \frac{14 \times 100 \times 365}{560 \times 73} = \mathbf{12.5\%}\end{aligned}$$

(v) Do yourself.

- (vi)  $P = \text{₹ } 720, R = 4\%, \text{ S.I.} = \text{₹ } 72$

$$\begin{aligned}\text{Time} &= \frac{\text{S.I.} \times 100}{R \times P} \\ &= \frac{72 \times 100}{4 \times 720} = \frac{100}{40} = 2 \frac{1}{2} \text{ Years}\end{aligned}$$

$$\begin{aligned}\text{Amount} &= P + \text{S.I.} \\ &= \text{₹ } 720 + \text{₹ } 72 = \text{₹ } \mathbf{792}\end{aligned}$$

2. (i), (ii) Do yourself.

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

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

$$\begin{aligned}\text{Amount} &= P + \text{S.I.} \\ &= \text{₹ } (600 + 20) = \text{₹ } \mathbf{620}\end{aligned}$$

3. (i), (ii) Do yourself.

- (iii)  $\text{S.I.} = \text{₹ } 12600$

$R = 18\% \text{ per annum}$

$P = 10000$

$$T = \frac{\text{S.I.} \times 100}{P \times R} = \frac{12600 \times 100}{10000 \times 18} = \mathbf{7 \text{ Years.}}$$



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

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

$$= \frac{36 \times 100}{3 \times 3} = ₹ \mathbf{3400}$$

(ii), (iii) Do yourself.

5. (i)  $P = ₹ 500, S.I. = ₹ 150, T = 4$  Years

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

(ii) Do yourself.

- (iii)  $P = 700, S.I. = ₹ 168, T = \frac{16}{12}$  years

$$R = \frac{S.I. \times 100}{P \times T}$$

$$= \frac{168 \times 100 \times 12}{700 \times 16} = \mathbf{18\%}$$

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

$$S.I. = \frac{P \times R \times T}{100}$$

$$= \frac{7200 \times 15 \times 9}{2 \times 100} = 36 \times 15 \times 9$$

$$= 4860$$

$$A = S.I. + P$$

$$= 4860 + 7200 = ₹ \mathbf{12060}$$

7., 8, 9. Do yourself.

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

$$A = S.I. + P$$

$$2520 - x = S.I.$$

$$= \frac{S.I. \times 100}{R \times T}$$

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

$$4x = 25200 - 10x$$

$$14x = 25200 \Rightarrow x = \frac{25200}{14}$$

$$x = ₹ \mathbf{1800}$$

11. Do yourself.

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

$$P = \frac{S.I. \times 100}{R \times T}$$

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

$$= ₹ 2200$$

### **EXERCISE 11.4**

1.  $P = ₹ 1500$ ,  $A = ₹ 2655$ , S.I. =  $A - P = ₹ 1155$ ,  $T = \frac{7}{2}$  years

$$R = \frac{\text{S.I.} \times 100}{P \times T}$$

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

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

$$\text{S.I.} = \text{Amount} - \text{Principal}$$

$$= \frac{7x}{4} - x = \frac{3x}{4}$$

$$P = x, \text{S.I.} = \frac{3x}{4}, T = 6 \text{ years}$$

$$R = \frac{\text{S.I.} \times 100}{P \times T} = \frac{3x \times 100}{4 \times x \times 6} = \mathbf{12.5\%}$$

3. Do yourself.

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

$$T = \frac{\text{S.I.} \times 100}{P \times R}$$

$$= \frac{x \times 100 \times 2}{x \times 25} = \mathbf{8 \text{ years}}$$

7.  $P = ₹ 4500$ ,  $T = 1$  year,  $A = ₹ 5265$

$$\text{S.I.} = ₹ (5265 - 4500) = ₹ 765$$

$$R = ?$$

$$R = \frac{\text{S.I.} \times 100}{P \times T}$$

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

For Sanjiv

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

$$\text{S.I.} = \frac{P \times R \times T}{100} = \frac{4500 \times 17 \times 3}{100}$$

$$= ₹ 2295$$

$$\text{Amount} = \text{Principal} + \text{S.I.}$$

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

8. Do yourself.

## Let's Recall

1. (a) Total number of invalid votes = 20% of 7500

$$= \frac{20 \times 7500}{100} = 1500$$

Total number of valid votes polled = 7500 – 1500 = 6000

Number of valid votes polled in favour of the candidate

$$= 55\% \text{ of } 6000$$

$$= \frac{55 \times 6000}{100} = 3300$$

Thus, the number of valid votes that the other candidate got

$$= 6000 - 3300 = \mathbf{2700}$$

2. (d) Let number of apples with fruitseller =  $x$

$$\text{Number of apples to be sold} = x \text{ of } 40\% = x \times \frac{40}{100} = x \times \frac{2}{5} = \frac{2x}{5}$$

Number of remaining apples = 420

$$x - \frac{2x}{5} = 420$$

$$\frac{5x - 2x}{5} = 420$$

$$\frac{3x}{5} = 420$$

$$3x = 420 \times 5$$

$$\Rightarrow x = \frac{420 \times 5}{3}$$

$$x = 700$$

Thus number of apples that originally he had = **700**

4. (c)

$$\text{CP} = ₹ 1400$$

$$\text{Loss} = 15\% \text{ of } ₹ 1400$$

$$= 1400 \times 15\%$$

$$= 1400 \times \frac{15}{100} = ₹ 210$$

$$\text{Selling Price (SP)} = \text{CP} - \text{Loss} = ₹ 1400 - ₹ 210$$

$$= ₹ 1190$$

5. (b) CP = ₹ 4700 + ₹ 800 = ₹ 5500

$$\text{SP} = ₹ 5800$$

$$\text{Gain} = \text{SP} - \text{CP}$$

$$= ₹ 5800 - ₹ 5500$$

$$= ₹ 300$$

$$\text{Gain per cent} = \frac{\text{gain} \times 100}{\text{CP}}$$

$$= \frac{300 \times 100}{5500}$$

$$= \frac{60}{11} = 5 \frac{5}{11} \%$$

7. (c) Interest = ₹ 5400

Rate ( $R$ ) = 12%

Time ( $T$ ) = 3 years

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

$$5400 = \frac{P \times 12 \times 3}{100}$$

$$12 \times 3 \times P = 5400 \times 100$$

$$P = \frac{5400 \times 100}{12 \times 3}$$

$$= ₹ 15000$$

## Unit-V : Mensuration

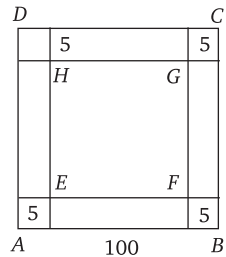
# 18. Areas of Rectilinear Figures

### EXERCISE 18

1. Side of square park = 100 m

Width of path = 5 m

$$\begin{aligned} \text{Area of path} &= (\text{Area of square } ABCD \\ &\quad - \text{Area of square } EFGH) \\ &= (100 \times 100 - 90 \times 90) \text{ m}^2 \\ &= 10000 - 8100 \\ &= \mathbf{1900 \text{ m}^2} \end{aligned}$$



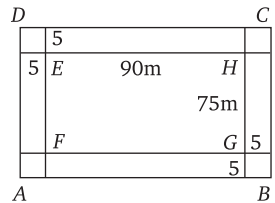
2. Length = 90 m, wide = 75 m

$$AB = 90 + 10 = 100$$

$$BC = 75 + 10 = 85$$

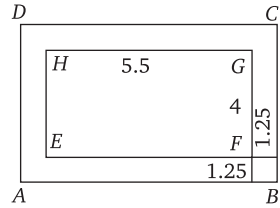
Area of path

$$\begin{aligned} &= (\text{Area of rectangle } ABCD \\ &\quad - \text{Area of rectangle } EFGH) \\ &= (100 \times 85 - 90 \times 75) \text{ m}^2 \\ &= 1750 \text{ m}^2 \end{aligned}$$



3., 4., 5., 6., 7. Do yourself.

8. (i) Length of room = 5.5 m  
 Breadth of room = 4 m  
 $AB = 5.5 + 2.5 = 8$   
 $BC = 4 + 2.5$   
 $= 6.5$  m

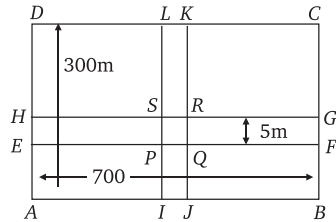


Width of verandah = 1.25 m  
 Area of verandah  
 $= (\text{Area of rectangle } ABCD$   
 $\quad - \text{Area of rectangle } EFGH)$   
 $= (8 \times 6.5 - 5.5 \times 4) \text{ m}^2$   
 $= 30 \text{ m}^2$

- (ii) Cost of cementing the floor of verandah = ₹  $30 \times 25$   
 $= ₹ 750$

9., 10. Do yourself.

11. Area of the cross road  $EFGH$  parallel to the length of the park  
 $= 700 \text{ m} \times 5 \text{ m}$   
 $= 3500 \text{ m}^2$



- Area of the cross road  $IJKL$  parallel to the breadth of the park.  
 $= 300 \times 5$   
 $= 1500 \text{ m}^2$

From the figure, we observe that the shaded area  $PQRS$  has been included in both the cross road. But it should come once only.

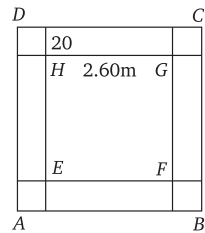
$$\begin{aligned} \text{Area of } PQRS &= 5 \text{ m} \times 5 \text{ m} \\ &= 25 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of road} &= \text{Area of } EFGH + \text{Area of } IJKL - \text{Area of } PQRS \\ &= (3500 + 1500 - 25) = 4975 \text{ m}^2 \end{aligned}$$

$$\text{Cost of constructing the roads} = 4975 \times 105 = ₹ \mathbf{522375}$$

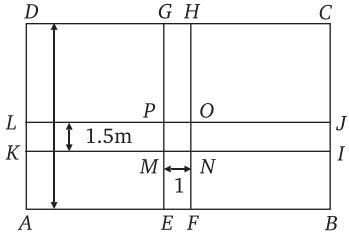
12., 13., Do yourself.

14. Side of square = 2.60 m  
 Area of Strip = Area of  $ABCD$  – Area of  $EFGH$   
 $AB = 2.60 + 0.40 = 3 \text{ m}$   
 $BC = 2.60 + 0.40 = 3 \text{ m}$   
 $= (3 \times 3 - 2.60 \times 2.60) \text{ m}^2$   
 $= 2.24 \text{ m}^2$



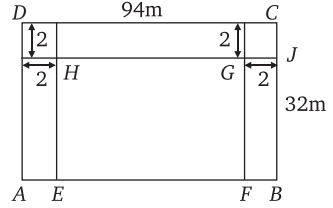
$$\begin{aligned} \text{Area of enlarged flowerbed} &= (3 \times 3) \text{ m}^2 \\ &= 9 \text{ m}^2 \end{aligned}$$

15. Area of total paths  
 = (Area of  $LKIJ$  + Area of  $EFGH$   
 - Area of  $PMNO$ )  
 =  $(32 \times 1.5 + 18 \times 1 - 1.5 \times 1) \text{ m}^2$   
 =  **$64.5 \text{ m}^2$**



16. Do yourself.  
 17. (i) In a rectangular field length = 94 m

- Breadth = 32 m  
 Area of road =  $IJCD$   
 =  $94 \times 2 = 188 \text{ m}^2$   
 Area of road =  $(AEHI + BFGJ)$   
 =  $(30 \times 2 + 30 \times 2)$   
 =  $(60 + 60)$   
 =  $120 \text{ m}^2$



- Total area of road =  $(188 + 120) \text{ m}^2 = \mathbf{308 \text{ m}^2}$   
 (ii) Not covered Area of roads  
 = Area of  $ABCD$  - Area of three roads.  
 =  $(94 \times 32 - 308) \text{ m}^2 = \mathbf{2700 \text{ m}^2}$

18. Do yourself.

**Let's Recall**

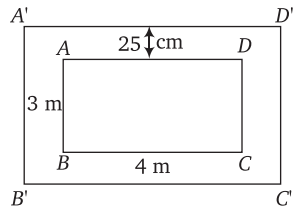
1. (c) Let Area of square  $A_1 = (\text{Side})^2$   
 and Area of square  $A_2 = (2 \times \text{Side})^2$   

$$\frac{A_1}{A_2} = \frac{(\text{Side})^2}{4(\text{Side})^2}$$
  

$$A_2 = 4A_1$$

Therefore. If the side of square is doubled then its area becomes four times.

2. (b) In the rectangle  $ABCD$ ,  $l = 4\text{m}$   
 and  $b = 3\text{m}$   
 Area of  $ABCD = 4\text{m} \times 3\text{m} = 12 \text{ m}^2$   
 The length of bedsheet with border  
 =  $4\text{m} + 2 \times \frac{25}{100} \text{ m}$   
 $l = 4\text{m} + 0.5\text{m}$   
 $l = 4.5\text{m}$



- The width of bedsheet with border =  $3\text{m} + 2 \times \frac{25}{100} \text{ m}$

$$b = 3 \text{ m} + 0.5 \text{ m}$$

$$b = 3.5 \text{ m}$$

Then, The area of  $A' B' C' D' = 4.5 \text{ m} \times 3.5 \text{ m} = 15.75 \text{ m}^2$

$$\text{The area of border} = 15.75 \text{ m}^2 - 12 \text{ m}^2 = 3.75 \text{ m}^2$$

$$\text{Per m}^2 \text{ rate} = ₹ 50$$

$$3.75 \text{ m}^2 \text{ rate will be} = ₹ 50 \times 3.75 = ₹ 187.50$$

Therefore cost of printing the border = ₹ **187.50**

**3. (a)** According to question,

Area of rectangle = 90% of area of square

$$360 = \frac{90}{100} \times (\text{side})^2$$

$$\frac{360 \times 100}{90} = (\text{side})^2$$

$$400 = (\text{side})^2$$

or

$$\text{Side}^2 = 400$$

$$\text{Side} = \sqrt{400}$$

$$\text{Side} = \mathbf{20 \text{ m}}$$

## 19. Volumes And Surface Areas

### EXERCISE 19.2

1. (i) Volume of cube =  $(\text{side})^3$

$$(15)^3 = \mathbf{3375 \text{ mm}^3}$$

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

2. (i) length = 12 cm, breadth = 10 cm, height = 8 cm

$$\text{Volume of cuboid} = \text{length} \times \text{breadth} \times \text{height}$$

$$= 12 \text{ cm} \times 10 \text{ cm} \times 8 \text{ cm}$$

$$= \mathbf{960 \text{ cm}^3}$$

(ii), (iii), (iv), (v), (vi) Do yourself.

3. Volume of cuboidal wood =  $36 \text{ cm}^3$

$$\text{Length} = 4 \text{ cm, Breadth} = 3 \text{ cm}$$

$$\text{Height} = \frac{\text{Volume}}{\text{Length} \times \text{Breadth}}$$

$$= \frac{36}{4 \times 3} \text{ cm} = \mathbf{3 \text{ cm}}$$

4. Do yourself.

5. One match box volume =  $4 \text{ cm} \times 2.5 \text{ cm} \times 1.5 \text{ cm}$

$$\begin{aligned}\text{Such 12 match box volume} &= 12 \times 4 \text{ cm} \times 2.5 \text{ cm} \times 1.5 \text{ cm} \\ &= \mathbf{180 \text{ cm}^3}\end{aligned}$$

6. , 7. Do yourself.

$$\begin{aligned}\mathbf{8.} \text{ Volume of cuboidal pit} &= 8 \text{ m} \times 6 \text{ m} \times 3 \text{ m} \\ &= 144 \text{ m}^3\end{aligned}$$

$$\begin{aligned}\text{Cost of digging} &= 144 \times ₹ 30 \\ &= ₹ \mathbf{4320}\end{aligned}$$

$$\begin{aligned}\mathbf{9.} \text{ Total required water of population of village} &= 150 \times 4000 \\ &= 600000 \text{ L}\end{aligned}$$

$$1000 \text{ L} = 1 \text{ m}^3$$

$$600000 \text{ L} = 600 \text{ m}^3$$

$$\text{Days} = \frac{20 \times 15 \times 6}{600}$$

$$= \frac{6}{3} = \mathbf{3 \text{ days}}$$

**10.**

$$1000 \text{ L} = 1 \text{ m}^3$$

$$50000 \text{ L} = \frac{50000}{1000} = 50 \text{ m}^3$$

$$\text{Volume of cuboid} = \text{Length} \times \text{Breadth} \times \text{Height}$$

$$50 = 2.5 \times 10 \times \text{Breadth}$$

$$\text{Breadth} = \frac{50}{2.5 \times 10} = \mathbf{2 \text{ m}}$$

**11.** Joined to two cubes end to end then

$$\text{Length} = 12 \text{ cm, Breadth} = 6 \text{ cm,}$$

$$\text{Height} = 6 \text{ cm}$$

$$\begin{aligned}\text{Volume of cuboid} &= 12 \times 6 \times 6 \text{ cm}^3 \\ &= \mathbf{432 \text{ cm}^3}\end{aligned}$$

**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 =  $x$

$$\text{Volume of cube} = x^3$$

(i) Doubled then  $2x$

$$\text{Volume of cube} = (2x)^3 = 8x^3 = \mathbf{8 \text{ times}}$$

(ii), (iii) Do yourself.

**14.** Do yourself.

$$\mathbf{15.} \text{ Number of cubical blocks} = \frac{3.60 \times 3.60 \times 3.60}{0.12 \times 0.12 \times 0.12} = \mathbf{27000 \text{ blocks}}$$



### EXERCISE 19.3

1. Surface area of cube =  $6a^2$   
 $= 6 \times (11)^2 = 6 \times 121 = \mathbf{726 \text{ cm}^2}$

(ii), (iii) Do yourself.

2. Do yourself.

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., 5., 6. Do yourself.

7. Surface area =  $2(l^2 + l^2 + l^2) = 6l^2 = 6 \times 15 \times 15 = 1350$

8., 9., 10., 11. Do yourself.

12. As given in hint, firstly the surface area of a brick and secondly divide  $9.375 \text{ m}^2$  from the calculated area. Number of bricks will be found.

13. Area of four walls =  $2 \times h(l + b)$   
 $= 2 \times 5 \times (10 + 8) = 180 \text{ m}^2$

Required length of wallpaper  $l \times \frac{50}{100} = \frac{180}{1}$   
 $l = \frac{180 \times 100}{50} \text{ m}$   
 $l = 180 \times 2 = \mathbf{360 \text{ m}}$

14. Do yourself.

15. Area of four walls =  $2 \times h \times (l + b)$   
 $= 2 \times 5 \times (15 + 10)$   
 $= 10 \times 25 = 250 \text{ m}^2$   
Area of roof =  $l \times b$   
 $= 15 \times 10 = 150 \text{ m}^2$   
Total painted area =  $(250 + 150) \text{ m}^2 = \mathbf{400 \text{ m}^2}$

### Let's Recall

1. (c) According to question

$$b = 2 \times h$$

$$b = 2h \text{ and}$$

$$b = \frac{1}{2} \times l$$

$$2h = \frac{1}{2} l$$

$$h = \frac{1}{4} l$$

$$\begin{aligned}
 \text{Volume of room} &= 512 \text{ m}^3 \\
 l \times b \times h &= 512 \text{ m}^3 \\
 l \times \frac{1}{2} l \times \frac{1}{4} l &= 512 \text{ m}^3 \\
 l^3 &= 512 \times 8 \\
 l^3 &= 16 \times 16 \times 2 \times 8 \\
 l^3 &= 16 \times 16 \times 16 \\
 l^3 &= 16^3 \\
 l &= \mathbf{16 \text{ m}}
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{2. (c)} \text{ Volume of wall} &= l \times b \times h \quad [\cdot: 1 \text{ m} = 100 \text{ cm}] \\
 &= 800 \text{ cm} \times 600 \text{ cm} \times 22.5 \text{ cm} \\
 &= 10800000 \text{ cm}^3
 \end{aligned}$$

$$\begin{aligned}
 \text{Volume of each brick} &= 25 \text{ cm} \times 11.25 \text{ cm} \times 6 \text{ cm} \\
 &= 1687.50 \text{ cm}^3
 \end{aligned}$$

$$\begin{aligned}
 \text{Required number of bricks to build a wall} \\
 &= \frac{\text{Volume of wall}}{\text{Volume of one bricks}} \\
 &= \frac{10800000 \text{ cm}^3}{1687.50 \text{ cm}^3} = \mathbf{6400 \text{ bricks}}
 \end{aligned}$$

Thus number of bricks needed to build a wall is 6400

## Unit-VI : Statistics

# 20. Data Handling

### EXERCISE 20.3

$$\mathbf{3. (a)} \quad m = 4, n = 52$$

$$P(A) = \left( \frac{m}{n} \right) = \frac{4}{52} = \frac{\mathbf{1}}{\mathbf{13}}$$

$$\mathbf{(b)} \quad m = 26, n = 52$$

$$P(A) = \left( \frac{26}{52} \right) = \left( \frac{m}{n} \right) = \frac{\mathbf{1}}{\mathbf{2}}$$

$$\begin{aligned}
 \mathbf{(c)} \quad m &= [4 \text{ kings} + (26 \text{ Red} - 2 \text{ Red kings})] \\
 &= 4 + 24 = 28
 \end{aligned}$$

and

$$\begin{aligned}
 n &= 52 \\
 \therefore P(A) &= \left( \frac{m}{n} \right) = \frac{28}{52} = \frac{\mathbf{7}}{\mathbf{13}}
 \end{aligned}$$

$$\mathbf{(d)} \quad m = 2, n = 52$$

$$P(A) = \frac{m}{n} = \frac{2}{52} = \frac{\mathbf{1}}{\mathbf{26}}$$