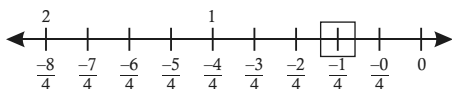


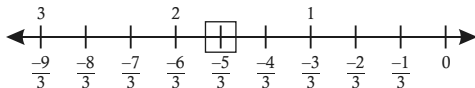
Chapter - 1

Exercise - 1.1

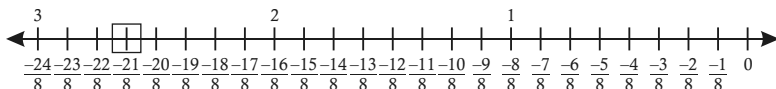
1. (a) $-\frac{1}{4}$



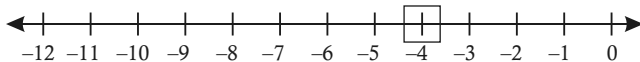
(b) $-\frac{5}{3}$



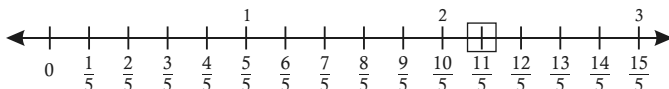
(c) $-2\frac{5}{8} = -\frac{21}{8}$



(d) -4



(e) $2\frac{1}{5} = \frac{11}{5}$



Exercise - 1.2

1. Write the properties of addition that are satisfied by following statements:

- Closure property of addition
- 0 is additive identity for addition
- Additive inverse of addition
- Associative property of addition

2. Write the additive inverse of each of the following numbers:

(a) $-\frac{5}{7}$ (b) $\frac{3}{8}$ (c) 0

(d) $\frac{9}{11}$ (e) $\frac{3}{80}$

3. Verify commutative property of addition for the following rational numbers:

(a) $x = \frac{1}{2}, y = \frac{7}{2}$
 $\frac{1}{2} + \frac{7}{2}, \frac{7}{2} + \frac{1}{2} \Rightarrow \frac{1+7}{2}, \frac{7+1}{2}$
 $\frac{8}{2}, \frac{8}{2} \Rightarrow 4, 4$

Thus $\frac{1}{2} + \frac{7}{2} = \frac{7}{2} + \frac{1}{2}$

(b) $x = \left(-\frac{1}{3}\right), y = \left(\frac{3}{8}\right)$
 $\frac{-1}{3} + \frac{3}{8}, \frac{3}{8} + \frac{-1}{3}$
 $\frac{-8+9}{24}, \frac{9+(-8)}{24} \Rightarrow \frac{1}{24}, \frac{1}{24}$

Thus $\frac{-1}{3} + \frac{3}{8} = \frac{3}{8} + \left(\frac{-1}{3}\right)$

(c) $x = \left(-\frac{7}{8}\right), y = \left(\frac{-1}{4}\right)$
 $\frac{-7}{8} + \left(\frac{-1}{4}\right), \frac{-1}{4} + \left(\frac{-7}{8}\right)$
 $\frac{-7+(-2)}{8}, \frac{-2+(-7)}{8}$
 $\frac{-9}{8}, \frac{-9}{8}$

$\frac{-9}{8}, \frac{-9}{8}$

Thus, $\frac{-7}{8} + \left(\frac{-1}{4}\right) = \frac{-1}{4} + \left(\frac{-7}{8}\right)$

(d) $x = \frac{5}{2}, y = \frac{-3}{5}$
 $\frac{5}{2} + \left(\frac{-3}{5}\right), \frac{-3}{5} + \frac{5}{2}$
 $\frac{25+(-6)}{10}, \frac{-6+25}{10} \Rightarrow \frac{19}{10}, \frac{19}{10}$

Thus, $\frac{5}{2} + \left(\frac{-3}{5}\right) = \frac{-3}{5} + \frac{5}{2}$

4. Verify the associative property of addition for the following rational numbers:

(a) $x = \frac{1}{2}, y = \frac{1}{4}, z = \frac{1}{8}$

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

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

$\frac{3}{4} + \frac{1}{8} = \frac{1}{2} + \frac{3}{8}$

$\frac{6+1}{8} = \frac{4+3}{8} \Rightarrow \frac{7}{8} = \frac{7}{8}$

Thus,

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

(b) $x = \frac{-2}{3}, y = \frac{7}{2}, z = \frac{-6}{5}$

$\left(\frac{-2}{3} + \frac{7}{2}\right) + \left(\frac{-6}{5}\right)$

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

$\frac{4+21}{6} + \frac{-6}{5} = \frac{-2}{3} + \frac{35+(-12)}{10}$

$\frac{17}{6} + \left(\frac{-6}{5}\right) = \frac{-2}{3} + \frac{23}{10}$

$= \frac{85+(-36)}{30} = \frac{-20+69}{30}$

$= \frac{49}{30} = \frac{49}{30}$

Thus,

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

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

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

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

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

$$\frac{-5}{6} + \frac{2}{3} = \left(\frac{-1}{3} \right) + \frac{1}{6}$$

$$\frac{-5+(4)}{6} = \frac{-2+1}{6} \Rightarrow \frac{-1}{6} = \frac{-1}{6}$$

$$\text{Thus, } \left(\frac{-1}{3} + \left(\frac{-1}{2} \right) \right) + \frac{2}{3}$$

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

$$(d) x = \frac{-2}{9}, y = \frac{-1}{3}, z = \frac{-7}{6}$$

$$\left[\frac{-2}{9} + \left(\frac{-1}{3} \right) \right] + \frac{-7}{6}$$

$$= \frac{-2}{9} + \left[\frac{-1}{3} + \left(\frac{-7}{6} \right) \right]$$

$$\left[\frac{-2+(-3)}{9} \right] + \frac{7}{6}$$

$$= \frac{-2}{9} + \left(\frac{-2+(-7)}{6} \right)$$

$$\left[\frac{-5}{9} \right] + \frac{-7}{6} = \frac{-2}{9} + \left[\frac{-9}{6} \right]$$

$$= \frac{-10+(-21)}{18} = \frac{-4+(-27)}{18}$$

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

$$\text{Thus, } \left[\frac{-2}{9} + \left(\frac{-1}{3} \right) \right] + \frac{-7}{6}$$

$$= \frac{-2}{9} + \left[\frac{-1}{3} + \left(\frac{-7}{6} \right) \right]$$

5. Subtract the following:

$$(a) \frac{2}{3} \text{ From } \frac{9}{5}$$

$$= \frac{9}{5} - \frac{2}{3} = \frac{27-10}{15} = \frac{17}{15}$$

$$(b) \frac{-6}{7} \text{ From } 0$$

$$= 0 - \left(\frac{-6}{7} \right) = \frac{0-(-6)}{7} = \frac{6}{7}$$

$$(c) 0 \text{ From } \frac{-2}{3}$$

$$= \frac{-2}{3} - 0 = \frac{-2-0}{3} = \frac{-2}{3}$$

$$(d) \frac{4}{5} \text{ From } \frac{-8}{15}$$

$$= \frac{-8}{15} - \frac{4}{5} = \frac{-8-4}{15} = \frac{-12}{15}$$

$$(e) \frac{-1}{10} \text{ From } \left(\frac{-1}{20} \right)$$

$$\Rightarrow \left(-\frac{1}{20} \right) - \left(-\frac{1}{10} \right)$$

$$= \frac{-2-(-1)}{20} = \frac{-2-(-1)}{20} = \frac{-1}{20}$$

6. Verify $a - b \neq b - a$ for the following rational numbers:

$$(a) a = \frac{1}{2}, b = \frac{1}{4}$$

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

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

$$\frac{1}{4} \neq \frac{-1}{4} \text{ Hence Proved}$$

$$(b) a = \frac{2}{3}, b = \frac{1}{6}$$

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

$$\frac{3}{6} \neq \frac{-3}{6} \text{ Hence Proved}$$

$$(c) a = 0, b = \frac{-7}{9}$$

$$0 - \left(\frac{-7}{9} \right) = \frac{-7}{9} - 0$$

$$\frac{0+7}{9} = \frac{-7-0}{9}$$

$$\frac{7}{9} \neq \frac{-7}{9} \quad \text{Hence Proved}$$

$$(d) a = \frac{5}{8}, b = \frac{2}{2}$$

$$\frac{5}{8} - \frac{2}{3} = \frac{2}{3} - \frac{5}{8}$$

$$\frac{15-16}{24} = \frac{16-15}{24}$$

$$\frac{-1}{24} \neq \frac{1}{24} \quad \text{Hence Proved}$$

7. Solve the following and compare the results:

$$(a) \left(\frac{1}{2} - \frac{1}{4}\right) - \frac{1}{5} \text{ and } \frac{1}{2} - \left(\frac{1}{4} - \frac{1}{5}\right)$$

$$\left(\frac{2-1}{4}\right) - \frac{1}{5} \quad \frac{1}{2} - \left(\frac{5-4}{20}\right)$$

$$\frac{1}{4} - \frac{1}{5} \quad [\quad] \quad \frac{1}{2} - \frac{1}{20}$$

$$\frac{5-4}{20} \quad [\quad] \quad \frac{10-1}{20}$$

$$\frac{1}{20} \quad [\quad] \quad \frac{9}{20}$$

$$\frac{1}{20} [\neq] \frac{9}{20} \quad \frac{1}{20} [<] \frac{9}{20}$$

$$(b) \left(\frac{3}{4} - 0\right) - \frac{2}{5} \text{ and } \frac{3}{5} - \left(0 - \frac{2}{5}\right)$$

$$\left(\frac{3-0}{4}\right) - \frac{2}{5} \quad \frac{3}{5} - \left(\frac{0-2}{5}\right)$$

$$\frac{3-2}{5} \quad [\quad] \quad \frac{3}{5} - \left(\frac{-2}{5}\right)$$

$$\frac{3-2}{5} \quad [\quad] \quad \frac{3+2}{5}$$

$$\frac{1}{5} \quad [\quad] \quad \frac{5}{5}$$

$$\frac{1}{5} [<] \frac{5}{5}$$

$$(c) \left(0 - \frac{7}{5}\right) - \left(\frac{-6}{3}\right) \text{ and } 0 -$$

$$\left[\frac{7}{5} - \left(\frac{-6}{3}\right)\right]$$

$$\left(\frac{0-7}{5}\right) - \left(\frac{-6}{3}\right) \quad 0 - \left[\frac{21+30}{15}\right]$$

$$\frac{-7}{5} - \left(\frac{-6}{3}\right) \quad 0 - \frac{51}{15}$$

$$\frac{-21 - (-30)}{15} \quad \frac{0-51}{15}$$

$$\frac{-18}{15} \quad \frac{-51}{15}$$

$$\frac{-18}{15} \neq \frac{-51}{15}$$

$$(d) \left(\frac{5}{3} - \frac{7}{6}\right) + \frac{2}{3} \text{ and } \frac{5}{3} - \left(\frac{7}{6} + \frac{2}{3}\right)$$

$$\left(\frac{10-7}{6}\right) + \frac{2}{3} \quad [\quad] \quad \frac{5}{3} - \left(\frac{7+4}{6}\right)$$

$$\frac{3}{6} + \frac{2}{3} \quad [\quad] \quad \frac{5}{3} - \frac{3}{6}$$

$$\frac{3+4}{6} \quad [\quad] \quad \frac{10-3}{6}$$

$$\frac{7}{6} \quad [\quad] \quad \frac{7}{6}$$

$$\frac{7}{6} [=] \frac{7}{6}$$

8. Simplify the following:

$$(a) \frac{2}{5} + \frac{-7}{10} - \frac{3}{10} \\ = \frac{4 + (-7) - 3}{10} = \frac{-6}{10} = \frac{-3}{5}$$

$$(b) \left(\frac{-1}{6}\right) + \left(\frac{2}{3}\right) + \left(\frac{-8}{5}\right) \\ = \frac{-5 + 20 + (-48)}{30} = \frac{-33}{30} \\ = \frac{-11}{10}$$

$$(c) \frac{6}{11} + \left(\frac{-1}{22}\right) - \frac{3}{11} \\ = \frac{12 + (-1) - 6}{22} = \frac{5}{22}$$

$$(d) \frac{8}{9} - \left(\frac{-6}{18}\right) + \left(\frac{-2}{9}\right)$$

$$= \frac{16 - (-6) + (-4)}{18} = \frac{18}{18} = 1$$

Exercise - 1.2

1. List the properties of multiplication that makes true the following statements:

- Commutative property of multiplication
- Associative property of multiplication
- 1 is the multiplicative identity
- Distributive property of multiplication over addition

2. By using the following values, verify the commutative property of multiplication:

$$(a) a = \frac{5}{7}, b = \frac{2}{9}$$

$$\frac{5}{7} \times \frac{2}{9} \quad \frac{2}{9} \times \frac{5}{7}$$

$$\frac{10}{63} \quad \frac{10}{63}$$

$$\text{Thus, } \frac{5}{7} \times \frac{2}{9} = \frac{2}{9} \times \frac{5}{7}$$

$$(b) a = \frac{7}{11}, b = \frac{-2}{5}$$

$$\frac{7}{11} \times \frac{-2}{5} \quad \frac{-2}{5} \times \frac{7}{11}$$

$$\frac{-14}{55} \quad \frac{-14}{55}$$

$$\text{Thus, } \frac{7}{11} \times \frac{-2}{5} = \frac{-2}{5} \times \frac{7}{11}$$

$$(c) a = \left(\frac{-7}{8}\right), b = \left(\frac{-2}{5}\right)$$

$$\frac{-7}{8} \times \frac{-2}{5} \quad \frac{-2}{5} \times \frac{-7}{8}$$

$$\frac{14}{40} \quad \frac{14}{40}$$

$$\frac{7}{20} \quad \frac{7}{20}$$

$$\text{Thus, } \frac{-7}{8} \times \frac{-2}{5} = \frac{-2}{5} \times \frac{-7}{8}$$

3. By using the following values, verify the associative property of multiplication:

$$(a) a = \frac{5}{7}, b = \frac{7}{9}, c = \frac{-1}{2}$$

$$\left(\frac{5}{7} \times \frac{7}{9}\right) \times \frac{-1}{2} \quad \frac{5}{7} \times \left(\frac{7}{9} \times \frac{-1}{2}\right)$$

$$\frac{5}{9} \times \frac{-1}{2} \quad \frac{5}{7} \times \frac{-7}{18}$$

$$\text{Thus, } \left(\frac{5}{7} \times \frac{7}{9}\right) \times \frac{-1}{2} = \frac{5}{7} \times \left(\frac{7}{9} \times \frac{-1}{2}\right)$$

$$(b) a = \frac{7}{11}, b = \frac{-2}{5}, c = \frac{3}{5}$$

$$\left(\frac{7}{11} \times \frac{-2}{5}\right) \times \frac{3}{5} = \frac{7}{11} \times \left(\frac{-2}{5} \times \frac{3}{5}\right)$$

$$\frac{-14}{55} \times \frac{3}{5} = \frac{7}{11} \times \frac{-6}{25}$$

$$\frac{-42}{275} = \frac{-42}{275}$$

$$(c) a = \frac{15}{22}, b = \frac{44}{30}, c = \frac{22}{15}$$

$$\left(\frac{15}{22} \times \frac{44}{30}\right) \times \frac{22}{15} \quad \frac{15}{22} \times \left(\frac{44}{30} \times \frac{22}{15}\right)$$

$$\frac{22}{15} \quad \frac{15}{22} \times \frac{968}{450}$$

$$\frac{22}{15} \quad \frac{22}{15}$$

$$\text{Thus, } \left(\frac{15}{22} \times \frac{44}{30}\right) \times \frac{22}{15}$$

$$= \frac{15}{22} \times \left(\frac{44}{30} \times \frac{22}{15}\right)$$

$$(d) a = \frac{4}{9}, b = \frac{-5}{12}, c = \frac{2}{3}$$

$$\left(\frac{4}{9} \times \frac{-5}{12}\right) \times \frac{2}{3} \quad \frac{4}{9} \times \left(\frac{-5}{12} \times \frac{2}{3}\right)$$

$$\frac{-5}{27} \times \frac{2}{3} = \frac{4}{9} \times \frac{-5}{18}$$

$$\frac{-5}{27} \times \frac{2}{3} = \frac{4}{9} \times \frac{-5}{18}$$

$$\frac{-10}{81} = \frac{-10}{81}$$

$$\text{Thus } \left(\frac{4}{9} \times \frac{-5}{12}\right) \times \frac{2}{3} = \frac{4}{9} \times \left(\frac{-5}{12} \times \frac{2}{3}\right)$$

4. Find the product of the following:

$$(a) \frac{12}{25} \times \frac{55}{24} = \frac{11}{10}$$

$$(b) \frac{11}{16} \times \left(\frac{-32}{55}\right) \times \left(\frac{-7}{8}\right)$$

$$\frac{11}{16} \times \frac{-32}{55} \times \frac{-7}{8} = \frac{14}{40} = \frac{7}{20}$$

$$(c) \frac{16}{15} \times \frac{-3}{32} = \frac{-1}{10}$$

$$(d) \frac{12}{25} \times \frac{15}{36} \times \left(\frac{-9}{30}\right)$$

$$\frac{12}{25} \times \frac{15}{36} \times \frac{-9}{30} = \frac{-3}{50}$$

$$(e) \left(\frac{-22}{15}\right) \times \left(\frac{-15}{31}\right) \times \left(\frac{-31}{22}\right)$$

$$\frac{-22}{15} \times \frac{-15}{31} \times \frac{-31}{22} = -1$$

5. Find the multiplicative inverse each of the following:

$$(a) \frac{11}{7} \quad (b) \frac{-3}{2} \quad (c) \frac{81}{8}$$

$$(d) \frac{-7}{1} \quad (e) \frac{17}{16}$$

6. Divide the following rational numbers:

$$(a) \frac{16}{15} \text{ by } \frac{2}{35} = \frac{16}{15} \times \frac{35}{2} = \frac{56}{3}$$

$$(b) \frac{-7}{8} \text{ by } \frac{21}{24} = \frac{-7}{8} \div \frac{21}{24} = \frac{-7}{8} \times \frac{24}{21} = -1$$

$$(c) \left(\frac{-11}{22}\right) \text{ by } \left(\frac{-33}{22}\right) = \frac{-11}{22} \div \frac{-33}{22}$$

$$= \frac{-11}{22} \times \frac{22}{33} = \frac{-1}{3}$$

7. Find the value each of the following by using suitable properties:

$$(a) \frac{5}{12} \times \frac{1}{2} + \frac{3}{4} \times \frac{5}{12}$$

$$\frac{5}{12} \times \frac{1}{2} + \frac{3}{4} \times \frac{5}{12}$$

$$\frac{5}{24} + \frac{15}{24} = \frac{10+15}{24} = \frac{25}{24}$$

$$(b) \frac{6}{11} \times \frac{2}{3} + \frac{1}{3} \times \frac{6}{11} - \frac{6}{11} \times \frac{7}{2}$$

$$\frac{4}{11} \times \frac{2}{11} - \frac{21}{11} = \frac{4+2-21}{11} = \frac{-15}{11}$$

$$(c) \frac{11}{12} \times \frac{1}{10} - \frac{11}{12}$$

$$\frac{11}{120} - \frac{11}{12} = \frac{11-110}{120} = \frac{-99}{20}$$

$$(d) \frac{-5}{12} \times \frac{5}{15} + \frac{1}{2} \times \frac{-5}{12}$$

$$\frac{-5}{36} + \frac{-5}{24} = \frac{10+(-15)}{72} = \frac{-5}{72}$$

8. True and False:

(a) True (b) False (c) True

(d) True (e) True

Exercise - 1.3

1. Find a rational number return:

(a) 6 and 7

$$a = 6, b = 7 \\ = \frac{1}{2}(6+7) = \frac{1}{2} \times 13 = \frac{13}{2}$$

(b) $\frac{1}{2}$ and $\frac{5}{2}$

$$a = \frac{1}{2}, b = \frac{5}{2} \\ = \frac{1}{2} \left[\frac{1}{2} + \frac{5}{2} \right] = \frac{1}{2} \times \left[\frac{1+5}{2} \right] \\ = \frac{1}{2} \times \frac{6}{2} = \frac{3}{2}$$

(c) 0 and 2

$$a = 0, b = 2$$

$$= \frac{1}{2}(0+2) = \frac{1}{2} \times 2 = 1$$

(d) $1\frac{1}{2}$ and $3\frac{1}{4}$

$$a = \frac{3}{2}, b = \frac{13}{4}$$

$$= \frac{1}{2} \left[\frac{3}{2} + \frac{13}{4} \right] = \frac{1}{2} \times \left[\frac{6+12}{4} \right]$$

$$= \frac{1}{2} \times \frac{19}{4} = \frac{19}{8}$$

2. $a = \frac{-1}{2}$ $b = \frac{1}{2}$

$$= \frac{-1}{4} \text{ and } 0$$

3. $a = 5$ $b = 6$

5.1, 5.2, 5.3, 5.4, 5.5

4. Rational numbers return

$\frac{3}{10}$ and $\frac{7}{10}$ are:
 $\frac{4}{10}, \frac{5}{10}, \frac{6}{10}$

5. True and False:

(a) True (b) True (c) False

(d) False (e) False

Multiple Choice Question:

1. a 2. b 3. c 4. c 5. b

NCERT CORNER

Fill in the blanks:

1. rational 2. 0 3. 3 4. 0 5. 1

True and False:

1. True 2. True 3. False 4. True

5. False

Chapter - 2

Exercise - 2.1

1. $14x - 7 = 21$

$$14x = 21 + 7$$

$$14x = 28 \quad x = \frac{28}{14} \quad x = 2$$

On Putting $x = 2$ in eq.

$$14 \times 2 - 7 = 21 \quad 28 - 7 = 21$$

$$21 = 21 \quad \text{L.H.S} = \text{R.H.S}$$

2. $\frac{2x}{3} - 15 = 5$

$$\frac{2x}{3} = 5 + 15 = \frac{2x}{3} = 20$$

$$2x = 20 \times 3 \quad 2x = 60$$

$$x = 30$$

On Putting $x = 30$ in eq

$$= \frac{2 \times 30}{3} - 15 = 5 = \frac{60}{3} - 15 = 5$$

$$5 = 5 \quad \text{L.H.S} = \text{R.H.S}$$

3. $\frac{2x-3}{7} = 5$

$$2x - 3 = 35 \Rightarrow 2x = 38$$

$$x = \frac{38}{2} \Rightarrow x = 19$$

$$= \frac{2 \times 19 - 3}{7} = 5 = \frac{35}{7} = 5$$

$$5 = 5 \quad \text{L.H.S} = \text{R.H.S}$$

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

$$3x + 2 = 12 \Rightarrow 3x = 10$$

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

On Putting $x = \frac{10}{3}$ in eq

$$\frac{3 \times 10 + 2}{3} = 4 \quad \frac{12}{3} = 4$$

$$4 = 4 \quad \text{L.H.S} = \text{R.H.S}$$

5. $\frac{x}{2} - \frac{x}{3} = 8$

$$= \frac{3x - 2x}{6} = 8 \quad 3x - 2x = 48$$

$$x = 48$$

On Putting $x = 48$ in eq

$$\frac{48}{2} - \frac{48}{3} = 8 \quad 24 - 16 = 8$$

$$8 = 8 \quad \text{L.H.S} = \text{R.H.S}$$

6. $\frac{3x}{8} + 1 = 22$

$$\frac{3x}{8} = 21 \quad 3x = 21 \times 8$$

$$3x = 168 \quad x = 56$$

On Putting $x = 56$ in eq

$$\frac{3 \times 56}{8} + 1 = 22$$

$$\frac{168}{8} + 1 = 22 \quad 21 + 1 = 22$$

$$22 = 22 \quad \text{L.H.S} = \text{R.H.S}$$

$$7. \frac{x}{2} + \frac{x}{8} = \frac{1}{8} \quad = \frac{4x+x}{8} = \frac{1}{8}$$

$$= \frac{5x}{8} = \frac{1}{8} \quad 40x = 8$$

$$x = \frac{8}{40} \quad x = \frac{1}{5}$$

On Putting $x = \frac{1}{5}$ in eq

$$\frac{1}{2} + \frac{1}{8} = \frac{1}{8} \quad \frac{1}{10} + \frac{1}{40} = \frac{1}{8}$$

$$\frac{4+1}{40} = \frac{1}{8} \quad \frac{5}{40} = \frac{1}{8}$$

$$\frac{1}{8} = \frac{1}{8} \quad \text{L.H.S} = \text{R.H.S}$$

$$8. \frac{x}{2} + \frac{x}{3} + \frac{x}{4} = 13$$

$$\frac{6x+4x+3x}{12} = 13$$

$$\frac{13x}{12} = 13 \quad 13x = 156$$

$$x = 12$$

On Putting $x = 12$ in eq

$$\frac{12}{2} + \frac{12}{3} + \frac{12}{4} = 13 \quad 6+4+3=13$$

$$13 = 13 \quad \text{L.H.S} = \text{R.H.S}$$

$$9. \frac{5x}{3} = \frac{2}{5} = 1 \quad = \frac{5x}{3} = 1 - \frac{2}{5}$$

$$\frac{5x}{3} = \frac{5-2}{5} = \frac{5x}{3} = \frac{3}{5}$$

$$25x = 9 \quad x = \frac{9}{25}$$

On Putting $x = \frac{9}{25}$ in eq

$$\frac{5 \times 9}{23} + \frac{2}{5} = 1 \quad \frac{3}{5} + \frac{2}{5} = 1$$

$$\frac{3+2}{5} = 1 \quad \frac{5}{5} = 1$$

$$1 = 1 \quad \text{L.H.S} = \text{R.H.S}$$

$$10. 13(x-4) - 3(x-9)$$

$$-5(x+4) = 0$$

$$13x - 52 - 3x + 27 - 5x - 20 = 0$$

$$5x - 45 = 0 \quad 5x = 45 \quad x = 9$$

On Putting $x = 9$ in eq

$$13(9-4) - 3(9-9) - 5(9-4) = 0$$

$$13 \times 5 - 3 \times 0 - 5 \times 5 = 0$$

$$0 = 0 \quad \text{L.H.S} = \text{R.H.S}$$

$$11. \frac{x-5}{2} + \frac{2}{5} = 1 \quad \frac{5x-25+4}{10} = 1$$

$$5x - 21 = 10 \quad 5x = 31$$

$$x = \frac{31}{5}$$

On Putting $x = \frac{31}{5}$ in eq

$$\frac{31-5}{2} + \frac{2}{5} = 1 \quad = \frac{31-25}{2} + \frac{2}{5} = 1$$

$$\frac{6}{2} + \frac{2}{5} = 1 \quad = \frac{3}{5} + \frac{2}{5} = 1$$

$$\frac{5}{5} = 1 \quad 1 = 1$$

$$\text{L.H.S} = \text{R.H.S}$$

$$12. \frac{4x+1}{3} - \frac{x+2}{3} = 9$$

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

$$4x+1-x-2=27$$

$$3x-1=27 \quad 3x=28$$

$$x = \frac{28}{3}$$

On Putting $x = \frac{28}{3}$ in eq

$$\frac{4 \times 28}{3} = 1 \frac{28}{3} + 2$$

$$\frac{112}{3} + 1 - \frac{34}{9} = 9$$

$$\frac{112}{3} + 1 - \frac{34}{9} = 9$$

$$\frac{112+3}{3} - \frac{34}{9} = 9$$

$$\frac{115}{9} - \frac{34}{9} = 9 \quad \frac{81}{9} = 9$$

$$9 = 9 \quad \text{L.H.S} = \text{R.H.S}$$

$$13. \frac{6m-5}{2m} = \frac{7}{9}$$

$$9(6m-5) = 7 \times 2m$$

$$54m - 45 = 14m$$

$$54m - 14m = 45$$

$$40m = 45 \quad m = \frac{9}{8}$$

$$\text{On Putting } m = \frac{9}{8} \text{ in eq}$$

$$\frac{6 \times \frac{9}{8} - 5}{2 \times \frac{9}{8}} = \frac{7}{9} \quad = \frac{6 \times \frac{9}{8} - 5}{2 \times \frac{9}{8}} = \frac{7}{9}$$

$$\frac{27-20}{4} = \frac{7}{9} \quad = \frac{7}{9} = \frac{7}{9}$$

$$\frac{7}{9} = \frac{7}{9} \quad \text{L.H.S} = \text{R.H.S}$$

$$14. \frac{p+2}{p+3} = \frac{5}{6}$$

$$6(p+2) = 5(p+3)$$

$$6p + 12 = 5p + 15$$

$$6p - 5p = 15 - 12$$

$$p = 3$$

$$\text{On Putting } p = 3 \text{ in eq}$$

$$\frac{3+2}{3+3} = \frac{5}{6} \quad \frac{5}{6} = \frac{5}{6}$$

$$\text{L.H.S} = \text{R.H.S}$$

Exercise - 2.2

$$1. \frac{7+3x}{4} = -2 \quad = \frac{3x}{4} = -2 - 7$$

$$\frac{3x}{4} = -9 \quad 3x = -36$$

$$x = -12$$

$$\text{On Putting } x = -12 \text{ in eq}$$

$$\frac{7+3 \times (-12)}{4} = -2$$

$$\frac{7-36}{4} = -2 \quad 7+(-9) = -2$$

$$-2 = -2 \quad \text{L.H.S} = \text{R.H.S}$$

$$2. \frac{3x}{4} + 4x = \frac{7}{8} + 6x - 6$$

$$\frac{3x}{4} + 4x - 6x = \frac{7}{8} - 6$$

$$\frac{3x+16x-24x}{4} = \frac{7-48}{8}$$

$$\frac{-5x}{4} = \frac{-41}{8} \quad -5x \times 8 = -41 \times 4$$

$$-40x = -164 \quad x = \frac{164}{40} \quad x = \frac{41}{10}$$

$$\text{On Putting } x = \frac{41}{10} \text{ in eq}$$

$$\frac{3 \times 41}{4} + 4 \times \frac{41}{10} = \frac{7}{8} + 6 \times \frac{41}{10} - 6$$

$$\frac{123+656}{40} = \frac{35+984-240}{40}$$

$$\frac{779}{40} = \frac{779}{40} \quad \text{L.H.S} = \text{R.H.S}$$

$$3. 0.5x - 7.5 = -11.5$$

$$0.5x = -11.5 + 7.5$$

$$0.5x = -4 \quad x = -8$$

$$\text{On Putting } x = -8 \text{ in eq}$$

$$0.5 \times (-8) - 7.5 = -11.5$$

$$-4 - 7.5 = -11.5$$

$$-11.5 = -11.5 \quad \text{L.H.S} = \text{R.H.S}$$

$$4. y - 2y + \frac{7y}{2} - \frac{16y}{3} = 3 - 5 - 2$$

$$\frac{6y-12y+21y-32y}{6} = -4$$

$$\frac{-17y}{6} = -4 \quad -17y = -24 = y = \frac{24}{17}$$

On Putting $y = \frac{24}{17}$ in eq

$$\frac{24}{17} - \frac{2 \times 24}{17} + 2 = 3$$

$$\frac{-7 \times 24}{17} + \frac{16 \times 24}{17} - 5$$

$$\frac{17}{2} + \frac{17}{3} - 5$$

$$\frac{24-48+34}{17} = \frac{3-168}{34} + \frac{384}{51} - 5$$

$$\frac{10}{17} = \frac{-504+768-204}{102}$$

$$\frac{10}{17} = \frac{10}{17} \quad \text{L.H.S} = \text{R.H.S}$$

5. $3(m-2) = 15m$

$$3m-6=15m$$

$$3m-15m=6 \quad -12m=6$$

$$m = \frac{6}{-12} \quad m = \frac{-1}{2}$$

On Putting $m = \frac{-1}{2}$ in eq

$$3\left(\frac{-1}{2}-2\right) = 15 \times \frac{-1}{2}$$

$$\frac{-3}{2} - 6 = \frac{-15}{2} \quad = \frac{-3-12}{2} = \frac{-15}{2}$$

$$\frac{-15}{2} = \frac{-15}{2} \quad \text{L.H.S} = \text{R.H.S}$$

6. $\frac{8x-3}{4} = 2 - \frac{5x3}{2}$

$$\frac{8x-3}{4} = \frac{4-5x-3}{2}$$

$$\frac{8x-3}{4} = \frac{1-5x}{2}$$

$$2(8x-3) = 4(1-5x)$$

$$16x-6 = 4-20x$$

$$16x+20 = 4+6$$

$$36x = 10$$

$$x = \frac{10}{36} = \frac{5}{18}$$

On Putting $x = \frac{5}{18}$ in eq

$$\frac{8 \times 5}{18} - 3 = 2 - \frac{5 \times 5}{18} + 3$$

$$\frac{40}{18} - 3 = 2 - \frac{25}{18} + 3$$

$$\frac{40-54}{18} = 2 - \frac{25+54}{18}$$

$$\frac{18}{4} = 2 - \frac{18}{2}$$

$$\frac{-14}{72} = 2 - \frac{79}{36} = \frac{-14}{72} = \frac{72-79}{36}$$

$$\frac{-14}{72} = \frac{-7}{36} \quad \text{L.H.S} = \text{R.H.S}$$

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

$$\frac{2x+3}{3} = \frac{x+8}{4}$$

$$4(2x+3) = 3(x+8)$$

$$8x+12 = 3x+24$$

$$8x-3x = 24-12$$

$$5x = 12 \quad x = \frac{12}{5}$$

On Putting $x = \frac{12}{5}$ in eq

$$\frac{2 \times 12}{5} + 1 = \frac{12}{5} + 2$$

$$\frac{24}{5} + 1 = \frac{12}{5} + 2$$

$$\frac{24+15}{15} = \frac{12+40}{20} = \frac{39}{15} = \frac{52}{20}$$

$$\frac{13}{5} = \frac{13}{5} \quad \text{L.H.S} = \text{R.H.S}$$

8. $\frac{7p}{2} - \frac{5p}{2} = \frac{20p}{3} + 10$

$$\frac{21p-15p-40p}{6} = 10$$

$$\frac{-34p}{6} = 10 \quad -34p = 60$$

$$p = \frac{60}{-34} = \frac{30}{-17}$$

On Putting $x = \frac{30}{17}$ in eq

$$\frac{7 \times 30}{17} - \frac{5 \times -30}{17} = \frac{20 \times -30}{17} + 10$$

$$\frac{(-210)}{17} - \frac{(-150)}{17} = \frac{-600}{17} + 10$$

$$\frac{34}{-210 - (-150)} = \frac{51}{-600 + 510}$$

$$\frac{-60}{34} = \frac{-90}{51} \quad \frac{-30}{17} = \frac{-30}{17}$$

L.H.S = R.H.S

9. $\frac{x-3}{2} = \frac{x-8}{3}$

$$3(x-3) = 2(x-8)$$

$$3x-9 = 2x-16$$

$$3x-2x = -16+9 \quad x = -7$$

On Putting $x = -7$ in eq

$$\frac{-7-3}{2} = \frac{-7-8}{3} = \frac{-10}{2} = \frac{-15}{3}$$

$$-5 = -5 \quad \text{L.H.S} = \text{R.H.S}$$

10. $\frac{x}{1.5} + 2.7 = 2.7 \quad \frac{x}{1.5} = 2.7 - 2.7$

$$\frac{x}{1.5} = 0 \quad x = 0$$

On Putting $x = 0$ in eq

$$\frac{0}{1.5} + 2.7 = 2.7$$

$$2.7 = 2.7 \quad \text{L.H.S} = \text{R.H.S}$$

11. $\frac{x-5}{2} + \frac{x-3}{2} = 4 = \frac{x-5+x-3}{2} = 4$

$$x-5+x-3 = 8 \quad 2x-8 = 8$$

$$x = 16$$

On Putting $x = 16$ in eq

$$\frac{8-5}{2} + \frac{8-3}{2} = 4 = \frac{3}{2} + \frac{5}{2} = 4$$

$$\frac{3+5}{2} = 4 \quad \frac{8}{2} = 4 = 4$$

L.H.S = R.H.S

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

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

$$6x+6x+9-4 = 6x+7$$

$$6x = 7-9+4 \quad 6x = 2$$

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

On Putting value

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

$$\frac{1-2}{3} + \frac{2+9}{2} = \frac{2+7}{6}$$

$$\frac{-2+2+9}{6} = \frac{9}{6} = \frac{9}{6} = \frac{9}{6}$$

13. $\frac{y-2y+8}{3} = \frac{1}{4} \left(y - \frac{2-y}{6} \right) + 6$

$$\frac{4(3y-2y-8)}{3} = \frac{6y-2+y+72}{6}$$

$$\frac{4y-32}{3} = \frac{7y+70}{6}$$

$$8y-64 = 7y+70$$

$$8y-7y = 70+64 \quad y = 134$$

Putting value of eq

$$134 - \frac{2 \times 134 + 8}{3} = \frac{1}{4}$$

$$\left[\frac{134 - (2 - 134)}{6} \right] + 3$$

$$134 - \frac{268+8}{3} = \frac{1}{4} \left[\frac{134+132}{6} \right] + 3$$

$$134 - 92 = \frac{1}{4} [134 + 22] + 3$$

$$42 = 39 + 3 \quad 42 = 42$$

14. $\frac{4y+1}{3} = \frac{9+y+2}{3}$

$$\frac{4y+1}{3} = \frac{27+y+2}{3}$$

$$4y+1 = 27+y+2$$

$$3y = 28$$

$$y = \frac{28}{3} \Rightarrow 5 \frac{3}{5}$$

Put value in eq

$$\frac{4 \times 28}{3} + 1 = \frac{9 + 28}{3} + 2$$

$$\frac{115}{9} = \frac{9 + 34}{9} \quad \frac{115}{9} = \frac{115}{9}$$

Exercise - 2.3

1. $\frac{2x+1}{3x-2} = \frac{9}{10}$
 $10(2x+1) = 9(3x-2)$
 $20x+10 = 27x-18$
 $10+18 = 27x-20x$
 $28 = 7x \quad x = 4$
 $\frac{2 \times 4 + 1}{3 \times 4 - 2} = \frac{9}{10} = \frac{8+1}{12-2} = \frac{9}{10}$
 $\frac{9}{10} = \frac{9}{10} \quad \text{L.H.S} = \text{R.H.S}$

2. $\frac{x+2}{x-2} = \frac{6}{10}$
 $10(x+2) = 6(x-2)$
 $10x+20 = 6x-12$
 $20+12 = 6x-10x$
 $32 = -4x \quad x = -8$
 On Putting $x = -8$
 $\frac{-8+2}{-8-2} = \frac{6}{10} = \frac{6}{10} = \frac{6}{10}$
 $\text{L.H.S} = \text{R.H.S}$

3. $\frac{x+3}{2x+3} = \frac{2}{3}$
 $3(x+3) = 2(2x+3)$
 $3x+9 = 4x+6$
 $9-6 = 4x-3x \quad 3 = x$
 On Putting $x = 3$
 $\frac{3+3}{2 \times 3 + 3} = \frac{2}{3} = \frac{6}{9} = \frac{2}{3}$
 $\text{L.H.S} = \text{R.H.S}$

4. $\frac{1-x}{x} = \frac{5}{7}$
 $7(1-x) = 5x$
 $7-7x = 5x \quad 7 = 12x$
 $x = \frac{7}{12}$

On Putting value

$$\frac{1-7}{12} = \frac{5}{12} \quad \frac{12}{7} = \frac{5}{12} = \frac{5}{12}$$

$$\frac{5}{7} = \frac{5}{7} \quad \text{L.H.S} = \text{R.H.S}$$

5. $\frac{7(2-x) - 5(x+12)}{14 - 7x - 5x - 60} = 8$
 $\frac{1-7x}{-2x-46} = 8$
 $\frac{1-7x}{-2x-46} = 8-56x$
 $-2x+56x = 8+46$
 $54x = 54 \quad x = 1$
 On Putting value
 $\frac{17(2-1) - 5(1+12)}{17 \times 1 - 5 \times 13} = 8 = \frac{17-65}{-6} = 8$
 $\frac{-48}{6} = 8 \quad 8 = 8$

6. $\frac{1}{m+1} + \frac{1}{m+2} = \frac{2}{m+10}$
 $\frac{m+2+m+1}{(m+1)(m+2)} = \frac{2}{m+10}$
 $\frac{2m+3}{m+3m+3} = \frac{2}{m+10}$
 $(2m+3)(m+10) = 2(m+3m+2)$
 $2m+2m+30 = 2m+6m+4$
 $23m-6m-4-30$
 $17m = -26 \quad m = \frac{-26}{17}$

On Putting value
 $\frac{1}{17} + 1 \frac{-26}{17} + 2 = \frac{-26}{17} + 10$
 $\frac{1}{17} + \frac{1}{17} = \frac{2}{17}$
 $\frac{-9}{17} + \frac{-8}{17} = \frac{144}{17}$

$$\frac{-17}{9} + \frac{17}{8} = \frac{-17}{288} = \frac{17}{288} = \frac{17}{288}$$

L.H.S = R.H.S

$$7. \frac{15(2-m)-5(m+6)}{1-3m} = 10$$

$$\frac{30-15m-5m-30}{1-3m} = 10$$

$$\frac{-20m}{1-3m} = 10 \quad = -20+30m=10$$

$$-10m=10 \quad m=1$$

On Putting value

$$\frac{15(2-(+1))-5(+1+6)}{1-3 \times (+1)} = 10$$

$$\frac{15-25}{1-3} = 10$$

$$8. \frac{4y+1}{3} + \frac{2y-1}{2} - \frac{3y-7}{5} = 6$$

$$\frac{10(4y+1)+15(2y-1)-6(3y-7)}{30} = 6$$

$$\frac{40y+10+30y-15-18y+42}{30} = 6$$

$$\frac{52y+37}{30} = 6 \quad 52y+37=180$$

$$52y=143 \quad y=\frac{143}{52}=\frac{11}{4}$$

On Putting value

$$\frac{4 \times \frac{11}{4} + 1}{3} + \frac{2 \times \frac{11}{4} - 1}{2} -$$

$$\frac{\frac{3 \times 11}{4} - 7}{5} = 6$$

$$\frac{12}{3} + \frac{\frac{11-2}{2}}{2} - \frac{\frac{33-28}{5}}{5} = 6$$

$$\frac{12}{3} + \frac{9}{4} - \frac{1}{4} = 6 = \frac{48+27-3}{12} = 6$$

$$\frac{48+24}{12} = 6 \quad \frac{72}{12} = 6$$

$$6=6 \quad \text{L.H.S} = \text{R.H.S}$$

$$9. \frac{y-5}{2} - \frac{y-3}{5} = \frac{1}{2}$$

$$\frac{5(y-5)-2(y-3)}{10} = \frac{1}{2}$$

$$\frac{5y-25-2y+6}{10} = \frac{1}{2}$$

$$\frac{3y-19}{10} = \frac{1}{2} \quad 2(3y-19)=10$$

$$6y-38=10 \quad 6y-48$$

$$y = \frac{48}{6} \quad y=8$$

On Putting value

$$\frac{8-5}{2} - \frac{8-3}{5} = \frac{1}{2} = \frac{3}{2} - \frac{5}{5} = \frac{1}{2}$$

$$\frac{15-10}{10} = \frac{1}{2} = \frac{5}{10} = \frac{1}{2}$$

$$= \frac{1}{2} = \frac{1}{2} \quad \text{L.H.S} = \text{R.H.S}$$

$$10. \frac{x-7-8x}{3} = \frac{17}{6} - \frac{5x}{8}$$

$$\frac{3x-21}{3} = \frac{68-15x}{24}$$

$$24(-5x-21)=3(68-15x)$$

$$-120x-504=204+504$$

$$-120x-45x=204+504$$

$$-165x=708$$

$$x = \frac{708}{165} \quad x = \frac{-1}{6}$$

On Putting value

$$\frac{-1}{6} + 7 - 8 \times \frac{-1}{6} = \frac{17}{3} - 5 \times \frac{6}{8}$$

$$\frac{-1}{6} + 7 - \frac{-4}{9} = \frac{17}{6} - \frac{5}{48}$$

$$\frac{-3+126+8}{18} = \frac{136+5}{48}$$

$$\frac{131}{18} = \frac{131}{18}$$

$$\text{L.H.S} = \text{R.H.S}$$

$$11. \frac{10x+4}{4} = \frac{8x+2}{3}$$

$$3(10x+4) = 4(8x+2)$$

$$30x+12 = 32x+8$$

$$12-8 = 32x-30x$$

$$4 = 2x \quad x = 2$$

On Putting value

$$\frac{10 \times 2 + 4}{4} = \frac{8 \times 2 + 2}{3}$$

$$\frac{24}{4} = \frac{16+2}{3} \quad 6 = 6$$

L.H.S = R.H.S

$$12. \frac{2y-(7-5y)}{9y-3-4y} = \frac{7}{6}$$

$$\frac{2y-7+5y}{9y-3-4y} = \frac{7}{6} = \frac{7y-7}{5y-3} = \frac{7}{6}$$

$$6(7y-7) = 7(5y-3)$$

$$42y-42 = 35y-21$$

$$42y-35y = -21+42$$

$$7y = 21 \quad y = 3$$

On Putting value

$$\frac{2 \times 3 - (7 - 5 \times 3)}{9 \times 3 - (3 + 4 \times 3)} = \frac{7}{6}$$

$$\frac{14}{12} = \frac{7}{6} = \frac{7}{6} = \frac{7}{6}$$

L.H.S = R.H.S

$$13. 5x - \frac{1}{3}(x+1) = 6\left(x + \frac{1}{3}\right)$$

$$\frac{5x-x}{3} - \frac{1}{3} = 6x + \frac{6}{30}$$

$$\frac{15x-x-1}{3} = \frac{30x+1}{5}$$

$$\frac{14x-1}{3} = \frac{30x+1}{5}$$

$$5(14x-1) = 3(30x+1)$$

$$70x-5 = 90x+3$$

$$70x-90x = 3+5$$

$$-20x = 8 \quad x = \frac{-8}{20}$$

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

On Putting value

$$5 \times \frac{-2}{5} - \frac{1}{3} \left(\frac{-2+1}{5} \right) = 6 \left(\frac{-2}{5} + \frac{1}{30} \right)$$

$$\frac{-2-1}{3} \left(\frac{-2+5}{5} \right) = 6 \left(\frac{-12+1}{30} \right)$$

$$\frac{-2-1}{3} \times \frac{3}{5} = 6 \times \frac{-11}{30}$$

$$\frac{-10-1}{5} = \frac{-11}{5} \quad \frac{-11}{5} = \frac{-11}{5}$$

L.H.S = R.H.S

$$14. \frac{9x-7}{3x-4} = \frac{3x+5}{x+6}$$

$$(9x-7)(x+6) = (9x+5)(3x-4)$$

$$47x-42 = 3x-20$$

$$47x-3x = -20+42$$

$$44x = 22$$

$$x = \frac{22}{44} \quad x = \frac{1}{2}$$

$$\frac{9 \times 1}{2} - 7 = \frac{3 \times 1}{2} + 5$$

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

$$\frac{9}{2} - 7 = \frac{3}{2} + 5$$

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

$$\frac{9-14}{2} = \frac{3+10}{2} = \frac{-5}{-5} = \frac{13}{13}$$

$$\frac{3-8}{2} = \frac{1+12}{2} = \frac{-5}{-5} = \frac{13}{13}$$

$$1 = 1 \quad \text{L.H.S} = \text{R.H.S}$$

Exercise - 2.4

$$1. \text{Ratio} = \frac{2}{3} = 2:3 = 2x:3x$$

$$2x+3x = 350$$

$$5x = 350 \quad x = 70$$

Numbers are 140, 210

$$2. \text{Ratio} = 4:5:6 = 4x:5x:6x$$

$$4x+6x = 5x+55$$

$$10x-5x = 55$$

$$5x = 55 \quad x = 11$$

Numbers are 44, 55, 66

3. Ratio = $\frac{x}{y}$

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

$$\frac{x+1}{y+1} = \frac{1}{2} \quad 2x+2 = y+1$$

$$y = 2x+1 \quad x+4 = 2x+1$$

$$x = 3 \quad y = 3+4 = 7$$

$$y = 7 \quad \text{Fraction} = \frac{3}{7}$$

4. Fraction = $\frac{x}{y}$

$$x = y - 3 = y = x + 3$$

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

$$6x = x+3+2 \quad 5x = 5$$

$$x = 1 \quad y = 1+3 = 4$$

$$\text{Fraction} = \frac{1}{4}$$

5. $10x + y = xy = \text{Number}$

$$x + y = 8 = y = 8 - x$$

$$10x + y + 8 = 10y + x$$

$$9x + 8 = 9y$$

$$9x + 8 = 9(8 - x)$$

$$9x + 8 = 72 - 9x \quad 18x = 64$$

$$x = 3 \quad y = 8 - 3 \quad y = 5$$

$$\text{Number} = 35$$

6. $x + y = 15 = y = 15 - x$

$$10x + y + 19 = 10x + y$$

$$9x + 9y + 19$$

$$9x + 9(15 - x) + 19$$

$$9x + 135 - 9x + 19 \quad 18x = 154$$

$$x = 8 \quad y = 15 - 8 \quad y = 7$$

$$\text{Number} = 87$$

7. Aditi age = x Diksha age = y

$$x = y + 3 \quad (x - 6) = (y - 6)4$$

$$y + 3 - 6 = 4y - 24$$

$$-3 + 24 = 3y \quad 21 = 3y$$

$$y = 7 = \text{Diksha age}$$

$$x = 10 = \text{Aditi age}$$

8. I age is x

$$(x+12) = 3(x-4)$$

$$x+12 = 3x-12 \quad 2x = 24$$

$$x = 12 \text{ years}$$

9. Ratio = 5:6

$$\text{Tanu's age} = 5x$$

$$\text{Diksha's age} = 6x$$

$$\frac{5x+12}{6x+12} = \frac{9}{10}$$

$$10(5x+12) = 9(6x+12)$$

$$50x+120 = 54x+108$$

$$54x-50x = 120-108 \quad 4x = 12$$

$$x = 3$$

$$\text{Tanu's age} = 15$$

$$\text{Diksha's age} = 18$$

10. $2(l+b) = 104 = l+b$

$$= 52 = l = 52 - b \quad b = \frac{l}{3} + 2$$

$$3b = l + 6 \quad 3b = 52 - b + 6$$

$$4b = 58 \quad b = 14.5 \text{ cm}$$

$$l = 52 - 14.5 \quad l = 37.5 \text{ cm}$$

11. $5x + 6x + 7x = 1,80,000$

$$18x = 1,80,000 \quad x = 10,000$$

$$\text{Money of } 1^{\text{st}} = 50,000$$

$$\text{Money of } 2^{\text{nd}} = 60,000$$

$$\text{Money of } 3^{\text{rd}} = 70,000$$

12. $\frac{3x}{5x} = \frac{3x+10}{5x+10} = \frac{5}{7}$

$$5(5x+10) = 7(3x+10)$$

$$25+50 = 21x+70$$

$$4x = 20 \quad x = 5$$

$$\text{Numbers are } 15, 25$$

Multiple Choice Question:

1. a 2. c 3. a 4. b 5. c

NCERT CORNER

Fill in the blanks:

1. Variable, Constant 2. Variable

3. Constant 4. L.H.S, R.H.S

5. Equal

True and False

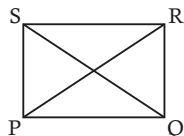
1. True 2. False 3. False

4. False 5. True

Chapter - 3

Exercise - 3.1

1.



Side - PQ, QR, RS, SP

Angle - $\angle PQO, \angle QPO, \angle OQP,$
 $\angle PSO, \angle OPS, \angle SRO, \angle QOR$

Diagonals - PQ, QS

2. Find the value of x in the following quadrilaterals:

(a) Sum of angle of Quadrilateral
 $= 360^\circ$

$$110^\circ + 70^\circ + 70^\circ + x = 360^\circ$$

$$255^\circ + x = 360^\circ$$

$$x = 360^\circ - 255^\circ$$

$$x = 105^\circ$$

(b) Sum of angle of Quadrilateral
 $= 360^\circ$

$$90^\circ + 100^\circ + 130^\circ + x = 360^\circ$$

$$320^\circ + x = 360^\circ$$

$$x = 360^\circ - 320^\circ$$

$$x = 40^\circ$$

(c) Sum of angle of Quadrilateral
 $= 360^\circ$

$$120^\circ + 100^\circ + 60^\circ + x = 360^\circ$$

$$280^\circ + x = 360^\circ$$

$$x = 360^\circ - 280^\circ$$

$$x = 80^\circ$$

3. Find the value of x in the following polygons:

(a) Sum angle of Quadrilateral
 $= 360^\circ$

$$110^\circ + 60^\circ + 70^\circ + a = 360^\circ$$

$$240^\circ + a = 360^\circ$$

$$a = 360^\circ - 240^\circ \quad a = 120^\circ$$

$$x + a = 180^\circ \text{ (Straight angle)}$$

$$x + 120^\circ = 180^\circ$$

$$x = 180^\circ - 120^\circ \quad x = 60^\circ$$

(b) Let the angle be a

$$a = 120^\circ = 180^\circ$$

(Straight angle)

$$a + 180^\circ - 120^\circ \quad a = 60^\circ$$

Sum of angle of triangle

$$= 180^\circ$$

$$50^\circ + b + 60^\circ = 180^\circ$$

$$110^\circ + b = 180^\circ$$

$$b = 180^\circ - 110^\circ \quad b = 70^\circ$$

$$x + b = 180^\circ \text{ (Straight angle)}$$

$$x + 70^\circ = 180^\circ$$

$$x = 180^\circ - 70^\circ \quad x = 110^\circ$$

(c) $\angle 2 = 180^\circ - 125^\circ \quad \angle 2 = 55^\circ$

$$\angle 3 = 180^\circ - 50^\circ \quad \angle 3 = 130^\circ$$

$$\angle 4 = 180^\circ - 125^\circ \quad \angle 4 = 55^\circ$$

$$\angle 1 + \angle 2 + \angle 3 + \angle 4 = 360^\circ$$

Sum of angle of Quadrilateral

$$\angle 1 = 55^\circ + 130^\circ + 55^\circ = 360^\circ$$

$$\angle 1 + 240^\circ = 360^\circ$$

$$\angle 1 = 360^\circ - 240^\circ \quad \angle 1 = 120^\circ$$

$$x = 180^\circ - 120^\circ \text{ (Straight angle)}$$

$$x = 60^\circ$$

(d) $\angle 1 = 180^\circ - 70^\circ \quad \angle 1 = 110^\circ$

$$\angle 2 = 180^\circ - 40^\circ \quad \angle 2 = 140^\circ$$

$$\angle 1 + \angle 2 + \angle 3 + \angle 4 = 360^\circ$$

Sum of angle of Quadrilateral

$$110^\circ + 140^\circ + 90^\circ + \angle 4 = 360^\circ$$

$$340^\circ + \angle 4 = 360^\circ$$

$$\angle 4 = 360^\circ - 340^\circ \quad \angle 4 = 20^\circ$$

$$x = 180^\circ - 20^\circ \text{ (Straight angle)}$$

$$x = 160^\circ$$

(e) $\angle 1 = 180^\circ - 60^\circ \quad \angle 1 = 120^\circ$

$$\angle 2 = 180^\circ - 85^\circ \quad \angle 2 = 95^\circ$$

$$\angle 3 = 180^\circ - 70^\circ \quad \angle 3 = 110^\circ$$

$$\angle 1 + \angle 2 + \angle 3 + \angle 4 = 360^\circ$$

Sum of angle of Quadrilateral

$$120^\circ + 95^\circ + 110^\circ + \angle 4 = 360^\circ$$

$$325^\circ + \angle 4 = 360^\circ \quad \angle 4 = 35^\circ$$

$$x = 180^\circ - 35^\circ \text{ (Straight angle)}$$

$$x = 145^\circ$$

4. Sum of angle Quadrilaterals
 $= 360^\circ$

$$\begin{aligned}
 4x + 3x + 2x + x &= 360^\circ \\
 10x &= 360^\circ \quad x = 36^\circ \\
 \angle P &= 4 \times 36 = 144^\circ \\
 \angle Q &= 3 \times 36 = 108^\circ \\
 \angle R &= 2 \times 36 = 72^\circ \quad \angle S = 36^\circ
 \end{aligned}$$

5. Let the angle be x

Sum of angle Quadrilaterals
 $= 360^\circ$

$$60^\circ + 110^\circ + x + x = 360^\circ$$

$$170^\circ + 2x = 360^\circ$$

$$2x = 360^\circ - 170^\circ \quad x = 95^\circ$$

6. Let the side be n

$$\text{Each interior angle} = \frac{n-2-360^\circ}{n}$$

$$135^\circ = \frac{180n-360^\circ}{n}$$

$$135^\circ n = 180^\circ n - 360^\circ$$

$$360^\circ = 180^\circ n - 135^\circ n$$

$$360^\circ = 45n \quad n = 8$$

7. Let the side be n

$$\text{Each interior angle} = \frac{360^\circ}{n}$$

$$= \frac{360^\circ}{n} = 30^\circ \quad 30^\circ n = 360^\circ$$

$$n = 12^\circ$$

8. Sides Pentagon = 5

$$n = 5$$

Each interior angle

$$= \frac{(n-2) \times 180^\circ}{n} = \frac{(5-2) \times 180^\circ}{5}$$

$$= \frac{3 \times 180^\circ}{5} = \frac{540^\circ}{5}$$

Each interior angle 108°

9. Sides Pentagon = 5

$$n = 5$$

$$\text{Each interior angle} = \frac{360^\circ}{n}$$

$$= \frac{360^\circ}{5} \quad \text{Each exterior angle } 72^\circ$$

10. Let the exterior angle be x interior

$$\text{angle } \frac{3x}{x}$$

Sum of interior and exterior angle
 $= 180^\circ$

$$3x + x = 180^\circ \quad 4x = 180^\circ$$

$$x = 45^\circ$$

$$\text{Exterior angle } \frac{360^\circ}{n}$$

$$54^\circ n = 360^\circ \quad n = \frac{360^\circ}{54} = 8$$

11. Let the sides be $N1$ & $N2$

$$N1:N2 = 1:2$$

$$(N1-2):(N2-2) = 1:2$$

$$N1 = 3 \quad N2 = 4$$

Exercise - 3.2

1. Adjacent angles $= 3x$ and $2x$

$$\angle A + \angle B = 180^\circ$$

$$3x + 2x = 180^\circ \quad 5x = 180^\circ$$

$$x = 36^\circ$$

$$\angle A = 3 \times 36 = 108^\circ$$

$$\angle B = 2 \times 36 = 72^\circ$$

$$\angle C = \angle A = 108^\circ$$

$$\angle D = \angle B = 72^\circ$$

2. Angles of Parallelogram

$$= (2x + 5^\circ) \text{ and } (3x + 10^\circ)$$

$$2x + 5 + 3x + 10 = 180^\circ$$

$$5x = 180^\circ - 15^\circ \quad 5x = 165^\circ$$

$$x = 33$$

$$\angle A = 2 \times 33 + 5 = 71^\circ$$

$$\angle B = 3 \times 33 + 10 = 109^\circ$$

$$\angle C = \angle A = 71^\circ$$

$$\angle B = \angle D = 109^\circ$$

3. In II gm $ABCD = A = 60^\circ$

Sum two adjacent angles of II gm
 $= 180^\circ$

$$\angle A + \angle B = 180^\circ$$

$$50 + \angle B = 180^\circ \quad \angle B = 130^\circ$$

Opposite angles of II gm are equal

$$\angle C = \angle A = 50^\circ$$

$$\angle D = \angle B = 130^\circ$$

4. In $\triangle ABD = \triangle CDA$

$$AB = CD$$

(Opposite sides of rectangle)

$$\angle D = \angle D \text{ (Common)}$$

$$AD = AD \text{ (Common)}$$

By SAS property of congruence

$$\triangle ABD \cong \triangle CDA \quad \text{Hence Proved}$$

5. In Ramblers all sides are equal

$$\therefore AB = AD$$

In Ramblers diagonals bisect each other

$$\text{So, } AO = DO$$

$$AO = AO (\text{Common})$$

$$\therefore \triangle ABO \cong \triangle ADO$$

$$\text{Similarly } \triangle ABO \cong \triangle BCO$$

$$\text{Similarly } \triangle BCO \cong \triangle DCO$$

$$\therefore \triangle ABO \cong \triangle DCO \cong \triangle ADO$$

Hence Proved

6. $\angle A = 70^\circ$ $\angle A = \angle Q$

Opposite angle are equal

$$\angle A + \angle P + \angle Q + \angle R = 360^\circ$$

$$70^\circ + x + 70^\circ + x = 360^\circ$$

$$140^\circ + 2x = 360^\circ$$

$$2x = 220^\circ \quad x = 110^\circ$$

$$\angle P = 110^\circ, \angle R = 110^\circ$$

In II gm $ABCD$

$$\angle A = \angle C$$

(Opposite angle are equal)

Let the angle B be x

$$\angle A + \angle B + \angle C + \angle D = 360^\circ$$

$$70^\circ + x + 70^\circ + x = 360^\circ$$

$$140^\circ + x = 360^\circ \quad x = 110^\circ$$

$$\angle B + \angle A = 110^\circ$$

7. In II gm sum of adjacent angle is 180°

$$\angle A + \angle B = 180^\circ$$

In $\triangle AOB$

$$\angle OAB + \angle OBA + \angle AOB = 180^\circ$$

$$\frac{\angle A}{2} + \frac{\angle B}{2} + \angle AOB = 180^\circ$$

$$90^\circ + \angle AOB = 180^\circ \quad \angle AOB = 90^\circ$$

8. Sum of adjacent angle = 180°

Let the angle be x and y

$$x = \frac{2}{3}y \rightarrow (1) \quad x + y = 180^\circ \rightarrow (2)$$

Put x from 1 to 2

$$\left(\frac{2}{3}\right)y + y = 180^\circ \quad \left(\frac{2}{3} + 1\right)y = 180^\circ$$

$$\frac{5}{3}y = 180^\circ \quad y = 180 \times \frac{3}{5}$$

$$y = 108^\circ$$

On eq 1

$$x + 108 = 180^\circ \quad x = 72^\circ$$

The angle is $72^\circ, 180^\circ, 72^\circ, 108^\circ$

9. Opposite angles of II gm are equal

$$(6x - 4) = (100 - 2x)$$

$$6x - 4 = 100 - 2x$$

$$6x + 2x = 104 \quad 8x = 104$$

$$x = \frac{104}{8} \quad x = 13$$

$$\angle A = 6x - 4 = 6 \times 13 - 4$$

$$x = 74^\circ \quad \angle E = \angle A$$

Let the $\angle B$ be x

$$\angle A + \angle B + \angle C + \angle D = 360^\circ$$

$$74^\circ + x + 74^\circ + x = 360^\circ$$

$$148 + 2x = 360^\circ \quad x = 106^\circ$$

$$\angle B = \angle D = 106^\circ$$

10. $\angle A = \angle C$

(Opposite angles of II gm)

$$70^\circ = 70^\circ$$

On $\triangle ABD$

$$\angle A + \angle ABD + 60^\circ = 180^\circ$$

$$\angle ABD + 130^\circ = 180^\circ$$

$$\angle ABD = 50^\circ$$

$$\angle ADB = \angle CBD$$

(Alternate interior angle)

$$60^\circ = 60^\circ \quad \angle CBD = 60^\circ$$

11. $\angle DAC = \angle BCA$

(Alternate interior angle)

$$30^\circ = 30^\circ$$

$$\angle CAB + \angle ABC + \angle BCA = 180^\circ$$

$$40^\circ + \angle ABC + 30^\circ = 180^\circ$$

$$70^\circ + \angle ABC = 180^\circ$$

$$\angle ABC = 180^\circ - 70^\circ$$

$$\angle ABC = 110^\circ$$

$$\angle DCA = \angle BAC$$

(Alternate interior angle)

$$40^\circ = 40^\circ$$

$$\angle BCA + \angle DCA = 30^\circ + 40^\circ$$

$$\angle BCD = 70^\circ$$

12. In $\triangle ADQ$ & $\triangle PBC$

$$AD = BC$$

Opposite side of II gm

$$DQ = PB \text{ (Given)}$$

$$CD = CB \text{ (each } 90^\circ \text{)}$$

By SAS Property

$$\triangle ADQ \cong \triangle PBC$$

In II gm opposite sides are equal

$\therefore APCQ$ is a II gm

13. Let $ABCD$ is a rhombus

$$AC = 16 = AO = \frac{16}{2} = 8 \text{ cm}$$

$$BD = 12 = BO = \frac{12}{2} = 6 \text{ cm}$$

By Pythagoras theorem

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

$$(AB)^2 = (8)^2 + (6)^2$$

$$(AB)^2 = 64 + 36 = 100$$

$$AB = 10 \text{ cm}$$

Sides of rhombs = 10 cm

Perimeter of rhombs = $10 + 10 +$

$$10 + 10 = 40 \text{ cm}$$

14. Let $ABCD$ is a rhombus

$$AC = \frac{10}{2} = 5 \text{ cm}$$

By Pythagoras theorem

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

$$(13)^2 = (5)^2 + (OB)^2$$

$$169 = 25 + (OB)^2$$

$$144 = (OB)^2$$

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

$$BD = 12 \times 2 = 24 \text{ cm}$$

15. Side of rectangle = $2x$ and $5x$

Perimeter $2(l+b)$

$$210 = 2(2x + 5x)$$

$$210 = 14x$$

$$x = \frac{210}{14} \quad x = 15 \text{ cm}$$

$$\text{Length} = 2 \times 15 = 30 \text{ cm}$$

$$\text{Breadth} = 5 \times 15 = 75 \text{ cm}$$

$$\text{Area of rectangle} = l \times b$$

$$= 30 \times 75 = 2250 \text{ cm}^2$$

16. Find the value of x and y if given figure are II gm:

$$(a) \quad x + y = 25$$

(Diagonal of II gm bisect each other) – (1)

$$x - y = 15 - (2)$$

$$x + y = 25 \quad x - y = 15$$

$$2x = 40 \quad x = 20$$

On Putting $x = 20$ in eq

$$20 + y = 25 \quad y = 5$$

- (b) Opposite sides of a II gm are equal

$$4x = 8 \quad x = 2 \text{ cm}$$

$$SP = RQ$$

$$5y + 12 = 12 \quad 5y = 12 - 12$$

$$5y = 0 \quad y = 0$$

Multiple Choice Question

1. b 2. b 3. b 4. b 5. c

NCERT CORNER

Fill in the blanks:

1. Equal, parallel 2. Decagon

3. Not equal 4. bisect

5. Diagonals equal

True and False

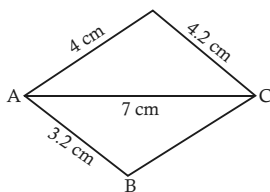
1. False 2. True 3. False

4. False 5. True

Chapter - 4

Exercise - 4.1

1.



Step 1: First identify the diagonal and draw a line $AC = 9 \text{ cm}$

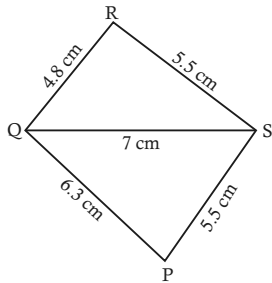
Step 2: With A as center and radius 3.2 cm ($AB = 3.2 \text{ cm}$) draw an arc by using a compass

Step 3: With center C and radius 4.2 cm ($CD = 4.2 \text{ cm}$) draw an arc

Step 4: With A drawn an arc 4.2 (AD = 4.2 cm)

Step 5: Join all the arcs together ABCD is a quadrilateral

2.



Step 1: Draw QS = 7 cm

Step 2: From Q take distance 4.8 cm and draw an arc

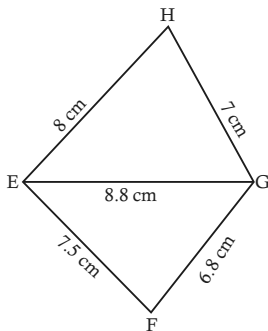
Step 3: From S take distance 5.5 cm and draw an arc

Step 4: Again from Q take a distance 6.3 cm and draw an arc

Step 5: Again from S take a distance 5.5 cm and draw an arc

Step 6: Join all the points. PQRS is a quadrilateral

3.



Step 1: Draw EG = 8 cm

Step 2: From point E take distance 8 cm and draw an arc

Step 3: From point G take distance 7 cm and cut an arc

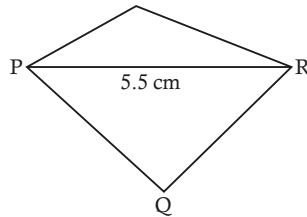
Step 4: Again from point E take a distance 7.3 cm and draw an arc

Step 5: From point G draw an arc of 8.6 cm

Step 6: Join all the points. EFGH is a quadrilateral

Exercise - 4.2

1.



Step 1: Draw PR = 5.5 cm

Step 2: With point P take distance 4.8 cm and draw an arc

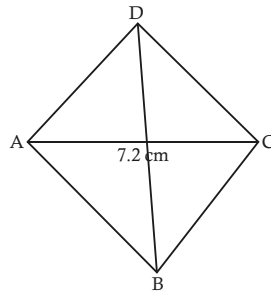
Step 3: With point R take distance 3.3 cm and draw an arc

Step 4: From point P again draw an arc of distance 4.8

Step 5: From point R again draw an arc of distance 4

Step 6: Join all the points. PQRS is a quadrilateral

2.



Step 1: Draw AC = 7.2 cm

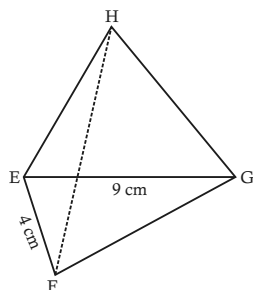
Step 2: From point A draw an arc of 6.1 cm

Step 3: From point B draw an arc of 5.4 cm

Step 4: Again from point C draw an arc of length 4.8 cm

Step 5: Connect all the points. ABCD is a Quadrilateral

3.



Step 1: Draw $EG = 9$ cm

Step 2: From point E take distance 8.5 cm and draw an arc

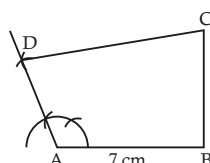
Step 3: From point G take distance 9 cm and draw an arc

Step 4: Again from E point draw an arc of 4 cm

Step 5: Join all the points EFGH is a Quadrilateral

Exercise - 4.3

1.



Step 1: Draw $AB = 7$ cm

Step 2: At Point A draw an angle of 20° let $\angle A \times AB$

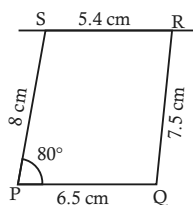
Step 3: From point B draw an arc of 8 cm

Step 4: From point A draw an arc of 7.5 cm

Step 5: Draw an arc of 5.5 cm from C

Step 6: Join all the points ABCD is a Quadrilateral

2.



Step 1: Draw $PQ = 6.5$ cm

Step 2: On point P draw an angle of 80°

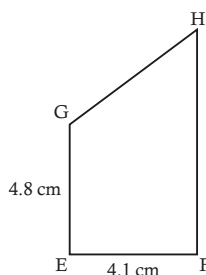
Step 3: From point Q draw an arc of 7.5 cm

Step 4: From point P draw an arc of 8 cm

Step 5: From point R draw an arc of 5.1 cm

Step 6: Join all the points PQRS is a Quadrilateral

3.



Step 1: Draw $EF = 4.1$ cm

Step 2: On point E draw an angle of 90°

Step 3: From point E draw an arc of 4.8 cm

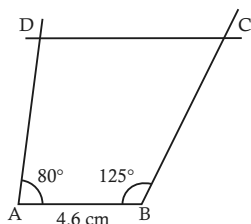
Step 4: From point F draw an arc of 4.8 cm

Step 5: From point D draw an arc of 5.3 cm

Step 6: Join all the points EFGH is a Quadrilateral

Exercise - 4.4

1.



Step 1: Draw $AB = 4.6$ cm

Step 2: At point A make an angle of 80°

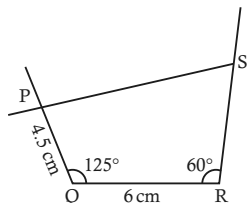
Step 3: At point B make an angle of 125°

Step 4: Cut $BC = 6.5$ cm along B

Step 5: Cut $CD = 5$ cm

Step 6: Join CD, ABCD is a Quadrilateral

2.



Step 1: Draw $QC = 6$ cm

Step 2: On point Q draw an angle of 125°

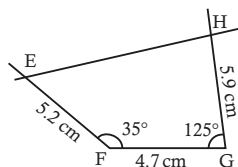
Step 3: On point R draw an angle of 60°

Step 4: Cut $RS = 6.5$ cm

Step 5: Cut $QP = 4.5$ cm

Step 6: Join all point PQRS is a Quadrilateral

3.



Step 1: Draw $FG = 4.7$ cm

Step 2: At point F draw an angle of 35°

Step 3: At point G draw an angle of 125°

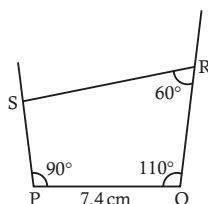
Step 4: From point F cut $FE = 5.2$ cm

Step 5: From point G cut $GH = 5.9$ cm

Step 6: Join all the point EFGH is a Quadrilateral

Exercise - 4.5

1.



Step 1: Draw $PQ = 7.4$ cm

Step 2: At point P draw an angle of 90°

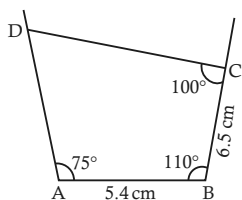
Step 3: At point Q draw an angle of 110°

Step 4: From point Q cut $QR = 7$ cm

Step 5: On point R draw an angle of 60°

Step 6: Join all the points PQRS is a Quadrilateral

2.



Step 1: Draw $AB = 5.4$ cm

Step 2: On point A draw an angle of 75°

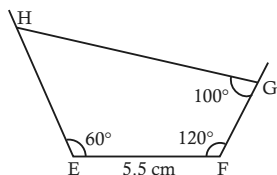
Step 3: On point B draw an angle of 110°

Step 4: On Point B cut $BC = 6.5$ cm

Step 5: On point C draw an angle of 100°

Step 6: Join all the points ABCD is a Quadrilateral

3.



Step 1: Draw $EF = 5.5$ cm

Step 2: On point E draw an angle of 60°

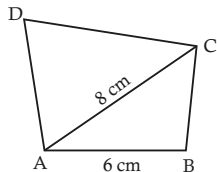
Step 3: On point E draw an angle of 120°

Step 4: Cut $FG = 4.8$ cm

Step 5: On point G draw an angle of 100°

Exercise - 4.6

1.



Step 1: Draw $AB = 6$ cm

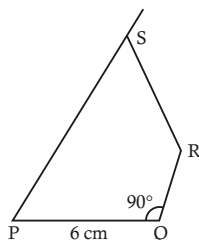
Step 2: From point A take distance 8 cm draw an arc

Step 3: From point B draw an arc of 4 cm (BC)

Step 4: From C draw an arc of 6 cm

Step 5: Join all the points. ABCD is a Quadrilateral

2.



Step 1: Draw $PQ = 6$ cm

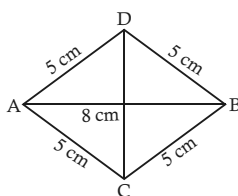
Step 2: On point Q draw an angle of 90°

Step 3: From point Q draw an arc of 3 cm

Step 4: From point R draw an arc of 6 cm

Step 5: Join on all the points PQRS is a Quadrilateral

3.



Step 1: Draw $AB = 8$ cm

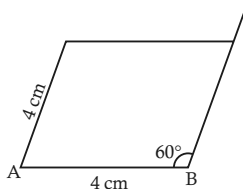
Step 2: From point A draw an arc of 5 cm

Step 3: From point B draw an arc of same length and cut the arc

Step 4: From point A and B again do the same work

Step 5: Join all the points. ABCD is a Quadrilateral

4.



Step 1: Draw $AB = 4$ cm

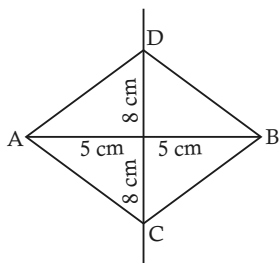
Step 2: From point A cut 4 cm

Step 3: On point B draw an angle of 60°

Step 4: From point B cut 4 cm

Step 5: Join all the points ABCD is a rhombus

5.



Step 1: Draw $AB = 4$ cm

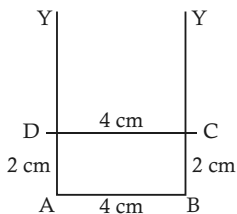
Step 2: Draw perpendicular bisector XY of AB

Step 3: With center O and radius 4 cm draw an arc along XY

Step 4: Suppose step 4 are cut XY at CD

Step 5: Join all the points $ABCD$ is a rhombs

6.



Step 1: Draw $AB = 4$ cm

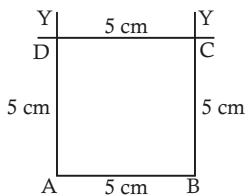
Step 2: On point A and B draw an angle of 90°

Step 3: Cut $AD = 2$ cm on AX

Step 4: Cut $BC = 2$ cm on BY

Step 5: Join all the points $ABCD$ is a rectangle

7.



Step 1: $AB = 5$ cm

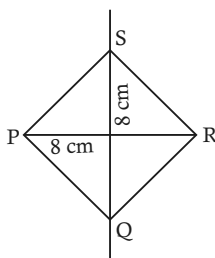
Step 2: On point A and B draw an angle 90°

Step 3: Cut $AB = 5$ cm on AX

Step 4: Cut $Bc = 5$ cm on BY

Step 5: Join all the lines $ABCD$ is a square

8.



Step 1: Draw $AB = 8$ cm

Step 2: Draw a perpendicular bisector on PR

Step 3: From point O take distance 4 cm and draw an arc of 4 cm

Step 4: Suppose step 3 are cut on QS

Step 5: Join all the points $PQRS$ is a rectangle

Multiple Choice Question:

1. c 2. b 3. c 4. b 5. c

Fill in the blanks:

1. Bisect
2. Perpendicular
3. Side, diagonal
4. 360°
5. Right angled

True and False:

1. False
2. False
3. False
4. True
5. False

Chapter - 5

Exercise - 5.1

1.

C.I	Tally mark	Frequency
0-10		1
10-20		4
20-30		4
30-40		6
40-50		5
50-60		2
60-70		9
70-80		6
80-90		5
90-100		8

(a)100 (b)9 (c)91 (d)9 (e)20

2.

Outcome	Tally mark	Frequency
1		9
2		10
3		7
4		8
5		6
6		10

3.

Fruits	Tally mark	Frequency
Apple		12
Grapes		6
Orange		12
Banana		6
Mango		9
Pineapple		5
Total		50

(a) Apple
(b) Pine apple

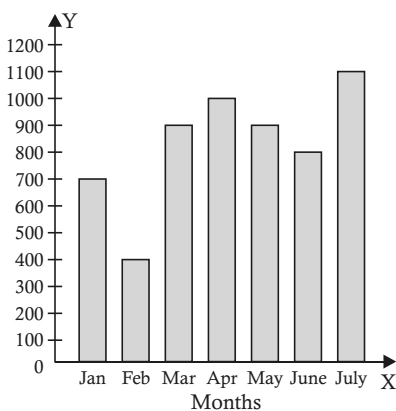
4.

Age (Years)	Tally mark	Frequency
10		2
11		7
12		9
13		4
14		3
Total		25

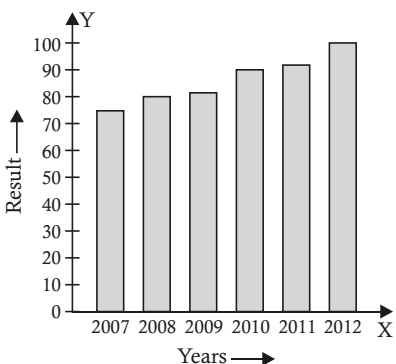
(a) 14 years (b) 10 years (c) 4

Exercise - 5.2

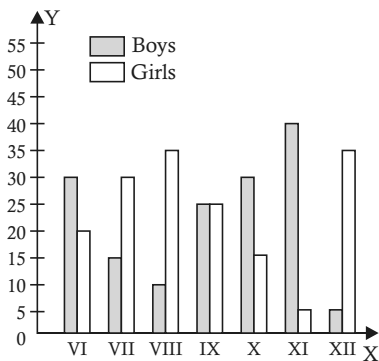
1.



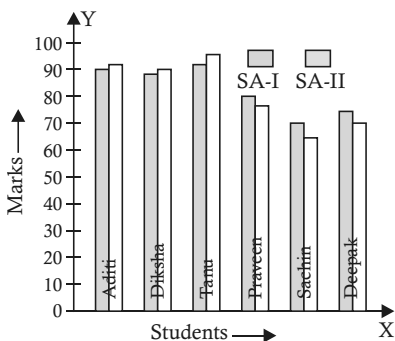
2.



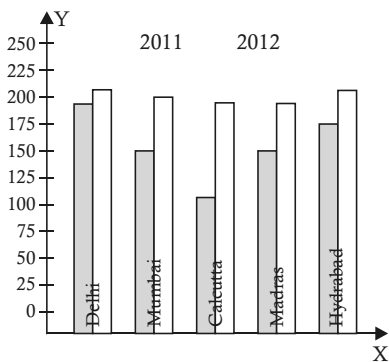
3.



4.

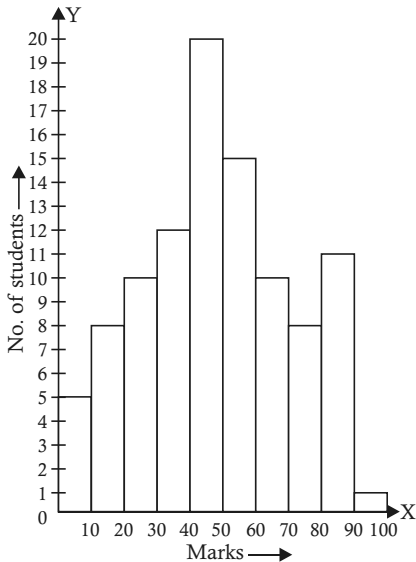


5.

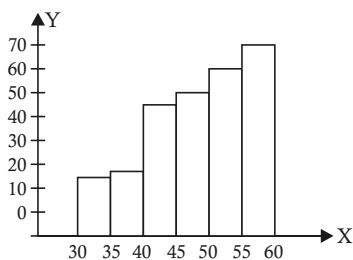


Exercise - 5.3

1.

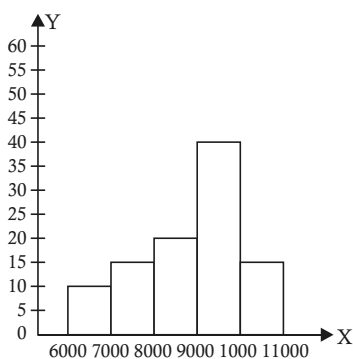


2.



(a) 5 (b) 40 (c) 55 (d) 42.5 (e) 52.5

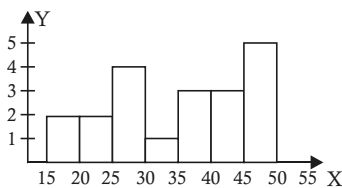
3.



- (a) 100 (b) 9000 – 10000
 (c) 6000 – 7000 (d) 45 (e) 55
 4. (a) 10 (b) 45 (c) 40 - 50
 (d) 0 - 10, 20 - 30

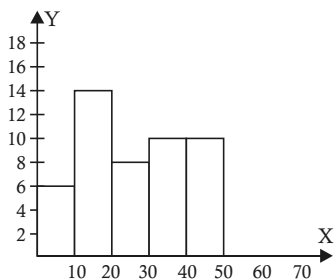
5.

C.I	Tally mark	Frequency
15 - 20		2
20 - 25		2
25 - 30		4
30 - 35		1
35 - 40		3
40 - 45		3
45 - 50		5
	Total	20



6.

C.I	Tally mark	Frequency
0 - 10		6
10 - 20		15
20 - 30		9
30 - 40		10
40 - 50		10
	Total	50



- (a) 10 (b) 45 (c) 10 - 20 (d) 0 - 10
 (e) 29

Exercise - 5.4

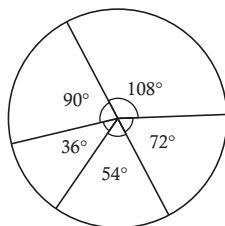
1. Coke = $\frac{30}{100} \times 360 = 108^\circ$

Thumps up = $\frac{25}{100} \times 360 = 90^\circ$

Slice = $\frac{10}{100} \times 360 = 36^\circ$

Limca = $\frac{15}{100} \times 360 = 54^\circ$

Sprite = $\frac{20}{100} \times 360 = 72^\circ$



2. Total Maps = 180

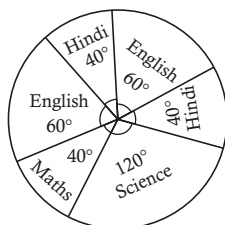
Hindi = $\frac{20}{180} \times 360 = 40^\circ$

English = $\frac{30}{180} \times 360 = 60^\circ$

Maths = $\frac{40}{180} \times 360 = 80^\circ$

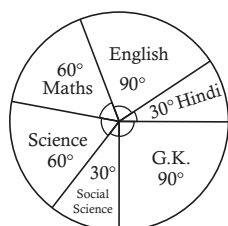
Science = $\frac{60}{180} \times 360 = 120^\circ$

S. Science = $\frac{30}{180} \times 360 = 72^\circ$



3. Total Maps = 1200

$$\begin{aligned}\text{Hindi} &= \frac{100}{1200} \times 360 = 30^\circ \\ \text{English} &= \frac{300}{1200} \times 360 = 90^\circ \\ \text{Maths} &= \frac{200}{1200} \times 360 = 60^\circ \\ \text{Science} &= \frac{200}{1200} \times 360 = 60^\circ \\ \text{S. Science} &= \frac{100}{1200} \times 360 = 30^\circ \\ \text{G.K.} &= \frac{300}{1200} \times 360 = 90^\circ\end{aligned}$$



4. Hindi = 72°

$$72 = \frac{x}{880} \times 360 \quad x = 176$$

$$\text{Science } 180 = \frac{x}{880} \times 360$$

$$95040 = 360x \quad x = 264$$

$$\text{Math } 81 = \frac{x}{880} \times 360$$

$$71280 = 360x \quad x = 198$$

$$\text{English } 880 - 770 = 110$$

5. Math = 270

$$\text{Maths} = \frac{270}{x} \times 360$$

$$90x = 97200 \quad x = 1080$$

$$\text{English} = 60 = \frac{x}{180} \times 360$$

$$6480 = 36x \quad x = 216$$

$$\text{S.Science} = 72 = \frac{x}{180} \times 360$$

$$x = 216$$

$$\text{Science} = 76 = \frac{x}{180} \times 360$$

$$x = 228$$

$$\text{Hindi } 1080 - 894 = 186$$

Exercise - 5.5

1. {H, T}
2. {HH, HT, TH, TT}
3. {HHH, HHT, HTH, THH, TTT, TTH, THT, HTT}

4. $P[E] = 0.75$

$$P[\text{not } E] = x$$

$$0.75 + x = 1$$

$$P[\text{not } E] = 0.27$$

5. $S = [1, 2, 3, 4, 5, 6,]$

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

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

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

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

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

$$(f) P[E] = \frac{0}{6} = 0$$

6. $S = 37$

$$(a) P[R] = \frac{10}{37}$$

$$(b) P[NR] = \frac{27}{37}$$

$$(c) P[G] = \frac{12}{37}$$

$$(d) P[NG] = \frac{25}{37}$$

$$(e) P[W] = \frac{15}{37}$$

$$(f) P[NW] = \frac{22}{37}$$

7. $S = 200$

$$(a) P[T] = \frac{110}{200} = \frac{11}{20}$$

$$(b) P[H] = \frac{110}{200} = \frac{11}{20}$$

8. $S = 52$

(a) $P[B] = \frac{26}{52} = \frac{1}{2}$

(b) $P[BQ] = \frac{2}{52} = \frac{1}{26}$

(c) $P[R] = \frac{26}{52} = \frac{1}{2}$

(d) $P[RK] = \frac{2}{52} = \frac{1}{26}$

(e) $P[F] = \frac{3}{13}$

(f) $P[D] = \frac{1}{4}$

9. $S = 30$

(a) $P[E] = \frac{15}{30} = \frac{1}{2}$

(b) $P[O] = \frac{15}{30} = \frac{1}{2}$

(c) $P[P] = \frac{10}{30} = \frac{1}{3}$

(d) $P[M] = \frac{6}{30} = \frac{1}{5}$

(e) $P[3] = \frac{10}{30} = \frac{1}{3}$

(f) $P[F] = \frac{8}{30} = \frac{4}{15}$

10. Probability having 53 Sundays

$= \frac{53}{365} = \frac{1}{7}$

11. Probability of having 53

Sundays in leap year $= \frac{53}{366} = \frac{2}{7}$

12. $S = 36$

(a) $P[E] = \frac{18}{36} = \frac{1}{2}$

(b) $P[O] = \frac{18}{36} = \frac{1}{2}$

(c) $P[P] = \frac{3}{10}$

(d) $P[D] = \frac{6}{36} = \frac{1}{6}$

(e) $P[DE] = \frac{3}{36} = \frac{1}{12}$

(f) $P[DO] = \frac{3}{36} = \frac{1}{12}$

(g) $P[F] = \frac{0}{36} = 0$

(h) $P[C2] = \frac{0}{36} = 0$

(i) $P[S12] = \frac{1}{36}$

13. $S = 26$

(a) $P[C] = \frac{21}{26}$

(b) $P[V] = \frac{5}{26}$

14. $S = 13$

(a) $P[R] = \frac{6}{13}$

(b) $P[W] = \frac{2}{13}$

(c) $P[G] = \frac{5}{13}$

(d) $P[NR] = \frac{7}{13}$

(e) $P[VW] = \frac{11}{13}$

15. $SE = 40$

(a) $P[S] = \frac{12}{40} = \frac{3}{10}$

(b) $P[C] = \frac{12}{40} = \frac{3}{10}$

(c) $P[D] = \frac{12}{40} = \frac{3}{10}$

(d) $P[A] = \frac{1}{40}$

Multiple Choice Question:

1. a 2. b 3. b 4. a 5. c

Fill in the blanks:

1. 0 and 1 2. 1 3. 0 4. 1 5. $1/2$

True and False:

1. False 2. False 3. True

4. True 5. False

Chapter - 6

Exercise - 6.1

1. Find square of the following:

(a) $(11)^2 = 121$

(b) $(25)^2 = 625$

(c) $(75)^2 = 5625$

(d) $(100)^2 = 10000$

(e) $(125)^2 = 15625$

2. Which of the following are perfect square:

(a) $784 = (28)^2$ = This is a perfect square.

(b) $1024 = (32)^2$ = This is a perfect square.

(c) $729 = (27)^2$ = This is a perfect square.

(d) 1056 = This is not a perfect square.

(e) 5120 = This is not a perfect square.

3. (a) 180

$$\begin{array}{r} 2 \overline{) 180} \\ 2 \overline{) 90} \\ 3 \overline{) 45} \\ 3 \overline{) 15} \\ 5 \overline{) 5} \\ 1 \end{array}$$

$$180 = 2 \times 2 \times 3 \times 3 \times 5$$

(b) 1800

$$\begin{array}{r} 2 \overline{) 1800} \\ 2 \overline{) 900} \\ 2 \overline{) 450} \\ 5 \overline{) 225} \\ 5 \overline{) 45} \\ 3 \overline{) 9} \\ 3 \overline{) 3} \\ 1 \end{array}$$

$$1800 = 2 \times 2 \times 2 \times 5 \times 5 \times 3 \times 3 = 2$$

(c) to (e) Do same as above.

4. (a) 1625

$$\begin{array}{r} 5 \overline{) 1625} \\ 5 \overline{) 325} \\ 5 \overline{) 65} \\ 13 \overline{) 13} \\ 1 \end{array}$$

$$1625 = 5 \times 5 \times 5 \times 13 = 6 \times 3 = 65$$

(b) 1200

$$\begin{array}{r} 2 \overline{) 1200} \\ 2 \overline{) 600} \\ 2 \overline{) 300} \\ 2 \overline{) 150} \\ 3 \overline{) 75} \\ 5 \overline{) 25} \\ 5 \overline{) 5} \\ 1 \end{array}$$

$$1200 = 2 \times 2 \times 2 \times 2 \times 3 \times 5 \times 5 = 3$$

(c) to (e) Do same as above

5. (a) 2025

$$\begin{array}{r} 5 \overline{) 2025} \\ 5 \overline{) 405} \\ 9 \overline{) 81} \\ 9 \overline{) 9} \\ 1 \end{array}$$

$$2025 = 5 \times 5 \times 9 \times 9 = 45$$

(b) 3600

$$\begin{array}{r} 2 \overline{) 3600} \\ 2 \overline{) 1800} \\ 2 \overline{) 900} \\ 2 \overline{) 450} \\ 3 \overline{) 225} \\ 3 \overline{) 75} \\ 5 \overline{) 25} \\ 5 \overline{) 5} \\ 1 \end{array}$$

$$3600 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5 = 60$$

(c) to (e) Do same as above.

6. (a) 256 $n = 3$ (add)
 No. of digits $= \frac{3+1}{2} = \frac{4}{2} = 2$

(b) 2025 $n = 4$ (even)
 No. of digits $= \frac{4}{2} = 2$

(c) 3600 $n = 4$ (even)
 No. of digits $= \frac{4}{2} = 2$

(d) 10816 $n = 5$ (add)
 No. of digits $= \frac{5+1}{2} = \frac{6}{2} = 3$

(e) 176400 $n = 6$ (even)
 No. of digits $= \frac{6}{2} = 3$

7. 1024

8. 9801

Exercise - 6.2

1. (a) 32-This is not a perfect square

(b) 64
 $64 = (8)^2$ This is a perfect square

(c) 1278 - This is not a perfect square

(d) 1233 - This is not a perfect square

(e) 1567 - This is not a perfect square

(f) $256 = (16)^2$ - This is a perfect square

(g) $3600 = (60)^2$ - This is a perfect square

(h) $1024 = (32)^2$ - This is a perfect square

(i) 5278 - This is not a perfect square

(j) $10000 = (100)^2$ - This is a perfect square

(k) 6250 - This is not a perfect square

(l) 7788 - This is not a perfect square

2. (a) 84100

8410 (0) = 0 is a perfect square

(b) $1621 = (1)$ odd (c) $9216 = (6)$

even (d) $6400 = (0)$ even (e) 1800

$= (0)$ even (f) $2961 = (1)$ odd (g)

$1764 = (4)$ even (h) $6084 = (4)$

even (i) $2481 = (1)$ odd

(j) $3600 = (0)$ even (k) $3136 = (6)$

even (l) $7938 = (8)$ even

3. (a) $361 = (1)$ odd (b) $625 = (5)$ odd

(c) $729 = (9)$ odd (d) $3136 = (6)$

even (e) $2401 = (1)$ odd (f) $4761 =$

(1) odd (g) $11025 = (5)$ odd (h)

$2916 = (6)$ even (i) $2048 = (8)$ odd

(j) $7776 = (6)$ even (k) $8820 = (0)$

even (l) $3675 = (5)$ odd

4. (a) $(70)^2 - (69)^2$

Using identity

$$a^2 - b^2 = (a+b)(a-b)$$

$$(b) (101)^2 - (100)^2$$

$$= (101+100)(101-100)$$

$$= 201 \times 1 = 201$$

$$(c) 98^2 - 97^2$$

$$= (98+97)(98-97)$$

$$= 195 \times 1 = 195$$

$$(d) (551)^2 - (550)^2$$

$$= (551+550)(551-550)$$

$$= 1101 \times 1 = 1101$$

$$(e) (120)^2 - (119)^2$$

$$= (120+119)(120-119)$$

$$= 239 \times 1 = 239$$

$$(f) (1000)^2 - (999)^2$$

$$= (1000+999)(1000-999)$$

$$= 1999 \times 1 = 1999$$

$$(g) (161)^2 - (160)^2$$

$$= (161+160)(161-160)$$

$$= 321 \times 1 = 321$$

$$(h) (225)^2 - (224)^2$$

$$= (225+224)(225-224)$$

$$= 449 \times 1 = 449$$

$$5. (a) 5^2 = \frac{5^2+1}{2} + \frac{5^2-1}{2}$$

$$\begin{aligned}
 &= \frac{26}{2} + \frac{24}{2} \quad 5^2 = 13 + 12 \\
 \text{(b)} \quad 25^2 &= \frac{25^2 + 1}{2} + \frac{25^2 - 1}{2} \\
 &= \frac{626}{2} + \frac{624}{2} \quad 25^2 = 313 + 312 \\
 \text{(c)} \quad 23^2 &= \frac{23^2 + 1}{2} + \frac{23^2 - 1}{2} \\
 &= \frac{530}{2} + \frac{528}{2} \quad 23^2 = 265 + 264 \\
 \text{(d)} \quad 35^2 &= \frac{35^2 + 1}{2} + \frac{35^2 - 1}{2} \\
 &= \frac{1226}{2} + \frac{1224}{2} \quad 35^2 = 613 + 612 \\
 \text{(f)} \quad 11^2 &= \frac{11^2 + 1}{2} + \frac{11^2 - 1}{2} \\
 &= \frac{122}{2} + \frac{120}{2} \quad 11^2 = 61 + 60 \\
 \text{(g)} \quad 15^2 &= \frac{15^2 + 1}{2} + \frac{15^2 - 1}{2} \\
 &= \frac{226}{2} + \frac{224}{2} \quad 15^2 = 113 + 112 \\
 \text{(h)} \quad (13)^2 &= 85 + 84 \\
 \text{(i)} \quad 87^2 &= \frac{87^2 + 1}{2} + \frac{87^2 - 1}{2} \\
 &= \frac{7570}{2} + \frac{7568}{2} \\
 87^2 &= 3785 + 3784 \\
 \text{(j)} \quad 45^2 &= \frac{45^2 + 1}{2} + \frac{45^2 - 1}{2} \\
 &= \frac{2026}{2} + \frac{2024}{2} \\
 45^2 &= 1013 + 1012 \\
 \text{(k)} \quad 75^2 &= \frac{75^2 + 1}{2} + \frac{75^2 - 1}{2} \\
 &= \frac{5626}{2} + \frac{5624}{2} \\
 75^2 &= 2813 + 2812 \\
 \text{(l)} \quad 105^2 &= \frac{105^2 + 1}{2} + \frac{105^2 - 1}{2}
 \end{aligned}$$

$$\begin{aligned}
 &= \frac{11026}{2} + \frac{11024}{2} \\
 105^2 &= 5513 + 5512 \\
 \text{6. (a)} \quad (3, 4, 5) \\
 (3)^2 + (4)^2 &= (5)^2 \\
 9 + 16 &= 25 \quad 25 = 25 \\
 \text{(b)} \quad (8, 15, 17) \\
 (8)^2 + (15)^2 &= (17)^2 \\
 64 + 225 &= 289 \quad 284 = 289 \\
 \text{(c)} \quad (10, 20, 30) \\
 (10)^2 + (20)^2 &= (30)^2 \\
 100 + 400 &= 900 \\
 500 \neq 900 \quad \text{This is not} \\
 &\quad \text{Pythagorean triplet} \\
 \text{(d)} \quad (5, 12, 13) \\
 (5)^2 + (12)^2 &= (13)^2 \\
 25 + 144 &= 169 \quad 169 = 169 \\
 \text{(e)} \quad (6, 8, 10) \\
 (6)^2 + (8)^2 &= (10)^2 \\
 36 + 64 &= 100 \quad 100 = 100 \\
 \text{(f)} \quad (9, 12, 20) \\
 (9)^2 + (12)^2 &= (20)^2 \\
 81 + 144 &= 400 \\
 225 \neq 404 \quad \text{This is not} \\
 &\quad \text{Pythagorean triplet} \\
 \text{(g)} \quad (9, 12, 15) \\
 (9)^2 + (12)^2 &= (15)^2 \\
 81 + 144 &= 225 \quad 225 = 225 \\
 \text{(h)} \quad (5, 10, 15) \\
 (5)^2 + (10)^2 &= (15)^2 \\
 25 + 100 &= 225 \quad 225 = 225 \\
 \text{7. (a)} \quad 1 + 3 + 5 + 7 + 9 \\
 (5)^2 \text{ (odd)} &= 25 \\
 \text{(b)} \quad 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 \\
 (8)^2 \text{ (even)} &= 64 \\
 \text{(c)} \quad 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 \\
 (10)^2 \text{ (even)} &= 100 \\
 \text{(d)} \quad 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 \\
 (12)^2 \text{ (even)} &= 144 \\
 \text{(e)} \quad 1 + 3 + 5 + 7 + 9 + 11 + 13 +
 \end{aligned}$$

$$15 + 17 + 19 + 21 + 23 + 25 + 27 + 29$$

$$(15)^2 \text{ (odd)} \\ = 225$$

8. (a) 49

$$\sqrt{49} = 7$$

$$1 + 3 + 5 + 7 + 9 + 11 + 13$$

(b) 25 $\sqrt{25} = 5$

$$1 + 3 + 5 + 7 + 9$$

(c) 121

$$\sqrt{121} = 11$$

$$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21$$

(d) 64

$$\sqrt{64} = 8$$

$$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15$$

(e) 256

$$\sqrt{256} = 16$$

$$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 + 25 + 27 + 29 + 31$$

(f) 144

$$\sqrt{144} = 12$$

$$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23$$

9. (a) 4

$2m, m^2 + 1, m^2 - 1$
are Pythagorean triplet

$$2 \times 4 = 8$$

$$(8)^2 + 1 = 64 + 1 = 65$$

$$(m^2 - 1) = 16 - 1 = 15$$

$$(16, 17, 15)$$

(b) 8

$$2m = 2 \times 8 = 16$$

$$(m^2 + 1) = 64 + 1 = 65$$

$$(m^2 - 1) = 64 - 1 = 63$$

$$(16, 65, 63)$$

(c) 12

$$2m = 2 \times 12 = 24$$

$$(m^2 + 1) = 144 + 1 = 145$$

$$(m^2 - 1) = 144 - 1 = 143$$

$$(24, 145, 143)$$

(d) 16

$$2m = 2 \times 16 = 32$$

$$(m^2 + 1) = 256 + 1 = 257$$

$$(m^2 - 1) = 256 - 1 = 254$$

$$(32, 257, 254)$$

(e) 50

$$2m = 2 \times 50 = 100$$

$$(m^2 + 1) = (50)^2 + 1$$

$$= 2500 + 1 = 2501$$

$$(m^2 - 1) = (50)^2 - 1 = 2499$$

$$(100, 2501, 2499)$$

(f) 10

$$2m = 2 \times 10 = 20$$

$$(m^2 + 1) = (20)^2 + 1$$

$$= 400 + 1 = 401$$

$$(m^2 - 1) = (20)^2 - 1 = 400 - 1 = 399$$

$$(20, 401, 399)$$

Exercise - 6.3

1. (a) 256

$$\begin{array}{r} 2 \overline{) 256} \\ 2 \overline{) 128} \\ 2 \overline{) 64} \\ 2 \overline{) 32} \\ 2 \overline{) 16} \\ 2 \overline{) 8} \\ 2 \overline{) 4} \\ 2 \overline{) 2} \\ 1 \end{array}$$

$$\sqrt{256} = \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \\ \times \underline{2} \times \underline{2} = 16$$

(b) 400

$$\begin{array}{r} 2 \overline{) 400} \\ 2 \overline{) 200} \\ 2 \overline{) 100} \\ 2 \overline{) 50} \\ 5 \overline{) 25} \\ 5 \overline{) 5} \\ 1 \end{array}$$

$$\sqrt{400} = \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \times \underline{5} \times \underline{5} \\ = 20$$

(c) to (j) Do same as above.

2. (a) 1210

$$\begin{array}{r|l} 2 & 1210 \\ \hline 5 & 605 \\ \hline 11 & 121 \\ \hline 11 & 11 \\ \hline & 1 \end{array}$$

$$= 10$$

(b) 7680

$$\begin{array}{r|l} 2 & 7680 \\ \hline 2 & 3840 \\ \hline 2 & 1920 \\ \hline 2 & 960 \\ \hline 2 & 480 \\ \hline 2 & 240 \\ \hline 2 & 120 \\ \hline 2 & 60 \\ \hline 2 & 30 \\ \hline 3 & 15 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$= 2 \times 3 \times 5 = 30$$

(c) to (j) Do same as above

3. (a) 3468

$$\begin{array}{r|l} 2 & 3468 \\ \hline 2 & 1734 \\ \hline 3 & 867 \\ \hline 17 & 289 \\ \hline 17 & 17 \\ \hline & 1 \end{array}$$

$$= 3$$

(b) 2904

$$\begin{array}{r|l} 2 & 2904 \\ \hline 2 & 1452 \\ \hline 2 & 726 \\ \hline 3 & 363 \\ \hline 11 & 121 \\ \hline 11 & 11 \\ \hline & 1 \end{array}$$

$$= 2 \times 3 = 6$$

(c) to (j) Do same as above.

$$\begin{array}{ll} 4. (a) \frac{256}{441} = \frac{16}{21} & (b) \frac{361}{484} = \frac{19}{22} \\ (c) \frac{625}{900} = \frac{25}{30} & (d) \frac{784}{1296} = \frac{28}{36} \\ (e) \frac{1936}{2601} = \frac{44}{51} & (f) \frac{121}{400} = \frac{11}{20} \\ (g) \frac{2401}{3136} = \frac{49}{56} & (h) \frac{3600}{9801} = \frac{60}{99} \\ (i) \frac{1764}{6084} = \frac{42}{78} & (j) \frac{4761}{9801} = \frac{69}{99} \end{array}$$

$$\begin{array}{ll} 5. (a) 1\frac{11}{25} = \sqrt{\frac{36}{25}} = \frac{6}{5} & \\ (b) 1\frac{275}{625} = \sqrt{\frac{900}{625}} = \frac{30}{25} & \\ (c) 1\frac{512}{784} = \sqrt{\frac{1296}{784}} = \frac{36}{28} & \\ (d) 6\frac{25}{100} = \sqrt{\frac{625}{100}} = \frac{25}{10} & \\ (e) 2\frac{14}{121} = \sqrt{\frac{256}{121}} = \frac{16}{11} & \\ (f) 1\frac{25}{144} = \sqrt{\frac{169}{144}} = \frac{13}{12} & \\ (g) 7\frac{29}{100} = \sqrt{\frac{729}{100}} = \frac{27}{10} & \\ (h) 41\frac{25}{144} = \sqrt{\frac{5929}{144}} = \frac{77}{12} & \\ (i) 6\frac{1}{400} = \sqrt{\frac{240}{400}} = \frac{49}{20} & \\ (j) 10\frac{79}{169} = \sqrt{\frac{1764}{169}} = \frac{42}{13} & \end{array}$$

$$\begin{array}{ll} 6. (a) 7.84 = \sqrt{784} & \\ \sqrt{\frac{784}{100}} = \frac{28}{10} = 2.8 & \\ (b) 0.0081 = \sqrt{\frac{00081}{10000}} = \frac{9}{10} = 0.09 & \\ (c) 0.0144 = \sqrt{0.0144} & \end{array}$$

$$\sqrt{\frac{00144}{1000}} = \frac{12}{100} = 0.12$$

$$(d) \frac{2.25}{\sqrt{2.25}} = \frac{15}{10} = 1.5$$

$$(e) \frac{0.0625}{\sqrt{0.0625}} = \frac{25}{100} = 0.25$$

7. Area of square = 121 m^2
 $a^2 = 121$ $a = \sqrt{121}$

$$a = 11 \text{ m}$$

Perimeter of square = $4a$
 $= 4 \times 11 = 44 \text{ m}$

8. Total money collected ₹6400
 Student in class = $\sqrt{6400} = 80$

9. No of student = 625
 Students in each row = $\sqrt{625}$

$$\begin{array}{r} 5 \overline{) 625} \\ 5 \overline{) 125} \\ 5 \overline{) 25} \\ 5 \overline{) 5} \\ \hline 1 \end{array}$$

$$= 5 \times 5 = 25$$

10. Find the value:

(a) $\sqrt{784} + \sqrt{900}$
 $28 + 30 = 58$

(b) $\sqrt{4225} - \sqrt{1936}$
 $65 - 44 = 21$

Exercise - 6.4

1. (a) 784

$$\begin{array}{r} 28 \\ 2 \overline{) 784} \\ 2 \overline{) 4} \downarrow \\ 48 \overline{) 384} \\ 384 \\ \hline \times \end{array}$$

$$= 28$$

(b) 900

$$\begin{array}{r} 30 \\ 3 \overline{) 900} \\ 9 \downarrow \\ 000 \end{array}$$

$$= 30$$

(c) to (j) Do same as above.

2. (a) $\frac{1296}{1936} = \sqrt{\frac{1296}{1936}}$

$$\begin{array}{r} 366 \\ 3 \overline{) 1296} \\ 3 \overline{) 9} \downarrow \\ 66 \overline{) 396} \\ 6 \overline{) 396} \\ \hline 0 \end{array}$$

$$= \frac{36}{44}$$

(b) $\frac{4225}{2601} = \sqrt{\frac{4225}{2601}}$

$$\begin{array}{r} 65 \\ 6 \overline{) 4225} \\ 6 \overline{) 36} \downarrow \\ 125 \overline{) 625} \\ 6 \overline{) 25} \\ \hline 0 \end{array} \quad \begin{array}{r} 51 \\ 5 \overline{) 2601} \\ 5 \overline{) 25} \downarrow \\ 101 \overline{) 101} \\ 101 \\ \hline 0 \end{array}$$

$$= \frac{65}{51}$$

(c) to (e) Do same as above.

3. (a) 12588

$$\begin{array}{r} 112 \\ 1 \overline{) 12588} \\ 1 \overline{) 1} \downarrow \\ 21 \overline{) 025} \\ 1 \overline{) -21} \downarrow \\ 222 \overline{) 488} \\ 444 \\ \hline 44 \end{array}$$

$$= 44$$

(b) 19815

$$\begin{array}{r} 140 \\ 1 \overline{) 26585} \\ 1 \overline{) 1} \downarrow \\ 24 \overline{) 098} \\ 4 \overline{) 96} \downarrow \\ 280 \overline{) 215} \end{array}$$

$$= 215 \text{ is subtract from } 19815$$

(c) to (e) Do same as above.

4. (a) 2509

$$\begin{array}{r} 50 \\ 5 \overline{) 2509} \\ \underline{525} \\ 525 \\ \underline{25} 9 \end{array}$$

= 9 is added to 2509

- (b) 8400

$$\begin{array}{r} 91 \\ 9 \overline{) 8400} \\ \underline{981} \\ 181 \\ \underline{181} \\ 0 \end{array}$$

= 119 is added to 8400

- (c) to (e) Do same as above.

5. Area of square = 286225 m^2

$$a^2 = 286225$$

$$a = \sqrt{286225}$$

$$\begin{array}{r} 535 \\ 5 \overline{) 286225} \\ \underline{525} \\ 103 \\ \underline{303} \\ 1065 \\ \underline{5325} \\ 5325 \\ \underline{0} \end{array}$$

$$a = 532 \text{ m}$$

6. 5 digits no. = 99856

$$\begin{array}{r} 316 \\ 3 \overline{) 99856} \\ \underline{399} \\ 161 \\ \underline{616} \\ 62 \\ \underline{3756} \\ 3756 \\ \underline{0} \end{array}$$

$$\sqrt{99856} = 316$$

7. 6 digits no. 998001

The largest is a digit no. is 998001

$$\sqrt{998001} = 999$$

8. Smallest 6 digit no. is 100000

$$\text{We find } \sqrt{100000} = 316.227766$$

$$\text{We next larger no.} = 317$$

$$(317)^2 = 100489$$

9. 10000 is a smallest 5 digit no.

$$\sqrt{10000} = 100$$

10. Simplify the following:

$$(a) \frac{\sqrt{256} + \sqrt{625}}{\sqrt{441} + \sqrt{1296}} = \frac{16+25}{21+36} = \frac{41}{57}$$

$$(b) \frac{\sqrt{1600} + \sqrt{900}}{\sqrt{400} + \sqrt{100}} = \frac{40-30}{20+10} = \frac{10}{30} = \frac{1}{3}$$

Exercise - 6.5

1. (a) 102.01

$$\begin{array}{r} 10.1 \\ 1 \overline{) 102.01} \\ \underline{10} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

- (b) 132.25

$$\begin{array}{r} 11.5 \\ 5 \overline{) 132.25} \\ \underline{513} \\ 103 \\ \underline{303} \\ 1065 \\ \underline{1125} \\ 1125 \\ \underline{0} \end{array}$$

- (c) to (h) Do same as above.

2. (a) 2

$$\begin{array}{r} 1.41 \\ 1 \overline{) 2.0000} \\ \underline{+1} \\ 24 \\ \underline{+4} \\ 281 \\ \underline{-281} \\ 0 \end{array}$$

$$= 1.41$$

$$\begin{array}{r|rrrr} & 1.73 \\ \hline 1 & 3000 \\ +7 & -1 \downarrow & & \\ \hline 27 & 200 & & \\ +7 & -189 & & \\ \hline 343 & 1100 \\ & -1029 \\ \hline & 71 & = 1.73 \end{array}$$

3. Area of square = a^2
 $= 42127.5625 \text{ m}^2$
 $a^2 = 42127.5625$
 $a = \sqrt{42127.5625} \quad a = 205.25 \text{ m}$

5. 2

	2.23606
2	500000000
+2	-4 ↓
42	100 ↓
+2	-84 ↓
443	1600 ↓
+3	-1329 ↓
446	27100 ↓
+6	-26796 ↓
4526	304000
	271236
	32764
	= 2.23606

	3	6	3	1	6	6	2	
3	1	1	0	0	0	0	0	0
+3	-9							
63	2	0	0					
3	1	8	9					
661	1	1	0	0				
1	6	6	1					
6626	4	3	9	0	0			
8	3	9	6	9	6			
661326	4	2	0	4	0	0		
	3	9	7	9	5	6		
	2	2	4	4	4			

7. Simplify the following:

$$\begin{aligned} \text{(b)} \quad \frac{\sqrt{17.64} + \sqrt{0.7225}}{\sqrt{17.64} - \sqrt{0.7225}} &= \frac{4.2 + 0.85}{4.2 - 0.85} \\ &= \frac{5.05}{3.35} \end{aligned}$$
$$\sqrt{1.030225} = 1.015$$

(c) $\sqrt{10302.25} = 101.5$

Fill in the blanks:

5. $\sqrt{\quad}$ or $\sqrt[2]{\quad}$

1. True 2. False 3. True 4. True

5. False

Exercise - 7.1

(b) $11 = (11)^3 = 1331$

(c) $20 = (20)^2 = 8000$

(d) $55 = (55)^3 = 166375$

(e) $101 = (101)^3 = 1030301$

$$2. (a) \frac{2}{3} = \left(\frac{2}{3}\right)^3 = \frac{8}{27}$$
$$(b) \left(\frac{-7}{11} \right)^3 = \frac{-343}{1331}$$
$$(c) \left(\frac{-5}{6}\right)^3 = \frac{-125}{216}$$
$$(d) 4\frac{1}{2} = \left(\frac{9}{2}\right)^3 = \frac{729}{8}$$
$$(e) \left(-10\frac{2}{3}\right) = \left(\frac{32}{3}\right)^3 = \frac{32768}{27}$$

3. (a) $(15)^3 = 3375$

(b) $(223)^3 = 11089567$

(c) $(129)^3 = 2146689$

(d) $(-62)^3 = -238328$

(e) $(-75)^3 = -421875$

4. (a) $50 = 5[0]^3 = 0$

(b) $321 = 32[1]^3 = 1$

(c) $642 = 64[2]^3 = 8$

(d) $943 = 94[3]^3 = 27$

(e) $624 = 62[4]^3 = 64$

(f) $825 = 82[5]^3 = 125$

(g) $626 = 62[6]^3 = 216$

(h) $343 = 34[3]^3 = 27$

(i) $888 = 88[8]^3 = 512$

(j) $729 = 72[9]^3 = 729$

5. (a) Volume of cube $= a^3$
 $= (25)^3 = 15.625 \text{ cm}^3$

(b) Volume of cube $= a^3$
 $= (3.6)^3 = 46.656 \text{ cm}^3$

(c) $2\frac{1}{3} \text{ cm} = \frac{7}{3} \text{ cm}$

Volume of cube

$$= \left(\frac{7}{3}\right)^3 = \frac{343}{27} \text{ cm}^3$$

(d) $6\frac{7}{8} = \frac{55}{8} \text{ cm}$

Volume of cube

$$= \left(\frac{55}{8}\right)^3 = \frac{166375}{512} \text{ cm}^3$$

(e) 0.032

Volume of cube $= (0.032)^3$

$$= 3.2768 \text{ cm}^3$$

6. (a) $\sqrt[3]{216} = 6$ This is a perfect cube

(b) $\sqrt[3]{3087} =$ This is not a perfect cube

(c) $\sqrt[3]{1728} = 12$ This is a perfect cube

(d) $\sqrt[3]{10648} = 22$ This is a perfect cube

(e) $\sqrt[3]{166375} = 55$ This is a perfect

cube

7. (a) $512 = (2)^{\text{even}}$

$8 =$ This is a perfect cube

(b) $72 (9) \text{ odd}$ (c) $133 (1) \text{ odd}$

(d) $127 (8) \text{ even} =$ This is not a perfect cube (e) $337 (5) \text{ odd}$

8. (a) $216 = 21 [6] \text{ even}$

(b) $2 [7] = \text{odd} =$ This is a perfect cube (c) $3276 [8] = \text{even}$

(d) $127 [8] = \text{even}$

(e) $337 [5] = 15$ This is a perfect cube

9. Verify the following:

(a) $(3 \times 5)^3 = (3)^3 \times (5)^3$

$$(15)^3 = 27 \times 125$$

$$3375 = 3375 \text{ Hence proved}$$

(b) $(-10 \times 6)^3 = (-10)^3 \times (6)^3$

$$(-60)^3 = -1000 \times 216$$

$$216000 = 216000$$

Hence proved

(c) $\left(\frac{6}{7}\right)^3 = (6)^3 \div (7)^3$

$$\frac{216}{343} = 216 \div 343 = \frac{216}{343} = \frac{216}{343}$$

Hence proved

(d) $\left(\frac{11}{15}\right)^3 = \frac{(11)^3}{(15)^3} = \frac{1331}{3375} = \frac{1331}{3375}$

Hence proved

Exercise - 7.2

1. (a) -512

$$\begin{array}{r} 2 \overline{) 512} \\ 2 \overline{) 256} \\ 2 \overline{) 128} \\ 2 \overline{) 64} \\ 2 \overline{) 32} \\ 2 \overline{) 16} \\ 2 \overline{) 8} \\ 2 \overline{) 4} \\ 2 \overline{) 2} \\ 2 \overline{) 1} \end{array}$$

$$= 2 \times 2 \times 2 = -8$$

$$(b) - 1331$$

$$\begin{array}{r} 11 \overline{) 1331} \\ \underline{11} \\ 23 \\ \underline{22} \\ 11 \\ \underline{11} \\ 0 \end{array} = -8$$

(c) to (e) Do same as above.

$$2. (a) \frac{125}{729}$$

$$\begin{array}{r} 5 \overline{) 125} \\ \underline{5} \\ 5 \\ \underline{5} \\ 0 \end{array} \quad \begin{array}{r} 9 \overline{) 729} \\ \underline{9} \\ 81 \\ \underline{81} \\ 0 \end{array} = \frac{5}{9}$$

$$(b) \frac{216}{-1728}$$

$$\begin{array}{r} 2 \overline{) 216} \\ \underline{2} \\ 108 \\ \underline{10} \\ 8 \\ \underline{8} \\ 0 \end{array} \quad \begin{array}{r} 2 \overline{) 1728} \\ \underline{2} \\ 864 \\ \underline{8} \\ 432 \\ \underline{4} \\ 216 \\ \underline{2} \\ 108 \\ \underline{1} \\ 8 \\ \underline{8} \\ 0 \end{array}$$

$$= 2 \times 3 = 6 \quad = 2 \times 2 \times 3 = 12$$

$$= \frac{6}{-12}$$

(c) to (e) Do same as above.

$$3. (a) \frac{91125}{1000}$$

$$\begin{array}{r} 5 \overline{) 91125} \\ \underline{5} \\ 41125 \\ \underline{41} \\ 225 \\ \underline{22} \\ 5 \\ \underline{5} \\ 0 \end{array}$$

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

$$= \frac{45}{10} = 4.5$$

$$(b) \sqrt[3]{0.001331}$$

$$\begin{array}{r} 11 \overline{) 1331} \\ \underline{11} \\ 23 \\ \underline{22} \\ 11 \\ \underline{11} \\ 0 \end{array}$$

$$\frac{11}{100} = 0.11$$

(c) to (e) Do same as above.

$$4. (a) 392$$

$$\begin{array}{r} 2 \overline{) 392} \\ \underline{2} \\ 196 \\ \underline{19} \\ 6 \\ \underline{6} \\ 0 \end{array} \quad \begin{array}{r} 2 \overline{) 2744} \\ \underline{2} \\ 1372 \\ \underline{13} \\ 686 \\ \underline{68} \\ 6 \\ \underline{6} \\ 0 \end{array}$$

7 is multiplied with 392

$$7 \times 392 = 2744$$

$$= 7 \times 2$$

$$= 14$$

(b) to (e) Do same as above.

$$5. (a) 1024$$

$$\begin{array}{r} 2 \overline{) 1024} \\ \underline{2} \\ 512 \\ \underline{5} \\ 256 \\ \underline{25} \\ 64 \\ \underline{64} \\ 0 \end{array} \quad \begin{array}{r} 2 \overline{) 512} \\ \underline{2} \\ 256 \\ \underline{25} \\ 64 \\ \underline{64} \\ 0 \end{array}$$

1024 is divided with 2

$$= 512$$

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

$$= 8$$

2	3	5	1	5	2
2	1	7	5	7	6
2		8	7	8	8
2		4	3	9	4
3		2	1	9	7
3			1	6	4
3				1	3
					1

(c) to (e) Do same as above.

6. Volume of cube = 1728 m^3
 $a^3 = 1728$
 $a = \sqrt[3]{1728} \quad a = 12 \text{ m}$

$$\begin{aligned} \text{(a)} \quad & \sqrt[3]{64} + \sqrt[3]{125} - \sqrt[3]{216} \\ &= 4 + 5 - 6 \\ &= 3 \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & \sqrt[3]{0.125} + \sqrt[3]{0.64} - \sqrt[3]{1} \\ &= 0.5 + 0.4 + 1 \\ &= 1.9 \end{aligned}$$

$$(c) \frac{\sqrt{0.008}}{\sqrt{0.027}} + \frac{\sqrt{0.0027}}{\sqrt{0.008}} = \frac{0.2}{0.3} + \frac{0.13}{0.2} = 1.316$$

$$\begin{aligned} \text{(d)} \quad & \frac{\sqrt[3]{-125}}{\sqrt[3]{512}} \times \frac{\sqrt[3]{216}}{\sqrt[3]{-1728}} \\ & \frac{5}{8} \times \frac{6}{12} = \frac{5}{16} \end{aligned}$$

$$(a) \sqrt[3]{512} \times \sqrt[3]{64}$$
$$8 \times 4 = 32$$

(b) $\sqrt[3]{100} \times \sqrt[3]{2160}$

$$4.641 \times 12.92 = 60$$

$$(c) \sqrt[3]{6400} \times \sqrt[3]{10000} = 400$$

$$(a) \frac{\sqrt[3]{216}}{\sqrt[3]{512}} \times \frac{\sqrt[3]{216}}{\sqrt[3]{512}}$$

$$\frac{6}{8} \times \frac{6}{8}$$

$$\frac{3}{4} = \frac{3}{4} \quad \text{Hence verified}$$

$$\begin{aligned} \text{(b)} \quad \sqrt[3]{216 \times 512} &= \sqrt[3]{216} \times \sqrt[3]{512} \\ 6 \times 8 &= 6 \times 8 \\ &= 48 = 48 \end{aligned}$$

$$\begin{aligned} \text{(a)} \quad & \sqrt[3]{5^3 \times 6^3} \\ &= \sqrt[3]{125 \times 216} \\ &= \sqrt[3]{27000} \\ &= 30 \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & \sqrt[3]{27 \times 4^6 \times 5^3} \\ & \sqrt[3]{27 \times 4096 \times 125} \\ & \sqrt[3]{13824000} \\ & = 240 \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad & \sqrt[3]{2^9 \times 3^6 \times 5^3} \\ &= 2^3 \times 3^2 \times 5 \\ &= 5832000 \end{aligned}$$

1. c 2. d 3. a 4. b 5. d

NCERT CORNER

(Fill in the blanks)

1. a^3

2. One, three

3. 12

4. even

5. Rational

True and False:

1. False

2. False

3. True

4. True

Chapter - 8

Exercise - 8.1

1. C.P = ₹ 500, S.P = ₹ 625

$$\text{Profit} = \text{S.P} - \text{C.P}$$

$$= 625 - 500 = ₹ 125$$

$$\text{Profit \%} = \frac{125}{500} \times 100 = 25\%$$

2. C.P = ₹ 1500, S.P = ₹ 1200

$$\text{Loss} = \text{C.P} - \text{S.P}$$

$$= 1500 - 1200 = ₹ 300$$

$$\text{Profit \%} = \frac{300}{1500} \times 100 = 20\%$$

3. C.P = ₹ 2800, P% = 10%

$$P\% = \frac{\text{Profit}}{\text{C.P}} \times 100$$

$$\text{Profit} = ₹ 280$$

$$\text{Profit} = \text{S.P} - \text{C.P}$$

$$80 = \text{S.P} - 800$$

$$80 + 800 = \text{S.P} = ₹ 880 = \text{S.P}$$

4. C.P = ₹ 8100

$$l\% = 10\%$$

$$l\% = \frac{\text{Loss}}{\text{C.P}} \times 100 \quad 10 = \frac{\text{Loss}}{1800} \times 100$$

$$\text{Loss} = ₹ 180$$

$$\text{Loss} = \text{C.P} - \text{S.P}$$

$$\text{S.P} = 1800 - 180$$

$$\text{S.P} = ₹ 1620$$

5. C.P = ₹ 235

$$= 235 + 15 = ₹ 250$$

$$\text{S.P} = ₹ 300$$

$$\text{Profit} = \text{S.P} - \text{C.P}$$

$$= 300 - 250 = ₹ 50$$

$$\text{Profit\%} = \frac{50}{250} \times 100 = 20\%$$

6. S.P = ₹ 4200

$$l\% = 16\%$$

$$\text{Let the C.P be } ₹ x$$

$$l\% = 16\%$$

$$\begin{aligned} \text{Actual loss} &= 16\% \text{ of } x = \frac{16}{100} x \\ &= \frac{16x}{100} \end{aligned}$$

$$\text{Loss} - \text{C.P} = - \text{S.P}$$

$$\frac{16x}{100} - x = - \text{S.P}$$

$$\frac{16x - 100x}{100} = - 4200$$

$$16x - 100x = - 420000$$

$$84x = 420000 \quad x = 5000$$

$$\text{S.P} = ₹ 5000$$

7. C.P = ₹ 18500

After spent on repairs

$$\text{C.P} = ₹ 18500 + 1500$$

$$\text{C.P} = ₹ 20000$$

$$\text{S.P} = ₹ 23000$$

$$\text{Profit} = 23000 - 20000 = ₹ 3000$$

$$\text{Profit} = \frac{3000}{20000} \times 100 = 15\%$$

8. C.P = ₹ 1500

$$P\% \text{ on one box} = 10\%$$

$$L\% \text{ on another} = 10\%$$

$$\text{Profit} = 10 - 10 = 0$$

There is no profit or loss on transaction.

9. C.P ₹ 960

$$\text{Profit\%} = 10\%$$

$$\text{Loss\% on other} = 12\%$$

$$\text{Loss\%} = 12 - 10 = 2\%$$

$$1\% \frac{1}{\text{C.P}} \times 100 \quad 2 = \frac{21}{960} \times 100$$

$$2 = \frac{101}{960} \quad 192 = 101$$

$$₹ 19.2 = \text{loss}$$

10. Let the cost of 1 mobile is 1

Then,

$$\text{C.P} = 16 \text{ mobile} = \text{Rs. } 16$$

$$\text{C.P of 16 mobile} = \text{C.P of 15 mobile} = \text{Rs } 15$$

$$\text{Gain} = (\text{C.P} - \text{S.P})$$

$$= 16 - 15 = \text{Rs } 1$$

$$\text{Gain\%} = \text{gain} \times \frac{100}{\text{C.P}}$$

$$= 1 \times \frac{100}{16} = 6.25\%$$

11. Original price = ₹ 1104
 Formula = OP - (OP × rate)
 $x - \frac{8x}{100} = 1104$
 $x \left(1 - \frac{8}{100}\right) = 1104 \quad x \left(\frac{92}{100}\right) = 1104$
 $x = \frac{1104 \times 100}{92} \quad x = 1200$
 20% of 1200 = $\frac{20 \times 1200}{100} = ₹ 240$
 = 1200 + 240 = ₹ 1440

Exercise - 8.2

1. Find the S.P if:

(a) M.P = ₹ 2600
 Discount = 20%
 Discount = M.P - S.P
 $D\% \frac{M.P - S.P}{M.P} \times 100$
 $D\% \frac{2600 - S.P}{2600} \times 100$
 $26 \times 20 = 2600 - S.P$
 $520 = 2600 - S.P$
 $S.P = 2600 - 520$
 $S.P = ₹ 2080$

(b) M.P = ₹ 8500
 Discount = 15%
 $D\% \frac{M.P - S.P}{M.P} \times 100$
 $D\% \frac{8500 - S.P}{8500} \times 100$
 $85 \times 15 = 8500 - S.P$
 $1275 = 8500 - S.P$
 $S.P = 8500 - 1275$
 $S.P = ₹ 7225$

2. Find the M.P if:

(a) S.P = ₹ 10000
 Discount = 20%
 $D\% \frac{M.P - S.P}{M.P} \times 100$
 $20 \frac{S.P - 10000}{M.P} \times 100$
 $20 M.P = 100 M.P - 10000$

$$1000000 = 80 M.P$$

$$M.P \frac{1000000}{80} \quad S.P = ₹ 12500$$

(b) S.P = ₹ 7500
 Discount = 15%
 $D\% \frac{M.P - S.P}{M.P} \times 100$
 $15 \frac{M.P - 7500}{M.P} \times 100$

$$15 M.P = 100 M.P - 7500$$

$$750000 = 85 M.P$$

$$M.P \frac{750000}{85} \quad M.P = ₹ 8823.5$$

3. M.P = ₹ 10000, Discount = 25%
 S.P = ?

$$D\% \frac{M.P - S.P}{M.P} \times 100$$

$$25 \frac{6800 - S.P}{6800} \times 100$$

$$25 \times 68 = 6800 - S.P$$

$$1700 = 6800 - S.P$$

$$S.P = 6800 - 1700 \quad S.P = ₹ 5100$$

4. M.P = ₹ 500, Discount = ?

$$S.P = ₹ 400$$

$$D\% \frac{500 - 400}{500} \times 100 = \frac{100}{5}$$

$$D = 20\%$$

5. D% = 30, S.P = ₹ 1400, M.P = ?

$$D\% \frac{M.P - S.P}{M.P} \times 100$$

$$30 = \frac{M.P - 1400}{M.P} \times 100$$

$$23 M.P = 100 M.P - 140000$$

$$140000 = 70 M.P$$

$$M.P = \frac{140000}{70} \quad M.P = ₹ 2000$$

6. Let the C.P of the book be ₹ 100
 So, M.P of book = ₹ (100 + 25% of 100)
 = ₹ (100 + 25) = ₹ 125
 Discount if 10% = 10% of 125

$$\frac{10}{100} \times 125 = ₹ 12.5$$

$$S.P = ₹ 125 - 12.5 = 112.5$$

$$S.P > C.P \text{ There is a profit}$$

7. $D\% = 10\%$, $P\% = 26\%$
 $M.P = ₹ 280$
Discount = $\frac{D}{M.P} \times 100$
 $10 = \frac{D}{280} \times 100$, $280 = 10D$
 $\frac{280}{10} = D$ $D = ₹ 28$
Discount = $M.P - S.P$
 $28 = 280 - S.P$
 $S.P = 280 - 28$
 $S.P = ₹ 250$
Let C.P be x
 $C.P + \text{Profit} = S.P$
 $x + \frac{x \times 26}{100} = 252$
 $100x + 26x = 25200$
 $126x = 25200$ $x = \frac{25200}{126}$
 $x = 200$ $C.P = 200$

8. 1st Discount = 20% of 100
= ₹ 20%
= $100 - 20 = ₹ 80$
2nd Discount = 10% if 80 = 8%
= $80 - 8 = ₹ 72$
Equivalent % = $100 - 72 = 28\%$

9. $M.P = ₹ 15000$, $D\% = 10\%$
 $P\% = 20\%$ $D\% \frac{D}{M.P} \times 100$
 $10 = \frac{D}{15000} \times 100$ $₹ 1500 = D$
Discount = $M.P - S.P$
 $1500 = 15000 - S.P$
 $S.P = 15000 - 1500$
 $S.P = ₹ 13500$
Let C.P be x
 $C.P + \text{Profit} = S.P$

$$x + \frac{x \times 20}{100} = 1350000$$

$$100x + 20x = 1350000$$

$$x = 11250$$
 $C.P = ₹ 11250$

10. $D\% = 25\%$, $S.P = ₹ 660$
 $P\% = 10\%$, $M.P = ?$
Let buying price be x
 $x + 10\% \text{ of } x = 600$
 $x + \frac{10}{100} \times x = 660$ $\frac{11}{10} x = 660$
 $x = 600$
Buying price = ₹ 600
He bought at 25% discount
Let the M.P be y
 $y - 25\% \text{ of } y = 600$
 $y - \frac{25}{100} y = 600$ $y - \frac{1}{4} y = 600$
 $y = 800$ $M.P = ₹ 800$

11. Discount = 25%, $M.P = ₹ 12000$
 $D\% = \frac{M.P - S.P}{M.P} \times 100$
 $25 = \frac{12000 - S.P}{12000} \times 100$
 $3000 = 12000 - S.P$
 $S.P = 12000 - 3000 = ₹ 9000$

12. $D\% = 20\%$, $P\% = 10\%$
 $M.P = ₹ 10000$, $C.P = ?$
 $D\% = \frac{D}{M.P} \times 100$
 $20 = \frac{D}{10000} \times 100$ $₹ 2000 = D$
Discount = $M.P - S.P$
 $200 = 10000 - S.P$
 $S.P = 10000 - 2000$
 $S.P = ₹ 8000$
Let the C.P be x
 $C.P + \text{Profit} = S.P$
 $x + \frac{x \times 20}{100} = 8000$
 $100x + 20x = 800000$
 $80x = 800000$

$$x = \frac{800000}{80} \quad x = ₹ 10000$$

$$C.P = ₹ 10000$$

$$13. D\% = 4\%, P\% = 4\%$$

$$C.P = ₹ 960$$

$$\text{Discount} = \frac{4}{100} \times 960 = 38.4$$

$$\text{Profit} = ₹ 38.4$$

$$\text{Final price of 1}^{\text{st}} = 960 - 38.4 = ₹ 921.6$$

$$\text{Final price of 2}^{\text{nd}} = 960 - 38.4 = ₹ 921.6$$

$$\text{Final price} = ₹ 1843.2$$

$$\text{Original price} = 960 + 960 = ₹ 1920$$

$$\text{Loss} = 1920 - 1843.2$$

$$\text{Loss} = ₹ 76.8$$

Exercise - 8.3

$$1. \text{List price} = ₹ 8990$$

$$\text{VAT} = 12\%$$

$$\text{VAT @ } 12\% = 12\% \text{ of } 8990$$

$$= \frac{12}{100} \times 8990 = \frac{107880}{100} = ₹ 1078.8$$

$$\text{Total} = 8990 + 1078.8$$

$$= ₹ 10068.8$$

$$2. \text{VAT} = 15\%$$

$$\text{Purchase amount} = ₹ 23575$$

$$\text{VAT at } 15\% = \frac{15}{100} \times 23575$$

$$= 3536.25$$

$$\text{M.P} = 23575 - 3536.25$$

$$= ₹ 20038.75$$

$$3. \text{VAT} = 800 - 720 = ₹ 80$$

$$\text{Rate of VAT} = \frac{80}{800} \times 100 = 10\%$$

$$4. \text{M.P} = ₹ 750, \text{Discount} = 20\%$$

$$\text{VAT} = 10\%$$

$$\text{Discount} = 20\% \text{ of } 750$$

$$= \frac{20}{100} \times 750 = ₹ 150$$

$$\text{Net price} = 750 - 150 = ₹ 600$$

$$\text{VAT rate} = 10\%$$

$$\text{VAT} = 10\% \text{ of } 600$$

$$= \frac{10}{100} \times 600 = ₹ 60$$

$$\text{S.P of article} = 600 + 60 = ₹ 660$$

$$5. \text{VAT} = ₹ 50, \text{M.P} = ₹ 500$$

$$\text{Rate of VAT} = \frac{50}{500} \times 100 = 10\%$$

$$6. \text{S.P} = ₹ 13440, \text{VAT} = 10\%$$

$$\text{M.P} = ?$$

$$\text{VAT} = \frac{10}{100} \times 13440 = ₹ 1344$$

$$\text{M.P} = 13440 - 1344$$

$$\text{M.P} = ₹ 12096$$

$$7. \text{List price} = ₹ 2563$$

$$\text{VAT} = 10\%$$

$$\text{Rate of VAT} = \frac{10}{100} \times 2563$$

$$= ₹ 256.3$$

$$\text{Discount} = 2563 - 256.3$$

$$= ₹ 23067$$

$$8. \text{Do it yourself}$$

Exercise - 8.4

$$1. P = ₹ 10,000, R = 5\%$$

$$T = 3 \text{ years (n)}$$

$$C.I = P \left(1 + \frac{r}{100} \right)^n$$

$$= 10,000 \left(1 + \frac{5}{100} \right)^3$$

$$= 10,000 \left(\frac{105}{100} \right)^3$$

$$= 10,000 \times \frac{105}{100} \times \frac{105}{100} \times \frac{105}{100}$$

$$= ₹ 11576.25$$

$$2. P = ₹ 8000, R = 10\%$$

$$T = 2 \text{ years (n)}$$

$$C.I = P \left(1 + \frac{r}{100} \right)^n$$

$$= 8000 \left(1 + \frac{10}{100} \right)^2$$

$$= 8000 = 8000 \times \frac{110}{100} \times \frac{110}{100}$$

$$= ₹ 9680$$

C.I = Amount Principal

$$9680 = A - 8000$$

$$9680 + 8000 = A \quad ₹ 17680 = A$$

3. $P = ₹ 3000, R = 10\%, T = 2 \text{ years}$

$$S.I = \frac{P \times R \times T}{100} = \frac{3000 \times 10 \times 2}{100}$$

$$= ₹ 600$$

$$C.I = P \left(1 + \frac{r}{100} \right)^n = 3000 \left(1 + \frac{10}{100} \right)^2$$

$$= 3000 \times \frac{110}{100} \times \frac{110}{100}$$

$$= 3630 - 3000 = 630$$

$$\text{Difference} = 630 - 600 = ₹ 30$$

4. $P = ₹ 640,000, R = 10\%, h = 2$

$$C.I = P \left[\left(1 + \frac{r}{200} \right)^{2n} - 1 \right]$$

$$= 640000 \left[\left(1 + \frac{10}{200} \right)^4 - 1 \right]$$

$$= 640000 \left[\left(\frac{210}{200} \right)^4 - 1 \right]$$

$$= 640000 [(1.05)^4 - 1] = ₹ 137924$$

5. $P = ₹ 2000, R = 10\%, h = \frac{3}{2} \text{ years}$

$$C.I = P \left[\left(1 + \frac{r}{200} \right)^{2n} - 1 \right]$$

$$= 2000 \left[\left(1 + \frac{10}{200} \right)^3 - 1 \right]$$

$$= 2000 \left[\left(\frac{210}{200} \right)^3 - 1 \right]$$

$$= 2000 [(1.05)^3 - 1] = ₹ 315.25$$

6. $P = ₹ 15625, n = 1, r = 16\%$

$$C.I = P \left[\left(1 + \frac{r}{400} \right)^{4n} - 1 \right]$$

$$= 15625 \left[\left(1 + \frac{16}{400} \right)^4 - 1 \right]$$

$$= 15625 \left[\left(\frac{416}{400} \right)^4 - 1 \right]$$

$$= 15625 [(1.04)^4 - 1] = ₹ 2654.04$$

7. $P = ₹ 2400, r = 20\%, n = 1$

$$\text{Amount} = P \left(1 + \frac{r}{400} \right)^{4n}$$

$$= 2400 \left(1 + \frac{20}{400} \right)^4$$

$$= 2400 \times \frac{420}{400} \times \frac{420}{400} \times \frac{420}{400} \times \frac{420}{400}$$

$$= \frac{74680704}{25600} = ₹ 2917.215$$

8. Aditi gave

$$P = ₹ 2000, R = 10\%, T = 2 \text{ years}$$

$$S.I = \frac{P \times R \times T}{100} = \frac{2000 \times 10 \times 2}{100}$$

$$= ₹ 400$$

Shikha gave to Geeta

$$C.I = P \left[\left(1 + \frac{r}{200} \right)^n - 1 \right]$$

$$= 2000 \left[\left(1 + \frac{10}{200} \right)^2 - 1 \right]$$

$$= 2000 \left[\left(\frac{110}{100} \right)^2 - 1 \right]$$

$$= 2000 [(1.1)^2 - 1] = ₹ 420$$

Shikha Arsal got more interest by ₹ 20

9. $P = ₹ 25000, n = 2, r = \frac{5}{2} \%$

$$A = P \left[\left(1 + \frac{5}{2400} \right)^2 \right]$$

$$= 5000 \left[\left(\frac{2405}{2400} \right)^2 \right] = ₹ 5253.12$$

10. $S.I = ₹ 400, n = 2 \text{ years}$

S.I for 1 year = ₹ 200

$$\text{Rate} = \frac{200}{400} \times 100 = 5\%$$

$$\text{C.I} = P \left[\left(1 + \frac{r}{100} \right)^n \right]$$

$$= 10,000 \left[\left(1 + \frac{5}{100} \right)^2 \right]$$

$$= 10,000 \left[\left(\frac{105}{100} \right)^2 \right]$$

$$= 10,000 \times 10.1025 = ₹ 11025$$

Multiple Choice Question:

1. a 2. b 3. c 4. a 5. b

NCERT CORNER

Fill in the blanks:

1. Compound interest 2. Same

3. 10% 4. 10% 5. Smaller

True and False:

1. True 2. True 3. True 4. False

5. True

Chapter - 9

Exercise - 9.1

1. (a) 3 mn; - 6 mn; 5 mn, - 2mn
 $3mn + (-6mn) + 5mn + (-2mn)$
 $3mn - 6mn + 5mn - 2mn$
 $= 0$

(b) $8x^2, -3x^2, 7x^2, -9x^2$
 $8x^2 + (-3x^2) + 7x^2 + (-9x^2)$
 $8x^2 - 3x^2 + 7x^2 - 9x^2 = 3x^2$

(c) $-xyz, -3xyz, 4xyz$
 $-xyz + (-3xyz) + 4xyz$
 $= -xyz - 3xyz + 4xyz = 0$

(d) $3a^2b^2, -7a^2b^2, -8a^2b^2$
 $3a^2b^2 + (-7a^2b^2) + (-8a^2b^2)$
 $= 3a^2b^2 - 7a^2b^2 - 8a^2b^2$
 $= -12a^2b^2$

2. (a) $7ab - 8a^2$
 $-3ab + 9a^2$
 $+ 8a^2$

 $4ab + 9a^2$

(b) $3x^2 + y^2$
 $-5x^2 - 9y^2$
 $+ x^2 + 2y^2$

 $4x^2 - 6y^2$

(c) $8a^2 - b^2$
 $11a^2 + 2b^2$
 $-19a^2 - 2b^2$

 $0 + 0$

(d) $a^2 + b^2 - c^2$
 $a^2 - b^2 + c^2$
 $-a^2 + b^2 + c^2$

 $a^2 + b^2 + c^2$

(e) $11a^2b - 14ab^2 + 0$
 $-12a^2b + 6ab^2 + 0$
 $0 + 0 - 6a^2 + 4$

 $-a^2b - 8ab^2 - 6a^2 + 4$

3. (a) $7a - 5b + 3c$
 $7 \times 1 - 5 \times 2 + 3 \times 3$
 $7 - 10 + 9 = 6$ $2a - b + c$
 $2 \times 1 - 2 + 3$
 $2 - 2 + 3 = 3$ $3a + 2b$
 $3 \times 1 + 2 \times 2$
 $3 + 4 = 7$
 $6 + 3 + 7 = 16$

(b) $2a^2 + 3b^2 + c^2 - a^2 - b^2 - c^2 - a^2 - b^2 + c^2$
 $2 \times 1 + 3 \times 4 + 9 - 1 - 4 - 9 - 1 - 4 + 9$
 $-4 + 9$
 $2 + 12 + 9 - 1 - 4 - 9 - 1 - 4 + 9$
 $= 13$

(c) $a^2 + b^2 + c^2 - a^2 - b^2 - c^2$
 $b^2 + b^2 - c^2$
 $1 + 4 + 9 - 1 - 4 + 4 - 9 = 4$

(d) $ab + bc + ca + ab - bc - ca$
 $ca - ab + bc + ca$
 $1 \times 2 + 2 \times 3 + 3 \times 1 + 1 \times 2 - 2$
 $\times 3 - 3 \times 1 - 1 \times 2 + 2 \times 3 + 3 \times 1$
 $2 + 6 + 3 + 2 - 6 - 3 - 2 + 6 + 3$
 $= 11$

4. Perimeter = $2(l+b)$
 $= 2(x^2 + y + 2xy + 3x^2 + 3y^2 + 3xy)$
 $2(4x^2 + 4y^2 + 5xy)$

$$= 8x^2 + 8y^2 + 10xy$$

5. Shirt $= x^2 + 2x + 5$

Spirit $= 4x^3 + 7x^2 - 8$

$$x^2 + 2x + 5 + 4x^3 + 7x^2 - 8$$

$$4x^3 + 8x^2 + 6x^2 - 3$$

Exercise - 9.2

1. (a) $11xy - 9xy = 2xy$

(b) $-8x^2 - 6x^2 = -14x^2$

(c) $0 - (-9m^2n^2)$
 $0 + 9m^2n^2 = 9m^2n^2$

(d) $0 - 12a^2 = -12a^2$

(e) $8xy - 6ab$

(j) $-12xy - 0 = -12xy$

2. (a) $-6x + 3y - 8x + 5y$

$$-14x + 8y$$

(b) $8x^2 - 5y^2 - 9x^2 - 10y^2$
 $-x^2 - 15y^2$

(c) $7m^2 - 5mn - 7mn + m^2$
 $8m^2 - 12mn$

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

(e) $x + y + z - (a + b + c)$
 $x + y + z - a - b - c$

(f) $100x - (xy - yz - zx)$
 $100x - xy - yz - zx$

3. $(2x^4 + 5x^2 - 8x + 9) -$
 $(3x^2 + 4x^3 - 9)$

$$2x^4 + 5x^2 - 8x + 9 - 3x^2 - 4x^3 + 9$$

$$2x^4 + 2x^2 - 4x^3 - 8x + 18$$

4. $(9 + 3x^2 + 6x + 5x^3)$

$$-(2x^3 + 7x^2 - 8x + 5)$$

$$9 + 3x^2 + 6x + 5x^3 - 2x^3 - 7x^2$$

$$+ 8x - 5$$

$$3x^3 - 4x^2 + 14x + 4$$

5. $2x^2 2xy + 6xy^2 - 3x^2 - 5xy - 7xy^2$
 $-x^2 - 3xy - xy^2$ (i)

$$3 - xy + xy - xy^2$$

$$3x^2 - 8xy^2$$
 (ii)

$$3x^2 - 8xy^2 - (-x^2 + 3xy - xy^2)$$

$$3x^2 - 8xy^2 + x^2 - 3xy + xy^2$$

$$4x^2 - xy^2 - 3xy$$

Exercise - 9.3

1. (a) $4x^3 \times 3xy^2 = 12x^4 y^2$

(b) $(-8xy^2) \times \frac{-1}{2} x^3 y \times 2x^2 y$

$$+ 8x^6 y^5$$

(c) $\left(\frac{-1}{2} xyz\right) \times \left(\frac{16}{9} \times xy^2 z\right) \times$

$$\left(\frac{-9}{8} xyz^2\right)$$

$$\frac{-1}{2} xyz \times \frac{-16}{9} xy^2 z \times \frac{-9}{8} xyz^2$$

$$-x^2 y^4 z^4$$

(d) $(xy) \times (3x^2 y) \times 4xy^2$

$$xy \times 3x^2 y \times 4xy^2 = 12x^4 y^4$$

2. (a) $x(x - y) = x^2 - xy$

(b) $2x^2 (y^2 + z^2) = 2x^2 y^2 + 2x^2 z^2$

(c) $3ab(a^2 b + ab^2)$

$$3a^2 b^2 + 3a^2 b^3$$

(d) $9xy(3x^2 y - 8xy^2)$

$$27x^3 y^2 - 72x^2 y^3$$

(e) $6a^2 b^2 (a^2 + ab - b^2)$

$$6a^4 b^2 + 6a^3 b^3 - 6a^2 b^4$$

3. (a) $(x + y)(xy - 5)$

$$x(xy - 5) + y(xy - 5)$$

$$x^2 y - 5x + xy^2 - 5y$$

(b) $(4 - 2a)(6 - 2a + 3b)$

$$4(6 - 2a + 3b) - 2a(6 - 2a + 3b)$$

$$24 - 8a + 12b - 12a + 4a - 6ab$$

$$24 - 16a - 6ab$$

(c) $(x^2 + y^2)(a^2 - b^2)$

$$x^2(a^2 - b^2) + y^2(a^2 - b^2)$$

$$x^2 a^2 - x^2 b^2 + y^2 a^2 - y^2 b^2$$

(d) $(x^2 - y^2)(x^2 + xy + y^2)$

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

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

$$x^4 + x^3 y - xy^3 - y^4$$

(e) $(5x + 3y)(5x - 3y)$

$$5x(5x - 3y) + 3y(5x - 3y)$$

$$25x^2 - 15yx + 15yx - 9y^2$$

$$25x^2 - 9y^2$$

4. (a) $x^2(x^3 - y^2) - y^2(y^2 - x^2)$

$$x^5 - x^2 y^2 - y^4 + x^2 y^2$$

$$\begin{aligned} & x^5 - y^4 \\ \text{(b)} & (x^2 + 3x + 1)(-2x) - (x^2 xy - y^2)(-4x) \\ & -2x^3 - 6x - 2x - (4x^2 + 4x^2 y + 4xy^2) \\ & -2x^3 - 6x - 2x + 4x^2 - 4x^2 y - 4xy^2 \\ & -2x^3 - 8x + 4x^3 - 4x^2 y - 4xy^3 \end{aligned}$$

$$\begin{aligned} \text{(c)} & (5x + 9y)(6x - 17y) - (2x + 3y + 3)(10x - 2y) \\ & [5x(6x - 17y) + 9y(6x - 17y)] - [10x(2x + 3y + 3) - 2y(2x + 3y + 3)] \\ & [30x^2 - 85xy + 54xy - 153y] - [20x^2 + 26xy + 30xy + 30x - 4xy - 6y^2 - 6y] \\ & 30x^2 - 31xy - 153y - [20x^2 - 26xy - 30x + 6y^2 + 6y] \\ & 30x^2 - 31xy - 153y - 20x^2 - 26xy + 30x - 6y^2 - 6y \\ & 10x^2 - 57xy - 159y - 30x \\ & 10x^2 - 59xy - 159y - 30x \end{aligned}$$

$$\begin{aligned} \text{(d)} & (1 + x + y)(1 - x - y) - (-1 - x - y)(-1 + x + y) \\ & [1(1 - x - y) + x(1 - x - y) + y] - [-1(1 + x + y) - x(-1 + x + y) - y(-1 + x + y)] \\ & [1 - x - y + x - x^2 xy + y - xy - y^2] - [1 - x - y + x - x^2 - xy + y - xy - y^2] \\ & [-x^2 - 2xy - y^2 + 1] - [1 - x^2 - 2xy - y^2] \\ & -x^2 - 2xy - y^2 + 1 - 1 + x^2 + 2xy + y^2 = 0 \end{aligned}$$

$$\begin{aligned} \text{5. (a)} & (15x + 25y)(15x - 25y) \\ & 15x(15x - 25y) + 25y(15x - 25y) \\ & 225x^2 - 3.75xy + 3.75xy - 625y^2 \\ & 225x^2 - 625y^2 \end{aligned}$$

$$\begin{aligned} \text{(b)} & (x^2 + y^2)(x + y - xy) \\ & x^2(x + y - xy) + y^2(x + y - xy) \\ & x^3 + x^2 y - x^3 y + y^2 x + y^2 - xy^2 \end{aligned}$$

Exercise - 9.4

$$\begin{array}{r} \text{1. (a)} \quad x^{15} y^{12} c^8 \text{ by } x^2 y^2 \\ \quad \quad \quad x^{13} y^{10} c^8 \\ x^2 y^2 \overline{) x^{15} y^{12} c^8} \\ \quad \quad \quad -x^{13} y^{10} c^8 \\ \hline \quad \quad \quad 0 \end{array}$$

$$\begin{aligned} \text{(b)} & 18x^3 + 12x^2 y - 30xy^2 + 12 \div 6xy \\ & \frac{3x^3}{y} + 2x - \frac{5}{y} \end{aligned}$$

$$\begin{aligned} \text{(c)} & 48a^3 b^3 c^3 - 18 \\ & a^2 b^2 c^2 + 30abc \text{ by } -12abc \\ & -4a^2 b^2 c^2 + \frac{3}{2} abc - \frac{5}{2} \end{aligned}$$

$$\begin{aligned} \text{(d)} & 15x^2 y^2 - 20y^2 z^2 + 25z^2 x^2 \text{ by } 10xyz \\ & \frac{-3xy}{2z} - \frac{2xy}{x} - \frac{5zx}{2y} \end{aligned}$$

$$\text{2. (a)} \quad x^2 + 5x + 6 \text{ by } x + 2$$

$$\begin{array}{r}
 x+3 \\
 x+2 \overline{) x^2 + 5x + 6} \\
 \underline{- x^2 + 2x} \\
 3x + 6 \\
 \underline{- 3x + 6} \\
 0 \\
 = x + 3
 \end{array}$$

(b) to (f) Do same as above

3. Area of rectangle

$$= 6x^2 - 7x - 5$$

$$\text{Length} = 2x + 1$$

$$\text{Area} = 1 \times b$$

$$6x^2 - 7x - 5 = 2x + 1 \times \text{breadth}$$

$$\frac{6x^2 - 7x - 5}{2x + 1} = \text{Breadth}$$

$$\begin{array}{r}
 3x+2 \\
 2x+1 \overline{) 6x^2 - 7x - 5} \\
 \underline{- 6x^2 - 3x} \\
 4x - 5 \\
 \underline{- 4x + 2} \\
 7 \\
 = 3x + 2
 \end{array}$$

4. Dividend = Divisor $\times$ Quotient + Remainder

$$= [2x(7x + 3y) - 5y(7x + 3y)]$$

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

$$= [14x^2 - 6xy - 35yx - 15y^2]$$

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

$$14x^2 - 29xy - 15y^2 - 3y^2$$

$$14x^2 - 29xy - 18y^2$$

Exercise - 9.5

1. (a) $(9x + y)(9x + y) = (9x + y)^2$

$$(a + b)^2 = a^2 + b^2 + 2ab$$

$$= (9x)^2 + (y)^2 + 2 \times 9x \times y$$

$$81x^2 + y^2 + 18xy$$

$$(b) \left(\frac{1}{2}x + y\right)^2$$

$$(a + b)^2 = a^2 + b^2 + 2ab$$

$$\left(\frac{1}{2}x\right)^2 + (y)^2 + 2 \times \frac{1}{2}x \times y$$

$$\frac{1}{4}x^2 + y^2 + xy$$

(c) $(3x + 2y)^2$

$$(a + b)^2 = a^2 + b^2 + 2ab$$

$$= (3x)^2 + (2y)^2 + 2 \times 3x \times 2y$$

$$= 9x^2 + 4y^2 + 12xy$$

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

$$(a + b)^2 = a^2 + b^2 + 2ab$$

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

$$+ 2 \times 2x^2y \times 3xy^2$$

$$4x^4y^2 + 9x^2y^4 + 12x^3y^3$$

(e) $(4xy + 3)^2$

$$(a + b)^2 = a^2 + b^2 + 2ab$$

$$= (4xy)^2 + (3)^2 + 2 \times 4xy \times 3$$

$$16x^2y^2 + 9 + 24xy$$

(f) $\left(\frac{2}{3}x + \frac{3}{5}y\right)^2$

$$(a + b)^2 = a^2 + b^2 + 2ab$$

$$= \left(\frac{2}{3}x\right)^2 + \left(\frac{3}{5}y\right)^2 + 2 \times \frac{2}{3}x \times \frac{3}{5}y$$

$$\frac{4}{9}x^2 + \frac{9}{25}y^2 + \frac{4}{5}y$$

2. (a) $(3x - 5y)^2$

$$(a - b)^2 = a^2 + b^2 - 2ab$$

$$= (3x)^2 + (5y)^2 - 2 \times 3x \times 5y$$

$$9x^2 + 25y^2 - 30xy$$

(b) $\left(\frac{x-1}{x}\right)^2 (a-b) = a^2b^2 - 2ab$

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

$$x^2 + \frac{1}{x^2} - 2$$

(c) $\left(\frac{3x}{2} - \frac{4y}{5}\right)^2$

$$(a - b)^2 = a^2 + b^2 - 2ab$$

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

$$\frac{9x^2}{4} + \frac{16y^2}{25} - \frac{12xy}{5}$$

(d) $(5p^2 - 3y^3)^2$

$$(a-b)^2 = a^2b^2 - 2ab$$

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

$$25p^4 + 9y^6 - 30p^2y^3$$

(e) $(3x^2 - 2y^2)^2$

$$(a-b)^2 = a^2 + b^2 - 2ab$$

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

$$2 \times 3x^2 \times 2y^2$$

$$9x^4 + 4y^4 - 12x^2y^2$$

(f) $\left(\frac{1}{4}a^2 - \frac{1}{2}b^2\right)^2$

$$(a-b)^2 = a^2 + b^2 - 2ab$$

$$\left(\frac{1}{4}a^2\right)^2 + \left(\frac{1}{2}b^2\right)^2$$

$$- 2 \times \frac{1}{4}a^2 \times \frac{1}{2}b^2$$

$$= \frac{1}{16}a^4 + \frac{1}{9}b^4 - a^2b^2$$

3. (a) $(2x+3y)(2x-3y)$

$$(a+b)(a-b) = a^2 - b^2$$

$$(2x)^2 - (3y)^2 = 4x^2 - 9y^2$$

(b) $(2x+3)(2x-3)$

$$(a+b)(a-b) = a^2 - b^2$$

$$(2x)^2 - (3)^2 = 4x^2 - 9$$

(c) $\left(\frac{x+1}{x}\right)\left(\frac{x-1}{x}\right)$

$$(a+b)(a-b) = a^2 - b^2$$

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

(d) $(x^2 + y^2)(x^2 - y^2)$

$$(a+b)(a-b) = a^2 - b^2$$

$$(x^2)^2 - (y^2)^2 = x^4 - y^4$$

(e) $(5xy+10)(5xy-10)$

$$(5xy)^2 - (10)^2$$

$$25x^2y^2 - 100$$

(f) $(4ab-3)(4ab+3)$

$$(4ab)^2 - (3)^2 = 16a^2b^2 - 9$$

4. (a) $(x+2)(x+3)$

$$(x+a)(x+b) = x^2 + (a+b)x + ab$$

$$= x^2 + (2+3)x + 2 \times 3$$

$$= x^2 + 5x + 6$$

(b) $(x+7)(x+5)$

$$(x+a)(x+b) = x^2 + (a+b)x + ab$$

$$= x^2 + (7+5)x + 7 \times 5$$

$$= x^2 + 12x + 35$$

(c) $(2p+3)(2p+8)$

$$(x+a)(x+b) = x^2 + (a+b)x + ab$$

$$= (2p)^2 + (3+8)2p + 3 \times 8$$

$$= 4p^2 + 22p + 24$$

(d) $(3p-2)(3p+7)$

$$(x-a)(x+b) = x^2 + (a-b)x - ab$$

$$= (3p)^2 + (7-2)3p - 2 \times 7$$

$$= 9p^2 + 15p - 14$$

(e) $\left(\frac{2}{3}x+5\right)\left(\frac{2}{3}x+7\right)$

$$(x-a)(x-b) = x^2 + (a+b)x + ab$$

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

$$= \frac{4x^2}{9} + 8x + 35$$

(f) $(x-8)(x-2)$

$$(x-a)(x-b) = x^2 - (a+b)x + ab$$

$$= x^2 - (8+2)x + 8 \times 2$$

$$= x^2 - 10x + 16$$

5. (a) $(107)^2$ $(100+7)^2$

$$(a+b)^2 = a^2 + b^2 + 2ab$$

$$= (100)^2 + (7)^2 + 2 \times 100 \times 7$$

$$= 10000 + 49 + 1400 = 11449$$

(b) $(95)^2$ $(100-5)^2$

$$(a-b)^2 = a^2 + b^2 - 2ab$$

$$= (100)^2 + (5)^2 - 2 \times 100 \times 5$$

$$= 10000 + 25 - 1000 = 9025$$

(c) 104×96

$$(100+4)(100-4)$$

$$a^2 - b^2 = (a+b)(a-b)$$

$$= (100)^2 - (4)^2$$

$$= 10000 - 16 = 9984$$

$$(d) 95 \times 102$$

$$(100 - 5)(100 + 2)$$

$$(x - a)(x + b) = x^2$$

$$+ (a - b)x - ab$$

$$= (100)^2 + (5 - 2) \times 100 - 5 \times 2$$

$$= 10000 + 300 - 10 = 10290$$

$$(e) (85)^2 - (75)^2$$

$$a^2 - b^2 = (a+b)(a-b)$$

$$= (85 + 75)(85 - 75)$$

$$= 160 \times 10 = 1600$$

$$66 \times 66 - 33 \times 33$$

$$(f) \frac{66 + 33}{(66)^2 - (33)^2}$$

$$= \frac{(66 + 33)}{(66 + 33)(66 - 33)}$$

$$= \frac{(66 + 33)}{(66 + 33)}$$

$$= 66 - 33 = -33$$

$$6. (a) \frac{x+1}{x} = 10$$

On squaring both side

$$= \left(\frac{x+1}{x} \right)^2 = (10)^2$$

$$\frac{x^2 + 1}{x^2} + 2 \times 1 \times \frac{1}{x} = 100$$

$$\frac{x^2 + 1}{x^2} + 2 = 100 = \frac{x^2 + 1}{x^2} = 98$$

$$7. 3y - \frac{1}{3y} = 8$$

On squaring both side

$$= \left(\frac{3y-1}{3y} \right)^2 = 64$$

$$= \frac{9y^2 + 1}{9y^2} - 2 \times 3y \times \frac{1}{3y} = 64$$

$$= \frac{9y^2 + 1}{9y^2} - 2 = 64 = \frac{9y^2 + 1}{9y^2} = 66$$

$$8. \frac{x-1}{x} = 12 = \left(\frac{x-1}{x} \right)^2 = (12)^2$$

$$= \frac{x^2 - 1}{x^2} - 2 = 144 = \frac{x^2 + a}{x^2} = 146$$

On squaring both sides

$$\left(\frac{x^2 - 1}{x^2} \right)^2 = (146)^2$$

$$(x^2)^2 + \left(\frac{1}{x^2} \right)^2 + 2$$

$$(x)^2 \frac{1}{x^2} = 21316$$

$$\frac{x^4 + 1}{x^4} + 2 = 21316$$

$$\frac{x^4 + 1}{x^4} = 21316 - 2$$

$$\frac{x^4 + 1}{x^4} = 21314$$

$$9. 3x + 9y = 16 \quad \text{--- (1)}$$

$$xy = 8 \quad \text{--- (2)}$$

From eq. (2)

$$x = \frac{8}{y} = \frac{3 \times 8}{y} + 9y = 16$$

$$\frac{24}{y} + 9y = 16 \quad 24 + 9y^2 = 16y$$

$$9y^2 - 16 + 24 = 0 \quad = -176$$

$$10. (a) 8x = (53)^2 - (45)^2$$

$$8x = (53 + 45)(53 - 45)$$

$$8x = 98 \times 8$$

$$8x = 784 \quad x = 98$$

$$(b) 13x = (78)^2 - (26)^2$$

$$13x(78 + 26)(78 - 26)$$

$$13x = 104 \times 52$$

$$13x = 5408 \quad x = 416$$

Multiple Choice Question:

1. a 2. b 3. c 4. a 5. a

NCERT CORNER

Fill in the blanks:

1. Highest 2. 2 3. $a^2 + b^2 + 2ab$

4. $(a-b)^2$ 5. $a^2 - b^2$

True and False:

1. False 2. False 3. False 4. True

5. True

Chapter - 10

Exercise - 10.1

1. (a) 6 (b) 6 (c) 5 (d) 4
2. (a) 12 (b) 16 (c) 15 (d) 12
3. (a) 8 (b) 8 (c) 10 (d) 10
4. $F + V - E = 2$
 $4 + 4 - E = 2$
 $8 - E = 2 \quad 8 - 2 = E$
 $6 = E$
5. $F = 20, E = 30$
 $F + V - E = 2$
 $20 + V - 30 = 2$
 $20 + V = 32$
 $V = 32 - 20 \quad V = 12$
6. $E = 30, V = 20$
 $F + V - E = 2$
 $F + 20 - 30 = 2$
 $F + 10 = 2 \quad F = 12$
7. Vertices = 16
 $2n = 16 \quad n = 8$
Focus = $n + 2 = 8 + 2 = 10$
8. Edge = $3n$
 $27 = 3n \quad n = \frac{27}{3} \quad n = 9$
Vertices = $2n$
 $= 2 \times 9 = 18$
9. Focus = $n + 2$
 $14 = n + 2$
 $14 - 2 = n \quad n = 12$
Edge = $3n$
 $= 3 \times 12 = 36$
10. Focus = $n + 2$
 $16 = n + 2 \quad n = 14$
Edge = $2 \times n$
 $= 2 \times 14 = 28$
11. (a) By Euler formula
 $F + V - E = 2$
 $6 + 8 - 10 = 2$
 $4 \neq 2$ False
(b) $F + V - E = 2$
 $4 + 4 - 6 = 2$
 $2 = 2$ True
(c) $F + V - E = 2$
 $5 + 5 - 8 = 2$
 $2 = 2$ True
(d) $F + V - E = 2$
 $7 + 10 - 14 = 2$
 $17 - 14 = 2$
 $3 \neq 2$ False
(e) $F + V - E = 2$
 $8 + 12 - 18 = 2$
 $20 - 18 = 2$
 $2 = 2$ True
12. (a) $F + V - E = 2$
 $7 + 7 - E = 2$
 $14 - E = 2$
 $14 - 2 = E \quad 12 = E$
(b) $F + V - E = 2$
 $8 + V - 18 = 2$
 $8 + V = 20 \quad V = 12$
(c) $F + V - E = 2$
 $F + 6 - 10 = 2$
 $F + 6 = 12 \quad F = 6$
(d) $F + V - E = 2$
 $4 + 4 - E = 2$
 $8 - E = 2$
 $8 - 2 = E \quad 6 = E$
(e) $F + V - E = 2$
 $F + 12 - 18 = 2$
 $F + 12 = 20 \quad F = 8$

Multiple Choice Question:

1. b 2. c 3. c 4. a 5. c

NCERT CORNER

Fill in the blanks:

1. Euler's 2. Congruent
3. Polygon 4. Triangle
5. Regular Prism

Chapter - 11

Exercise - 11.1

1. Base = 48 cm, Height = 20 cm
Area of cardboard = 48×20
 $= 960 \text{ cm}^2$

2. Area of rectangle park
 $= 100 \times 75 = 7500 \text{ m}^2$
 Area of circle $= \pi r^2 = \frac{22}{7} \times 25 \times 25$
 $= \frac{13750}{7} = 1964.28 \text{ m}^2$

Area of remaining park
 $= 7500 - 1964.28 = 5535.75$

3. Let the height be x

Base $= 2x$

Area of II gm $= 512 \text{ cm}^2$

Area of II gm $= b \times h$

$512 = 2x \times x \quad 512 = 2x^2$

$\frac{512}{2} x^2 \quad 256 = x^2 \quad x = 16 \text{ cm}$

Base $= 2x = 2 \times 16 = 32 \text{ cm}$

4. Length $= 12 \text{ cm}$, Breadth $= 5 \text{ cm}$

Diagonal $= \sqrt{l^2 + b^2}$

$= \sqrt{(12)^2 + (5)^2}$

$= \sqrt{144 + 25} = \sqrt{169} = 13 \text{ cm}$

5. Area of rhombus $= 48 \text{ cm}^2$

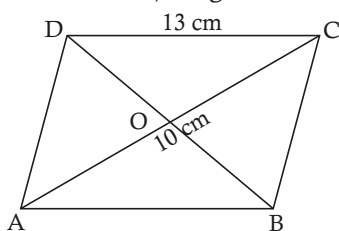
1st Diagonal $= 8 \text{ cm}$

Area of rhombus $= \frac{1}{2} \times d_1 \times d_2$

$48 = \frac{1}{2} \times 8 \times d_2 \quad \frac{48}{4} = d_2$

$d_2 = 12 \text{ cm}$

6. Side $= 13 \text{ cm}$, Diagonal $= 10 \text{ cm}$



Using Pythagoras theorem

$(DC)^2 = (OC)^2 + (OD)^2$

$(13)^2 = (5)^2 + (OD)^2$

$169 = 25 + (OD)^2$

$OD^2 = 169 - 25$

$OD = 12 \text{ cm}$

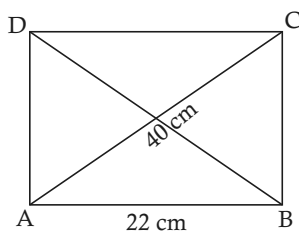
Area of rhombus $= \frac{1}{2} \times d_1 \times d_2$

$= \frac{1}{2} \times 12 \times 10 = 60 \text{ cm}^2$

7. Diagonal $= 40 \text{ m}$

Sides $= 17 \text{ cm}, 22 \text{ cm}$

In $\angle ABC$



Area of quadrilateral

$= \frac{1}{2} \times \text{diagonal} \times \text{sum of } \perp$

$= \frac{1}{2} \times 40 \times (17 + 22) = 20 \times 39$

$= 780 \text{ cm}^2$

8. Side of square $= 10 \text{ cm}$

Area of square $= a^2$

$= (10)^2 = 100 \text{ cm}^2$

Radius $= 2 \text{ cm}$

Area of circle $= \pi r^2$

$= \frac{22}{7} \times 4 = \frac{88}{7} = 12.57 \text{ cm}^2$

Area of remaining shut

$= 100 - 12.57 = 84.43 \text{ cm}^2$

9. (a) Area of square $= a^2$

$= (14)^2 = 196 \text{ cm}^2$

Area of semicircle $= \frac{2 \times \pi r^2}{2}$

$2 \times \frac{22}{7} \times 7 \times 7 = \frac{44 \times 7}{2}$

$= 154 \text{ cm}^2$

Area of shaded portion

$= 196 - 154 = 42 \text{ cm}^2$

- (b) Area of larger circle $= \pi r^2$

$= \frac{22}{7} \times 16 = 50.28 \text{ cm}^2$

$$\begin{aligned}\text{Area of small circle} &= \pi r^2 \\ &= \frac{22}{7} \times 4 = 12.57 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of shaded portion} \\ &= 50.28 - 12.57 = 37.71 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{(c) Area of square} &= a^2 \\ &= 100 \text{ cm}^2 \\ \text{Area of semicircle} &= \pi r^2 \\ &= \frac{22}{7} \times 4 = 12.57 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of shaded portion} \\ &= 100 - 12.57 = 84.43 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{10. Length of } \parallel \text{ side} \\ &= 25 \text{ m and } 15 \text{ m} \\ \text{Distance b/w } \parallel \text{ side} &= 8 \text{ m} \\ \text{Area of trapezium} \\ &= \frac{1}{2}(\text{sum of } \parallel \text{ side}) \times \text{Distance} \\ \text{b/w } \parallel \text{ side} \\ &= \frac{1}{2}(25+15) \times 8 = \frac{1}{2} \times 40 \times 8 \\ &= 160 \text{ m}^2\end{aligned}$$

$$\begin{aligned}\text{11. Area of rhombus} &= 84 \text{ m}^2 \\ \text{Perimeter} &= 40 \text{ m} \\ \text{Perimeter} &= 4 \times a \\ 40 &= 4a \quad a = 10 \text{ m} \\ \text{Area of rhombus} &= \text{side} \times \text{height} \\ 84 &= 10 \times \text{height} \\ \text{height} &= 8.4 \text{ m}\end{aligned}$$

$$\begin{aligned}\text{12. Through C, Draw CE } \parallel \text{ AD} \\ \text{Meeting A B at E} \\ \text{Draw CF } \perp \text{ AB} \\ EB &= (AB-AE) = (AB-DC) \\ EB &= (20-10) = 10 \text{ cm} \\ CE &= AD = 13 \text{ cm} \\ AE &= DC = 13 \text{ cm} \\ \angle EBC \quad CE &= BC = 13 \text{ cm} \\ \text{Also CF } &\perp \text{ AB} \\ \text{So, F is the midpoint of EB} \\ EF &= 1/2 \times EB = \frac{1}{2} \times 10 = 5 \text{ cm} \\ \text{Thus, } \angle CFE\end{aligned}$$

$$CE = 13 \text{ cm}, EF = 5 \text{ cm}$$

By Pythagoras theorem

$$CF = \sqrt{(13)^2 - (5)^2}$$

$$CF = \sqrt{144} \quad CF = 12 \text{ cm}$$

$$\begin{aligned}\text{Area of trapezium} \\ &= \frac{1}{2}(20+10) \times 12 = \frac{1}{2} \times 30 \times 12 \\ &= 180 \text{ cm}^2\end{aligned}$$

$$\text{13. Length of II side} = 50 \text{ m}$$

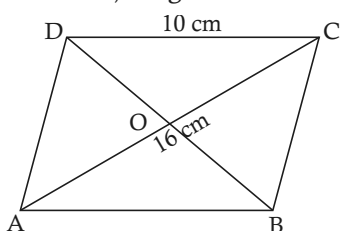
$$\text{Area} = 1200 \text{ m}^2$$

$$\text{Area of trapezium} = \frac{1}{2} \times 50 \times x$$

$$1200 = 25x \quad x = \frac{1200}{25} \quad x = 48 \text{ m}$$

$$\text{Height} = 48 \text{ m}$$

$$\text{14. Side} = 10, \text{ Diagonal} = 16 \text{ cm}$$



$$(OC)^2 + (OD)^2 = (CD)^2$$

$$(8)^2 + (OD)^2 = (10)^2$$

$$(OD)^2 = 100 - 64$$

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

$$\begin{aligned}\text{Area of rhombus} &= \frac{1}{2} \times 12 \times 16 \\ &= 96 \text{ cm}^2\end{aligned}$$

$$\text{15. Parallel side} = 5x \text{ and } 3x$$

$$\text{Height} = 16 \text{ cm}$$

$$\text{Area} = 768 \text{ cm}^2$$

$$\text{Area} = \frac{1}{2}(5x+3x) \times 16$$

$$768 = \frac{1}{2} \times 8 \times 16 \quad 768 = 64x$$

$$x = \frac{768}{64} \quad x = 12 \text{ cm}$$

$$\text{16. Area of square} = 900 \text{ cm}$$

$$a^2 = 900 \quad a = \sqrt{900}$$

$$a = 30 \text{ cm} \quad \text{Side} = 30 \text{ cm}$$

Let the diagonal be x

$$\text{Area of square} = \frac{1}{2} \times (d)^2$$

$$900 = \frac{x^2}{2} \quad 1800 = x^2$$

$$x = \sqrt{1800} \quad x = 42.42 \text{ cm}$$

$$\text{Perimeter} = 4 \times \text{side}$$

$$= 4 \times 30 = 120 \text{ cm}$$

Exercise - 11.2

1. Area of quadrilateral

$$= \frac{1}{2} \times AC \times (DE + BF)$$

$$= \frac{1}{2} \times 300 \times (120 + 100)$$

$$= 150 \times 220 = 33000 \text{ m}^2$$

2. AC = 10, AD = 20

$$CE = 40 - 10 = 30$$

$$DF = 60 - 10 = 30$$

$$EG = 70 - 40 = 30$$

$$BF = 90 - 60 = 30$$

$$GB = 90 - 70 = 20$$

$$GH = 60 \quad EL = 10$$

$$CI = 70 \quad KF = 20$$

$$DJ = 30$$

$$\text{Area of } \angle ADJ = \frac{1}{2} B \times H$$

$$= \frac{1}{2} \times DA \times DJ = \frac{1}{2} \times 20 \times 30$$

$$\text{Area of } \angle ADJ = 300$$

$$\text{Area of } \angle ACI = \frac{1}{2} CA \times CI$$

$$= \frac{1}{2} \times 10 \times 70 = 350$$

$$\text{Area of } \angle BHG = \frac{1}{2} BG \times HG$$

$$= \frac{1}{2} \times 20 \times 60 = 600$$

$$\text{Area of } \angle BFK = \frac{1}{2} BF \times FK$$

$$= \frac{1}{2} \times 30 \times 20 = 300$$

3. Area of park = $l \times b$
 $= 80 \times 30 = 2400 \text{ m}^2$

$$\text{Area of path} = l \times b$$

$$= 6 \times 80 = 480 \text{ m}^2$$

$$\text{Area of path} = l \times b$$

$$= 6 \times 30 = 180 \text{ m}^2$$

$$\text{Area of path} = 180 + 480$$

$$= 660 \text{ m} - 36 = 624 \text{ m}^2$$

$$\text{Area of remaining path}$$

$$= 2400 - 60 = 1776 \text{ m}^2$$

4. Area of rectangle = $l \times b$
 $= 14 \times 50 = 700 \text{ cm}^2$

$$\text{Area of semicircle} = \frac{2 \times \pi r^2}{2}$$

$$= \pi r^2 = \frac{22}{7} \times 7 \times 7 = 154 \text{ cm}^2$$

$$\text{Area of garden}$$

$$= 700 + 154 = 854 \text{ cm}^2$$

$$\text{Perimeter } 2(l+b) + 2\pi r$$

$$= 2(50+50) + 2 \times \frac{22}{7} \times 7$$

$$= 100 + 44 = 144$$

5. Area of room

$$= 2(lb + bh + hl) - 2(1 \times b)$$

$$= 2(20 \times 15 + 15 \times 12 + 12 \times 20)$$

$$2(20 \times 15)$$

$$= 1440 - 600 = 840 \text{ m}^2$$

$$\text{Area of 3 windows} = 3(1 \times b)$$

$$= 4.5 \text{ m}^2$$

$$\text{Area of 2 doors} = 2(1 \times b)$$

$$= 2(2.5 \times 2) = 10 \text{ m}^2$$

$$\text{Painting of room}$$

$$= 840 \times 4.50 = \text{Rs } 3780$$

$$\text{Painting of room}$$

$$= 3780 - (6.50 \times 14.5)$$

$$= 3780 - 94.25 = \text{Rs. } 3685.75$$

6. Area of wheel = $2\pi r$

$$x \times 2\pi r = 121 \text{ km}$$

$$= \frac{x \times 22}{7} \times \frac{77}{2} = 12100000$$

$$\frac{x \cdot 3388}{14} = 12100000$$

$$x \cdot 242 = 12100000 \quad x = 50000$$

7. Let the radius be r cm

$$\text{Circumference} = 2\pi r$$

$$= 2 \times 3.14 \times r = 6.28r$$

According to Question.

$$6.28r - 1r = 37$$

$$5.28r = 37 \quad r = 7 \text{ cm}$$

$$\text{Area of circle} = \frac{22}{7} \times 7 \times 7$$

$$= 154 \text{ cm}$$

8. Distance by our hand

$$= \frac{22}{7} \times 7 \times 7 = 26.4 \text{ cm}$$

$$\text{Minute hand} = \frac{24 \times 2 \times 22}{7} \times 7$$

$$= 1056$$

$$4 \text{ days} = 1056 \times 4 = 4224 \text{ cm}$$

Exercise - 11.3

1. (a) $l = 12 \text{ cm}$, $b = 10 \text{ cm}$, $h = 8 \text{ cm}$

$$\text{Volume of circle} = l \times b \times h$$

$$= 12 \times 10 \times 8 = 960 \text{ cm}^2$$

- (b) $l = 2 \text{ cm}$, $b = 25 \text{ cm}$,

$$h = 20 \text{ cm}$$

$$\text{Volume of circle} = l \times b \times h$$

$$= 2 \times 25 \times 20 = 1000 \text{ cm}^3$$

- (c) $l = 10.5 \text{ cm}$, $b = 7.5 \text{ cm}$,

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

$$\text{Volume of circle} = l \times b \times h$$

$$= 10.5 \times 7.5 \times 5$$

$$= 393.75 \text{ cm}^2$$

2. (a) $l = 8 \text{ m}$, $b = 5 \text{ m}$,

$$\text{Volume} = 280 \text{ m}^3$$

$$\text{Volume of cuboid} = l \times b \times h$$

$$280 = 8 \times 5 \times h$$

$$280 = 40n \quad n = \frac{280}{40}$$

$$n = 7 \text{ m}$$

- (b) $l = 15 \text{ m}$, $h = 12 \text{ m}$,

$$\text{Volume} = 360 \text{ m}^3$$

$$\text{Volume} = 15 \times 12 \times b$$

$$360 = 180 \quad 280 = 40n$$

$$b = \frac{360}{180} \quad b = 2 \text{ m}$$

- (c) $l = ?$, $b = 10.5 \text{ m}$, $h = 10 \text{ m}$

$$\text{Volume} = 525 \text{ m}^3$$

$$\text{Volume} = 10.5 \times 10 \times l$$

$$525 = 105 \times l$$

$$l = \frac{525}{105} \quad l = 5 \text{ m}$$

3. (a) $l = 125 \text{ cm}$, $b = 95 \text{ cm}$,

$$h = 85 \text{ cm}$$

$$\text{Area of cuboid} = 2 (lb \times bh \times hl)$$

$$2 = (125 \times 95 + 9 \times 85 \times 185)$$

$$= 2 \times 30575 = 61150 \text{ cm}^2$$

- (b) $l = 30 \text{ cm}$, $b = 12 \text{ cm}$,

$$h = 63 \text{ cm}$$

$$\text{Area of cuboid 2} = (30 \times 12 +$$

$$12 \times 63 + 63 \times 30)$$

$$= 2 \times 1296 = 2592 \text{ cm}^2$$

- (c) $l = 95 \text{ m}$, $b = 12 \text{ cm}$,

$$h = 62 \text{ cm}$$

$$l = 95 \text{ m} \quad l = 950 \text{ cm}$$

$$\text{Area of cuboid 2} = (95 \times 12 +$$

$$12 \times 62 + 62 \times 9500)$$

$$= 2 \times 703744 = 1407488 \text{ cm}^2$$

4. Volume of cuboid = Base area $\times$ height

$$880 = 176 \times h$$

$$h = \frac{880}{176} \quad h = 5 \text{ cm}$$

5. Volume clay = $6 \times 4 \times 8 = 192 \text{ m}^2$

6. Volume of cuboid = $l \times b \times h$

$$108 = 12 \times 3 \times h$$

$$108 = 36 \times h$$

$$h = \frac{108}{36} \quad h = \text{cm}$$

7. (a) Let the length, breadth and height be x, y, z

$$\text{Volume of cuboid}$$

$$2x \times 2xy \times \frac{4}{2}$$

$$xyz = xyz \quad \text{No change}$$

- (b) Let the Length, breadth and height be x , y and z

$$\text{Volume of cuboid} = l \times b \times h$$

$$xyz = 2x \times 2xy \times \frac{4}{2}$$

$$xyz = 2xyz \quad \text{It get double.}$$

8. Volume of cuboid boxes
 $= 8 \times 6 \times 20 = 960 \text{ cm}^3$
 Volume of carton $= 120 \times 72 \times 48 = 414720 \text{ cm}^3$
 No. of cuboid boxes $= \frac{414720}{960}$
 $= 432 \text{ boxes}$

9. Volume of iron piece
 $= l \times b \times h = 60 \times 50 \times 20$
 $= 60000 \text{ cm}^3$
 Weight of 6000 cm^3 boxes
 $= 60000 \times 6 = 360000 \text{ g} = 360 \text{ kg}$

10. Total surface area $= 414 \text{ m}^2$
 $2(lb + bh + hl) = 414$
 $2(5x \times 3x + 3x \times x + x \times 5x)$
 $= 414$
 $2(15x^2 + 3x^2 + 5x^2) = 414$
 $46x^2 = 414 \quad x^2 = \frac{414}{46} \quad x = 3$

$$\text{Length} = 3 \times 3 = 9 \text{ m}$$

$$\text{Breadth} = 5 \times 3 = 15 \text{ m}$$

11. L.S.A $= 2(l + b) \times h$
 $= 2(20 + 18) \times 16$
 $= 2 \times 38 \times 16 = 1216 \text{ m}^2$

12. T.S.A $= 100 \text{ m}^2$
 $2(lb + bh + hl) = 100 \text{ m}^2$
 $lb + bh + hl = 50 \text{ m}^2$
 L.S.A $= 60 \text{ m}^2$
 $2n(l + b) = 60 \text{ m}^2$
 $n(l + b) = 30 \text{ m}^2$
 $nl + nb = 30 \text{ m}^2$
 On substitute of eq 1 & 2
 $lb + 30 + 50$
 $lb = 20 \text{ m}^2$

13. T.S.A of boxes $2(lb + bh + hl)$
 $= 2(25 \times 18 + 18 \times 12 + 12 \times 25)$
 $= 2 \times 966 = 1932 \text{ cm}^3$

$$\text{Area of top} = l \times b$$

$$= 25 \times 18 = 450 \text{ cm}^3$$

$$\text{Shut required} = 1932 - 450$$

$$= 1482 \text{ cm}^3$$

14. T.S.A of room $= 2(l + b) \times h$
 $= 2(54 + 18) \times 15$
 $= 2 \times 72 \times 15 = 2160$

15. Area to be white wash
 $= 2(l + b) \times h$
 $= 2(18 + 16) \times 12$
 $= 2 \times 34 \times 12 = 816 \text{ m}^2$

Exercise - 11.4

- (a) 6 cm
 Volume of cube $= a^3$
 $= (6)^3 = 216 \text{ cm}^3$

(b) 5.9 cm
 Volume of cube $= a^3$
 $= (5.9)^3 = 205.379 \text{ cm}^3$

(c) 10 cm
 Volume of cube $= a^3$
 $= (10)^3 = 1000 \text{ cm}^3$

(d) 12 cm
 Volume of cube $= a^3$
 $= (12)^3 = 1728 \text{ cm}^3$
- (a) 8 cm
 T.S.A of cube $= 6 \times a^2$
 $= 6 \times 64 = 384 \text{ cm}^2$

(b) 4 cm
 T.S.A of cube $= 6 \times a^2$
 $= 6 \times 16 = 96 \text{ cm}^2$

(c) 2.5 cm
 T.S.A of cube $= 6 \times a^2$
 $= 6 \times (2.5)^2 = 37.5 \text{ cm}^2$

(d) 3.8 cm
 T.S.A of cube $= 6 \times a^2$
 $= 2 \times 14.44 = 86.64 \text{ cm}^2$
- (a) 512 cm^3
 Volume of cube $= a^3$
 $512 = a^3 \quad a = 8 \text{ cm}$

(b) 729 cm^3

Volume of cube = a^3

$$729 = a^3 \quad a = 9 \text{ cm}$$

(c) 1331 cm^3

Volume of cube = a^3

$$1331 = a^3 \quad a = 11 \text{ cm}$$

(d) 1728 cm^3

Volume of cube = a^3

$$1728 = a^3 \quad a = 12 \text{ cm}$$

4. (a) 5400 m^2

T.S.A of cube = $6 \times a^2$

$$\frac{5400}{6} = a^2 \quad 900 = a^2 \quad a = 30 \text{ m}$$

(b) 150 cm^2

T.S.A of cube = $6 \times a^2$

$$\frac{150}{6} = a^2$$

$$25 = a^2 \quad a = 5 \text{ cm}$$

(c) 3174 cm^2

T.S.A of cube = $6 \times a^2$

$$\frac{3174}{6} = a^2 \quad a = 23 \text{ cm}$$

(d) 3750 cm^2

T.S.A of cube = $6 \times a^2$

$$\frac{3750}{6} = a^2 \quad 625 = a^2$$

$$a = 25 \text{ cm}$$

5. Volume of cube = 1728 cm^3

$$a^3 = 1728 \quad a = 12 \text{ cm}$$

T.S.A of cube = $6a^2$

$$= 6 \times (12)^2 = 6 \times 144 = 864 \text{ cm}^2$$

6. T.S.A cube = $6a^2$

$$3174 = 6a^2 = \sqrt{\frac{3174}{6}} = a$$

$$a = 23 \text{ cm}$$

Volume of cube = a^3

$$= (23)^3 = 12167 \text{ cm}^3$$

7. (a) Volume of cube = a^3

$$a^3 = (2a)^3 \quad \text{It get eight times}$$

(b) Volume of cube = a^3

$$a^3 = \left(\frac{a}{2}\right)^3$$

It get $\frac{1}{8}$ times

(c) Volume of cube = a^3

$$a^3 = (3a)^3 = 27a^3$$

It get 27 times

8. Volume of 5 cm cube = 125 cm^3

Volume of 10 cm cube = a^3

$$= (10)^3 = 1000 \text{ cm}^3$$

$$\text{No. of cubes} = \frac{1000}{125} = 8 \text{ cube}$$

9. Length of each cube = 5 cm

$$3 \text{ cube} = 5 + 5 + 5 = 15 \text{ cm}$$

Breadth and height same

T.S.A of cuboid

$$= 2(lb + bh + hl)$$

$$= 2(15 \times 5 + 5 \times 5 + 5 \times 15)$$

$$= 2 \times 175 = 350 \text{ cm}^2$$

Volume of cuboid

$$= 15 \times 5 \times 5 = 375 \text{ cm}^3$$

10. Volume of three cubes

$$(5 \times 6 \times 7) + (7 \times 4 \times 8) + (2 \times 13 \times 2)$$

$$= 210 + 224 + 52 = 484 \text{ cm}^3$$

Volume of cube = 484 cm^3

$$a^3 = 484 \text{ cm}^3 \quad a = 7.85 \text{ cm}$$

L.S.A of cube = $4 \times \text{side}^2$

$$= 4 \times (7.85)^2 = 246.5 \text{ cm}^2$$

11. Let the length be x

$$\text{Breadth} = \frac{x}{2} \quad h = 3 \text{ m}$$

L.S.A of cuboid = $2(l+b) \times h$

$$108 = 2\left(\frac{x+x}{2}\right) \times 3 \quad \frac{108}{6} = \frac{2x+x}{2}$$

$$18 \times 2 = 2x + x \quad 36 = 3x$$

$$x = 12$$

Length = 12 m, Breadth = 6 m

Volume = $l \times b \times h$

$$= 12 \times 6 \times 3$$

$$= 216 \text{ m}^3$$

12. Length = 10 m

Length of road = $\text{side} \sqrt{3}$

$$10\sqrt{3} = 17.32 \text{ m}$$

Exercise - 11.5

1. (a) $r = 7$ cm $h = 14$ cm

$$\text{C.S.A of cylinder} = 2\pi rh$$

$$= \frac{2 \times 22}{7} \times 7 \times 14$$

$$= 44 \times 14 = 616 \text{ cm}^3$$

- (b) $r = 14$ cm, $h = 28$ cm

$$\text{C.S.A of cylinder} = 2\pi rh$$

$$= \frac{2 \times 22}{7} \times 14 \times 28 = 2464 \text{ cm}^3$$

2. (a) $r = 3.5$ cm, $h = 10$ cm

$$\text{T.S.A of cylinder} = 2\pi r(r + h)$$

$$= \frac{2 \times 22}{7} \times 3.5(3.5 + 10)$$

$$= \frac{2 \times 22}{7} \times 3.5 \times 13.5 = 297 \text{ cm}^3$$

- (b) $r = 10.5$ cm $h = 20$ cm

$$\text{T.S.A of cylinder} = 2\pi r(r + h)$$

$$= \frac{2 \times 22}{7} \times 10.5(10.5 + 20)$$

$$= \frac{2 \times 22}{7} \times 10.5 \times 30.5 = \frac{14091}{7} = 2013 \text{ cm}^3$$

3. (a) $r = 21$ cm, $h = 15$ cm

$$\text{Volume} = \pi r^2 h$$

$$= \frac{22}{7} \times 27 \times 21 \times 15 = 2079 \text{ cm}^3$$

- (b) $r = 10.5$ cm, $h = 21$ cm

$$\text{Volume} = \pi r^2 h$$

$$= \frac{22}{7} \times 10.5 \times 10.5 \times 21$$

$$= \frac{50935.5}{7} = 7276.5 \text{ cm}^3$$

4. Perimeter of base $= 2\pi r$

$$44 = \frac{22}{7} \times 2 \times r \quad 44 = \frac{44}{7} \times r$$

$$r = 7 \text{ cm}$$

$$\text{C.S.A of cylinder} = 2\pi rh$$

$$= \frac{2 \times 22}{7} \times 7 \times 10 = 440 \text{ cm}^2$$

5. Area $= \pi r^2$

$$154 = \frac{22}{7} \times r^2 = \frac{154 \times 7}{22} \times r^2$$

$$49 = r^2 \quad r = 7 \text{ cm}$$

$$\text{T.S.A of cylinder} = 2\pi r(r + h)$$

$$= \frac{2 \times 22}{7} \times 7(7 + 25)$$

$$= 44 \times 32 = 1408 \text{ cm}^2$$

6. Radius $= 2:3$ Height $= 3:4$

$$\text{C.S.A of } 1^{\text{st}} : \text{C.S.A of } 2^{\text{st}}$$

$$2\pi rh : 2\pi rh$$

$$2 \times 3 : 3 \times 4 = 6 : 12 = 1:2$$

7. Length $=$ height $= 12$ cm

$$2\pi r = 44 \quad r = 7 \text{ cm}$$

$$\text{T.S.A} = 2\pi r(r + h)$$

$$= \frac{2 \times 22}{7} \times 7(7 + 12) = 44 \times 19$$

$$= 836 \text{ cm}^3$$

8. $d = 42$ cm, $r = 21$ cm, $l = 100$ cm

$$\text{T.S.A of cylinder} = 2\pi rh$$

$$= \frac{2 \times 22}{7} \times 21 \times 100 = 8800$$

$$\text{Area traveled by 750 revolution}$$

$$= 750 \times 8800$$

$$= 6600000 \text{ cm}^2 = 660 \text{ m}^2$$

9. $h = 25$ cm, $r = 10.5$ cm

$$\text{C.S.A} = 2\pi rh$$

$$= \frac{2 \times 22}{7} \times 10.5 \times 25 = \frac{11550}{7}$$

$$= 1650 \text{ cm}^2$$

$$\text{T.S.A} = 2\pi r(r + h)$$

$$= \frac{2 \times 22}{7} \times 10.5 \times (10.5 + 25)$$

$$= \frac{462}{7} \times 35.5 = \frac{16401}{7}$$

$$= 2343 \text{ cm}^2$$

10. C.S.A $= 616 \text{ cm}^2$

$$h = 20 \text{ cm}$$

$$\text{C.S.A} = 2\pi rh$$

$$616 = \frac{2 \times 22}{7} \times r \times 20$$

$$616 = \frac{880}{7} \times r$$

$$= \frac{616 \times 7}{880} = r = \frac{4312}{880} = r$$

$$r = 4.9 \text{ cm}$$

$$\text{T.S.A} = 2\pi r(r + h)$$

$$= \frac{2 \times 22}{7} \times 4.9 \times (4.9 + 20)$$

$$= \frac{44}{7} \times 122.01 = \frac{5368.44}{7}$$

$$= 766.92 \text{ cm}^2$$

11. Circumference = $2\pi r$

$$66 = \frac{22}{7} \times 2 \times r \quad 66 = \frac{44}{7} \times r$$

$$r = \frac{66 \times 7}{44} \quad r = 10.5 \text{ cm}$$

$$\text{C.S.A} = 2\pi rh$$

$$2640 = \frac{2 \times 22}{7} \times 10.5 \times h$$

$$2640 = \frac{462}{7} \times h = \frac{2640}{66} = h$$

$$h = 40 \text{ cm}$$

$$\text{Volume} = \pi r^2 h$$

$$= \frac{22}{7} \times 10.5 \times 10.5 \times 40 = \frac{97020}{7}$$

$$= 13860 \text{ cm}^3$$

12. Volume of cylinder = 6930 cm^3

$$\text{Height} = 20 \text{ cm}$$

$$= \pi r^2 h = 6930$$

$$= \frac{22}{7} \times r^2 \times 20 = 6930$$

$$= \frac{22}{7} \times r^2 = \frac{6930}{20}$$

$$r^2 = \frac{693}{2} \times \frac{7}{22} \quad r^2 = \frac{4851}{44}$$

$$r^2 = 110.25 \quad r = 10.5 \text{ cm}$$

13. $22\pi r_1 = 88$

$$r = \frac{88}{2\pi} \quad r = \frac{44}{\pi}$$

$$2\pi r_2 = 22 \quad r_2 = \frac{22}{2\pi}$$

$$r_2 = \frac{11}{\pi}$$

$$\text{Ratio 1} = \frac{2\pi rh}{\pi rh}$$

$$\frac{2}{\pi} = \frac{2\pi}{44} \quad \frac{1}{7} = 1:7$$

$$\text{Ratio 2} = \frac{2\pi r_2 h}{\pi r r_2 h} = \frac{2}{r_2}$$

$$= \frac{2\pi}{11} = \frac{4}{7}$$

$$= 4:7$$

14. Volume = 866.25

$$\pi r^2 h = 866.25$$

$$866.25 = \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times h$$

$$866.25 = \frac{77}{2} \times h$$

$$h = \frac{1732.5}{71}$$

$$h = 22.5 \text{ cm}$$

15. Volume of hollow cylinder

$$= (r_1^2 - r_2^2)$$

$$= \pi (9)^2 - (8)^2 \times 14$$

$$= \pi (81 - 64) \times 14$$

$$= \pi \times 17 \times 14$$

$$= \frac{22}{7} \times 17 \times 14 = 748 \text{ cm}^3$$

Multiple Choice Question

1. c 2. c 3. c 4. c 5. b

NCERT CORNER

Fill in the blanks:

1. $\sqrt{l^2 \times b^2 \times h^2}$

2. axis

3. b, identical

4. edge

5. plan, curved

True or False

1. False

2. True

3. False

4. True

5. False

Chapter - 12

Exercise - 12.1

- (a) Base = 5, Exponent = 6
 (b) Base = -2, Exponent = 8
 (c) Base = $-\frac{3}{5}$, Exponent = 6
 (d) Base = $-\frac{6}{7}$, Exponent = 0
 (e) Base = $\frac{9}{2}$, Exponent = 6
- (a) $(-2)^5$ (b) $(5)^4$
 (c) $\left(\frac{-3}{3}\right)^6$ (d) $\left(\frac{7}{3}\right)^5$ (e) $\left(\frac{-1}{10}\right)^4$
- (a) 729 (b) -32 (c) $\frac{16}{18}$
 (d) $-\frac{1024}{3125}$ (e) $-\frac{125}{216}$
- (a) $\left(\frac{1}{2}\right)^3$ (b) $\left(\frac{1}{8}\right)^5$ (c) $\left(\frac{-9}{7}\right)^3$
 (d) $\left(\frac{-9}{7}\right)^3$ (e) $\left(\frac{-1}{15}\right)^2$
- (a) $(5)^4$ (b) 2^{10} (c) $\left(\frac{6}{8}\right)^3$
 (d) $\left(\frac{7}{10}\right)^3$ (e) $\left(\frac{-4}{6}\right)^3$
- (a) $3 \times 3 \times 3 = 27$
 (b) $\left(\frac{1}{5}\right)^4 = \frac{1}{625}$ (c) $\frac{1}{10}$
 (d) $(-5)^3 = 25$ (e) $(3)^5 = 343$
- (a) $\left(\frac{6}{7}\right)^2$ (b) $\left(\frac{-7}{5}\right)^3$ (c) $(-6)^5$
 (d) $\left(\frac{-2}{3}\right)^{10}$ (e) $\left(\frac{1}{7}\right)^2$
- (a) $\left(\frac{2}{2}\right)^3 = \frac{23}{33} = \frac{8}{27} = \frac{8}{27}$
 L.H.S = R.H.S

$$(b) \left(\frac{-3}{5}\right)^2 = \frac{(-3)^2}{(5)^2} = \frac{9}{25} = \frac{9}{25} \quad \text{Hence Verified}$$

$$(c) (-9 \times -8)^2 = (-9)^2 \times (-8)^2$$

$$(72)^2 = 81 \times 64$$

$$5184 = 5184 \quad \text{Hence Verified}$$

$$(d) (-5)^4 \times (-3)^4 = [(-2) \times (-3)]^4$$

$$16 \times 81 = (6)^4$$

$$1296 = 1296 \quad \text{Hence Verified}$$

- (a) $\left(\frac{1}{3}\right)^2 \times \left(\frac{2}{3}\right)^3 = \frac{1}{9} \times \frac{8}{27} = \frac{8}{243}$
 (b) $\left(\frac{2}{5}\right)^3 \times \left(\frac{5}{7}\right)^2 = \frac{8}{125} \times \frac{25}{49} = \frac{8}{245}$
 (c) $\left(\frac{-4}{5}\right)^2 \times \left(\frac{2}{7}\right)^3 \times \left(\frac{1}{4}\right)^2 = \frac{16}{25} \times \frac{8}{343} \times \frac{1}{64} = \frac{2}{8575}$
 (d) $\left(\frac{4}{7}\right)^3 \times \left(\frac{-7}{3}\right)^2 = \frac{64}{343} \times \frac{49}{9} = \frac{64}{63}$
 (e) $\left(\frac{-1}{2}\right)^2 \times \left(\frac{2}{3}\right)^3 \div \left(\frac{3}{4}\right)^2 = \frac{1}{4} \times \frac{8}{27} \times \frac{16}{9} = \frac{32}{243}$
 (f) $\left(\frac{-3}{4}\right)^2 \times \left(\frac{-4}{3}\right)^3 \div \left(\frac{2}{3}\right)^2 = \frac{9}{16} \times \frac{64}{27} \times \frac{9}{4} = 3$

Exercise - 12.2

- (a) $\left(\frac{7}{8}\right)^3 \times \left(\frac{7}{8}\right)^2 = \left(\frac{7}{8}\right)^{2+3} = \left(\frac{7}{8}\right)^5$
 (b) $\left(\frac{9}{11}\right)^5 \times \frac{9}{11} = \left(\frac{9}{11}\right)^{5+1} = \left(\frac{9}{11}\right)^6$
 (c) $\left(\frac{-3}{4}\right)^{10} \times \left(\frac{-3}{4}\right)^2 \times \left(\frac{-3}{4}\right)^{-8} = \left(\frac{-3}{4}\right)^{10+2-8} = \left(\frac{-3}{4}\right)^4$

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

$$(e) \left(\frac{5}{7}\right)^0 \times \left(\frac{5}{7}\right)^2 = \left(\frac{5}{7}\right)^2$$

$$(f) \left(\frac{8}{11}\right)^9 \times \left(\frac{8}{11}\right)^{(-2)} \times \left(\frac{8}{11}\right)^{(-7)} \\ \left(\frac{8}{11}\right)^{9-2-7}$$

$$2. (a) \left(\frac{3}{7}\right)^{8-2} = \left(\frac{3}{7}\right)^6$$

$$(b) \left(\frac{-7}{11}\right)^{3-(-8)} = \left(\frac{-7}{11}\right)^{11}$$

$$(c) (-100)^4 \div (-100)^2 = (-100)^2$$

$$(d) \left(\frac{-2}{9}\right)^{-7-(-11)} = \left(\frac{-2}{9}\right)^4$$

$$(e) \left(\frac{-8}{13}\right)^{7-0} = \left(\frac{-8}{13}\right)^7$$

$$(f) \left[\left(\frac{3}{2}\right)^4\right]^3 \div \left(\frac{3}{2}\right)^{15} = \left(\frac{3}{2}\right)^0 = 1$$

$$3. (a) 8^2 \times 8^3 \times 8^0 \\ = 8^{2+3+0} = 8^5$$

$$(b) (-6)^{5+3+9} = (-6)^{17}$$

$$(c) \left(\frac{21}{81}\right)^{18} \quad (d) (3)^{-5-(-7)} = (3)^2$$

$$(e) \left[\left(\frac{2}{3}\right)^2\right]^5 = \left(\frac{2}{3}\right)^{10}$$

$$(f) \left(\frac{3}{5}\right)^{7+(-3)+2} = \left(\frac{3}{5}\right)^6$$

4. Solve the following:

$$(a) 1 \times 1 \times 1 = 1 \quad (b) 1 + 1 + 1 = 3$$

$$(c) 1 \div 1 = 1 \quad (d) 1 - 1 = 0$$

$$(e) \left(\frac{2}{3}\right)^0 = 1 \quad (f) 1 \times 1 \times 1 = 1$$

$$5. (a) \left(\frac{2}{7}\right)^x \times \left(\frac{2}{7}\right)^{3x} = \left(\frac{2}{7}\right)^{16}$$

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

Taping Powers

$$x + 3x = 16$$

$$4x = 16 \quad x = 4$$

$$(b) \left[\left[\left(\frac{5}{8}\right)^x\right]^2\right]^5 \times \left(\frac{5}{8}\right)^{20} \\ \left(\frac{5}{8}\right)^{10x} = \left(\frac{5}{8}\right)^{20}$$

Taping Powers

$$10x = 20 \quad x = 2$$

$$(c) (10)^x \times (10)^5 = 100$$

$$(10)^{x+5} = (10)^2$$

Taping Powers

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

$$(d) [(-10)^8 \times (-10)^x] \div \\ (-10)^2 = (-10)^{10} \\ (-10)^{8+x-2} = (-10)^{10}$$

Taping Powers

$$8 + x - 2 = 10$$

$$8 + x = 12 \quad x = 4$$

$$(e) \left(\frac{2}{9}\right)^{3x-2} = \left(\frac{2}{9}\right)^{5-2x}$$

Taping Powers

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

$$3x + 2x = 5 + 2 \quad x = 7$$

$$(f) \left(\frac{8}{11}\right)^{-7+(-4)} = \left(\frac{8}{11}\right)^{11x}$$

$$\left(\frac{8}{11}\right)^{-11} = \left(\frac{8}{11}\right)^{11x}$$

Taping Powers

$$-11 = 11x \quad x = -1$$

$$6. (a) \left(\frac{65}{64}\right) \div 6^1 = 6^1 \div 6^1 \\ = 6^0 = 1$$

$$(b) (10^3 \times 10^7) \div 10^5 \\ 10^{10} \div 10^5 = 10^5$$

$$(c) \frac{2^4 \times 2^3 \times 3^2}{2^4 \times 3^3} = 2^3$$

$$(d) \frac{1 \times 65}{6} + 6 \quad 6^4 + 6$$

$$= 1296 + 6 = 1302$$

$$(e) \left[\left(\frac{1}{3} \right)^{(-2)} - \left(\frac{1}{2} \right)^{-2} \right] \div \left(\frac{1}{3} \right)^{-3}$$

$$[(3)^2 - (2)^2] \div (3)^3$$

$$5 \div 27 = \frac{27}{5}$$

$$(f) \left(\frac{2}{3} \right)^5 \times \left(\frac{4}{9} \right)^2 \div \left(\frac{2}{3} \right)^9$$

$$\left(\frac{2}{3} \right)^5 \times \left(\frac{2}{3} \right)^4 \div \left(\frac{2}{3} \right)^9$$

$$\left(\frac{2}{3} \right)^{5+3+9} = \left(\frac{2}{3} \right)^0 = 1$$

$$(g) \left(\frac{1}{4} \right)^2 \times \left(\frac{1}{2} \right)^4 \div \left(\frac{1}{4} \right)^3$$

$$\left(\frac{1}{2} \right)^4 \times \left(\frac{1}{2} \right)^4 \div \left(\frac{1}{2} \right)^6 = \left(\frac{1}{2} \right)^2$$

$$(h) \left(\frac{7}{12} \right)^{3x} \times \left(\frac{7}{12} \right)^2 = \left(\frac{7}{12} \right)^{2x+2}$$

$$7. (a) \times (b) \div (c) - (d) \times$$

Exercise - 12.3

$$1. (a) 7.86 \times 10^8 \quad (b) 1.256 \times 10^{12}$$

$$(c) 2.62 \times 10^{12} \quad (d) 3.2 \times 10^{14}$$

$$(e) 1.48 \times 10^{16}$$

$$2. (a) 2.86 \times 10^{-7} \quad (b) 3.82 \times 10^{-10}$$

$$(c) 6.725 \times 10^{-6} \quad (d) 9.315 \times 10^{-1}$$

$$(e) 2.000038 \times 10^{-2}$$

$$3. (a) 2.465 \times 10^9 \quad (b) 2.645 \times 10^9$$

$$(c) 2.345 \times 10^9 \quad (d) 4.567 \times 10^{-1}$$

$$(e) 3.875 \times 10^{-8} \quad (f) 3.275 \times 10^0$$

$$4. (a) 3735 \quad (b) 0.6785 \quad (c) 628000$$

$$(d) 0.000345672 \quad (e) 6.8542$$

$$(f) 0.4532$$

$$5. (a) 6 \times 10^5 + 7 \times 10^4 + 2 \times 10^3$$

$$3 \times 10^2 + 8 \times 10^1 + 5 \times 10^0$$

$$(b) 4 \times 10^6 + 5 \times 10^5 + 0 \times 10^4$$

$$+ 0 \times 10^3 + 7 \times 10^2 + 5 \times 10^1$$

$$+ 6 \times 10^0$$

$$(c) 2 \times 10^6 + 3 \times 10^5 + 4 \times 10^4 + 5 \times 10^3 + 3 \times 10^2 + 0 \times 10^1 + 7 \times 10^0$$

$$(d) 6 \times 10^5 + 0 \times 10^4 + 0 \times 10^3 + 0 \times 10^2 + 0 \times 10^1 + 7 \times 10^0$$

$$(e) 9 \times 10^6 + 1 \times 10^5 + 3 \times 10^4 + 2 \times 10^3 + 6 \times 10^2 + 2 \times 10^1 + 5 \times 10^0$$

$$(f) 6 \times 10^6 + 7 \times 10^5 + 0 \times 10^4 + 2 \times 10^3 + 0 \times 10^2 + 3 \times 10^1 + 4 \times 10^0$$

Chapter - 13

Exercise - 13.1

1. In which of the following tables x and y vary directly:

(a) we have,

$$\frac{1}{2} = \frac{4}{8} = \frac{6}{12} = \frac{10}{20} = \frac{11}{22} = \frac{30}{60} = \frac{1}{2}$$

Here, the ratio of corresponding values x and y is a constant and direct

(b) It is not in ratio of corresponding values x and y is not a constant

$$2. (a) \frac{x}{y} = \frac{5}{30} = \frac{4}{24} = \frac{1}{3} = \frac{10}{30} = \frac{12}{36}$$

$$= \frac{5}{15}$$

$$(b) \frac{x}{y} = \frac{5}{4} = \frac{5}{10} = \frac{3}{6} = \frac{8}{16} = \frac{6}{12} = \frac{15}{30}$$

3. There is a direct variation between distance of car and quantity of petrol

Distance (km) Qty. of petrol (l)

$$\begin{array}{ccc} 180\text{km} & \downarrow & 20\text{l} \\ x & & 48\text{l} \end{array}$$

$$\frac{x}{180} = \frac{48}{20}$$

$$20 \times x = 180 \times 48$$

$$x = \frac{180 \times 48}{20} = 9 \times 48 \quad x = 432$$

Thus, the distance between car = 432 km

4. Student ₹
 $\begin{array}{c} 50 \\ \downarrow \\ 80 \end{array}$ $\begin{array}{c} 166 \\ \downarrow \\ x \end{array}$
 $\frac{x}{1600} = \frac{80}{50}$
 $x \times 50 = 80 \times 1600$ $x = \frac{80 \times 1600}{50}$
 $x = 80 \times 30$ $x = 2400$
 So, 80 student collected ₹ 2400
5. Qty. cloth (m) Cost cloth (₹)
 $\begin{array}{c} 20m \\ \downarrow \\ x \end{array}$ $\begin{array}{c} ₹970 \\ \downarrow \\ ₹485 \end{array}$
 $\frac{x}{20} = \frac{485}{970}$ $x = \frac{20 \times 485}{970}$
 $x = 2 \times 10$ $x = 10$ m
 So, the cost of 10 m cloth is ₹ 485
6. No. of packets Rate of kurkure
 $\begin{array}{c} 12 \\ \downarrow \\ 48 \end{array}$ $\begin{array}{c} ₹240 \\ \downarrow \\ x \end{array}$
 $\frac{x}{240} = \frac{48}{12}$ $12 \times x = 48 \times 240$
 $x = \frac{48 \times 240}{12}$ $x = 860$
7. Speed of car Time
 $\begin{array}{c} 60km/h \\ \downarrow \\ x \end{array}$ $\begin{array}{c} 1hr \\ \downarrow \\ 240 \text{ min} \end{array}$
 $= 240 \text{ min} = 4 \text{ hr}$
 $\frac{x}{60} = \frac{4}{1}$
 $x = 60 \times 4$
 $x = 240 \text{ km/h}$
 So, he reach 240 km in 4 hrs
8. Words Time
 $\begin{array}{c} 108 \\ \downarrow \\ x \end{array}$ $\begin{array}{c} 3 \text{ min} \\ \downarrow \\ 1 \text{ hr} = 60 \text{ min} \end{array}$
 $\frac{x}{108} = \frac{60}{3}$
 $3 \times x = 60 \times 108$

$$x = \frac{60 \times 108}{3} \quad x = 2160$$

So, Priya type 2160 words in 60 minute

9. Earn ₹ Weeks
 $\begin{array}{c} ₹1540 \\ \downarrow \\ x \end{array}$ $\begin{array}{c} 1 \text{ week} \\ \downarrow \\ 1 \text{ year} \end{array}$
10. Qty. of cloth Cost of cloth
 $\begin{array}{c} 36m \\ \downarrow \\ 108m \end{array}$ $\begin{array}{c} ₹180 \\ \downarrow \\ x \end{array}$
 $\frac{x}{1080} = \frac{108}{36}$
 $x \times 36 = 108 \times 1080$
 $x = \frac{108 \times 1080}{36}$ $x = 3180$ ₹
 So, the cost of 108 m of cloth ₹3180
11. ₹ Days
 $\begin{array}{c} ₹350 \\ \downarrow \\ x \end{array}$ $\begin{array}{c} 2 \\ \downarrow \\ 28 \end{array}$
 $\frac{x}{350} = \frac{28}{2}$
 $2x = 350 \times 28$
 $x = \frac{350 \times 28}{2}$
 $x = 350 \times 14$ $x = 4900$
 So, he will get ₹ 4900 in 28 days
12. No of trees No of rows
 $\begin{array}{c} 450 \\ \downarrow \\ x \end{array}$ $\begin{array}{c} 15 \\ \downarrow \\ 86 \end{array}$
 $x \times 450 = 86 \times 15$
 $x = \frac{86 \times 15}{450}$

Exercise - 13.2

1. (a) Solution x and y inversely if $x \times y$ remains same for every value of x and y
 $6 \times 5 = 30$, $2 \times 15 = 30$, $10 \times 3 = 30$
 $7.5 \times 4 = 30$, $\frac{6}{5} \times 25 = 30$
 i.e $6 \times 5 = 2 \times 15 = 10 \times 3$

$$= 75 \times 4 = \frac{6}{5} \times 25$$

So, x and y vary inversely

(b) Here,

$$20 \times 4 = 80, 13 \times 5 = 65,$$

$$18 \times 6 = 108$$

$$95 \times 25 = 2375, \frac{4}{3} \times \frac{3}{4} = 1$$

$$\text{i.e. } 20 \times 4 \neq 13 \times 5 \neq 18 \times 6$$

$$\neq 95 \times 25 \neq \frac{4}{3} \times \frac{3}{4}$$

So, x and y do not vary inversely

2. (a) x product y vary of x and y should remain same:

$$(a) 12 \times 2 = 3 \times y_1 = y_1 = \frac{12 \times 2}{3}$$

$$= y_1 = 8$$

$$(b) 12 \times 2 = x_1 \times 6 = x_1 = \frac{12 \times 2}{6}$$

$$= x_1 = 4$$

$$(c) 12 \times 2 = 24 \times y_2 = y_2 = \frac{12 \times 2}{24}$$

$$= y_2 = 1$$

$$(d) 12 \times 2 = x_2 \times \frac{6}{5} = x_2 = \frac{12 \times 2 \times 5}{6}$$

$$= x_2 = 20$$

$$\text{So, } \frac{x}{y} = \frac{12}{2} = \frac{3}{8} = \frac{4}{6} = \frac{24}{1} = \frac{20}{6/5}$$

$$(b) (a) 10 \times 6 = 2 \times y_1 = y_1 = \frac{10 \times 6}{2}$$

$$= y_1 = 30$$

$$(b) 10 \times 6 = x_1 \times 12 = x_1 = \frac{10 \times 6}{12}$$

$$= x_1 = 5$$

$$(c) 10 \times 6 = 30 \times y_2 = y_2 = \frac{10 \times 6}{30}$$

$$= y_2 = 2$$

$$(d) 10 \times 6 = 15 \times y_3 = y_3 = \frac{10 \times 6}{15}$$

$$= y_3 = 6$$

$$\text{So, } \frac{x}{y} = \frac{2}{30} = \frac{10}{6} = \frac{5}{12} = \frac{30}{2} = \frac{15}{6}$$

3. Men Days

$$\begin{array}{ccc} 15 & \downarrow & 60 \\ 36 & & x \end{array}$$

$$15 \times 36 = 60 + x$$

$$x = \frac{15 \times 36}{60}$$

$$= 9$$

$$x = 9$$

36 men will do a piece of work in 9 days

4. Do same as above

5. Student Days

$$\begin{array}{ccc} 300 & \downarrow & 50 \\ 300 + 200 = 500 & & x \end{array}$$

$$\frac{x}{50} = \frac{300}{500}$$

$$x = \frac{300 \times 50}{500}$$

$$x \times 500 = 300 \times 0$$

$$x = \frac{300 \times 50}{500} \quad x = 30$$

Rhus, 30 days food will last

6. Men Days

$$\begin{array}{ccc} 17 & \downarrow & 120 \\ x & & 102 \end{array}$$

$$\frac{x}{17} = \frac{120}{102}$$

$$102 \times x = 17 \times 120$$

$$x = \frac{17 \times 120}{102}$$

$$x = \frac{17 \times 120}{102} \quad 20 \text{ men more}$$

Multiple Choice Questions

1. (a) 2. (a) 3. (a) 4. (a) 5. (a)

Fill in the blanks:

(i) Directly

(ii) Directly

(iii) Inversely

(iv) Directly

(v) Inversely

True and False:

(i) True (ii) True (iii) True

(vi) True (v) True

Chapter - 14

Exercise - 14.1

1. (a) Factor of $3x^2 = 3 \times x \times x$
Factor of $18x^2 = 2 \times 3 \times 3 \times x \times x \times x$
H.C.F of $18x^2 = 3 \times x \times x = 3x^2$
(b) Factor of $7m^2n^2 = 7 \times m \times m \times n \times n$
Factor of $28m^3n = 2 \times 2 \times 7 \times m \times m \times m \times n$
H.C.F of $7m^2n^2$ and $28m^3n = 7 \times m \times m \times n = 7m^2n$
(c) to (f): Do same as above.
2. Find the highest common factors of each terms in the following algebraic expression:
(a) Factors of $5x^4 = 5 \times x \times x \times x \times x$
Factors of $10x^3 = 5 \times 2 \times x \times x \times x$
Factors of $20x^2 = 5 \times 2 \times 3 \times x \times x$
H.C.F = $5x^2$
(b) Factors of $4xyz = 2 \times 2 \times x \times y \times z$
Factors of $6x^2y = 2 \times 3 \times x \times x \times y$
Factors of $8y^2 = 2 \times 2 \times 2 \times y \times y$
H.C.F = $2 \times xy = 2xy$
(c) to (f): So same as above.
3. 1
4. Do it yourself

Exercise - 14.2

1. Factorize the following expressions using common factors:
(a) $7x^2(1-3x)$
(b) $10xy(1-y)$
(c) $18xy(1-3xy)$
(d) $4xyz(6+14yz)$
(e) $50mn(n+2m)$
(f) $20m(m^2-2m+4)$
(g) $x^2y^2(x^2-y^2-x^2y^2)$
(h) $7mnl(3n-5m-10l)$
2. Factorize the following expressions:
(a) $(x+y)(5x-3y)$
(b) $(a-b)(2a+4b)$
 $(a-b)2(a+2a)$
 $2(a-b)(a+2a)$
(c) to (h) Do same as above.
3. Factorize the following expressions by grouping the terms:
(a) $ax+bx+by+ay$
 $x(a+b)+y(a+b)$
 $(x+y)(a+b)$
(b) $a^2b-ab-ac^2+c^2$
 $ab(a-1)-ac(a-1)$
 $(ab-ac)(a-1)$
 $a(b-c)(a-1)$
(c) to (h): Do same as above.

Exercise - 14.3**1. Factorize the following:**

(a) $(3x)^2 + 2 \times 3 \times 2 \times xy + (2y)^2$

$$\therefore (a+b)^2 = a^2 + b^2 + 2ab$$

$$= (3x+2y)^2$$

$$= (3x+2y)(3x+2y)$$

(b) $(2a)^2 + 2 \times 2 \times 4 \times a \times b + (4a)^2$

$$= (2a+4b)^2$$

$$= (2a+4b)(2a+4b)$$

(c) $y^2 - 6y + 9$

$$= y^2 - 3 \times 2 \times y + (3)^2$$

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

$$= (y-3)(y-3)$$

(d) $(1)^2 - 2 \times 1 \times m + (m)^2$

$$= (1-m)^2$$

$$= (1-m)(1-m)$$

(e) $(11x)^2 - 2 \times 11 \times y + (1)^2$

$$= (11x-1)^2$$

$$= (11x-1)(11x-1)$$

(f) $(6)^2 - 2 \times 6 \times k + (k)^2 = (6-k)^2$

$$= (6-k)(6-k)$$

(g) $(6a)^2 + 2 \times 6 \times 3 \times a + (3)^2$

$$= (6a+3)^2$$

$$= (6a+k)(6a+k)$$

(h) $\left(\frac{1}{2}\right)^2 - 2 \times \frac{1}{2} \times 3 \times h + (3h)^2$

$$= \left(\frac{1}{2} - 3h\right)^2$$

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

(i) $(ab)^2 - 2 \times a \times b + (1)^2$

$$= (ab+1)^2$$

2. Factorize the following:

(a) $a^2 + 2ab + b^2 - 25$

$$(a+b)^2 - 25$$

$$(a+b)^2 - (5)^2$$

$$\therefore a^2 + 2ab + b^2 = (a+b)^2$$

$$\therefore a^2 - b^2 = (a+b)(a-b)$$

$$(a+b-5)(a+b+5)$$

(b) $9x^2 - 6xy + y^2 - 256$

$$(3x)^2 - 3 \times 2 \times xy + (y)^2 - 256$$

$$(3x-y)^2 - 256$$

$$(3x-y)^2 - (16)^2$$

$$(3x-y-16)(3x-y+16)$$

(c) $x^2 - 8b + 16b^2 - 169$

$$(3x-2 \times 4 \times xb + (4b)^2) - 169$$

$$(x-4b)^2 - 169$$

$$(x-4b)^2 - (13)^2$$

$$(x-4b-13)(x-4b+13)$$

(d) $a^2 - 4b^2 - 4ab - 4c^2$

$$a^2 + (2b)^2 - 2 \times 2 \times ab - 4c^2$$

$$(a-2b)^2 - 4c^2$$

$$(a-2b-4c)(a-2b+4c)$$

(e) $4a^2 - ab^2 - 12ab - 81c^2$

$$(2a)^2 + (3b)^2 - 2 \times 2a \times 3b$$

$$- 81c^2$$

$$(2a+3b)^2 - 81c^2$$

$$(2a+3b)^2 - (9c)^2$$

$$(2a+3b-9c)(2a+3b+9c)$$

(f) $t^2 + 2 \times 15st + (12)^2 - 400$

$$(t+12)^2 - 400$$

$$(t+12)^2 - (20)^2$$

$$(t+12-20)(t+12+20)$$

$$(t-2)(t+32)$$

(g) $c^2 - (a^2 - 2ab + b^2)$

$$c^2 - (a-b)^2$$

$$[c+a-b][c+a-b]$$

(h) $25 - [x^2 + y^2 + 2xy]$

$$25 - (x+y)^2$$

$$(5)^2 - (x+y)^2$$

$$(x+y-5)(x+y+5)$$

(i) $x^2 - (y^2 - 2yz + z^2)$

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

$$(x-y+z)(x-y-z)$$

Exercise - 14.4**1. Factorize the following:**

(a) $x^2 + (3+5)x + 15$

$$x^2 + 3x + 5x + 15$$

$$x(x+3) + 5(x+3)$$

$$(x+5)(x+3)$$

(b) Do same as above.

(c) $x^2 + (3+4)x + 12$

$$x^2 + 3x + 4x + 12$$

$$x(x+3) + 4(x+3)$$

$$(x+4)(x+3)$$

$$\begin{aligned} & \text{(d) } x^2 + (8+5)x + 40 \\ & \quad x^2 + 8x + 5x + 40 \\ & \quad x(x+8) + 5(x+8) \\ & \quad (x+5)(x+8) \end{aligned}$$

(e) to (i): Do same as above.

$$\begin{aligned} 2. \text{ (a) } & x^2 - (13+9)x + 117 \\ & \quad x^2 - 13x - 9x + 117 \\ & \quad x(x-13) - 9(x-13) \\ & \quad (x-9)(x-13) \end{aligned}$$

$$\begin{aligned} \text{(b) } & y^2 - (21+2)y + 42 \\ & \quad y^2 - 21y - 2y + 42 \\ & \quad y(y-21) - 2(y-21) \\ & \quad (y-2)(y-21) \end{aligned}$$

$$\begin{aligned} \text{(c) } & x^2 - (7+2)m + 14 \\ & \quad x^2 - 7m - 2m + 14 \\ & \quad x(x-7) - 2(m-7) \\ & \quad (x-7)(x-7) \end{aligned}$$

$$\begin{aligned} \text{(d) } & y^2 - (4+2)y + 8 \\ & \quad y^2 - 4y - 2y + 8 \\ & \quad y(y-4) - 2(y-4) \\ & \quad (y-2)(y-4) \end{aligned}$$

(e) to (i): Do same as above.

$$\begin{aligned} 3. \text{ (a) } & p^2 - (6+4)p - 24 \\ & \quad p^2 - 6p - 4p - 24 \\ & \quad -p(p+6) - 4(p+6) \\ & \quad (-p-4)(p+6) \end{aligned}$$

$$\begin{aligned} \text{(b) } & a^2 - (10+3)a - 30 \\ & \quad a^2 - 10a - 3a - 30 \\ & \quad -a(a+10) - 3(a+10) \\ & \quad (-a-3)(a+10) \end{aligned}$$

$$\begin{aligned} \text{(c) } & a^2 - (6-9)a - 54 \\ & \quad a^2 - 6a + 9a - 54 \\ & \quad a(a-6) + 9(a-6) \\ & \quad (a+9)(a-6) \end{aligned}$$

$$\begin{aligned} \text{(d) } & x^2 + (8-2)x - 16 \\ & \quad x^2 + 8x - 2x - 16 \\ & \quad x(x+8) - 2(x+8) \\ & \quad (x-2)(x+8) \end{aligned}$$

(e) to (i): Do same as above.

5. Solve the following:

$$\text{(a) } \frac{2x^2 + (3+2)x + 3}{(x+1)}$$

$$\begin{aligned} & = \frac{2x^2 + 3x + 2x + 3}{(x+1)} \\ & = \frac{x(2x+3) + 1(2x+3)}{(x+1)} \\ & = \frac{(x+1)(2x+3)}{(x+1)} = (2x+3) \end{aligned}$$

(b) Do same as above.

$$\begin{aligned} \text{(c) } & \frac{6a^2 + 17ab - 3b^2}{(a+3b)} \\ & = \frac{6a^2 + (18-1)ab - 3b^2}{(a+3b)} \\ & = \frac{6a^2 + 18ab - ab - 3b^2}{(a+3b)} \\ & = \frac{6a(a+3b) - b(a+3b)}{(a+3b)} \\ & = \frac{(6a-b)(a+3b)}{(a+3b)} \\ & = (6a-b) \end{aligned}$$

$$\begin{aligned} \text{(d) } & \frac{3m^2 + 13m - 10}{(3m-2)} \\ & = \frac{3m^2 + (10+3)m - 10}{(3m-2)} \\ & = \frac{3m^2 + 10m + 3m - 10}{(3m-2)} \\ & = \frac{m(3m+10) - 1(3m-10)}{(3m-2)} \\ & = \frac{(m-1)(3m+10)}{(3m-2)} \end{aligned}$$

(e) Do same as above.

$$\begin{aligned} & = m+2 \\ \text{(f) } & \frac{a^2 + 10a - 11}{(a+11)} \\ & = \frac{a^2 + (11-1)a - 11}{(a+11)} \\ & = \frac{a^2 + 11a - a - 11}{(a+11)} \end{aligned}$$

$$\begin{aligned}
 &= \frac{a(a+11)-1(a+11)}{(a+11)} \\
 &= \frac{(a-1)(a+11)}{(a+11)} = (a-1) \\
 \text{(g)} \quad &\frac{3x^2+10x+3}{(x+3)} \\
 &= \frac{3x^2+(9+1)x+3}{(x+3)} \\
 &= \frac{3x(x+3)+1(x+3)}{(x+3)} \\
 &= \frac{(3x+1)(x+3)}{(x+3)} \\
 &= (3x+1) \\
 \text{(h)} \quad &\frac{15x^2-16y-15y^2}{5x+3y} \\
 &= \frac{15x^2-(25-9)y-15y^2}{5x+3y} \\
 &= \frac{15x^2-25xy+9y-15y^2}{5x+3y} \\
 &= \frac{5x^2(3x-5y)+3y(3x-5y)}{5x+3y} \\
 &= \frac{(5x+3y)(3x-5y)}{5x+3y} = (3x-5y) \\
 \text{(h)} \quad &\frac{6a^2+17ab-3b^2}{(a+3b)} \\
 &= \frac{6a^2+(18-1)ab-3b^2}{(a+3b)} \\
 &= \frac{6a^2+18ab-ab-3b^2}{(a+3b)} \\
 &= \frac{6a(a+3b)-b(a+3b)}{(a+3b)} \\
 &= \frac{(6a-b)(a+3b)}{(a+3b)} = (6a-b)
 \end{aligned}$$

Multiple Choice Questions:

1. (b) 2. (d) 3. (e) 4. (a) 5. (a)

NCERT CORNER:

1. Monomial 2. Binomial
3. Trinomial
4. $(a-6), (x+6)(5)1$

True and False

- (i) False (ii) False (iii) True
(iv) True (v) False

Chapter - 15

Exercise - 15.1

1. Write the abscissa and ordinate in the following coordinate:

- (a) abscissa = 7, ordinate = 2
(b) abscissa = -5, ordinate = 6
(c) abscissa = 3, ordinate = 0
(d) abscissa = 0, ordinate = 7

2. Write the coordinate of points whose:

- (a) (6, 7) (b) (-7, 2)
(c) $\left(\frac{1}{2}, 0\right)$ (d) $\left(3, -\frac{7}{8}\right)$

3. Do it yourself.

Multiple Choice Question:

1. a 2. c 3. d 4. c 5. a

NCERT CORNER

Fill in the blanks:

1. 1 2. Scientific 3. a $4x^m$
5. x° or 1

True and False

1. True 2. True 3. False 4. False
5. False

Chapter - 16

Exercise - 16.1

1. (a) 1015 - It is not divisible by 2
(b) 1042 - It is divisible by 2
(c) 584 [4] - It is divisible by 2
(d) 987 [5] - It is not divisible by 2
(e) 262 [3] - It is not divisible by 2
(f) 453 [2] - It is divisible by 2
(g) 302 [0] - It is divisible by 2
(h) 660 [0] - It is divisible by 2
(i) 743 [1] - It is not divisible by 2
(j) 418 [7] - It is not divisible by 2
(k) 222 [9] - It is not divisible by 2
(l) 980 [2] - It is not divisible by 2
2. (a) 6270

- $6 + 2 + 7 + 0 = 15$
 It is divisible by 3
 (b) 2467
 $= 2 + 4 + 6 + 7 = 19$
 It is not divisible by 3
 (c) 5436
 $5 + 4 + 3 + 6 = 18$
 It is divisible by 3
 (d) 9006
 $9 + 0 + 0 + 6 = 15$
 It is divisible by 3
 (e) 4329
 $4 + 3 + 2 + 9 = 18$
 It is divisible by 3
 (f) 4562
 $4 + 5 + 6 + 2 = 17$
 It is not divisible by 3
 (g) 2030
 $2 + 0 + 3 + 0 = 5$
 It is not divisible by 3
 (h) to (l): Do same as above.
3. (a) 2015 = 15, No
 (b) 2242 = 42, No
 (c) 5474 = 74, No
 (d) 5613 = 13, No
 (e) 10 [75] = 75, No
 (f) 65 [52] = 52, Yes
 (g) 3020 = 20, Yes
 (h) 6623 = 23, No
 (i) 8431 = 31, No
 (j) 4287 = 87, No
 (k) 2422 = 22, No
 (l) 9302 = 02, No
4. (a) 1015 - 5 Yes (b) 2040 = 0 Yes
 (c) 5684 = 4 No (d) 9775 = 5 Yes
 (e) 5693 = 3 No (f) 4550 = 0 Yes
 (g) 3027 = 7 No (h) 6607 = 7 No
 (i) 7437 = 7 Yes (j) 8180 = 0 Yes
 (k) 2225 = 5 Yes (l) 9800 = 0 Yes
5. (a) 7015 No (b) 3042 Yes
 (c) 5684 No (d) 9875 No
 (e) 5624 No (f) 4582 No
- (g) 3030 Yes (h) 6606 Yes
 (i) 7437 No (j) 4187 No
 (k) 2622 Yes (l) 9802 No
6. (a) $147 = 7 \times 2 = 14$
 $147 - 14 = 133$ Yes
 (b) $2963 = 3 \times 2 = 6$
 $2963 - 6 = 2957$ No
 (c) $3780 = 2 \times 0 = 0$
 $3780 - 0 = 3780$ Yes
 (d) $6587 = 2 \times 7 = 14$
 $6587 - 14 = 6573$ Yes
 (e) $6106 = 6 \times 2 = 12$
 $6106 - 12 = 6094$ No
 (f) $5359 = 9 \times 2 = 18$
 $5359 - 18 = 5341$ No
 (g) $70075 = 5 \times 2 = 10$
 $70075 - 10 = 70065$ No
 (h) $46603 = 3 \times 2 = 6$
 $46603 - 6 = 46597$ No
 (i) $6804 = 4 \times 2 = 8$
 $6804 - 8 = 6796$ Yes
 (j) $14187 = 7 \times 2 = 14$
 $14187 - 14 = 14173$ No
 (k) $12621 = 1 \times 2 = 2$
 $12621 - 2 = 12619$ Yes'
 (l) $29802 = 2 \times 2 = 4$
 $29802 - 4 = 29798$ No
7. (a) 43256 = 256 Yes
 (b) 41840 = 840 Yes
 (c) 87456 = 456 Yes
 (d) 98782 = 782 No
 (e) 35624 = 424 Yes
 (f) 48582 = 582 No
 (g) 87832 = 832 Yes
 (h) 31648 = 648 Yes
 (i) 71344 = 344 Yes
 (j) 54267 = 267 No
 (k) 72622 = 622 No
 (l) 69802 = 802 No
8. (a) 75015
 $7 + 5 + 0 + 1 + 5 = 18$ Yes
 (b) 36042

- $3 + 6 + 0 + 4 + 2 = 15$ No
 (c) 56484
 $5 + 6 + 4 + 8 + 4 = 27$ Yes
 (d) 92875
 $9 + 2 + 8 + 7 + 5 = 31$ No
 (e) 59624
 $5 + 9 + 6 + 2 + 4 = 26$ No
 (f) 48582
 $4 + 8 + 5 + 8 + 2 = 27$ Yes
 (g) 30360
 $3 + 0 + 3 + 6 + 0 = 12$ No
 (h) 62606
 $6 + 2 + 6 + 0 + 6 = 20$ No
 (i) 4500
 $4 + 5 + 0 + 0 = 9$ Yes
 (j) $8 + 5 + 3 + 0 = 14$ No
 (k) 1010
 $1 + 0 + 1 + 0 = 2$ No
 (l) 5470
 $5 + 4 + 7 + 0 = 16$ No

9. (a) Yes (b) No (c) Yes (d) No
 (e) Yes (f) No (g) Yes (h) No
 (i) Yes (j) Yes (k) Yes (l) Yes

10. (a) 5544
 $= 5 + 4 = 9$
 $= 5 + 4 = 9 = 9 - 9 = 0$ Yes
 (b) 3042
 $2 + 0 = 2$
 $4 + 3 = 7 = 7 - 2 = 5$ No
 (c) 6864
 $4 + 8 = 12$
 $6 + 6 = 12 = 12 - 12 = 0$ Yes
 (d) 9875
 $5 + 8 = 13$
 $7 + 9 = 16 = 16 - 13 = 3$ No
 (e) 9933
 $9 + 3 = 12$
 $9 + 3 = 12$
 $= 12 - 12 = 0 = \text{Yes}$
 (f) 10780
 $0 + 7 + 1 = 8$
 $8 + 0 = 8 = 8 - 8 = 0$ Yes
 (g) 33033

- $3 + 0 + 3 = 6$
 $3 + 3 = 6$ $6 - 6 = 0$ Yes
 (h) 66605
 $5 + 6 + 6 = 17$
 $0 + 6 = 6$ $17 - 6 = 11$ No
 (i) 67437
 $6 + 4 + 6 = 17$
 $3 + 7 = 10$ $17 - 10 = 7$ No
 (j) 49187
 $7 + 1 + 4 = 12$
 $8 + 9 = 17$ $17 - 12 = 5$ No
 (k) 21622
 $2 + 6 + 2 = 10$
 $2 + 1 = 3$ $10 - 3 = 7$ No
 (l) 49802
 $2 + 4 + 8 = 14$
 $0 + 9 = 9$ $14 - 9 = 5$ No

11.

No	2	3	4
a	✓	✗	✓
b	✓	✓	✓

Exercise - 16.2

1. (a) $5 + B = 6$ $B = 1$
 $4 + A = 6$ $A = 2$
 (b) $B + 2 = 9$ $B = 7$
 $A + 1 = 9$ $A = 8$
 (c) $B = 7$ $A + 4 = 0$
 $A = -4$ In tens column
 $A = 5$
 (d) $A + 9 = 12$
 $A = 12 - 9$ $A = 3$
 $B = 5$ $C = 4$
 (e) $4 + A = 8$ $A = 4$
 $B + 3 = A$ $B = 1$
 $6 + 2 = 6$ $8 = 6$
 (f) $4 + 3 = A$ $A = 7$
 (g) $3 \times A = A$ $A = 5$
 $7 - 5 = B$ $B = 2$
 (h) $B \times B = 6$ $B^2 = 6$
 $B = 4$
 $254 \times 4 = 1016$ $A = 2$

$$\begin{aligned}(i) (400+10A+5) &= 1000A+975 \\ 2800+70A+35 &= 1000A+975 \\ 28000-975 &= 1000A-70A \\ 1860 &= 930A \quad A = 2\end{aligned}$$

2. (a) 35×64

$$\begin{aligned}3 + 5 + 6 + 4 + x \\ = 18 + x \quad = x = 3\end{aligned}$$

$$\begin{aligned}(b) 9 + 2 + x + 4 \\ = 15 + x \quad = x = 3\end{aligned}$$

$$\begin{aligned}(c) 6 + 2 + x + 5 + 3 \\ = 16 + x \quad = 2\end{aligned}$$

$$\begin{aligned}(d) 1 + 2 + 3 + 4 + x \\ = 10 + x \quad = 2\end{aligned}$$

3. (a) $8 + 5 + x + 6 = 19 + x = 8$

$$\begin{aligned}(b) x + 4 + 7 + 2 \\ = 13 + x = 5\end{aligned}$$

$$(c) 3 + x + 6 + 5 = 14 + x = 4$$

$$(d) 1 + 9 + x + 4 = 14 + x = 4$$

Exercise - 16.3

1.	A	B	7
	C	D	E
	5	F	3

$$13 + D + 5 = 27$$

$$18 + D = 27$$

$$D = 27 - 18 \quad D = 9$$

$$A + 13 + 8 = 27$$

$$A + 21 = 27 \quad A = 6$$

$$8 + 9 + C = 27$$

$$17 + C = 27 \quad C = 10$$

$$10 + 5 + G = 27$$

$$15 + G = 27 \quad G = 12$$

$$12 + F + 8 = 27$$

$$20 + F = 27 \quad F = 7$$

$$6 + 10 + B = 27$$

$$16 + B = 27 \quad B = 11$$

2.	A	B	7
	C	D	E
	5	F	3

$$5 + 3 + 5 = 18$$

$$F = 11 \quad E = 8$$

$$5 + 7 + D = 18 \quad D = 6$$

$$6 + 3 + A = 18$$

$$9 + A = 18 \quad A = 9$$

$$9 + 7 + B = 18$$

$$16 + B = 18 \quad B = 2$$

$$8 + 6 + C = 18$$

$$14 + C = 18 \quad C = 4$$

3.	8	A	B
	C	D	E
	4	F	2

$$4 + 2 + F = 15$$

$$6 + F = 15 \quad F = 9$$

$$8 + 4 + C = 15$$

$$12 + C = 15 \quad C = 3$$

$$8 + 2 + D = 15 \quad D = 5$$

$$9 + 5 + A = 15 \quad A = 1$$

$$1 + 8 + B = 15$$

$$9 + B = 15 \quad B = 6$$

$$6 + 2 + E = 15$$

$$8 + E = 15 \quad E = 7$$

4. (a) $30 + 5 = 35$

$$= 35 + 5$$

$$= 40, 45, 50, 55$$

(b) 3872, 42592, 468512,
5153632, 56689952

(c) Previous + 15 = 100, 115,
130, 145, 160

(d) Previous $\times 2$ = 512, 1024,
2048, 4096, 2192

Multiple Choice Question:

1. b 2. b 3. b 4. a 5. b

NCERT CORNER

Fill in the blanks:

1. b 2. 0 3. 3 4. 0, 2, 4, 6, 8 5. 3

True and False

1. False 2. False 3. True 4. True

5. False