

6. (i)  $102 \times 105$   
 $= (100 + 2) (100 + 5) = 100 (100 + 5) + 2 (100 + 5)$   
 $= 10000 + 500 + 200 + 10 = 10710$
- (ii)  $95 \times 92$   
 $= (90 + 5) (90 + 2) = 90 (90 + 2) + 5 (90 + 2)$   
 $= 8100 + 180 + 450 + 10 = 8740$
- (iii)  $43 \times 45$   
 $= (40 + 3) (40 + 5) = 40 (40 + 5) + 3 (40 + 5)$   
 $= 1600 + 200 + 120 + 15 = 1935$
- (iv)  $56 \times 48$   
 $= (50 + 2) (50 - 2) = 50 (50 - 2) + 6 (50 - 2)$   
 $= 2500 - 100 + 300 - 12 = 2688$
7.  $x + y = 12$        $xy = 14$        $x^2 + y^2 = ?$   
 $(x + y)^2 = x^2 + y^2 + 2xy$   
 $x^2 + y^2 = (x + y)^2 - 2xy$   
 $= 12^2 - 2 \times 14 = 144 - 28 = 116$
8.  $x - y = 7$        $xy = 9$   
 $x^2 + y^2 = (x - y)^2 + 2xy = 7^2 + 2 \times 9 = 49 + 18 = 67$
9. (i)  $9x^2 + 30x + 25$        $x = 1$   
 $= 9 + 30 + 25 = 64$
- (ii)  $49x^2 - 56xy + 16y^2$   
 $x = \frac{1}{7}, y = \frac{1}{2}$   
 $= 49 \left(\frac{1}{7}\right)^2 - 56 \times \frac{1}{7} \times \frac{1}{2} + 16 \times \left(\frac{1}{2}\right)^2$   
 $= 49 \times \frac{1}{49} - 4 + 16 \times \frac{1}{4} = 1 - 4 + 4 = 1$
10. (i) LHS  $(3x + 7)^2 - 84x$   
 $= 9x^2 + 49 + 42x - 84x = 9x^2 + 49 - 42x = (3x + 7)^2$   
 $= \text{RHS.}$
- (ii) LHS  $(9p - 5q)^2 + 180pq = (9p + 5q)^2$   
 $= 81p^2 + 25q^2 - 90pq + 180pq = 81p^2 + 25q^2 + 90pq = (9p + 5q)^2$   
 $= \text{RHS}$
- (iii)  $(a - b) (a + b) (b - c) (b + c) + (c - a) (c + a) = 0$   
RHS  $a^2 - b^2 + b^2 - c^2 + c^2 - a^2 = 0$
11. (i)  $x + \frac{1}{x} = 1$   
 $\left(x + \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} + 2$   
 $x^2 + \frac{1}{x^2} = \left(x + \frac{1}{x}\right)^2 - 2 = 1^2 - 2 = 1 - 2 = -1$

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

(iii)  $x + \frac{1}{x} = \sqrt{5}$   
 $\left(x + \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} + 2$        $x^2 + \frac{1}{x^2} = \left(x + \frac{1}{x}\right)^2 - 2 = (\sqrt{5})^2 - 2 = 3$   
 $\left(x^2 + \frac{1}{x^2}\right)^2 = x^4 + \frac{1}{x^4} + 2$        $x^4 + \frac{1}{x^4} = \left(x^2 + \frac{1}{x^2}\right)^2 - 2 = 3^2 - 2 = 9 - 2 = 7$

(iv)  $x^2 + \frac{1}{x^2} = 6$   
 $\left(x - \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} - 2 = 6 - 2$        $x - \frac{1}{x} = \sqrt{4} = 2$

(v)  $x^2 + \frac{1}{x^2} = 9$   
 $\left(x - \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} - 2 = 9 - 2$        $\left(x - \frac{1}{x}\right)^2 = 7$        $x - \frac{1}{x} = \sqrt{7}$

## Chapter-7 Factorisation

### Exercise = 7.1

1. (i)  $2y, 22xy$       H.C.F. =  $2y$   
(ii)  $a^2b^3, a^3b^2$       H.C.F. =  $a^2b^2$   
(iii)  $36a^2b^3c^4 = 2 \times 2 \times 3 \times 3 \times a^2b^3c^4$   
 $54a^5c^2 = 2 \times 3 \times 3 \times 3 \times a^5c^2$   
 $90a^4b^2c^2 = 2 \times 3 \times 3 \times 5 \times a^4b^2c^2$   
H.C.F. =  $2 \times 3 \times 3 \times a^2c^2 = 18a^2c^2$   
(iv)  $x^3 - yx^2$       H.C.F. =  $x^2$   
(v)  $15a^3 = 3 \times 5 \times a^3$   
 $-45a^2 = 3 \times 5 \times a^2$        $-150a = 2 \times 3 \times 5 \times 5 \times a$   
H.C.F. =  $3 \times 5 \times a = 15a$   
(vi)  $16x^3 = 2 \times 2 \times 2 \times 2 \times x^3$   
 $-4x^2 = -2 \times 2 \times x^2$        $32x^2 = 2 \times 2 \times 2 \times 2 \times 2 \times x^2$   
H.C.F. =  $4x^2$   
(vii)  $10pq = 2 \times 5 \times pq$        $20qr = 2 \times 2 \times 5 \times qr$        $30rp = 2 \times 3 \times 5 \times rp$   
H.C.F. =  $2 \times 5 = 10$   
(viii)  $2x^3y^2, 10x^2y^3, 14xy$       H.C.F. =  $2xy$   
(ix)  $11abc^3, 13a^2b^2c, 17abc$   
H.C.F. =  $abc$
2. (i)  $24x + 32x^3 = 8x(3 + 4x^2)$       (ii)  $30a + 54ab = 6a(5 + 9b)$   
(iii)  $28c^2d^2 - 21c^2d = 7c^2d(4d^2 - 3d)$       (iv)  $36y^3z + 48y^2z = 12y^2z(3y + 4)$

$$\begin{array}{ll}
\text{(v)} & 6p + 8p^2 - 4p^3 = 2p(3 + 4p - 2p^2) \\
\text{(vii)} & 15y^2z^3 - 20y^3z^4 + 35y^2z^2 \\
\text{(ix)} & x^2 - 6x - bx + 6b \\
& = x(x-6) - b(x-6) = (x-6)(x-b) \\
\text{(xi)} & a(x+y) + 3(x+y) \\
& = (x+y)(a+3) \\
\text{(xiii)} & 3(x-2y)^3 - 4(x-2y)^2 + 2(4-2y) \\
& = (x-2y)[3(x-xy)^2 - 4(x-2x) + 2] \\
\text{(xv)} & x(2a-3b) + y(3b-2a) \\
& = x(2a-3b) - y(2a-3b) = (2a-3b)(x-y) \\
\text{(xvi)} & x^2 + xy(y+1) + y^3 \\
& = x^2 + xy^2 + xy + y^3 = x(x+y^2) + y(x+y^2) = (x+y)^2(x+y) \\
\text{(xvii)} & 4p(x+y)^3 + 2q(x+y)^2 + 3y(x+y)^4 \\
& = (x+y)^2[4p(x+y) + 2q + 3y(x+y)^2]
\end{array}$$

$$\begin{array}{ll}
\text{(vi)} & 12a^3 - 15a^2 + 7a = a(12a^2 - 15a - 7) \\
\text{(viii)} & 14m^5n^4p^2 - 42m^7n^3p^7 - 70m^6n^4p^3 \\
& = 14m^5n^3p^2(n - 3m^2p^5 - 5mnp) \\
\text{(x)} & 1 + x + xy + x^2y \\
& = (1+x) + xy(1+x) = (1+x)(1+xy) \\
\text{(xii)} & 7x(x+xy) + 3y(x+2y) \\
& = (x+xy)(7x+3y) \\
\text{(xiv)} & x^2 + 5x + 5xy + 25y \\
& = x(x+5) + 5y(x+5) = (x+5)(x+5y) \\
\text{3. (i)} & a^2 + bc + ab + ac \\
& = a(a+b) + c(a+b) = (a+b)(a+c) \\
\text{(ii)} & ax^2 + by^2 + bx^2 + ay^2 \\
& = ax^2(a+b) + y^2(a+b) = (a+b)(x^2 + y^2) \\
\text{(iii)} & xy - pq + qy - px \\
& = x(y-p) + q(y-p) = (y-p)(x+q) \\
\text{(iv)} & ab(x^2 + y^2) + xy(a^2 + b^2) \\
& = abx^2 + aby^2 + xy a^2 + xy b^2 = abx^2 + xy b^2 + aby^2 + xy a^2 \\
& = bx(ax+by) + ay(ax+by) = (ax+by)(bx+ay) \\
\text{(v)} & x(a-3) + y(3-a) \\
& = x(a-3) - y(a-3) = (a-3)(x-y) \\
\text{(vi)} & 12(2x-3y)^2 - 16(3y-2x) \\
& = 12(2x-3y)^2 + 16(2x-3y) = 4(2x-3y)[3(2x-3y) + 4] \\
\text{(vii)} & ar + br + at + bt \\
& = r(a+b) + t(a+b) = (a+b)(r+t) \\
\text{(viii)} & x^2 - ax - bx + ab \\
& = x(x-a) - b(x-b) = (x-a)(x-b) \\
\text{(ix)} & ab^2 + (a-1)(b-1) = ab^2 + ab - a - b + 1 \\
\text{(x)} & x^2 - x(a+2b) + 2ab \\
& = x^2 - ax - 2bx + 2ab = x(x-a) - 2b(x-a) = (x-a)(x-2b)
\end{array}$$

### Exercise = 7.2

$$\begin{array}{ll}
\text{1. (i)} & x^2 + 16x + 64 = x^2 + 8x + 8x + 64 \\
& = x(x+8) + 8(x+8) = (x+8)(x+8) = (x+8)^2 \\
\text{(ii)} & 4x^2 - 2xy + 25y^2 \\
& = 4x^2 - 10xy - 10xy + 25y^2 = 2x(2x-5y) - 5y(2x-5y) \\
& = (2x-5y)(2x-5y) = (2x-5y)^2
\end{array}$$

$$\begin{aligned}
\text{(iii)} \quad & p^2 + 8p + 16 = p^2 + 4p + 4p + 16 \\
& = p(p+4) + 4(p+4) = (p+4)(p+4) = (p+4)^2 \\
\text{(iv)} \quad & 49x^2 - 14x + 1 = 49x^2 - 7x - 7x + 1 \\
& = 7x(7x-1) - 1(7x-1) = (7x-1)(7x-1) = (7x-1)^2 \\
\text{(v)} \quad & x^2 - 10x^2y^2 + 25y^2 \\
& = (x^2)^2 + (5y^2)^2 - 2 \times x^2 \times 5y^2 = (x^2 - 5y^2)^2 \\
\text{(vi)} \quad & y^2 + 2 + \frac{1}{y^2} = y^2 + \frac{1}{y^2} + 2 \times y^2 \times \frac{1}{y^2} = \left(y + \frac{1}{y}\right)^2 \\
\text{(vii)} \quad & \frac{1}{2}x^2 - x + 1 = \left(\frac{1}{2}x\right)^2 + 1^2 - 2 \times \frac{1}{2}x \times 1 = \left(\frac{1}{2}x - 1\right)^2 \\
\text{(viii)} \quad & 25a^2 - 4 = (5a)^2 - 2^2 = (5a+2)(5a-2) \\
\text{(ix)} \quad & 16x^2 - 9y^2 = (4x)^2 - (3y)^2 = (4x+3y)(4x-3y) \\
\text{(x)} \quad & 49x^4 - 16y^4 = (7x^2)^2 - (4y^2)^2 = (7x^2 + 4y^2)(7x^2 - 4y^2) \\
\text{(xi)} \quad & 4 - 36y^2 = 2^2 - (6y)^2 = (2+6)(2-6y) \\
\text{(xii)} \quad & \frac{9}{64}x^2 - \frac{1}{144}y^2 = \left(\frac{3}{8}x\right)^2 - \left(\frac{1}{12}y\right)^2 = \left(\frac{3}{8}x + \frac{1}{12}y\right)\left(\frac{3}{8}x - \frac{1}{12}y\right) \\
\text{(xiii)} \quad & (4x-5y)^2 - 16z^2 \\
& = (4x-5y)^2 - (4z)^2 = (4x-5y+4z)(4x-5y-4z) \\
\text{(xiv)} \quad & 1(6x^2 + 40xy + 25y^2 - 1) \\
& = (4x^2 + 5y)^2 - 1^2 = (4x^2 + 5y + 1)(4x^2 + 5y - 1) \\
\text{(xv)} \quad & 16x^2 - (2y-3z)^2 \\
& = (4x)^2 - (2y-3z)^2 = (4x+2y-3z)(4x-2y+3z) \\
\text{(xvi)} \quad & a^2 + b^2 + 2ab - c^2 \\
& = (a+b)^2 - c^2 = (a+b+c)(a+b-c) \\
\text{(xvii)} \quad & 49 - x^2 - 16y^2 - 8xy \\
& = 49 - (x^2 + 16y^2 + 8xy) = 7^2 - (x+4y)^2 = (7+x+4y)(7-x-4y) \\
\text{(xviii)} \quad & 4x^2 - 4x + 1 - y^4 \\
& = (2x-1)^2 - (y^2)^2 = (2x-1+y^2)(2x-1-y^2)
\end{aligned}$$

$$\begin{aligned}
2. \quad & \text{(i)} \quad x^4 - 16 \\
& = (x^2)^2 - 4^2 = (x^2+4)(x^2-4) = (x^2+4)(x^2-2^2) = (x^2+4)(x+2)(x-2) \\
& \text{(ii)} \quad x^4 - y^4 \\
& = (x^2)^2 - (y^2)^2 = (x^2+y^2)(x^2-y^2) = (x^2+y^2)(x+y)(x-y) \\
& \text{(iii)} \quad a^4b^4 - c^4 = (a^2b^2)^2 - (c^2)^2 \\
& = (a^2b^2 + c^2)(a^2b^2 - c^2) \\
& = (a^2b^2 + c^2)(ab+c)(ab-c) \\
& \text{(iv)} \quad 3a^2 - 12b^4 = 3(a^2 - 4b^2) \\
& = 3[a^2 - (2b)^2] = 3(a+2b)(a-2b) \\
& \text{(v)} \quad 8x^3 - 2x = 2x(4x^2 - 1) \\
& = 2x(2x+1)(2x-1) \\
& \text{(vi)} \quad y^4 - (y+x)^4 = (y^2)^2 - [(y+x)^2]^2 \\
& = [y^2 + (y+x)^2][y^2 - (y+x)^2]
\end{aligned}$$



$$= [y^2 + (y+x^2)](y+y+x)(y-y-x)$$

$$= -x(2y+x)[y^2 + (y+x)^2]$$

$$(vii) \quad 16x^4 - (2-x)^4$$

$$= (4x^2)^2 - [(z-x)^2]^2 = [4x^2 + (z-x)^2][4x^2 - (z-x)^2]$$

$$= [4x^2 + (z-x)^2][2x)^2 - (z-x)^2] = [4x^2 + (z-x)^2](2x+z-x)(2x-2+x)$$

$$= (3x-z)(x+z)[4x^2 + (z-x)^2]$$

3. (i)  $a^2 - b^2 - c^2 + d^2 - 2(ad - bc)$
- $$= a^2 - b^2 - c^2 + d^2 - 2ad + 2bc = a^2 + d^2 - 2ad - (b^2 + c^2 - 2bc)$$
- $$= (a-d)^2 - (b-c)^2 = [(a-d) + (b-c)][(a-d) - (b-c)]$$
- $$= (a-d+b-c)(a-d-b+c) = (a+b-c-d)(a-b+c-d)$$
- (ii)  $4b^2c^2 - (b^2 + c^2 - a^2)^2$
- $$= (2abc)^2 - (b^2 + c^2 - a^2)^2 = (2bc + b^2 + c^2 - a^2)(2bc - b^2 - c^2 + a^2)$$
- $$= [(b+c)^2 - a^2][a^2 - (b-c)^2] = (b+c-a)(b+c+a)(a+b-c)(a-b+c)$$
- (iii)  $1 - 2ab - (a^2 + b^2)$
- $$= 1 - (2ab - a^2 - b^2) = 1 - (a^2 + b^2 - 2ab)$$
- $$= 1 - (a+b)^2 = (1-a-b)(1+a+b)$$
- (iv)  $1 + 2ab - (a^2 + b^2)$
- $$= 1 + 2ab - a^2 - b^2 = 1 - (a^2 - 2ab + b^2)$$
- $$= 1 - (a-b)^2 = (1+a-b)(1-a+b)$$
- (v)  $\frac{16-x^4+2x^2y^2-y^4}{4-x^2+y^2}$
- $$= \frac{16 - (x^4 + y^4 - 2x^2y^2)}{4-x^2+y^2} = \frac{4^2 - (x^2 - y^2)^2}{4-x^2+y^2} = \frac{(4-x^2+y^2)(4+x^2-y^2)}{4-x^2+y^2} = 4+x^2-y^2$$
- (vi)  $x^2 + y^2 - 2(xy - xz + yz)$
- $$= x^2 + y^2 - 2xy + 2xz - 2yz = (x-y)^2 + 2z(x-y) = (x-y)(x-y+2z)$$
- 4 (i)  $\frac{1 \cdot 23 \times 1 \cdot 23 - 0 \cdot 73 \times 0 \cdot 73}{1 \cdot 23 + 0 \cdot 73} = \frac{(1 \cdot 23 + 0 \cdot 73)(1 \cdot 23 - 0 \cdot 73)}{(1 \cdot 23 + 0 \cdot 73)} = 0 \cdot 5$
- (ii)  $\frac{1 \cdot 37 \times 1 \cdot 37 - 0 \cdot 63 \times 0 \cdot 63}{1 \cdot 37 - 0 \cdot 63} = \frac{(1 \cdot 37 + 0 \cdot 63)(1 \cdot 37 - 0 \cdot 63)}{(1 \cdot 37 - 0 \cdot 63)} = 1 \cdot 37 + 0 \cdot 63 = 2$

### Exercise = 7.3

1. (i)  $a^2 + 5a + 6 = a^2 + 3a + 2a + 6$
- $$= a(a+3) + 2(a+3) = (a+3)(a+2)$$
- (ii)  $x^2 + 7x + 12 = x^2 + 4x + 3x + 12$
- $$= x(x+4) + 3(x+4) = (x+4)(x+3)$$
- (iii)  $m^2 + 13m + 42 = m^2 + 7m + 6m + 42$
- $$= m(m+7) + 6(m+7) = (m+7)(m+6)$$
- (iv)  $a^2 + 25a - 54 = a^2 + 27a - 2a - 54$
- $$= a(a+27) - a(a+27) = (a+27)(a-2)$$
- (v)  $t^2 + at - 36 = t^2 + 12t - 3t - 36$
- $$= t(t+12) - 3(t+12) = (t+12)(t-3)$$

$$\begin{aligned} \text{(vi)} \quad a^2 + 5a - 50 &= a^2 + 10a - 5a - 50 \\ &= a(a+10) - 5(a+10) = (a+10)(a-5) \end{aligned}$$

$$\begin{aligned} \text{(vii)} \quad x^2 - 4x - 5 &= x^2 - 5x + x - 5 \\ &= x(x-5) + 1(x-5) = (x-5)(x+1) \end{aligned}$$

$$\begin{aligned} \text{(viii)} \quad y^2 - 10y + 16 &= y^2 - 8y - 2y + 16 \\ &= y(y-8) - 2(y-8) = (y-8)(y-2) \end{aligned}$$

$$\begin{aligned} \text{(ix)} \quad x^2 - 2x - 24 &= x^2 - 6x + 4x - 24 \\ &= x(x-6) + 4(x-6) = (x-6)(x+4) \end{aligned}$$

$$\begin{aligned} \text{(x)} \quad y^2 + 2y - 48 &= y^2 + 8y - 6y - 48 \\ &= y(y+8) - 6(y+8) = (y+8)(y-6) \end{aligned}$$

$$\begin{aligned} \text{(xi)} \quad x^2 - 3x - 40 &= x^2 - 8x + 5x - 40 \\ &= x(x-8) + 5(x-8) = (x-8)(n+5) \end{aligned}$$

$$\begin{aligned} \text{(xii)} \quad y^2 - 11y + 24 &= y^2 - 8y - 3y + 24 \\ &= y(y-8) - 3(y-8) = (y-8)(y-3) \end{aligned}$$

$$\begin{aligned} \text{(xiii)} \quad 48 + 22x - x^2 &= 48 + 24x - 2x - x^2 \\ &= 24(2+x) - 2(2+x) = (2+x)(24-x) \end{aligned}$$

$$\begin{aligned} \text{(xiv)} \quad x^2 - 29x + 20y &= x^2 - 12x - 17x + 20x \\ &= x(x+2) - 17(x-12) = (x-12)(x-17) \end{aligned}$$

$$\begin{aligned} \text{(xv)} \quad p^2 - 5p - 176 &= p^2 - 16p + 11p - 176 \\ &= p(p-16) + 11(p-16) = (p-16)(p+11) \end{aligned}$$

2. (i)  $7x - 6x^2 + 20$

$$\begin{aligned} &= -6x^2 + 7x + 20 = -6x^2 + 15x - 8x + 20 \\ &= 3x(2x-5) - 4(2x-5) = (-3x-4)(2x-5) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad 3x^2 + 22x + 35 &= 3x^2 + 15x + 7x + 35 = 3x(x+5) + 7(x+5) = (x+5)(3x+7) \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad 15x^2 - 16xyz - 15y^2z^2 &= 15x^2 - 125xy_2 + 9xyz - 15y^2z^2 \\ &= 5x(3x-5yz) + 3yz(3x-5yz) = (3x-5yz)(5x+3yz) \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad 36a^2 + 12abc - 15b^2c^2 &= 3(12a^2 + 4abc - 5b^2c^2) = 3(12a^2 + 10abc - 6abc - 5b^2c^2) \\ &= 3[2a(6a+5bc) - bc(6a+5bc)] = 3(6a+5bc)(2a-bc) \end{aligned}$$

$$\begin{aligned} \text{(v)} \quad 6a^2 + 17ab - 3b^2 &= 6a^2 + 18ab - ab - 3b^2 = 6a(a+3b) - b(a+3b) = (a+3b)(6a-b) \end{aligned}$$

$$\begin{aligned} \text{(vi)} \quad 6x^2 - 13xy + 2y^2 &= 6x^2 - 12xy - xy + 2y^2 = 6x(x-2y) - y(x-2y) = (x-2y)(6x-y) \end{aligned}$$

$$\begin{aligned} \text{(vii)} \quad 6x^2 - 5xy - 6y^2 &= 6x^2 - 9xy + 4xy - 6y^2 = 3x(2x-3y) + 2y(2x-3y) = (3x+2y)(2x-3y) \end{aligned}$$

$$\begin{aligned} \text{(viii)} \quad (2a-b)^2 + 2(2a-b) - 8 &= (2a-b)^2 + 4(a-b) - 2(2a-b) - 8 \\ &= (2a-b)(2a-b+4) - 2(2a-b+4) = (2a-b+4)(2a-b-2) \end{aligned}$$

$$\begin{aligned} \text{(ix)} \quad (x-2y)^2 - 5(x-2y) + 6 &= (x-2y)^2 - 3(x-2y) - 2(x-2y) + 6 = (x-2y)(x-2y-3) - 2(x-2y-3) \\ &= (x-2y-3)(x-2y-2) \end{aligned}$$

$$\begin{aligned}
 \text{(x)} \quad & 2x^2 + 9x - 5 \\
 & = 2x^2 + 10x - x - 5 = 2x(x+5) - 1(x+5) \\
 & = (x+5)(2x-1) \\
 \text{(xi)} \quad & -5x^2 - x + 4 \\
 & = -5x^2 - 5x + 4x + 4 = -5x(x+1) + 4(x+1) = (4-5x)(x+1) \\
 \text{(xii)} \quad & 12y^3 - 14y^2 - 10y \\
 & = 2y(6y^2 - 7y - 5) = 2y(6y^2 - 10y + 3y - 5) \\
 & = 2y[2y(3y-5) + 1(3y-5)] = 2y(3y-5)(2y+1)
 \end{aligned}$$

### Chapter-8 Linear Equation in one variable

#### Exercise = 8.1

$  \begin{aligned}  1. \quad & 3(x-1) = 8 \\  & 3x - 3 = -8 \\  & 3x = 8 + 3 \\  & 3x = 11 \\  & x = \frac{11}{3}  \end{aligned}  $	$  \begin{aligned}  & \text{verify} \\  & 3\left(\frac{11}{3} - 1\right) \\  & = 3\left(\frac{11-3}{3}\right) \\  & = 8 \\  & = \text{RHS}  \end{aligned}  $	$  \begin{aligned}  2. \quad & 5x + 4 = 19 \\  & 5x = 19 - 4 \\  & 5x = 15 \\  & x = \frac{15}{5} \\  & x = 3  \end{aligned}  $	$  \begin{aligned}  & 5 \times 3 + 4 \\  & = 15 + 4 \\  & = 19 \\  & = \text{RHS}  \end{aligned}  $
$  \begin{aligned}  3. \quad & \frac{x}{2} + 6 = 10 \\  & = \frac{x}{2} = 10 - 6 \\  & \frac{x}{2} = 4 \\  & x = 8  \end{aligned}  $	$  \begin{aligned}  & \frac{8}{2} + 6 \\  & 4 + 6 \\  & = 10 \\  & = \text{RHS}  \end{aligned}  $	$  \begin{aligned}  4. \quad & \frac{3}{7} + x = \frac{17}{7} \\  & x = \frac{17}{7} - \frac{3}{7} \\  & x = \frac{17-3}{7} \\  & x = \frac{14}{7} \\  & x = 2  \end{aligned}  $	$  \begin{aligned}  & \frac{3}{7} + 2 \\  & \frac{3+14}{7} \\  & = \frac{17}{7} \\  & \text{RHS}  \end{aligned}  $
$  \begin{aligned}  5. \quad & \frac{x}{4} + \frac{1}{2} = \frac{1}{4} \\  & \frac{x+2}{4} = \frac{1}{4} \\  & x+2 = 1 \\  & x = -2+1 \\  & x = -1  \end{aligned}  $	$  \begin{aligned}  & \frac{-1}{4} + \frac{1}{2} \\  & = \frac{-1+2}{4} \\  & = \frac{1}{4} \\  & = \text{RHS}  \end{aligned}  $	$  \begin{aligned}  6. \quad & \frac{3x}{4} = 18 \\  & x = \frac{18 \times 4}{3} \\  & x = 24  \end{aligned}  $	$  \begin{aligned}  & \frac{3}{4} \times 24 \\  & = 3 \times 6 \\  & = 18 = \text{RHS}  \end{aligned}  $
$  \begin{aligned}  7. \quad & \frac{-x}{3} + \frac{5}{2} = \frac{-3}{2} \\  & \frac{x}{3} = \frac{-3}{2} - \frac{5}{2} \\  & \frac{x}{3} = -4 + \frac{5}{2}  \end{aligned}  $	$  \begin{aligned}  & \frac{-12}{3} + \frac{5}{2} \\  & = -4 + \frac{5}{2}  \end{aligned}  $	$  \begin{aligned}  8. \quad & \frac{15}{4} - 7x - 9 \\  & 7x = \frac{95}{4} - 9 \\  & 7x = \frac{-3}{4}  \end{aligned}  $	$  \begin{aligned}  & 7x = \frac{-21}{4} \\  & x = \frac{-3}{4}  \end{aligned}  $

$$\frac{x}{3} = \frac{-8}{2} \quad \Bigg| \quad = \frac{-8+5}{2}$$

$$x = -4 \times 3 \quad \Bigg| \quad \frac{-3}{2} = \text{RHS}$$

$$x = -12$$

$$9. \quad \frac{y}{3} + 1 = \frac{7}{15} \quad \Bigg| \quad \frac{-8}{5 \times 3} + 1$$

$$\frac{y}{3} = \frac{7}{15} - 1 \quad \Bigg| \quad = \frac{8+15}{15}$$

$$\frac{y}{3} = \frac{7-15}{15} \quad \Bigg| \quad = \frac{7}{15}$$

$$\frac{y}{3} = \frac{-8}{15} \quad \Bigg| \quad = \text{RHS}$$

$$y = \frac{-8}{5}$$

$$7x = \frac{15-36}{4}$$

$$\text{verify } \frac{15}{4} - 7 \times \frac{-3}{4} = \frac{15+21}{4} = \frac{36}{4} = 9$$

$$10. \quad \frac{x}{5} + 11 = \frac{11}{15} \quad \Bigg| \quad \frac{-54}{5} + 11$$

$$\frac{x}{5} = \frac{1}{5} - 11 \quad \Bigg| \quad \frac{-54+55}{5}$$

$$= \frac{1-55}{5} \quad \Bigg| \quad = \frac{1}{5}$$

$$\frac{x}{5} = \frac{-54}{5} \quad \Bigg| \quad = \text{RHS}$$

$$x = -54$$

$$11. \quad \frac{y-1}{3} - \frac{y-2}{4} = 1 \quad \Bigg| \quad \frac{10-1}{3} - \frac{10-2}{4}$$

$$4(y-1) - 3(y-2) = 12 \quad \Bigg| \quad \frac{y^3}{3} - \frac{8^2}{4}$$

$$4y - 4 - 3y + 6 = 12 \quad \Bigg| \quad = 3 - 2$$

$$y + 2 = 12 \quad \Bigg| \quad = 1 = \text{RHS}$$

$$y = 12 - 2$$

$$y = 10$$

$$12. \quad \frac{2x-1}{3} - \frac{6x-2}{5} = \frac{1}{3}$$

$$\frac{5(2x-1) - 3(6x-2)}{15} = \frac{1}{3}$$

$$10x - 5 - 18x + 6 = 5$$

$$-8x + 1 = 5$$

$$8x = 1 - 5$$

$$8x = -4$$

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

$$\text{verify LHS } \frac{\sqrt{2} \times \frac{-1}{2} - 1}{3} - \frac{\sqrt{3} \times \frac{-1}{2} - 2}{5}$$

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

$$\frac{-2}{3} + 1 = \frac{-2+3}{3} = \frac{1}{3} = \text{RHS}$$

### Exercise = 8.2

1.  $x + (x+15) = 95$

$$2x + 15 = 95 \quad 2x = 95 - 15 \quad 2x = 80 \quad x = 40 \quad 40, 55$$

2.  $8x + 8(x+1) + 8(x+2) = 888$

$$8x + 8x + 8 + 8x + 16 = 888 \quad 24x = 888 - 24 \quad 24x = 864 \quad x = \frac{864}{24} = 36$$

$$x = 36 \quad 8 \times 36 = 288 \quad 8 \times 37 = 296 \quad 6 \times 38 = 304$$

3.  $5x - 3x = 18$

$$2x = 18 \quad x = 9 \quad 5 \times 9 = 45 \quad 3 \times 9 = 27$$

4.  $x + \frac{1}{3}x + \frac{1}{2}x + \frac{1}{7}x = 97$   
 $\frac{42x + 14x + 21x + 6x}{42} = 97$      $83x = 42 \times 97$      $x = \frac{4074}{83} = 49.08$
5.  $x + \frac{2}{3}x = 35$   
 $\frac{3x + 2x}{3} = 35$      $5x = 3 \times 35$      $x = 3 \times 7$      $x = 21$
6.  $x + y = 15$   
 $(10x + y) - (10y + x) = 27$   
 $9x - 9y = 27$   
 $x - y = 3$   
 $x + y = 15$   
 $\hline 2x = 18$   
 $x = 9$   
 $y = 15 - x$   
 $= 15 - 9 = 6 = 96$
7.  $(2x + 1) + (2x + 3) + (2x + 5) = 45$   
 $6x + 9 = 45$      $6x = 45 - 9$      $6x = 36$      $x = 6$   
 $2 \times 6 + 1 = 13$      $2 \times 6 + 3 = 15$      $2 \times 6 + 5 = 17$
8. Sangini's age =  $x$     Father's age =  $3x$   
After 5 years Sangini's age =  $x + 5$     After 5 years father's =  $3x + 5$   
 $x + 5 + 3x + 5 = 66$      $4x + 10 = 66$      $4x = 66 - 10$      $4x = 56$      $x = 14$   
14, 42 years
9. Father's age =  $x$     Grandfather's age =  $x + 26$     Vivek father's age =  $x - 29$   
 $x + x + 26 + x - 29 = 135$      $3x - 3 = 135$      $3x = 135 + 3$      $3x = 138$   
 $x = \frac{138}{3} = 46$      $x = 46$  years    46 years, 72 years, 17 years
10.  $2x + 3x + 5x = 400000$   
 $10x = 400000$      $x = 40000$      $2 \times 40000 = 80000$      $3 \times 40000 = 120000$   
 $5 \times 40000 = 200000$
11.  $100x + (63 - x)25 = 3000$   
 $100x + 1575 - 25x = 3000$      $75x = 3000 - 1575$      $75x = 1425$   
 $x = \frac{1425}{75} = 19$
12.  $x - \left(\frac{1}{2}x + \frac{1}{3}x\right) = 5$   
 $\frac{6x - 3x - 2x}{6} = 5$      $x = 6 \times 5$      $x = ₹ 30$     Spend =  $\frac{1}{2} \times 30^{15} = ₹ 15$
13.  $60x - (30 - x)10 = 1380$   
 $60x - 300 + 10x = 1380$      $70x = 1380 + 300$   
 $70x = 1680$

$$x = \frac{1680}{70} = 24 \quad x = 24 \text{ days}$$

14. Chair cost =  $x$       Table cost =  $x + 20$

$$2(x + 20) + 3x = 340$$

$$2x + 40 + 3x = 340 \quad 5x = 340 - 40 \quad 5x = 300 \quad x = 60 \quad ₹ 60, 80$$

15. Breadth =  $x$       Length =  $x + 4$

$$(x + 3)(x + 4 + 3) - x(x + 4) = 81$$

$$(x + 3)(x + 7) - (x^2 + 4x) = 81$$

$$x^2 + 3x + 7x + 21 - x^2 - 4x = 81$$

$$6x = 81 - 21 \quad 6x = 60 \quad x = 10 \quad 10\text{cm}, 14\text{cm}$$

16. Let length =  $x$       Breadth =  $y$

$$2(x + y) = 240 \quad x + y = 120 \quad \dots(1)$$

$$\text{New length} = x - x \times \frac{10}{100} = \frac{9x}{10} \quad \text{New breadth} = y + y \times \frac{20}{100} = \frac{6}{5}y$$

$$2\left(\frac{9x}{10} + \frac{6y}{5}\right) = 240 \quad \frac{9x + 12y}{10} = 120 \quad 9x + 12y = 1200 \quad \dots(2)$$

$$\text{putting } x = 120 - y \quad 9(120 - y) + 12y = 1200 \quad 1080 - 9y + 12y = 1200$$

$$3y = 1200 - 1080 \quad 3y = 120 \quad y = 40 \quad x = 120 - 40 = 80$$

$$40\text{cm}, 80\text{cm}$$

17. Width =  $x$       Length =  $x + 15$

$$2(x + x + 15) = 210 \quad 2x + 15 = 105 \quad 2x = 105 - 15 \quad 2x = 90 \quad x = 45$$

$$45, 60\text{cm}$$

### Exercise = 8.3

1.  $8x + 3 = 27 + 2x$

$$8x - 2x = 27 - 3 \quad 6x = 24 \quad x = \frac{24}{6} \quad x = 4$$

2.  $5x + 7 = 2x - 8$

$$5x - 2x = -8 - 7 \quad 3x = -15 \quad x = -5$$

3.  $2z - 1 = 14 - z$

$$2z + z = 14 + 1 \quad 3z = 15 \quad z = 5$$

4.  $9x + 5 = 4(x - 2) + 8$

$$9x + 5 = 4x - 8 + 8 \quad 9x - 4x = -5 \quad 5x = -5 \quad x = -1$$

5.  $\frac{7y}{5} = y - 4$

$$\frac{7y}{5} - y = -4 \quad \frac{7y - 5y}{5} = -4 \quad 2y = 5 \times (-4) \quad y = -10$$

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

$$3x - 2x = 1 - \frac{2}{3} \quad x = \frac{3 - 2}{3} = \frac{1}{3}$$

7.  $\frac{17-3y}{5} - \frac{4y+2}{3} = 5-6y + \frac{7y+14}{3}$   
 $\frac{17-3y}{5} - \frac{4y+2}{3} + 6y - \frac{7y+14}{3} = 5$       $\frac{51-9y-20y-10+90y-30y-70}{15} = 5$   
 $26y-29=75$       $26y=75+29$       $26y=104$       $y = \frac{104}{26}$       $y=4$
8.  $\frac{3x-7}{5} = \frac{1-x}{-3}$   
 $-3(3x-7) = 5(1-x)$       $-9+21 = 5-5x$       $-9x+5x = 5-21$   
 $-4x = -16$       $x = 4$
9.  $2b+7 - \frac{8b}{3} = \frac{17}{b} - \frac{5b}{3}$   
 $2b - \frac{8b}{3} + \frac{5b}{3} = \frac{17}{b} - 7$       $\frac{6b-8b+5b}{3} = \frac{17-42}{b^2}$       $3b = \frac{-25}{2} b = \frac{-25}{6}$
10.  $\frac{3(a-5)}{4} - 4a = 3 - \frac{a-3}{2}$   
 $\frac{3a-15}{4} - 4a + \frac{a-3}{2} = 3$       $\frac{3a-15-16a+2a-6}{4} = 3$       $-11a-21=12$   
 $-11a = 12+21$       $-11a = 33$       $a = -3$
11.  $\frac{12}{7}(x-5) = 24 + 8x$   
 $\frac{12x-60}{7} - 8x = 24$       $\frac{12x-60-56x}{7} = 24$       $-44x-60=168$       $-44x=168+60$   
 $-44x = 228$       $x = \frac{-228}{44}$       $x = \frac{-57}{11}$
12.  $2 \cdot 4x + 1 \cdot 35 = 3 \cdot 75x + 13 \cdot 5$   
 $2 \cdot 4x - 3 \cdot 75x = 13 \cdot 5 - 1 \cdot 35$       $-1 \cdot 35x = 12 \cdot 5$       $x = -9$

**Exercise = 8.4**

1. Let the No. =  $x$   
 $8\left(x - \frac{5}{2}\right) = 3x$       $8x - 20 = 3x$       $8x - 3x = 20$       $5x = 20$       $x = 4$
2.  $x + y = 3$   
 $(10x + y) - (10y + x) = 9$   
 $9x - 9y = 9$   
 $x - y = 1$   
 $eq^1 (1) + eq^2 (2)$   
 $\begin{array}{r} x + y = 3 \\ x - y = 1 \\ \hline 2x = 4 \\ x = 2 \\ y = 3 - x = 3 - 2 = 1, 21 \end{array}$

3. Let, No. =  $3x$   
 Other No. =  $x$        $2(x+15) = (3x+15)$        $2x+30 = 3x+15$        $2x-3x = 15-30$   
 $-x = -15$        $x = -15$        $x = 15$        $15, 45$
4.  $\frac{1}{5}x + 5 = \frac{1}{4}x - 4$   
 $\frac{1}{5}x - \frac{1}{4}x = -5 - 4$        $\frac{4x-5x}{20} = -9$        $-x = -9 \times 20$        $x = 180$
5. Rakesh's age =  $x$       Kareena's age =  $x + 24$   
 $(x+24-10) = 5(x-10)$        $x+14 = 5x-50$        $5x-x = 14+50$        $4x = 64$        $x = 16$   
 16, 40 years
6. Daughter's age =  $x$       Father's age =  $x + 24$   
 $(x+24+4) = 3(x+4)$   
 $x+28 = 3x+12$        $x-3x = 12-28$        $-2x = -16$        $x = 8$   
 8 years, 32 years
7. Let the present age of son =  $x$       Let the present age of father =  $y$   
 $5(x-5) = (y-5)$        $5x-25 = y-5$        $5x-y = 25-5$        $5x-y = 20$       ... (1)  
 $3(x+5) = (y+5)-8$        $3x+15 = y-3$        $3x-y = -15-3$        $3x-y = -18$       ... (2)  
 eq (1) - eq (2)  

$$\begin{array}{r} 5x - y = 20 \\ 3x - y = -18 \\ \hline -2x = 38 \\ x = 19 \end{array}$$
  
 from eq (1)  $5 \times 19 - y = 20$   
 $y = 95 - 20$        $y = 75$   
 19 years, 75 years
8.  $\frac{1}{3}x + \frac{1}{4}x + \frac{1}{6}x + 12 = x$        $\frac{1}{3}x + \frac{1}{4}x + \frac{1}{6}x - x = -12$   
 $\frac{8x+6x+4x-24x}{24} = -12$        $-6x = -12 \times 24$        $x = \frac{-12^2 \times 24}{-6}$        $x = 48$
9. For I<sup>st</sup> bus  
 time =  $\frac{\text{distance}}{\text{speed}}$        $t_1 = \frac{x}{72} = x = 72t_1$   
 For II<sup>nd</sup> bus  
 $t_2 = \frac{810-x}{63}$        $t = t_1 + t_2 = \frac{x}{72} + \frac{810-x}{63}$
10. Let the speed of still water =  $x$   
 Distance = speed  $\times$  time =  $(x+1.5) \times 5 = 5x+7.5$   
 Distance =  $(x-1.5) \times 5.5 = 5.5x-8.25$   
 $5x+7.5 = 5.5x-8.25$        $5.5x-5x = 7.5+8.25$        $0.5x = 15.75$   
 $x = 15.75 \times 0.5$   
 $x = 31.5 \text{ km/h}$



**Exercise = 8.5**

1.  $\frac{2x-3}{3x+2} = \frac{-2}{3}$      $3(2x-3) = -2(3x+2)$      $6x-9 = -6x-4$

$6x+6x = 9-4$      $12x = 5$      $x = \frac{5}{12}$

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

$2x = -3(3x+1)$      $2x = 9x-3$      $2x+9x = -3$      $11x = -3$      $x = \frac{-3}{11}$

3.  $\frac{9x-7}{3x+5} = \frac{3x-4}{x+6}$

$(9x-7)(x+6) = (3x-4)(3x+5)$      $9x+54x-7x-42 = 9x^2+15x-12x-20$

$47x-3x = -20+42$      $44x = -22$      $x = \frac{-22}{44} = \frac{-1}{2}$

4.  $\frac{6}{2x-(3-4x)} = \frac{2}{3}$

$6 \times 3 = 2 \times (6x-3)$      $18 = 12x-6$      $12x = 18+6$      $12x = 24$      $x = 2$

5.  $\frac{2}{3x} - \frac{3}{2x} = \frac{1}{12}$

$\frac{4-9}{6x} = \frac{1}{12}$      $x = 2 \times -5$      $x = -10$

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

$3(9y-7) = 2(-3)$      $27y-21 = -6$      $27y = 21-6$      $27y = 15$      $y = \frac{15}{27} = \frac{5}{9}$

7.  $\frac{x+2}{x+5} = \frac{x}{x+6}$

$(x+2)(x+6) = x(x+5)$      $x^2+6x+2x+12 = x^2+5x$      $8x-5x = -12$   
 $3x = -12$      $x = -4$

8.  $\frac{(2x-3)-(5x-7)}{6x+11} = \frac{-8}{3}$

$3(-3x+10) = -8(6x+11)$      $-9x+30 = -48x-88$      $-9x+48x = -88-30$   
 $39x = -118$      $x = \frac{-118}{39}$

9.  $\frac{2x-1}{x+4} - \frac{2x-5}{x+3} = 0$

$(2x-1)(x+3) - (x+4)(2x-5) = 0$

$2x^2+6x-x-3 - (2x^2-5x+8x-20) = 0$

$2x^2+5x-3-2x^2-3x+20-0$      $2x-17=0$

$x = \frac{17}{2}$

10.  $\frac{12x+1}{4} = \frac{15x-1}{5} + \frac{2x-5}{3x-1}$

$$\frac{12x+1}{4} = \frac{(15x-1)(3x-1)+5(2x-5)}{5(3x-1)}$$

$$\frac{12x+1}{4} = \frac{45x^2 - 15x - 3x + 1 + 10x - 25}{5(3x-1)}$$

$$(15x-5)(12x+1) = 4(45x^2 + 8x - 24)$$

$$180x^2 + 15x - 60x - 5 = 180x^2 + 32x - 96$$

$$-45x - 32x = -96 + 5 \quad -77x = -91$$

$$x = \frac{91}{77}$$

11.  $\frac{(x+2)(2x-3)-2x^2-16}{x-5} = 2$

$$\cancel{2x^2} - 3x + 4x - 6 - \cancel{2x^2} - 16 = 2(x-5)$$

$$x - 22 = 2x - 10 \quad x - 2x = -10 + 22$$

$$-x = 12 \quad x = -12$$

12.  $\frac{2y^2 - (2y+3)(y-1)}{3y-5} = \frac{-1}{2}$

$$2(2y^2 - 2y^2 + 2y - 3y + 3) = -(3y-5)$$

$$-y + 6 = -3y + 5 \quad -y + 3y = 5 - 6$$

$$2y = 7 \quad y = \frac{7}{2}$$

### Exercise = 8.6

1.  $1 : 3$   
 $3x - x = 50 \quad 2x = 50 \quad x = 25 \quad 25, 75$
2.  $7x + 8x = 90$   
 $15x = 90 \quad x = 6 \quad 42, 48$
3. Rahul age =  $5x$   
 Heena age =  $7x$   
 $\frac{5x+4}{7x+4} = \frac{3}{4} \quad 4(5x+4) = 3(7x+4) \quad 20x+16 = 21x+12 \quad 20x-21x = -16+12$   
 $-x = -4 \quad x = 4$   
 20 years and 28 years
4. Number =  $\frac{x}{x+8}$   
 $\frac{x+17}{x+8-1} = \frac{3}{2} \quad \frac{x+17}{x+7} = \frac{3}{2} \quad 2x+34 = 3x+21 \quad 2x-3x = -34+21$   
 $-x = -13 \quad x = 13$   
 Rational No. =  $\frac{13}{13+8} = \frac{13}{21}$
5. Fraction =  $\frac{x-3}{x}$   
 $\frac{x-3+2}{x+5} = \frac{1}{2} \quad 2(x-1) = x+5 \quad 2x-2 = x+5 \quad 2x-x = 5+2$   
 $x = 7 \quad \frac{7-3}{7} = \frac{4}{7}$
6. Vishal age =  $x$       Reema age =  $x+6$

$$\frac{x+6-7}{x-7} = \frac{8}{5} \quad 5(x-1) = 8(x-7) \quad 5x-5 = 8x-56 \quad 5x-8x = -56+5$$

$$-3x = -51 \quad x = \frac{-51}{-3} \quad x = 17 \quad 17-7 = 10 \quad 17+6-7 = 16$$

7.  $5x+10 \times 8 = 6 \times (x+10)$

$$5x+80 = 6x+60 \quad 5x-6x+60-80 \quad -x = -20 \text{ kg}$$

8.  $5x+5 \times 8 = 6 \times (x+5)$

$$5x+40 = 6x+30 \quad 5x-6x = 30-40 \quad -x = -10 \quad x = 10 \text{ litres}$$

### Chapter-9 Comparing Quantities

#### Exercise = 9.1

1. (i)  $35\% = \frac{35}{100} \times \frac{1}{20} = \frac{7}{20}$  (ii)  $4\frac{1}{8} = \frac{33}{8} = \left(\frac{33}{8} \times 100\right) \times \frac{1}{100} = \frac{825}{2}\%$

(iii)  $17\frac{1}{2}\% = \frac{35}{2} \times \frac{1}{100} = 0.175$  (iv)  $\frac{95}{10} = \frac{19}{2} \times 100 \times \frac{1}{100} = 950\%$

(v)  $5 : 8 = \left(\frac{5}{8} \times 100\right) \times \frac{1}{100} = \frac{125}{2} \times \frac{1}{100} = 62.5\%$

(vi)  $18\% = \frac{18}{100} = 9:50$

2. (i)  $\frac{96}{150} \times 100 = 32 \times 2 = 64\%$

(ii)  $5 \text{ kg} \times 1000 = 5000 \text{ gm} \quad \% = \frac{200}{5000} \times 100 = 4\%$

(iii)  $\% = \frac{250}{2 \times 1000} \times 100 = \frac{25}{2} = 12.5\%$

3. (i)  $x \times \frac{14}{100} = 63 \quad x = \frac{63 \times 100}{14} = 450$

(ii)  $\text{Amount} = \frac{62.50 \times 100^4 \times 2}{25} = 500 \text{ Rs}$

4.  $x = \frac{45 \times 150}{30} \quad x = 150$  5.  $\% = \frac{500}{2500} \times 100 = 20\%$

6.  $\% = \frac{80}{200} \times 100 = 40\%$

7. No. of apples =  $1200 \times \frac{25}{100} = 12 \times 25 = 300$

No. of oranges =  $1200 \times \frac{35}{100} = 12 \times 35 = 420$

No. of mangoes =  $40 \times \frac{1200}{100} = 40 \times 12 = 480$

$$8. \quad x = \frac{2800 \times 100^5}{20} = 2800 \times 5 = 14000 \text{ Rs}$$

$$9. \quad \begin{aligned} \text{B's income} &= \text{A's income} - \text{A's } 60\% \\ &= x - x \times \frac{60}{100} = \frac{5x - 3x}{5} = \frac{2}{5}x = \frac{2}{5}x \times 100 \times \frac{1}{100} = 40\% \text{ of A's income} \end{aligned}$$

10. Original price =  $x$

$$x + x \times \frac{20}{100} = 600 \quad \frac{5x + x}{5} = 600 \quad 6x = 600 \times 5 \quad x = 500 \text{ Rs}$$

$$11. \quad \text{Price} = 34000 + 34000 \times \frac{20}{100} = 34000 + 6800 = 40800 \text{ Rs}$$

12. Price =  $x$

$$x + x \times \frac{30}{100} = \frac{13}{10}x \quad \frac{13x}{10} - y = x \quad y = \frac{13x}{10} - x = \frac{13x - 10x}{10} = \frac{3x}{10}$$

$$\% = \frac{\frac{3x}{10}}{x} \times 100 = 30\%$$

$$13. \quad x = \frac{8756 \times 100^{20}}{55_{11}} = 796 \times 20 = 15920 \text{ votes}$$

### Exercise = 9.2

$$1. \quad \% \text{ Gain} = \frac{125}{750} \times 100 = \frac{50}{3} \%$$

$$2. \quad \text{Loss } \% = \frac{63}{1260} \times 100 = 5\%$$

$$3. \quad \% \text{ Gain} = \left( \frac{1}{4} \times 100 \right) \frac{1}{100} = 25\%$$

$$4. \quad \text{C.P. of 1} = x \quad \text{S.P. of 1} = y \quad 10x = 9y \quad y = \frac{10x}{9}$$

$$\text{gain} = \frac{10x}{9} - x = \frac{10x - 9x}{9} = \frac{x}{9} \quad \% \text{ gain} = \frac{\frac{x}{9}}{x} \times 100 = \frac{100}{9} \%$$

$$5. \quad \text{Let S.P. of 1 pen} = x \quad \text{Loss percent} = \frac{6}{144} \times 100 = \frac{100}{24} = \frac{25}{6} \%$$

$$6. \quad \text{S.P.} = 2400 + 2400 \times \frac{16}{100} = 2400 + 384 = 2784 \text{ Rs}$$

$$7. \quad \text{C.P.} = 1680 - \text{C.P.} \times \frac{20}{100}$$

$$x = 1680 - \frac{x}{5} \quad x + \frac{x}{5} = 1680 \quad 6x = 1680 \times 5 \quad x = 280 \times 5 \quad x = 1400 \text{ Rs}$$

$$8. \quad \text{C.P.} = 2123 - \text{C.P.} \times \frac{12}{100} \quad x = 2123 - x \times \frac{12}{100} \quad x + \frac{3x}{25} = 2123$$

$$\frac{28x}{25} = 2123 \quad x = \frac{2123 \times 25}{28} = \frac{53075}{28} = x = 1895.5 \text{ Rs}$$

$$10. \text{ C.P.} = x \quad \text{S.P.} = x + x \times \frac{5}{100} \quad \text{S.P.}_1 = \frac{21x}{20} \dots (1) \quad \text{S.P.}_2 = x - x \times \frac{8}{100}$$

$$\frac{21x}{20} - 490 = \frac{49x}{50} \quad \frac{105x - 98x}{100} = 490 \quad 7x = 49000 \quad x = 7000 \text{ Rs}$$

$$11. \text{ CP} = 170000 + 10,000 + 4000 = 184000 \quad \text{S.P} = 1,90,000 \quad \text{gain} = 6000 \text{ Rs}$$

$$\% \text{ gain} = \frac{6000}{184000} \times 100 = \frac{300}{92} = \frac{75}{23} \%$$

$$12. x = 14880 + x \times \frac{7}{100}$$

$$x - \frac{7x}{100} = 14880 \quad \frac{93x}{100} = 14880 \quad x = \frac{1488000}{93} \quad x = 16000 \text{ Rs}$$

$$\text{S.P.} = x + x \times \frac{5}{100} = 16000 + \frac{16000 \times 5}{100} = 16800$$

$$13. \text{ C.P. of 100 gm} = 54000 \text{ Rs}$$

$$\text{S.P.} = 54000 + 54000 \times \frac{10}{100} = 54000 + 5400 = 59400 \text{ Rs}$$

$$(i) 100 \text{ gm S.P.} = 59400$$

$$100 \text{ gm S.P.} = \frac{59400}{100} = 594 \text{ Rs}$$

$$10 \text{ gm S.P.} = 594 \times 10 = 5940 \text{ Rs}$$

$$15. \text{ C.P.} = 600000 \text{ Rs}$$

$$I \quad \text{C.P.} = \frac{1}{3} \times 600000 = 200000 \text{ Rs.}$$

$$\text{S.P.} = 200000 - 200000 \times \frac{20}{100} = 200000 - 40000 = 160000 \text{ Rs.}$$

$$II \quad \text{C.P.} = \frac{2}{3} \times 600000 = 400000 \text{ Rs.}$$

$$\text{S.P.} = 400000 + 400000 \times \frac{25}{100} = 400000 + 100000 = 500000 \text{ Rs.}$$

$$\text{Remaining land} = 160,000 \text{ Rs.}$$

$$\text{Total gain} = 60,000 - 40,000 = 20,000 \text{ Rs.}$$

$$\% \text{ gain} = \frac{20,000}{600000} \times 100 = \frac{10}{3} \%$$

$$\text{S.P.} = 160,000 + 160000 \times \frac{20}{3} = 160,000 + 1,066,666.6 \quad \text{S.P.} = 1,226,666.6 \text{ Rs.}$$

$$16. \text{ C.P. of I table} = x$$

$$\text{C.P. of II table} = 4320 - x$$

$$\text{I Table Profit} = x \times \frac{15}{100} = \frac{3x}{20}$$

$$\text{II Table Loss} = (4320 - x) \times \frac{9}{100} = \frac{3x}{20} = \frac{9}{100} (4320 - x)$$

$$5x = 12960 - 3x$$

$$8x = 12960 \text{ Rs}$$

$$x = 1620 \text{ Rs}$$

$$1620 \text{ Rs and } 2700 \text{ Rs}$$

$$17. \text{ S.P.} = x + x \times \frac{5}{100_{20}} \quad \text{S.P.} = \frac{21x}{20} \quad \text{C.P.} = \left( x - x \times \frac{5}{100_{20}} \right) = \frac{19x}{20} \quad \text{S.P.} = \frac{21x}{20} - 2$$

$$\frac{21x}{20} - 2 = \frac{19x}{20} + \frac{19x}{20} \times \frac{10}{100} \quad \frac{21x}{20} - \frac{19x}{20} - \frac{194}{200} = 2 \quad \frac{210x - 190x - 19x}{200} = 2$$

$$x = 2 \times 200 \quad x = 400 \text{ Rs.}$$

$$18. \text{ S.P.} = 24 \text{ Rs} \quad \text{C.P.} = ?$$

$$(i) \quad x = 24 + x \times \frac{20}{100_5} \quad x - \frac{x}{5} = 24 \quad 4x = 24 \times 5 \quad x = 30 \text{ Rs/kg}$$

$$(ii) \quad \text{Reduced rate} = 30 - 30 \times \frac{20}{100_5} = 24 \text{ Rs/kg}$$

$$19. \text{ C.P.} = (5000 + x) \text{ Rs.} \quad \text{S.P.} = 6720 \text{ Rs.}$$

$$\text{S.P.} = \text{C.P.} + \text{C.P.} \times \frac{12}{100_{25}}$$

$$6720 = (5000 + x) + (5000 + x) \times \frac{3}{25} \quad 6720 \times 25 = 125000 + 25x + 15000 + 3x$$

$$28x = 168000 - 140000 \quad 28x = 28000 \quad x = 1000 \text{ Rs.}$$

$$20. \text{ C.P.} = 200 \times 180 = 36000 \text{ Rs.} \quad \text{C.P. of 100 shirts} = 18000 \text{ Rs}$$

$$\text{S.P. of 100 shirts} = 18000 + 18000 \times \frac{10}{100} = 18000 + 1800 = 19800 \text{ Rs.}$$

$$\text{Gain} = 19800 - 18000 = 1,800 \text{ Rs.}$$

$$\text{Gain} = 15\% \quad 15 = \frac{x}{360} \times 100 \quad x = 15 \times 360 \quad x = 5400 \text{ Rs.}$$

$$\text{remaining gain} = 5,400 - 1,800 = 3600 \text{ Rs}$$

$$\text{S.P.} = 18000 + 3600 = 216000 \text{ Rs}$$

$$\text{Gain} = \frac{3600}{18000} \times 100 = 20\%$$

### Exercise = 9.3

$$1. (i) \text{ S.P.} = 240 - 240 \times \frac{15}{100_2} = 240 - 36 = 204 \text{ Rs}$$

$$(ii) \text{ S.P.} = 1500 - 1500 \times \frac{25}{2 \times 100} = 1500 - 187.5 = 1312.50 \text{ Rs}$$

$$2. (i) \quad 624 = x - x \times \frac{4}{100_{25}} \quad 624 = \frac{24}{25}x \quad x = \frac{625 \times 28}{24} = 26 \times 25 = 650 \text{ Rs}$$

$$(ii) \quad x - x \times \frac{10}{100_{10}} = 1080 \quad 9x = 10800 \quad x = 1200 \text{ Rs}$$

$$3. (i) \text{ Discount} = 625 \cdot 5 - 562 \cdot 95 = 62.55$$

$$\% = \frac{62.55}{625.50} \times 100 = 10\%$$

$$(ii) \text{ Discount} = 1600 - 1280 = 320 \text{ Rs}$$

$$\% = \frac{320}{1600} \times 100 = 20\%$$

$$4. \quad \text{M.P.} = x + x \times \frac{20}{100_5} = \frac{6x}{5} \quad \text{S.P.} = \frac{6x}{5} - \frac{6x}{5} \times \frac{19}{100} = \frac{60x - 6x}{50} = \frac{54x}{50}$$

$$\text{Gain} = \frac{54x}{58} - x = \frac{44}{50} \quad \% \text{ gain} = \frac{4x}{50} \times 100 = 8\%$$

$$5. \quad \text{M.P.} = x \quad \text{S.P.} = x - x \times \frac{20}{100_5} = \frac{4x}{5} \quad \text{Gain} = x - \frac{4x}{5} = \frac{x}{5}$$

$$\% \text{ gain} = \frac{\frac{x}{5}}{\frac{4x}{5}} \times 100 = 25\%$$

$$6. \quad \text{M.P.} = 850 \quad \text{S.P.} = 850 - 850 \times \frac{4}{100_2} = 850 - 34 = 816 \text{ Rs}$$

$$\text{C.P.} = x \quad 20 = \frac{816 - x}{x} \times 100 \quad x = 4080 - 5x \quad 6x = 4080 \quad x = 680 \text{ Rs}$$

$$7. \quad \text{S.P.} = 2200 + 2200 \times \frac{26}{100} = 2200 + 572 = 2772 \text{ Rs}$$

$$\text{M.P.} = \text{S.P.} + \text{M.P.} \times \frac{12}{100_{25}} \quad x = 27 + 72 + x \times \frac{3}{25} \quad 25x = 69300 + 3x$$

$$22x = 69300 \quad x = 3150 \text{ Rs}$$

$$8. \quad \% \text{ gain} = 25 \quad 25 = \frac{150}{x} \times 100 \quad x = \frac{150 \times 100}{25}$$

$$\text{C.P.} = x = 600 \text{ Rs} \quad \text{M.P.} = 600 + 600 \times \frac{20}{100_5} = 720 \text{ Rs}$$

$$9. \quad \text{C.P.} = x \quad \% \text{ gain} = 20$$

$$\text{S.P.} = x + x \times \frac{20}{100_5} = \frac{60}{5} \quad \text{S.P.} = \text{M.P.} - \text{M.P.} \times \frac{25}{100_4} \quad \text{S.P.} = \frac{3x}{4}$$

$$\% = \frac{\frac{x}{5}}{\frac{3x}{4}} \times 100 = 20\%$$

$$10. \quad \text{M.P.} = 12000 \text{ Rs} \quad \text{M.P.} = \text{C.P.} + \text{C.P.} \times \frac{25}{100_4} \quad 12000 = \frac{5}{4} \text{ C.P.}$$

$$\text{C.P.} = \frac{2400 - 12000 \times 4}{5} \quad \text{C.P.} = 9600 \text{ Rs} \quad \text{S.P.} = 12000 - 12000 \times \frac{10}{100} = 10800 \text{ Rs}$$

$$11. \quad \text{S.P.} = 5760 \text{ Rs} \quad \text{Dis} = 10\% \text{ \& } 20\% \quad \text{S.P.} = \text{M.P.} - \text{M.P.} \times \frac{20}{100_5}$$

$$5760 = \frac{4 \text{ M.P.}}{5} \quad \text{M.P.} = \frac{5760 \times 5}{4} \quad \text{M.P.} = 7200 \text{ Rs}$$

$$\text{M.P.} = 7200 + 7200 \times \frac{10}{100} = 7920 \text{ Rs}$$

$$\text{Let M.P.} = 100 \text{ Rs}$$

$$\text{I dis} = 10\% \quad \text{S.P.} = 100 - 10 = 90$$

$$\text{II dis} = 20 \quad \text{S.P.} = 90 - 10 \times \frac{90}{100} = 90 - 9 = 81$$

$$\text{eq. disct.} = 100 - 81 = 19\%$$

$$12. \text{ M.P.} = 500 \quad \text{S.P.} = 500 - 50 \times \frac{10}{100} = 450 \text{ Rs} \quad \text{C.P.} = ?$$

$$\text{S.P.} = \text{C.P.} + \text{C.P.} \times \frac{25}{100} \quad 450 = \frac{5 \text{ C.P.}}{4} \quad \text{C.P.} = \frac{450 \times 4}{5} = 360 \text{ Rs}$$

$$13. \text{ C.P.} = 880 \text{ Rs} \quad \text{S.P.} = 880 + 880 \times \frac{25}{100} = 1100 \text{ Rs}$$

$$\text{S.P.} = \text{M.P.} - \text{M.P.} \times \frac{12}{100} \quad 1100 = \frac{22}{25} \text{ M.P.} \quad \text{M.P.} = \frac{1100 \times 25}{22} = 1250 \text{ Rs}$$

$$14. \text{ C.P.} = x \text{ Rs} \quad \text{S.P.} = x + x \times \frac{10}{100} = \frac{11x}{10} \quad \text{S.P.} = \text{M.P.} - \text{M.P.} \times \frac{12}{100}$$

$$\frac{11x}{10} = \frac{22}{25} \text{ M.P.} \quad \text{M.P.} = \frac{11x \times 25}{22 \times 10} \quad \text{M.P.} = \frac{5}{4} x \quad \frac{5}{4} \text{ of its C.P.}$$

$$15. \text{ M.P.} = 4200 \text{ Rs} \quad \text{S.P.} = 4536 \quad \text{Tax} = 4536 - 4200 = 336 \text{ Rs}$$

$$\% = \frac{336}{4200} \times 100 = 8\%$$

$$16. \text{ C.P.} = 500 - 5 \times \frac{28}{100} + 15 = 515 - 140 = 375 \text{ Rs}$$

$$\text{Gain} = 20\% \quad 20 = \frac{\text{gain}}{375} \times 100 \quad \text{Gain} = 75 \text{ Rs}$$

$$\text{S.P.} = 375 + 75 = 450 \text{ Rs}$$

$$17. \text{ Total paid} = 450 + 450 \times \frac{7}{100} = 450 + 31.5 = 481.50 \text{ Rs}$$

$$18. 5400 = x + x \times \frac{8}{100} \quad 5400 = \frac{27x}{25} \quad x = \frac{5400 \times 25}{27} \quad x = 5000 \text{ Rs}$$

$$19. \% = \frac{160}{3200} \times 100 = 5\%$$

$$20. \text{ M.P.} = 35000 \text{ Rs dis} = 5\%$$

$$\text{S.P. paid} = 35000 - 35000 \times \frac{10}{100} = 31500 \text{ Rs}$$

$$\text{Paid} = 31500 + 31500 \times \frac{10}{100} = 31500 + 3150 = 34650 \text{ Rs}$$

#### Exercise = 9.4

$$1. \text{ P} = 40960 \text{ Rs} \quad \text{R} = \frac{25}{4}\% \quad n = 3 \text{ years} \quad A = P \left( 1 + \frac{R}{100} \right)^n$$

$$A = 40960 \left( 1 + \frac{25}{400} \right)^3 = 40960 \left( \frac{17}{10} \right)^3 = 40960 \times \frac{4913}{1000} = 49130 \text{ Rs}$$



2.  $P = 32000$  Rs       $R = 12.5\%$        $n = 3$   
 $A = P \left(1 + \frac{R}{100}\right)^n = 32000 \left(1 + \frac{12.5}{100}\right)^3 = 32000 \left(\frac{13}{8}\right)^3 = 32000 \times \frac{2197}{512} = 2197 \times 62.5$   
 $A = 137312.5$  Rs      C.I. =  $137312.5 - 32000 = 105312.5$  Rs
3.  $P = 32000$  Rs       $R = 2.5$        $n = 3$   
 $A = P \left(1 + \frac{R}{100}\right)^n = 32000 \left(1 + \frac{2.5}{100}\right)^3 = 32000 \times \left(\frac{41}{40}\right)^3 = 32000 \times \frac{68921}{64000}$   
 $A = 34460.5$  Rs      C.I. =  $34460.5 - 32000 = 2460.5$  Rs
4.  $A = P + 3200$        $A = P \left(1 + \frac{R}{100}\right)^n$        $P + 3200 = P \left(1 + \frac{R}{100}\right)^n$   
 $P + 3200 = P \times \left(\frac{26}{25}\right)^4$        $P + 3200 = \frac{456976P}{390625}$        $1.16P - P = 3200$   
 $0.16P = 3200$        $P = 20,000$  Rs  
 $A = P \left(1 + \frac{R}{100}\right)^n = 20,000 \left(1 + \frac{10}{100}\right)^4 = 20,000 \times \left(\frac{11}{10}\right)^4 = 20,000 \times \frac{14641}{10000}$   
 $A = 29282$  Rs      C.I. =  $29282 - 20,000 = 9282$  Rs
5. S.I. =  $\frac{\text{time} \times \text{rate} \times p}{100} = P = \frac{SI \times 100}{\text{time} \times \text{rate}} = \frac{1600 \times 4800 \times 100^4 \times 4}{3 \times 25}$        $P = 25600$  Rs  
 $A = P \left(1 + \frac{R}{100}\right)^n = 25600 \left(1 + \frac{25}{4 \times 100}\right)^3 = 25600 \times \frac{4913}{4096}$   
 $A = 30706.25$  Rs      C.I. =  $30706.25 - 25600 = 5106.25$  Rs
6. S.I. =  $\frac{\text{time} \times \text{rate} \times p}{100} = \frac{2 \times 10 \times 500}{100}$       S.I. = 1000 Rs  
 $A = P \left(1 + \frac{R}{100}\right)^n = 5000 \left(1 + \frac{10}{100}\right)^2 = 5000 \times \frac{121}{100} = 6050$  Rs  
C.I. =  $6050 - 5000 = 50$  Rs
7.  $A = P \left(1 + \frac{R}{100}\right)^n$        $2880 = 2000 \left(1 + \frac{R}{100}\right)^2$ ,  $\frac{2880}{2000} = \left(1 + \frac{R}{100}\right)^2$        $1 + \frac{R}{100} = (1.44)^{1/2}$   
 $1 + \frac{R}{100} = 1.2$        $\frac{R}{100} = 0.2$        $R = 20\%$
8.  $A = P \left(1 + \frac{R}{100}\right)^n$        $1852.20 = 1600 \left(1 + \frac{10}{100}\right)^n$        $1.1576 = \left(\frac{11}{10}\right)^n$   
 $(1.1)^n = (1.1)^{1.5}$        $n = 1.5$  years
9.  $A = 45582.25$  Rs,       $R = \frac{27}{4}\%$ ,       $n = 2$  years  
 $A = P \left(1 + \frac{R}{100}\right)^n$        $45582.25 = P \left(1 + \frac{27}{400}\right)^2$        $45582.25 = P \left(\frac{427}{400}\right)^2$   
 $P = \frac{45582.25 \times 160000}{182329}$        $P = 40,000$  Rs

10.  $A = 256 \left(1 + \frac{25}{200}\right)^1 = 256^{32} \times \frac{9}{8} = 32 \times 9 = 288 \text{ Rs}$
11.  $A = 8192 \left(1 + \frac{12.5}{1000}\right)^{3/2} = 8192 \times \left(\frac{9}{8}\right)^{3/2} = 8192 \times 1.19 \quad A = 9775.04 \text{ Rs}$
12.  $A = P \left(1 + \frac{4}{100_{25}}\right) \left(1 + \frac{5}{100_{20}}\right) \left(1 + \frac{10}{100}\right)$   
 $= \frac{26}{25} \times \frac{21}{20} \times \frac{11}{10} \times 80000^{400^5} \quad A = 48048 \text{ Rs}$
13.  $A = 7500 \left(1 + \frac{12}{100}\right)^{3/4} = 7500 \times \left(\frac{28}{25}\right)^{3/4} \quad A = 8165.34 \text{ Rs}$
14.  $A = P \left(1 + \frac{r}{100}\right)^n \quad 18522 = 16000 \left(1 + \frac{10}{100_{10}}\right)^n \quad \frac{18522}{16000} = \left(\frac{1.1}{10}\right)^n$   
 $(1.1)^n = (1.1)^{1.5} \quad n = 1.5 \text{ years}$
15.  $A = P \left(1 + \frac{R}{100}\right)^n \quad A = 20000 \left(1 + \frac{5}{100_{20}}\right)^{23} = 20000 \left(\frac{21}{20}\right)^{23}$   
 $= 20000 \times 3.071 \quad A = 61430.4$
16.  $A = 40,000 \left(1 + \frac{20}{100}\right) \left(1 - \frac{20}{100}\right) \left(1 + \frac{20}{100}\right) \quad A = 40,000 + 40000^{8000} \times \frac{20}{100_5}$   
 $A = 48000 \quad A = 48000 - 48000 \times \frac{20}{100} = 48000 - 9600 \quad A = 38400$   
 $A = 38400 + 38400^{7680} \times \frac{20}{100_5} = 38400 + 7680 \quad A = 46080$
17.  $P = 160000 \text{ Rs} \quad R = 10\%$   
 (i)  $A = P \left(1 + \frac{R}{100}\right)^n = 160000 \left(1 + \frac{10}{100_{10}}\right)^1 = 160000 \times \frac{11}{10}$   
 $A = 176000 \text{ Rs}$   
 (ii)  $A = 160000 \left(1 + \frac{10}{100_{10}}\right)^2 = 160000 \times \frac{11}{10} \times \frac{11}{10} = 1600 \times 121$   
 $A = 193600 \text{ Rs}$

### Exercise = 9.5

1. Time =  
 $\frac{1}{20}$  part in = 1 day  $1 \text{ part in} = \frac{20}{1} \text{ days} = 20 \text{ days}$
2.  $\frac{1}{10} + \frac{1}{15} = \frac{3+2}{30} = \frac{5}{30} = \frac{1}{6}$  in 6 days
3.  $A + B = \frac{1}{15} \quad A = \frac{1}{15} \quad B = (A + B) - A = \frac{1}{15} - \frac{1}{20} = \frac{4-3}{60} = \frac{1}{60}$   
 B's days = 60 days

4. A's work =  $4 \times 5 = 20$        $A = \frac{1}{20}$   
 B's work =  $5 \times 6 = 30$        $B = \frac{1}{30}$   
 $A + B = \frac{1}{20} + \frac{1}{30} = \frac{3+2}{60} = \frac{5}{60} = \frac{1}{12}$  = 12 days
5.  $A + B = \frac{1}{12}$ ,  $B = \frac{1}{30}$        $A = (A + B) - B = \frac{1}{12} - \frac{1}{30} = \frac{5-2}{60} = \frac{3}{60} = \frac{1}{20}$   
 $A = \frac{1}{20} = 20$  days
6.  $A = \frac{1}{25}$ ,  $B = \frac{1}{20}$        $A + B = \frac{1}{5}$        $B = \frac{1}{5} - \frac{1}{25} = \frac{5-1}{25} = \frac{4}{25}$        $B = \frac{25}{4}$  days
7.  $A + B = \frac{1}{12}$ ,  $B + C = \frac{1}{15}$ ,  $D + C = \frac{1}{20}$        $2(A + B + C) = \frac{1}{2} + \frac{1}{15} + \frac{1}{20}$   
 $2(A + B + C) = \frac{5+4+3}{60} = \frac{12}{60} = \frac{1}{5}$        $A + B + C = \frac{1}{10} = 10$  days  
 $A = (A + B + C) - (B + C) = \frac{1}{10} - \frac{1}{10} = \frac{3-2}{30} = \frac{1}{30}$        $A = 30$  days  
 $B = (A + B + C) - (A + C) = \frac{1}{10} - \frac{1}{20} = \frac{2-1}{20} = \frac{1}{20}$        $B = 20$  days  
 $C = (A + B + C) - (B + C) = \frac{1}{10} - \frac{1}{12} = \frac{6-5}{60} = \frac{1}{60}$   
 $C = 60$  days
8.  $A + B + C = \frac{1}{4}$        $A = \frac{1}{15}$ ,  $B = \frac{1}{10}$ ,  $C = ?$        $A + B = \frac{1}{15} + \frac{1}{10} = \frac{3+2}{30} = \frac{5}{30} = \frac{1}{6}$   
 $A + B = \frac{1}{6}$        $C = (A + B + C) - (A + B) = \frac{1}{4} - \frac{1}{6} = \frac{6-4}{24} = \frac{2}{24} = \frac{1}{12}$  = 12 days
9. Time =  $\frac{1}{4} + \frac{1}{6} = \frac{6+4}{24} = \frac{10}{24}$        $\frac{12}{5}$  hrs =  $2\frac{2}{5}$  hrs
10.  $\frac{1}{8} + \frac{1}{12} = \frac{3+2}{24} = \frac{5}{24}$        $\frac{24}{5}$  hrs =  $4\frac{4}{5}$  hrs
11.  $A = \frac{1}{3}$ ,  $A + B = \frac{1}{4}$ ,  $B = ?$   
 $B = (A + B) - A = \frac{1}{4} - \frac{1}{3} = \frac{3-4}{12} = \frac{1}{12}$  = 12 hrs
12.  $A = \frac{1}{8}$ ,  $B = \frac{1}{12}$        $A + B = \frac{1}{8} + \frac{1}{12} = \frac{3+2}{24} = \frac{5}{24} = \frac{24}{5}$  hrs
13.  $A = \frac{1}{6}$ ,  $B = \frac{1}{8}$        $(A + B)_1 = \frac{1}{2}$        $A + B = \frac{4+3}{24} = \frac{7}{24}$   
 $B = \frac{7}{24} + \frac{1}{2} = \frac{12-7}{24} = \frac{5}{24}$   
 $\frac{24}{5}$  hrs =  $4\frac{4}{5}$  hrs

## Chapter-10 Direct and Inverse Proportion

### Exercise = 10.1

1. (i)  $\frac{x}{y} = \frac{3}{18_6} = \frac{5}{30_6} = \frac{7}{42_6} = \frac{8}{48_6} = \frac{12}{72_6} = \frac{1}{2}$  constant yes
- (ii)  $\frac{x}{y} = \frac{1}{8} = \frac{6}{48_8} = \frac{7}{56_8} = \frac{12}{96_8} = \frac{20}{160_8} = \frac{22}{176_8} = \frac{1}{8}$  constant yes
- (iii)  $\frac{x}{y} = \frac{9}{18_2} = \frac{10}{20_2} = \frac{15}{30_2} = \frac{30}{60_2} = \frac{40}{80_2} = \frac{80}{160_2} = \frac{100}{200_2} = \frac{1}{2}$  constant yes
- (iv)  $\frac{x}{y} = \frac{3}{10} = \frac{6^3}{20_{10}} = \frac{12^3}{40_{10}} \neq \frac{24}{100} \neq \frac{50}{150} \neq \frac{60}{100} \neq \frac{100}{300}$  No

2. (i)  $\frac{5}{10_3} = \frac{x_1}{30_{15}}$  |  $\frac{12}{24_2} = \frac{16}{y_1}$   
 $x_1 = 15$  |  $y_1 = 2 \times 16$   
 $\frac{5}{10} = \frac{x_2}{120_{60}}$  |  $y_1 = 32$   
 $x_2 = 60$
- (ii)  $\frac{2}{8_4} = \frac{x_1}{32_8}$  |  $x_1 = 8$   
 $\frac{2}{8_4} = \frac{16}{y_1}$  |  $y_1 = 4 \times 16 = 64$
- (iii)  $\frac{2}{5} = \frac{6^3}{y_1}$  |  $\frac{2}{5} = \frac{x_1}{17.5_{3.5}}$   
 $y_1 = 15$  |  $x_1 = 7$
- (iv)  $\frac{2}{y_1} = \frac{3}{36_{12}}$  |  $\frac{3}{36_{12}} = \frac{x_1}{84_7}$   
 $y_1 = 24$  |  $x_1 = 7$   
 $\frac{1}{12} = \frac{25}{y_2}$  |  $\frac{1}{12} = \frac{x_2}{1440_{120}}$   
 $y_2 = 300$  |  $x_2 = 120$
- (v)  $\frac{x_1}{9_3} = \frac{8}{24_3}$  |  $\frac{5}{y_1} = \frac{1}{3}$   
 $x_1 = 3$  |  $y_1 = 15$   
 $\frac{1}{3} = \frac{12}{y_2}$  |  $\frac{1}{3} = \frac{2y}{y_3}$   
 $y_2 = 36$  |  $y_3 = 72$   
 $\frac{1}{2} = \frac{x_2}{90}$  |  $\frac{1}{2} = \frac{x_3}{120}$   
 $x_2 = 180^{45}$  |  $x_3 = 60$

3. 72 books in = 4 cartons      1 books in =  $\frac{4}{72}$       540 books in =  $540 \times \frac{1}{18} = 30$
4. Cost of 8 meters cloth = 250 Rs      Cost of 1 meters =  $\frac{250}{8}$   
 Cost of 5.8 meters =  $\frac{250}{8} \times 5.8 = 181.25$  Rs
5. 5 days paid = 1200 Rs  
 1 days paid =  $\frac{1200}{5} = 240$  Rs      24 days paid =  $24 \times 240 = 5760$  Rs
6. 15 km charges = 675 Rs      675 Rs travel = 150 km      1 Rs travel =  $\frac{150}{675}$  km  
 1512 Rs travel =  $\frac{150}{675} \times 1512 = 336$  km
7. 5 person's quantity = 95 kg      1 person's quantity =  $\frac{95}{5}$   
 23 person's quantity =  $23 \times 19 = 437$  kg
8. 36 chairs prepared in = 8 days      1 chair prepared in =  $\frac{8}{36}$   
 27 chairs prepared in =  $27 \times \frac{2}{9} = 6$  days
9. 100 runs in = 25 overs      1 run in =  $\frac{25}{100} = \frac{1}{4}$   
 180 runs in =  $180 \times \frac{1}{4} = 45$  overs
10. 5.6m high pole shadow = 3.2 m  
 1 m high pole shadow =  $\frac{3.2}{5.6}$  m = 0.57 m  
 (i) 10.5 m high pole shadow =  $10.5 \times 0.57 = 6$  m  
 (ii) 3.2 m shadow = 5.6 m  
 1 m shadow =  $\frac{5.6}{3.2} = 1.75$   
 5m shadow =  $5 \times 1.75 = 8.75$  m
11. Actual length =  $\frac{5}{50000} = 10^{-9}$  m  
 50,000 times attains length = 5cm  
 1 times attains length =  $\frac{5}{50000} = \frac{1}{10000}$   
 20,000 times attains length =  $\frac{1}{10000} \times 20000^2 = 2$  m

### Exercise = 10.2

1. (i)  $x y = 4 \times 16 = 8 \times 8 = 16 \times 4 = 32 \times 2 = 64 \times 1 = 64$  constant, yes

- (ii)  $x y \neq \text{constant}$  No
- (iii)  $x y = 4 \times 6 = 3 \times 8 = 4 \cdot 8 \times 5 = 2 \times 12 = 24 \times 1 = 24$  constant yes
- (iv)  $x y = 9 \times 5 = 10 \times 4 \cdot 5 = 12 \times 3 \cdot 75 = 15 \times 3 = 45$  constant yes
- (v)  $x y \neq \text{constant}$  No
2. (i)  $50 \times 2 = 25 \times y_2$
- $$y_2 = \frac{50^2 \times 2}{25} = 4 \quad 100 = x_1 \times 10 \quad x_1 = 10 \quad y_2 \times 20 = 100$$
- $$y_2 = 5 \quad 100x_2 = 100 \quad x_2 = 1$$
- (ii)  $8 \times 15 = x_1 \times 12$
- $$x_1 = \frac{8^2 \times 15^5}{12^3} = 10 \quad 4y_1 = 8 \times 15 \quad y_1 = 30$$
- (iii)  $18x_1 = 3 \times 12$
- $$x_1 = \frac{3 \times 12^2}{18^3} = 2 \quad 4y_1 = 3 \times 12^3 \quad y_1 = 9 \quad 6x_2 = 3 \times 12^2$$
- $$x_2 = 6$$
3. Distance =  $4 \times 60 = 240$  km
- $$\text{Time} = \frac{\text{distance}}{\text{speed}} = \frac{240^6}{40} = 6 \text{ hrs}$$
4. Days =  $\frac{360^{12} \times 20}{250} = 24$  days
5. No. of books =  $\frac{8 \times 7 \cdot 50}{10} = 0 \cdot 8 \times 7 \cdot 50 = 6$  books
6. Days =  $\frac{35 \times 160}{28} = \frac{5600}{28} = 200$  days
7. Time =  $\frac{20 \times 780}{800} = \frac{15600}{800} = 19.5$  hrs
8. 64 scouts = 7 days      1 scout =  $\frac{7}{64}$  days      8 scouts =  $\frac{7}{64} \times 8$
- $$56 \text{ scouts} = \frac{7}{64} \times 56^7 = \frac{49}{8} \text{ days}$$
9.  $\frac{80}{800} \times \frac{750^{50}}{50} = 5$  days
10. Distance =  $4 \times \frac{45^3}{60^{15}} = 3$  km
- $$\text{Speed} = \frac{3 \times 60^{12}}{35^{11}} = \frac{36}{11} = 3 \frac{3}{11} \text{ km/h}$$
11. Distance =  $12 \times 45 = 540$  km.
- $$45 + x = \frac{540}{10} \quad x = 54 - 45 \quad x = 9 \text{ km/h}$$
12. (i) Time =  $3 \times 2 = 6$  days
- (ii) 6 persons

## Chapter-11 Understanding Quadrilaterals

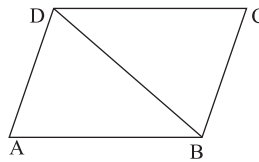
### Exercise = 11.1

1. (i) Four  
(AB, BC), (BC, CD), (CD, AD), (AD, AB)
- (ii) Two, (AB, CD) & (AD, BC)
- (iii) Four ( $\angle A, \angle B$ ), ( $\angle B, \angle C$ ), ( $\angle C, \angle D$ ), ( $\angle D, \angle A$ )
- (iv) Two, ( $\angle A, \angle C$ ) and ( $\angle B, \angle D$ )
2. Fourth angle =  $360 - (105 + 35 + 70) = 360 - 210 = 150^\circ$
3.  $x + x + 125 + 93 = 360$   
 $2x = 360 - 218 \quad 2x = 142 \quad x = 71^\circ$
4.  $x + 2x + 3x + 4x = 360$   
 $10x = 360 \quad x = 36 \quad 36^\circ, 72^\circ, 108^\circ, 144^\circ$
5.  $x + 75 + 75 + 75 = 360$   
 $x = 360 - 225 \quad x = 135^\circ$
6.  $\angle A + \angle B + \angle C + \angle D = 360$   
 $\angle A + \angle B + 100 + 60 = 360$   
 $\angle A + \angle B = 360 - 160$   
 $\angle A + \angle B = 200$   
In  $\triangle APB$   $\frac{\angle A}{2} + \frac{\angle B}{2} + \angle P = 180 \quad \frac{\angle A + \angle B}{2} + \angle APB = 180, \frac{200}{2} + \angle APB = 180$   
 $\angle APB = 180 - 100 \quad \angle APB = 80^\circ$
7.  $\frac{(2x-4) \times 90}{2x} = \frac{3}{4} \quad 4(2x-4) = 3(2x-2)$   
 $8x - 16 = 6x - 6 \quad 8x - 6x = 16 - 6 \quad 2x = 10 \quad x = 5 \quad 5, 10$
8. (i) Sum of angles =  $(2x-4)90 = (2 \times 3 - 4)90 = 2 \times 90 = 180$
- (ii) Sum of angles =  $(2 \times 5 - 4)90 = 6 \times 90 = 540$
- (iii) Sum of angles =  $(2 \times 9 - 4)90 = 14 \times 90 = 1260$
- (iv) Sum of angles =  $(2 \times 12 - 4)90 = 20 \times 90 = 1800$
- (v) Sum of angles =  $(2x-4) \times 90 = (x-2) \times 180$
9. (i)  $10x = 360 \quad x = 36$
- (ii)  $12x = 360 \quad x = 30$
- (iii)  $20x = 360 \quad x = 18$
10. (i)  $\frac{2 \times 12 - 4}{12} \times 90 = \frac{4(6-1)}{12} \times 90 = 5 \times 30 = 150$
- (ii)  $\frac{2 \times 9 - 4}{9} \times 90 = 14 \times 10 = 140$
- (iii)  $\frac{2 \times 18 - 4}{18} \times 90 = 32 \times 5 = 160$

11.  $\frac{(2x-4)}{x} \times 90^5 = 144^8$   
 $10x - 20 = 8x \quad 10x - 8x = 20 \quad 2x = 20 \quad x = 10$
12. (i)  $x + 130 + 80 + 70 = 360 \quad x = 360 - 280 \quad x = 80$   
(ii)  $90 + 150 + 2y + y = 360$   
 $3y = 360 - 240 \quad 3y = 120 \quad y = 40 \quad 40^\circ, 80^\circ$   
(iii)  $72 + 30 + y + 25 = 360$   
 $y = 360 - 127 \quad y = 233$
13. (i)  $x + 80 = 180$   
 $x = 180 - 80 = 100 \quad z + 40 = 180 \quad z = 180 - 40 \quad z = 140$   
 $60 + y = 180 \quad y = 180 - 60 \quad y = 120$   
 $x + y + z = 100 + 140 + 120 = 360^\circ$   
(ii)  $a + 130 = 180$   
 $a = 50 \quad d = 180 - 50 = 130 \quad a + b + c + d = 50 + 50 + 130 + 130 = 360^\circ$
14. (i)  $x + 135 + 85 = 360 \quad x = 360 - 220 \quad x = 140^\circ$   
(ii)  $50 + 90^\circ + 110 + 4 = 360 \quad x = 360 - 250 \quad x = 110^\circ$

### Exercise = 11.2

1. (i) Yes, opposite angles equal. (ii) Yes, opposite angles equal.  
(iii) No (iv) Yes opposite sides equal.
2.  $\angle A + \angle B + \angle C + \angle D = 360$   
 $60 + x + x + 60 = 360 \quad 2x = 360 - 120 \quad 2x = 140 \quad x = 70$   
 $70^\circ, 70^\circ, 60^\circ$
3.  $2x + 3x = 180$   
 $5x = 180 \quad x = 36 \quad 72^\circ, 72^\circ, 108^\circ, 108^\circ$
4.  $x + x + (x + 10) + (x + 10) = 80$   
 $4x + 20 = 80 \quad 4x = 60 \quad x = 15 \quad 15m, 25m$
5.  $x + 3x + 7x + 9x = 360$   
 $20x = 360 \quad x = 18$   
(i)  $18^\circ, 54^\circ, 126^\circ, 162^\circ$  (ii) Yes (iii) No
6.  $2(4x - 15) + 2(5x - 3) = 360$   
 $8x - 30 + 10x - 6 = 360$   
 $18x = 360 + 36 \quad 18x = 396 \quad x = \frac{396}{18} \quad x = 22$   
 $4x - 15 = 4 \times 22 - 15 = 88 - 15 = 73 \quad 5x - 3 = 5 \times 22 - 3 = 110 - 3 = 107$   
 $73^\circ, 73^\circ, 107^\circ, 107^\circ$
7.  $\angle A = \angle C$   
 $\angle B = \angle D$   
In  $\triangle ABC$  and  $\triangle BCD$   
 $\angle A = \angle C \quad BD = BD$   
 $\angle B = \angle D \quad \triangle ABD = \triangle BCD$





- $AB = CD$        $AD = BC$        $ABCD$  is 11  
 8.  $AD = DE$        $BC = CE$        $AD = BC$        $CD = CE + ED$   
 $CD = AB$        $AB = CE + ED = BC + AD$        $AB = AO + AD$   
 $AB = 2 AD$

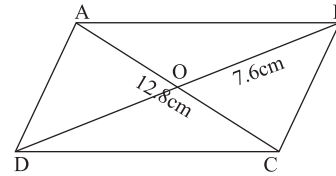
9. NO, diagonals of 11<sup>gm</sup> bisect each other.

10.  $AC = OA + OC$

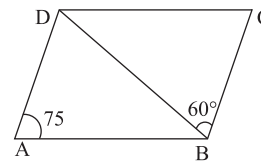
$$AC = 20 C$$

$$OC = AC/2 = \frac{12.8 - 8^{6.4}}{2} = 6.4 \text{ cm}$$

$$OD = \frac{BD}{2} = \frac{7.6}{2} = 3.8 \text{ cm}$$



11. (i)  $\angle CDB = ?$   
 (ii)  $\angle ADB = \angle CBD$   
 $\angle ADB = 60^\circ$   
 $\angle CDB = 180 - 60 - 75 = 180 - 135 = 45^\circ$



12. (ii)  $\angle BCD = \angle BAD = 35^\circ + 40^\circ = 75^\circ$

(iii)  $\angle ACB = 40$

(i)  $\angle ABD = ?$

$$2 \times 75 + \angle A + \angle C = 360 \quad \angle A + \angle A = 360 - 150 \quad 2 \angle A = 210$$

$$\angle A = 105 \quad \angle ABD = \frac{160}{2} = 80^\circ$$

(iv)  $\angle CBD = 25$

13.  $\angle A = \angle C$

$$\angle B = \angle D \quad AE \text{ bisects } \angle C \quad \angle DAE = \angle EAF \quad CE \text{ bisects } \angle C \quad \angle BCF = \angle FCE$$

$$\therefore \angle F = \angle C \quad \angle DAE = \angle BCF \quad \angle EAF = \angle FCE$$

$$\therefore AE \parallel CF$$

14.  $x = y$

$$x + y + 50 + 50 = 360 \quad 2x + 100 = 360 \quad 2x = 260 \quad x = 130$$

$$y = 130 \quad z + 150 = 180 \quad z = 180 - 50 \quad z = 130$$

15.  $AC = 16\text{cm}$ ,  $DB = 12\text{cm}$ ,  $CD = 6\text{cm}$

$$ED = \frac{1}{2} \times BD = \frac{12}{2} = 6 \text{ cm} \quad CE = \frac{1}{2} \times AC = \frac{1}{2} \times 16 = 8 \text{ cm}$$

$$\text{Perimeter of } \triangle ECD = 6 + 8 + 6 = 20\text{cm}$$

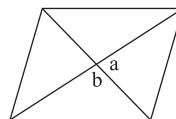
### Exercise = 11.3

1. (i) False, (ii) True, (iii) True, (iv) True, (v) True, (vi) True, (vii) False, (viii) True, (ix) True, (x) True.

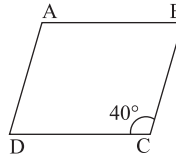
2.  $\text{Side}^2 = 4^2 + 3^2$   
 $= 16 + 9$   
 $= 25$

$$\text{Side} = 5 \text{ cm}$$

$$\text{Perimeter} = 4 \times 5 = 20\text{cm}$$



3.  $\angle DAC = \angle ACD = 40^\circ$   
 $\angle ABC + \angle ADC + 40 + 40 = 360$   
 $2 \angle ABC = 360 - 80$   
 $2 \angle ABC = 280$   
 $\angle ABC = 140^\circ$



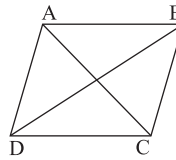
4. (i)  $OB \neq OD$   
(ii)  $BC = CD$  True  
(iii)  $BC = CD$        $OB = OD$        $OC = OC$        $\triangle BOC \cong \triangle DOC$   
(iv)  $\angle BCO = \angle DCO$  True

5.  $AB = BC = CD = AD$   
 $= AC$

In  $\triangle ABC$

$$AB = BC = AC$$

In  $\triangle ABC$  is isosceles each angle  $60^\circ$



6.  $AB = 10\text{cm}$ ,  $BD = 16\text{cm}$        $OB = \frac{BD}{2} = \frac{16}{2} = 8\text{cm}$

In  $\triangle AOB$

$$AB^2 = OA^2 + OB^2$$

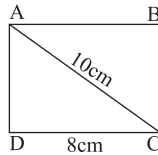
$$OA^2 = AB^2 - OB^2 = 10^2 - 8^2 = 100 - 64 = 36$$

$$OA = 6\text{cm}$$

$$AC = 2 OA = 2 \times 6$$

$$AC = 12\text{cm}$$

7.  $AB^2 + BC^2 = AC^2$   
 $BC^2 = AC^2 - AB^2$   
 $= 10^2 - 8^2$   
 $= 100 - 64 = 36$

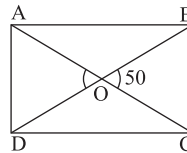


$$BC = 6\text{cm}$$

Breadth = 6cm

8.  $\angle OAB = 40$   
(i)  $\angle ACB = 90 - 40 = 50$   
(ii)  $\angle ABO = 40$   
(iii)  $\angle COD = ?$   
 $\angle AOB = 180 - 40 - 40 = 100$   
 $\angle COD = \angle AOB$   
(iv)  $2 \angle BOC = 360 - 100 - 100 = 160$   
 $\angle BOC = 80$

9.  $\angle AOD = 50$   
 $OA = OD$   
 $\angle OAD = \angle ODA$   
 $\angle OAD + \angle ODA + \angle AOD = 180$   
 $2 \angle OAD = 180 - 50 = 130$   
 $\angle OAD = 65^\circ$





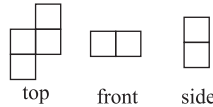
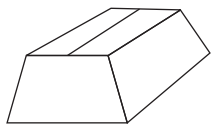
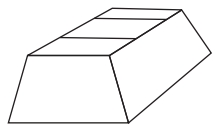
10. (i) Rectangle      (ii) Square      (iii) Rhombus  
(iv) Rhombus      (v) Square      (vi) Rectangle

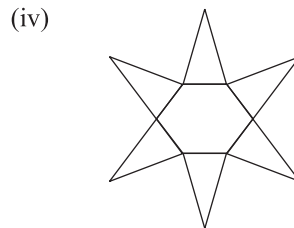
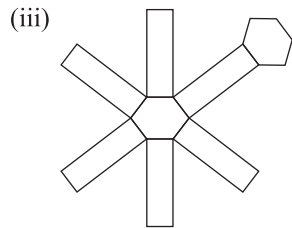
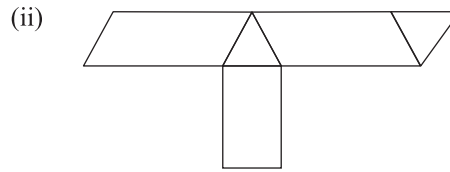
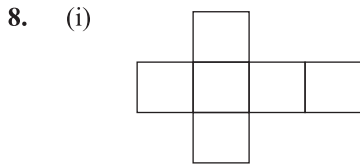
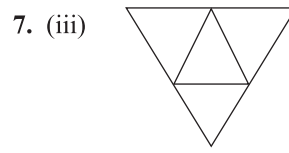
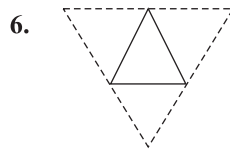
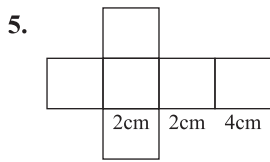
## Chapter-12 Visualising Solid Shapes

### Exercise = 12.1

1. (i) 6      (ii) 6      (iii) 5      (iv) 5      (v) 4
2. (i) 2      (ii) 8      (iii) 12      (iv) 9
3. (i) 8      (ii) 5      (iii) 4      (iv) 6
4.  $E = 30, v = 20$   
 $v + f - E = 2$        $20 + f - 30 = 2$        $f - 10 = 2$        $f = 10 + 2 = 12$
5.  $f = 20, v = 12$   
 $v + f - E = 2$        $12 + 20 - E = 2$        $32 - 2 = E$        $E = 30$
6. (i)  $V + f - E = 2$   
 $6 + f - 12 = 2$        $f = 2 + 6$        $f = 8$   
 (ii)  $5 + V - 9 = 2$   
 $V = 2 + 4 = 6$   
 (iii)  $20 + 12 - E = 2$   
 $32 - 2 = E$        $E = 30$
7. For cube  
 $f = 6, E = 12, V = 8$   
 $V + f - E = 8 + 6 + 12 = 14 - 12 = 2$   
 = RHS Proved
8.  $f = 10, E = 20, V = 15$   
 $V + f - E = 15 + 10 - 20 = 25 - 20 = 5 \neq 2$       No
9. (i)  $f = 4 + n + 1, V = 4 + n + 1$   
 $E = 2n + 8$   
 $V + f - E = n + 5 + n + 5 - 2n - 8$   
 $= 2n + 10 - 8 - 2n = 2 = \text{RHS}$   
 (ii)  $F = x + 1, V = x + 1, E = 2x$   
 $V + f - E = x + 1 + x + 1 - 2x$   
 $= 2x + 2 - 2x = 2 = \text{RHS}$

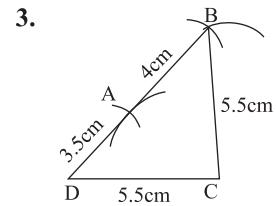
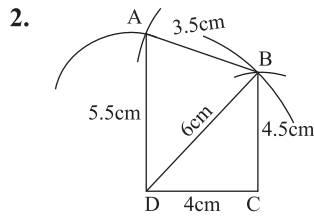
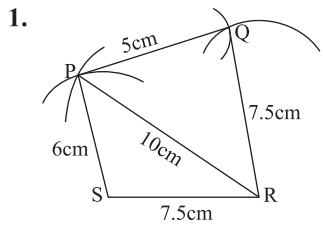
### Exercise = 12.2

1. (i)  (ii)  (iii) 
2. (i)  (ii) 
3. (i) (a) side      (b) front      (c) top  
 (ii) (a) top      (b) side      (c) front
4. (i) top      (ii) back      (iii) right side  
 (iv) left side      (vi) front

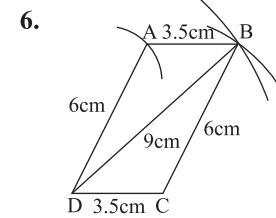
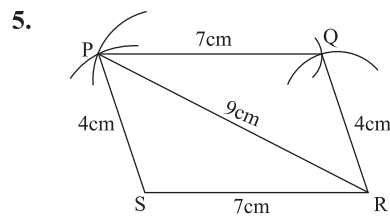


**Chapter-13 Constructions**

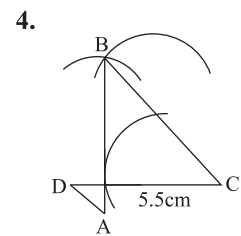
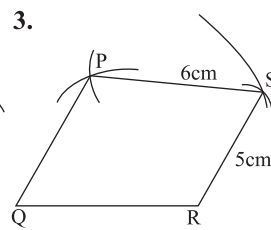
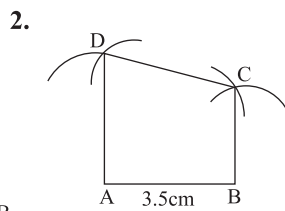
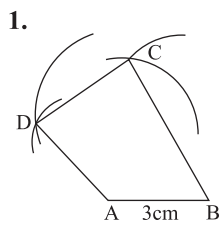
**Exercise = 13.1**



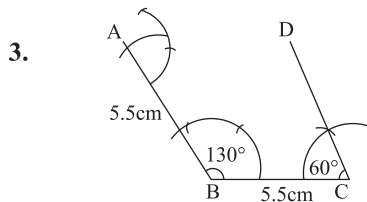
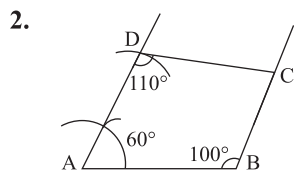
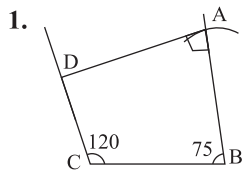
4. Do it yourself.



**Exercise = 13.2**

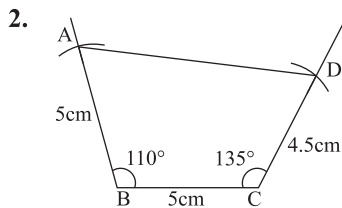
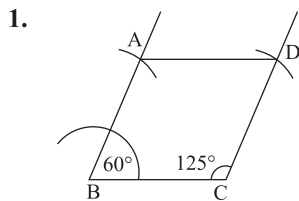


**Exercise = 13.3**



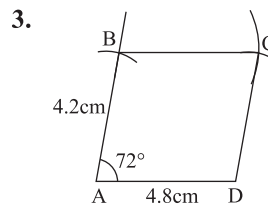
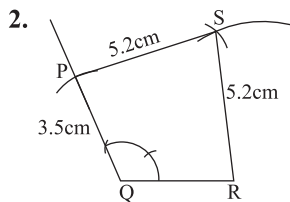
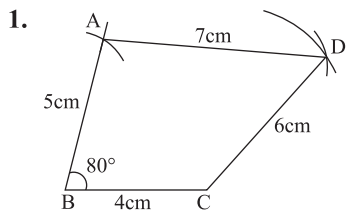
4. Do yourself.

**Exercise = 13.4**



3. Do yourself.

**Exercise = 13.5**



**Exercise = 13.6**

Do yourself.

**Chapter-14 Perimeter and Area**

**Exercise = 14.1**

- Area = length  $\times$  breadth  
 $1152 = x \times 2x$        $3x = 1152$        $x = 384$       384cm, 768cm
- Area =  $\frac{62475}{85} = 735m^2$   
 $5x \times 3x = 735$        $x^2 = \frac{735}{5 \times 3}$        $x^2 = 49$        $x = 7$   
 Perimeter =  $2(5 \times 7 + 3 \times 7) = 2(35 + 21) = 112$  m
- Area =  $\frac{1}{2} \times diagonal^2 = \frac{1}{2} \times 2 \times 2 = 2$  cm<sup>2</sup>  
 side<sup>2</sup> + side<sup>2</sup> = diagonal<sup>2</sup>  
 area = side<sup>2</sup> =  $\frac{1}{2} \times diagonal$

4. Area =  $60 \times 30 - (2 \times 44 + 2 \times 44) = 1800 - 176 = 1624 \text{ m}^2$

5. No of tiles =  $\frac{10 \times 7}{0.5^2} = \frac{70}{0.25} = 280$

6. Breadth =  $\sqrt{25^2 - 24^2} = \sqrt{625 - 576} = \sqrt{49} = 7$   
 Area =  $7 \times 24 = 168 \text{ m}^2$

7. Area =  $\frac{1}{2} \times 24^2 = \frac{1}{2} \times 24 \times 24 = 12 \times 24 = 288 \text{ m}^2$

8.  $2880 = 120 \times ST$  ST = 24 cm  
 $PT^2 = SP^2 - ST^2 = 26^2 - 24^2 = 676 - 576 = 100$  PT = 10cm

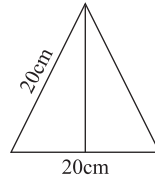
9. area = base  $\times$  height  
 $243 = 3x \times x$   $3x^2 = 243$   $x^2 = 81$   $x = 9 \text{ cm}, 27 \text{ cm}$

10. Area =  $20 \times 18 = 360 \text{ cm}^2$   
 $360 = 15 \times x$   $x = \frac{360}{15} = 24 \text{ cm}$

11. Area =  $\frac{1}{2} \times 350 \times 180 = 31500 \text{ cm}^2$  Cost =  $250 \times 31500 = 7875000$

12. Area =  $\frac{6210}{2160} = 13.5$  Area =  $\frac{1}{2} \times \text{height} \times \text{base}$   
 $13.5 = \frac{1}{2} \times x \times 3x$   $27 = 3x^2$   $x^2 = 9$   $x = 3 \text{ Hectare}$   
 altitude = 300m base = 900m

13.  $H^2 = 20^2 - 10^2$   
 $= 400 - 100 = 300$   
 $H = 17.32 \text{ cm}$   
 Area =  $\frac{1}{2} \times 20 \times 17.32$   
 $= 173.2 \text{ cm}^2$



14.  $2r_1 = 440$   
 $r_1 = \frac{440}{2} = 220 \text{ m}$

Perimeter =  $2\pi r_2 = 2 \times \frac{22}{7} \times 77 = 22 \times 22$

Cost =  $484 \times 2 = 968 \text{ Rs}$

15. Area of path =  $\pi r^2 - \pi r'^2$   
 $= \pi[(24.5)^2 - (21)^2] = 3.14 (600.25 - 441) = 3.14 \times 159.25 = 500.05$   
 Cost =  $10 \times 500.05 = 5000.5 \text{ Rs}$

16. AD = 6cm  
 AB = BC = CD = 2cm  
 Area of shaded region =  $\frac{1}{2} \pi \times 6^2 + \frac{1}{2} \pi \times 2^2 - \frac{1}{2} \pi \times 4^2 = 18\pi + 2\pi - 8\pi$   
 $= 12\pi = 12 \times 3.14 = 37.68 \text{ cm}^2$

17. (i) Perimeter =  $\frac{1}{2} \times 2 \pi r + 2 \cdot 8$   
 $= 3.14 \times 1.4 + 2.8 = 4.396 = 7.196 \text{ cm}$

(ii) Perimeter =  $4 \times 2.8 + \frac{1}{2} \times 2 \times 3.14 \times 1.4$   
 $= 11.2 + 4.396 = 15.596 \text{ cm}$

(iii) Perimeter =  $3.14 \times 1.4 + 2 + 2$   
 $= 4.396 + 4 = 8.396$

for (ii) path

18. Length of  $5M^2 = 25^2 - 15^2 = 625 - 225 = 400$

$SM = 20 \text{ cm}$        $SP^2 = 25^2 - 15^2 = 625 - 225 = 400$        $SP = 20 \text{ cm}$

Area of PQRS =  $\frac{1}{2} \times 20^{10} \times 15 + \frac{1}{2} \times 20^{10} \times 30 = 150 + 300 = 450 \text{ cm}^2$

### Exercise = 14.2

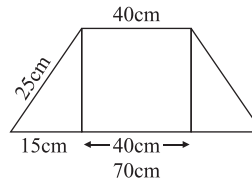
1. Area =  $\frac{1}{2} \times (85 + 63) \times 36^{18} = 148 \times 18 = 2664 \text{ m}^2$

2.  $1586 = \frac{1}{2} \times 26^{13} \times (84 + x)$

$84 + x \geq 122$        $x = 122 - 84$        $x = 38 \text{ cm}$

3. Altitude =  $\sqrt{25^2 - 15^2}$   
 $= \sqrt{625 - 225}$   
 $= \sqrt{400}$   
 $= 20 \text{ cm}$

Area =  $\frac{1}{2} \times 20^{10} \times (40 + 70) = 10 \times 110 = 1100 \text{ cm}^2$



4.  $480 \frac{1}{2} \times (48 + 72) \times h$        $h = \frac{480^8 \times 2}{120_{60}}$        $h = 8 \text{ cm}$

5.  $760 = \frac{1}{2} \times 16^8 \times (5x + 3x)$

$8x = \frac{760^{95}}{8}$        $x = 11.875$        $5 \times 11.875 = 59.375 \text{ cm}$        $3 \times 11.875 = 35.625 \text{ cm}$

6.  $4 \cdot 2 = \frac{1}{2} \times 2 \cdot 8^{1.4} \times \text{sum of lengths}$       Sum of sides =  $\frac{4 \cdot 2}{1.4} = 3$

7.  $28^2 = h^2 + x^2$

$h^2 = 784 - x^2$

$30^2 = h^2 + (26 - x)^2$

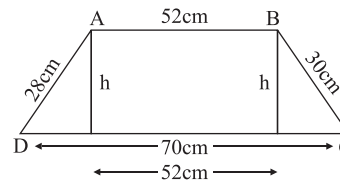
$h^2 = 900 - (26 - x)^2$

$784 - x^2 = 900 - 676 - x^2 + 52x$

$784 - 224 = 52x$        $52x = 560$

$x = 10.77$

$h^2 = 784 - 115.9$



$$h^2 = 668$$

$$h = 25.84 \text{ cm}$$

$$\text{Area} = \frac{1}{2} \times 25.84 \times (78 + 52) = 12.92 \times 130 = 1679.6 \text{ cm}^2$$

8.  $14^2 = h^2 + x^2$

$$h^2 = 196 - x^2$$

$$13^2 = h^2 + (15 - x)^2$$

$$h^2 = 169 - 225 - x^2 + 30x$$

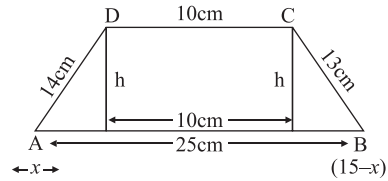
$$h^2 = -56 - x^2 + 30x$$

$$196 - x^2 = -56 - x^2 + 30x$$

$$252 = 30x \quad x = 8.4 \text{ cm}$$

$$h^2 = 196 - 70 \cdot 56 = 125.44 \quad h = 11.2 \text{ cm}$$

$$\text{Area} = \frac{1}{2} \times (10 + 25) \times 11.2 = 35 \times 5.6 = 196 \text{ cm}^2$$



9. Area of  $\square ABCD = \frac{1}{2} \times 14 \cdot 2 \times 31 + \frac{1}{2} \times 14 \cdot 2 \times 4 \cdot 5$

$$= 7 \cdot 1 \times 3 \cdot 1 + 7 \cdot 1 \times 4 \cdot 5 = 22 \cdot 01 + 31 \cdot 95 = 53.96 \text{ cm}^2$$

10.  $35^7 = \frac{1}{2} \times 10^5 \times (5 + 4) \quad x = 7 - 5 \quad x = 2 \text{ cm}$

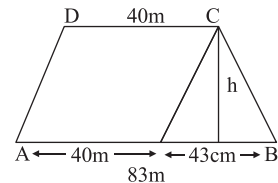
11.  $180^{30} = \frac{1}{2} \times 12^6 \times (x + 2x) \quad 3x = 30 \quad x = 10 \quad 10 \text{ cm}, 20 \text{ cm}$

12.  $2337 = \frac{1}{2} \times (40 + 83) \times h$

$$2337 \times 2 = 123 \times h \quad \frac{4674}{123} = h \quad h = 38 \text{ m}$$

(i) Area =  $\frac{1}{2} \times 38 \times 43 = 19 \times 43 = 817 \text{ m}^2$

(ii) Area =  $40 \times 38 = 1520 \text{ m}^2$



13.  $72^8 = \frac{1}{2} \times 9 \times x \quad x = 8 \times 2 = 16 \text{ cm}$

16.  $\Delta = \frac{1}{2} \times 13 \times 21 = \frac{273}{2} \text{ cm}^2$

$$\frac{273}{2} = \frac{1}{2} \times 14^7 \times x \quad x = \frac{273}{2 \times 7} \quad x = 19.5 \text{ cm}$$

17. Area =  $30 \times 16 = 480 \text{ m}^2 \quad \text{Cost} = 2 \times 480 = 960 \text{ Rs}$

18. Area =  $64 \times 16 \quad \text{side}^2 = 64 \times 16 \quad \text{side} = 8 \times 4 = 32 \text{ m}$

### Exercise = 14.3

1. Area =  $\frac{1}{2} \times 15 \times 30^{15} + \frac{1}{2} \times 20^{10} \times 60 +$

$$\frac{1}{2} \times (30 + 60) \times 70^{35} + \frac{1}{2} \times (20^{25} + 30) \times 45 + \frac{1}{2} \times (60^{30} \times 40 + \frac{1}{2} \times 30^{15} \times 20$$

$$= 225 + 600 + 3150 + 1125 + 1200 + 300 = 6600 \text{ m}^2$$



2. Area =  $\frac{1}{2} \times 30 \times 100 + \frac{1}{2} \times 35 \times 100^{50} + \frac{1}{2} \times 100^{50} \times 54 = 35 \times 50 + 50 \times 54$   
 $= 1750 + 2700 = 4450 \text{ m}^2$
3. Area =  $11 \times 4 + \frac{1}{2} (4 + 11) \times 4 + \frac{1}{2} \times (4 + 11) \times 4$   
 $= 44 + 4 \times 15 = 44 + 60 = 104 \text{ m}^2$
4. Area =  $\frac{1}{2} \times 25 \times 16^8 + 25 \times 25 = 200 + 625 = 825 \text{ m}^2$
5. Area =  $\frac{1}{2} \times (11 + 5) \times 4^2 + \frac{1}{2} \times (11 + 5) \times 4^2$   
 $= 16 \times 2 + 2 \times 16 = 32 + 32 = 64 \text{ m}^2$
6. Area =  $\frac{1}{2} \times (4 + 11) \times 4^2 + 4 \times 11 + \frac{1}{2} \times (4 + 11) \times 4^2$   
 $= 15 \times 2 + 44 + 15 \times 2 = 104 \text{ m}^2$

### Chapter-15 Surface Area and Volume

#### Exercise = 15.1

1. (i) S.A. =  $2(lb + bh + hl)$   
 $= 2(10 \times 12 + 12 \times 14 + 14 \times 10) = 2(120 + 168 + 140) = 2 \times 428 = 856 \text{ cm}^2$   
(ii) S.A. =  $2(3 \cdot 2 \times 30 + 30 \times 2 \cdot 5 + 2 \cdot 5 \times 3 \cdot 2) = 2(96 + 75 + 8) = 2 \times 179 = 350 \text{ m}^2$
2. S.A. =  $11 \times 8 + 2(8 \times 5 + 5 \times 11) = 88 + 2(40 + 55) = 88 + 2 \times 95 = 88 + 190 = 278 \text{ m}^2$
3. S. A. =  $12 \times 8 + 2(5 \times 8 + 5 \times 12) = 96 + 2(40 + 60) = 96 + 200 = 296$   
Cost =  $296 \times 3 \cdot 50 = 1036 \text{ Rs}$
4.  $2(5x \times 3x + 3x \times x + x \times 5x) = 414^{207} = 15x^2 + 3x^2 + 5x^2 = 207$   
 $23x^2 = 207 \quad x^2 = 9 \quad x = 3 \quad 3\text{m}, 9\text{m}, 15\text{m}$
5.  $2(lh + bh) = 51$   
 $2(5h + 3 \cdot 5h) = 51 \quad 2 \times 8 \cdot 5h = 51 \quad h = \frac{51}{2 \times 8 \cdot 5} \quad h = 3,$
6. S.A. =  $lb + 2(bh + hl)$   
 $= 20 \times 15 + 2(15 \times 4 + 4 \times 20) = 300 + 2(60 + 80)$   
 $= 300 + 2 \times 140 = 300 + 280 = 580 \text{ m}^2$   
Cost =  $12 \times 500 = 6960 \text{ Rs}$
7. Length of pole =  $\sqrt{10^2 + 10^2 + 5^2} = \sqrt{100 + 100 + 25} = \sqrt{225} = 15 \text{ m}$
8. (i) S.A. =  $6 \times 10^2 = 6 \times 100 = 600 \text{ cm}^2$   
L.S.A. =  $4 \times 10^2 = 4 \times 100 = 400 \text{ cm}^2$   
(ii) S.A. =  $6 \times 25^2 = 6 \times 625 = 375 \text{ cm}^2$   
 $\angle$  S.A. =  $4 \times 625 = 2500 \text{ cm}^2$
9. S.A. =  $6 \times 14^2 = 6 \times 196 = 1176 \text{ cm}^2$   
L.S.A. =  $4 \times 14^2 = 4 \times 196 = 784 \text{ cm}^2$

10. S.A. =  $0.75 \times 2 + 2(0.75 \times 1.2 + 1.2 \times 2)$   
 $= 1.5 + 2(0.9 + 2.4) = 1.5 + 2 \times 3.3 = 1.5 + 6.6 = 8.1 \text{ m}^2$
11. Area =  $6 \text{ side}^2$      $600 = 6 \text{ side}^2$      $100 = \text{side}^2$     side = 10 cm
12. S.A. =  $2(15 \times 15 + 15 \times 30 + 30 \times 15)$   
 $= 2(225 + 450 + 450) = 2 \times 1125 = 2250 \text{ m}^2$

### Exercise = 15.2

1. (i) C.S. =  $2\pi rh = 2 \times \frac{22}{7} \times 7 \times 9 = 396 \text{ cm}^2$   
Area of base =  $\pi r^2 = \frac{22}{7} \times 7 \times 7 = 154 \text{ cm}^2$   
T.S. =  $2\pi r(x+r) = 2 \times \frac{22}{7} \times 7(9+7) = 44 \times 16 = 704 \text{ cm}^2$
- (ii) C.S. =  $2 \times \frac{22}{7} \times 24^2 \times 10 = 880 \text{ cm}^2$   
Area of base =  $\frac{22}{7} \times 14^2 \times 14 = 616 \text{ cm}^2$   
T.S. =  $2 \times \frac{22}{7} \times 14^2 (10+14) = 88 \times 140 = 12320 \text{ cm}^2$
- (iii) C.S. =  $2 \times \frac{22}{7} \times 21^3 \times 5 = 660 \text{ cm}^2$   
Area of base =  $\frac{22}{7} \times 21^2 \times 21 = 1386 \text{ cm}^2$   
T.S. =  $2 \times \frac{22}{7} \times 21^3 (5+21) = 132 \times 26 = 3432 \text{ cm}^2$
- (iv) C.S. =  $2 \times \frac{22}{7} \times \frac{21^3}{2} \times 16^8 = 1056 \text{ cm}^2$   
Area of base =  $\frac{22^{11}}{7} \times \frac{21^3}{2} \times \frac{21}{2} = \frac{693}{2} \text{ cm}^2$   
T.S. =  $2 \times \frac{22}{7} \times \frac{21^3}{2} \left( \frac{21}{2} = 16 \right) = 66^{33} \times \frac{53}{2} = 1749 \text{ cm}^2$
2. C.S. =  $2\pi rh = 2 \times \frac{22}{7} \times 20 \times 14^2 = 1760 \text{ cm}^2$
3.  $4.4 = 2 \times \frac{22}{7} \times 0.7^{0.1} \times h$      $h = \frac{4.4}{440_{10} \times 0.1}$      $h = 1,$
4. C.S. =  $2 \times 3.14 \times 5 \times 10 = 314 \text{ cm}^2$
5. S.A. of roller =  $2 \times 42^6 \times \frac{22}{7} \times 120 = 31680 \text{ cm}^2$   
S.A. of ground =  $31680 \times 500 = 15840000 \text{ cm}^2 = 158400 \text{ m}^2$
6.  $2\pi r = 220 \text{ cm}, h = 2 \text{ m}$   
S.A. =  $2\pi rh = 220 \times 200 = 44000 \text{ cm}^2$
7. T.S.A. =  $2\pi r(h+r) = 2 \times 3.14 \times 10(30+10) = 2512 \text{ cm}^2$

$$8. \quad \text{T.S.A.} = 2 \times \frac{22}{7} \times 35^5 (35 + 50) = 220 \times 85 = 18700 \text{ cm}^2$$

$$9. \quad \text{S.A.} = 2 \times 3 \cdot 14 \times \frac{1}{2} \times 4 \cdot 2 = 13 \cdot 188 \text{ m}^2$$

$$\text{Cost} = 15 \times 13 \cdot 188 = 197 \cdot 82 \text{ Rs}$$

$$10. \quad 2\pi r(h+r) = 660$$

$$2 \times \frac{22}{7} \times 3(h+5) = 660 \quad h+5=21 \quad h=21-5 \quad h=16 \text{ cm}$$

$$11. \quad 2\pi r = 44$$

$$2 \times \frac{22}{7} \times r = 44 \quad r = 7 \text{ cm} \quad 2\pi rh = 2816 \quad 44 \times h = 2816 \quad h = 64 \text{ cm}$$

$$12. \quad \text{T.S.A.} = 2\pi r_1 h + 2\pi r_2 h$$

$$= 2 \times 3 \cdot 14 \times 2 \cdot 5 \times 50 + 2 \times 3 \cdot 14 \times 3 \times 50 = 314 \times 5 \cdot 5 = 1727$$

$$\text{Cost} = 1727 \times 50 = 86350 \text{ paise} = 863 \cdot 5 \text{ Rs}$$

$$13. \quad \text{S.A.} = 2\pi h(r_1 + r_2)$$

$$= 2 \times 3 \cdot 14 \times 20 \cdot (25 + 0 \cdot 24) = 125 \cdot 6 \times 0 \cdot 49 = 61 \cdot 544 \text{ m}^2$$

### Exercise = 15.3

$$1. \quad \text{(i) volume} = 5 \times 6 \times 8 = 240 \text{ cm}^3 \quad \text{(ii) } l = \frac{240^{12}}{10 \times 2} = 12 \text{ cm}$$

$$\text{(iii) } b = \frac{2105^{819}}{9 \times 5} = 9 \text{ cm} \quad \text{(iv) } n = \frac{320}{10 \times 5} = \frac{32}{5} \text{ cm}$$

$$2. \quad \text{Side}^3 = \text{volume}$$

$$\text{Side} = 27000^{1/3} = 30 \text{ cm}$$

$$3. \quad \text{Volume} = 60 \times 8 = 480 \text{ cm}^3$$

$$4. \quad \text{Volume} = l b h \quad h = \frac{1680^{847}}{20 \times 12} = 7 \text{ cm}$$

$$5. \quad \text{side}^3 = 5^3 + 4^3 + 3^3 = 125 + 64 + 27 = 216$$

$$\text{side} = 6 \text{ cm}$$

$$6. \quad \text{No of bricks} = \frac{2500^{625} \times 60^3 \times 200^{25}}{20 \times 12_4 \times 8} = 15625$$

$$7. \quad 12^3 = 15 \times 18 \times h$$

$$h = \frac{12^4 \times 12^4 \times 12^2}{15_5 \times 18_3} = \frac{32}{5} = 6 \cdot 4 \text{ cm}$$

$$8. \quad \text{Volume}_1 = x^3 = v_1 \quad \text{If, side} = 2x$$

$$\text{volume } v_2 = (2x)^3 = 8x^3 \quad v_2 = 8V_1$$

$$\text{If side} = \frac{x}{2} \quad V_3 = \left(\frac{x}{2}\right)^3 = \frac{1}{8}x^3 = \frac{V_1}{8} \quad V_3 = \frac{V_2}{8}$$

$$\text{If side} = 3x \quad V_4 = (3x)^3 = 27x^3 \quad V_4 = V_1 \cdot 27$$

$$9. \quad \text{Volume of brick} = 14 \times 9 \cdot 5 \times 6 = 798 \text{ cm}^3$$

10. Volume of soil =  $10 \times 7.5 \times 8 = 600 \text{ m}^3$

$$50 \times 80 \times h = 600 \quad h = \frac{600}{50 \times 80} = 0.15 \text{ m} = 15 \text{ cm}$$

11. Time =  $\frac{108000000}{60000} = \frac{10800}{6} = 1800 \text{ mint} = 30 \text{ hrs}$

12. Volume =  $60 \times 45 \times 32 = 86400 \text{ cm}^3$

13. Volume =  $135 \times 108 \times 90 - 132.5 \times 105.5 \times 87.5$   
 $= 1312200 - 1223140.625 = 89059.375 \text{ cm}^3$

14. Volume =  $\frac{80000000}{0.05} = 4000000 \text{ liter} = 4000 \text{ kl}$

15.  $2\pi r = 176$

$$r = \frac{176}{2 \times 22} \times 7 = 28 \quad \text{volume} = \pi r^2 h = \frac{22}{7} \times 28^2 \times 28 \times 65 = 160160 \text{ cm}^3$$

16.  $V = 5632 \quad \pi r^2 h = 5632$

$$\frac{22}{7} \times 8 \times 8 \times h = 5632 \quad h = \frac{5632 \times 7}{22 \times 8 \times 8} = \frac{39424}{1408} = h = 28 \text{ cm}$$

17.  $R = 20 \text{ cm}, \quad h = 14 \text{ cm}$

$$V = \pi r^2 h = \frac{22}{7} \times 20 \times 20 \times 14 = 17600 \text{ cm}^3$$

18. Volume =  $\pi r^2 h = 0.5 = \frac{22}{7} \times 3.5 \times 3.5 \times 16 = 616 \text{ m}^3$

Total area =  $25 \times 16 = 400 \text{ m}^2$

Area of well =  $\pi r^2 = \frac{22}{7} \times 3.5^2 = 38.5 \text{ m}^2$

Area =  $400 - 38.5 = 361.5 \text{ m}^2$

Height =  $\frac{616}{361.5} = 1.70$

19. (i) Volume =  $70 \times 44 \times 0.1 = 308 \text{ m}^3$

(ii)  $V = \pi r^2 h \quad h = \frac{V}{\pi r^2} = \frac{308 \times 7}{22 \times 14^2 \times 14} \quad h = 0.5 \text{ m}$

20. Volume =  $\pi(r_1^2 - r_2^2)h$

$$= \frac{22}{7} (10^2 - 9^2) \times 8 = \frac{22}{7} \times 19 \times 8 = 477.714 \text{ cm}^3$$

21. Volume =  $\pi(r_1^2 - r_2^2)h$

$$= \frac{22}{7} (5 \cdot 5^2 - 4^2) \times 49 = 22 \times 14 \cdot 25 \times 7 = 2194.5 \text{ cm}^3$$

Total weight =  $12 \times 2194.5 = 26334 \text{ kg}$

22.  $V = \pi(r_1^2 - r_2^2)h$

$$748 = \frac{22}{7} (9^2 - r_2^2) \times 14 \cdot 2 \quad 81 - r_2^2 = \frac{748}{44} \quad r_2^2 = 81 - 17 \quad r_2^2 = 64$$

$$r_2 = 8 \quad d = r_1 - r_2 = 9 - 8 \quad d = 1 \text{ cm}$$

$$\begin{aligned}
23. \quad 2\pi rh &= 264, & \pi r^2 h &= 924 \\
2 \times \frac{22}{7} rh &= 264 & \frac{22}{7} r^2 h &= 924 \\
rh &= \frac{264 \times 7}{2 \times 22} & r^2 h &= \frac{924 \times 7}{22} \\
rh &= 42 & r \cdot rh &= 294 \\
7 \times h &= 42 & r \times 42 &= 294 \\
h &= \frac{42}{7} & r &= \frac{294}{42} \\
h &= 6 \text{ cm} & r &= 7 \text{ cm}
\end{aligned}$$

$$\begin{aligned}
24. \quad h &= 7 \times 30 \times 60 = 12600 \text{ m} \\
r &= 0.75 \text{ cm} = 0.0075 \text{ m} \\
V &= \pi r^2 h = 3.14 \times 0.0075^2 \times 12600 = 2.225 \text{ m}^3
\end{aligned}$$

### Chapter-16 Data Handling

#### Exercise = 16.1

1.

Income	3000 – 3500	3500 – 4000	4000 – 4500	4500 – 5000	5000 – 5500
Frequency	11	6	2	2	4

$$\begin{aligned}
\frac{3000+3500}{2} &= 3250 & \frac{3500+4000}{2} &= 3750 & \frac{4000+4500}{2} &= 4250 \\
\frac{4500+5000}{2} &= 4750 & \frac{5000+5500}{2} &= 5250
\end{aligned}$$

2.

Weight	45-45	45-50	50-55	55-60	60-65
Frequency	5	7	11	7	5

3.

Temp	5 - 6	6 - 7	7 - 8	8 - 9	9 - 10	10 - 11	11 - 12	12 - 13
Frequency	3	2	6	5	5	4	3	3

minimum = 5.5°C

maximum = 12.5°C

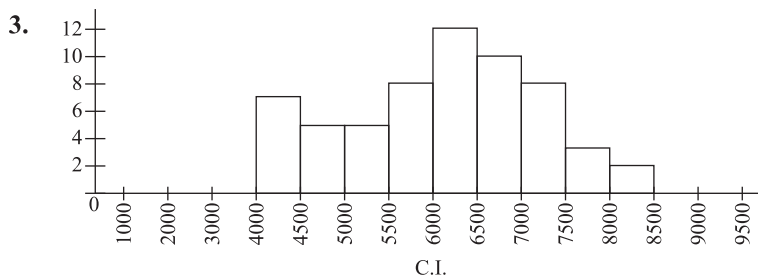
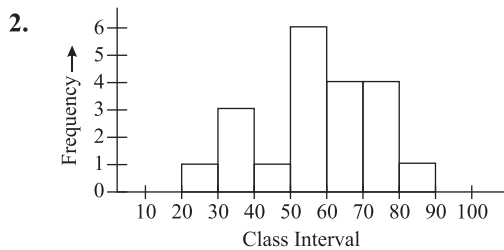
4. (i) rainfall during week (ii) rainfall in mm  
 (iii) Thursday (iv) Saturday  
 (v) Tuesday and Sunday (vi) Yes
5. (i) Class (vi), 55  
 (ii) ix  
 (iii) 10 : 11  
 (iv) 5  
 (v) 40

**Exercise = 16.2**

1.

No. of teachers	No. of schools
20 – 30	3
30 – 40	4
40 – 50	10
50 – 60	6
60 – 70	8
70 – 80	14

- (i) 10, (ii) 28, (iii) 20-30, (iv)  $\frac{70+80}{2} = 75$



4. (i)  $2 + 3 + 4 + 6 + 10 = 25$  matches (ii) 18 matches  
(iii) 10 matches

5. (i) 21 depicts the age of 26 teachers of a school.  
(ii) 3 (iii) 2 (iv) 45-50 (v) 35-40  
(vi) 5 (vii) 22.5, 27.5, 32.5, 37.5, 42.5, 47.5, 52.5 (viii) 6

**Exercise = 16.3**

1. (i) walking (ii) Bus

(iii) No. of students =  $\frac{90 \times 1200^{300}}{360} = 300$

2. (i)  $900 = \frac{45 \times x}{360}$   $x = 7200$

(ii) on hockey =  $\frac{100 \times 1200^{20}}{360} = 160 \times 20 = 3200$

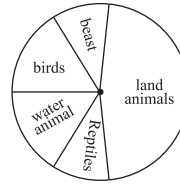
$$3. \quad \% \text{ of beast} = \frac{150}{900} \times 100 = 16.66\%$$

$$\% \text{ of other land animals} = \frac{400}{900} \times 100 = 44.4\%$$

$$\% \text{ of birds} = \frac{175}{900} \times 100 = 19.4\%$$

$$\% \text{ of water animals} = \frac{125}{900} \times 100 = 13.88\%$$

$$\% \text{ of Reptiles} = \frac{50}{900} \times 100 = 5.55\%$$



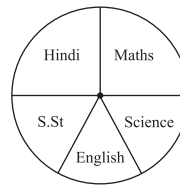
$$4. \quad \% \text{ of English} = \frac{105}{540} \times 100 = 19.44\%$$

$$\% \text{ of Hindi} = \frac{75}{540} \times 100 = 13.8\%$$

$$\% \text{ of Maths} = \frac{150}{540} \times 100 = 27.77\%$$

$$\% \text{ of Science} = \frac{120}{540} \times 100 = 22.22\%$$

$$\% \text{ of S.St} = \frac{90}{540} \times 100 = 16.66\%$$



$$5. \quad (a) \quad \text{Less than 2 hrs} = \frac{144}{240} = 3 : 5 \quad \text{More than 4 hrs} = \frac{36}{240} = 3 : 20$$

$$\text{More than 2 hrs} = \frac{60}{240} = 1 : 4$$

(b) 60

(c)  $144 + 60 + 36 = 240$

(d)  $\text{Less than 2 hrs} = \frac{144}{240} \times 100 = \frac{3}{5} \times 100 = 60\%$

$$\text{More than 4 hrs} = \frac{36}{240} \times 100 = \frac{3}{20} \times 100 = 15\%$$

$$\text{More than 2} = \frac{60}{240} \times 100 = 25\%$$

### Exercise = 16.4

1. Total possible out comes = 120

Favorable cases = 56

$$P(E) = \frac{56}{120} = \frac{7}{15}$$

2. Total possible out comes = 130

Favourable case =  $130 - 75 = 55$

$$P(E) = \frac{55}{130} = \frac{11}{26}$$

3. Total cases = 55

Favorable cases = 31

$$P(E) = \frac{31}{55}$$

4. For two coins  
 Total No. exhaustive cases = 36  
 Favorable case = 1 (HH)

$$P(E) = \frac{1}{36}$$

5. Total cases = 5  
 Favorable cases = 1

$$P(E) = \frac{1}{5}$$

6. Total = 360  
 Favorable = 150

$$P(E) = \frac{150}{360} = \frac{5}{12}$$

7. Total cases = 6

- (i) Prime numbers — 1, 2, 3, 5

$$P(E) = \frac{3}{6} = \frac{1}{2}$$

- (ii) Composite No — 4

$$P(E) = \frac{2}{6} = \frac{1}{3}$$

- (iii) Greater than 2 — 3, 4, 5, 6

$$P(E) = \frac{4}{6} = \frac{2}{3}$$

- (iv)  $P(E) = 1 - \frac{2}{3} = \frac{1}{3}$

8. Total No. of cases = 36  
 Favorable cases = (4, 6), (6, 4), (5, 5)

$$P(E) = \frac{3}{36} = \frac{1}{12}$$

9. Total = 360  
 Favorable =  $3 \times 72 = 216$

$$P(E) = \frac{216}{360} = \frac{3}{5}$$

10. (i) Total cases = 6  
 Favourite cases = 1

$$P(E) = \frac{1}{6}$$

- (ii) Favourite cases = 1

$$P(E) = \frac{1}{6}$$

- (iii) Consonant — C, H, N, C = 4

$$P(E) = \frac{4}{6} = \frac{2}{3}$$

- (iv)  $P(E) = \frac{5}{6}$



11. Total cases = 52

(i) red cards = 26       $P(E) = \frac{26}{52} = \frac{1}{2}$

(ii) No. of hearts = 13       $P(E) = \frac{13}{52} = \frac{1}{4}$

(iii) NO. of queen = 4       $P(E) = \frac{4}{52} = \frac{1}{13}$

(iv) black jack = 2       $P(E) = \frac{2}{52} = \frac{1}{26}$

12. Total No.'s = 10

(i)  $P(E) = \frac{1}{10}$

(ii) less than 5—1, 2, 3, 4       $P(E) = \frac{4}{10} = \frac{2}{5}$

(iii) greater than 4—5, 6, 7, 8, 9, 10       $P(E) = \frac{6}{10} = \frac{3}{5}$

(iv) 1 digit No's —1, 2, 3, 4, 5, 6, 7, 8, 9       $P(E) = \frac{9}{10}$