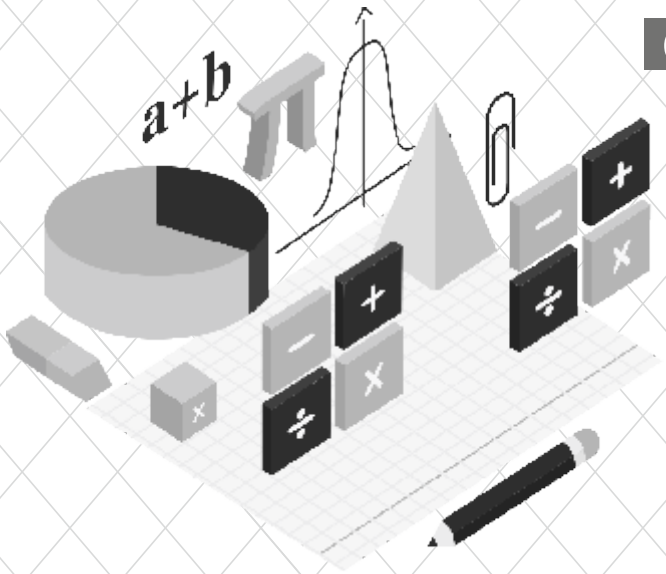
Maths Link

Teacher Manual

Class 8



WOODS
BOOK PUBLISHING

CLASS-8

Chapter-1

A 1. $\left(\frac{-1}{3}\right)^3$ 2. $\left(\frac{9}{11}\right)^2$ 3. $\left(\frac{12}{9}\right)^2$ 4. $\left(\frac{-2}{3}\right)^{15}$

5. $\left(\frac{3}{10}\right)^5$ 6. $(4)^5$ 7. $\left(\frac{11}{5}\right)^4$ 8. $\left(\frac{4}{9}\right)^4$

B 1. $\left(\frac{1^3}{6}\right) = \frac{1}{6\times6\times6} = \frac{1}{216}$ 2. $\left(\frac{1}{-3}\right)^{-2} = (-3)^2 = -3\times-3 = 9$

3. $(-6)^3 = -6\times-6\times-6 = -216$ 4. $\left(\frac{-1}{9}\right)^2 = \frac{-1}{9}\times\frac{-1}{9} = \frac{1}{81}$

5. $\left(\frac{3}{5}\right)^3 = \frac{3\times3\times3}{5\times5\times5} = \frac{27}{125}$ 6. $\left(\frac{-3}{2}\right)^3 = \frac{-3\times-3\times-3}{2\times2\times2} = \frac{-27}{8}$

7. $(-5)^2 = \frac{1}{5}\times\frac{1}{5} = \frac{1}{25}$ 8. $\left(\frac{-3}{8}\right)^2 = \frac{-3\times-3}{8\times8} = \frac{9}{64}$

C 1. $(8^5 \div 8^3)\times 8^{-2}$, $8^2 \times 8^{-2}$, $8^{2+(-2)}$, $8^0 = 1$

2. $x^2 \div x^7 \Rightarrow x^{2-7} \Rightarrow x^{-5}$

3. $(4^{-2})^3 \Rightarrow 4^{-2\times3} \Rightarrow 4^{-6}$

4. $\left(\frac{8}{9}\right)^{-1} \Rightarrow, \left(\frac{9}{8}\right)^1$

5. $\left[\left(\frac{-3}{2}\right)^2\right]^{-1} = \left(\frac{-3}{2}\right)^{2\times-1} = \left(\frac{-3}{2}\right)^{-2} = \left(\frac{-2}{3}\right)^2 = \frac{4}{9}$

6. $= (-2)^{+5} \div (-2)^{-2} = -2^{5-(-2)} = -2^7$

D 1. $3^4 \times 2^2 = 81\times4 = 324 = (18)^2$

2. $\left(\frac{1}{8}\right)^{-7} \times \left(\frac{1}{8}\right)^5 = \left(\frac{1}{8}\right)^{-7+5} = \left(\frac{1}{8}\right)^{-2} = (8)^2$

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

4. $\left(\frac{9}{4}\right)^{-2} \times \left(\frac{-3}{2}\right)^{3} = \frac{[(3)^2]^{-2}}{[(2)^2]^{-2}} \times \frac{(-3)^3}{(2)^3} = \frac{(-3)^{-4+3}}{2^{-4+3}} = \left(\frac{-3}{2}\right)^{-1} = \left(\frac{-2}{3}\right)^{1}$

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

6. $\left(\frac{-5}{9}\right)^{-3} \times \left(\frac{-5}{9}\right)^{2} \times \left(\frac{-5}{9}\right)^{1} = \left(\frac{-5}{9}\right)^{-3+2+1} = \left(\frac{-5}{9}\right)^{0} = 1$

E 1. $5^{-2} \times 5^{1} = \frac{1}{25} \times 5 = \frac{1}{5}$

2. $7^{-1} \times 7^{2} = 7^{-1+2} = 7^{1}$

3. $[(5^{-1} \times 3^{-1})^{-1} \div 6^{-1}]^2 = \left[\left(\frac{1}{5} \times \frac{1}{3}\right)^{-1} \div \frac{1}{6}\right]^2 = \left(15 \div \frac{1}{6}\right)^2$

$= (15 \times 6)^2 = (90)^2 = 8100$

4. $\left(\frac{2}{3}\right)^{3} \times \left(\frac{1}{2}\right)^{-2} \times 4^{3} \times \left(\frac{1}{6}\right)^{-1} = \frac{8}{27} \times (2)^2 \times 64 \times 6$

$= \frac{8}{27} \times 4 \times 64 \times 6 \Rightarrow \frac{4096}{9} = \frac{8^4}{3^2}$

5. $\left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{3}\right)^{-2} + \left(\frac{1}{4}\right)^{-2} = (2)^2 + (3)^2 + (4)^2 = 4 + 9 + 16 = 29$

6. $\left[\left(\frac{-1}{3}\right)^{-3} - \left(\frac{1}{2}\right)^{-2}\right] \div \left(\frac{1}{4}\right)^{2} = [(-3)^3 - (2)^2] \div 4^{-2} = [-27 - 4] \div 4^{-2}$

$= -31 \div \frac{1}{16} = -31 \times 16 = -496$

7. $8^{-3} \times 4^{4} \times 7^{0} \times 6^{2} = \frac{1}{8^3} \times 4^{4} \times 1 \times 36 = \frac{36}{2} = 18$

8. $2^{-5} \times 3^{0} \times 4^{2} \times 10^{3} \times 5^{-2} = 2^{-5} \times 1 \times [(2)^2]^2 \times 5^{3} \times 2^{3} \times 5^{-2}$

$= 2^{-5} \times 2^{4} \times 2^{3} \times 5^{3} \times 5^{-2} = 2^{2} \times 5^{1} = 4 \times 5 = 20$

9. $4 \times \left(\frac{-1}{2}\right)^{5} \times \left(\frac{-1}{2}\right)^{-3} = 4 \times (-2)^{-5} \times (-2)^{+3} = (2)^2 \times (-2)^{-5} \times (-2)^3$

$= 2^2 \times (-2)^{-2}, 2 = 1$

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

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

2. $\left(\frac{8}{9}\right)^{3} \times \left(\frac{8}{9}\right)^{-6} = \left(\frac{8}{9}\right)^{2x-1} = 3 + (-6) = 2x - 1 = 3 - 6 = 2x - 1$

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

3. $\left(\frac{-2}{3}\right)^{4} \div \left(\frac{-2}{3}\right)^{3} = \left(\frac{-3}{2}\right)^{x} = \left(\frac{-3}{2}\right)^{-4} \div \left(\frac{-3}{2}\right)^{-3} = \left(\frac{-3}{2}\right)^{x}$

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

4. $\left(\frac{18}{23}\right)^{4} \times \left(\frac{18}{23}\right)^{-5} = \left(\frac{18}{23}\right)^{2x+1} = \left(\frac{18}{23}\right)^{4-5} = \left(\frac{18}{23}\right)^{2x+1}$

$= \left(\frac{18}{23}\right)^{-1} = \left(\frac{18}{23}\right)^{2x+1} = 2x + 1 = -1 = 2x = -1 - 1$

$2x = -2, x = -1$

5. $\left(\frac{2}{3}\right)^{-4} \times \left(\frac{2}{3}\right)^{18} = \left(\frac{2}{3}\right)^{10x} = \left(\frac{2}{3}\right)^{-4+18} = \left(\frac{2}{3}\right)^{10x}$

$= 14 = 10x = \frac{14}{10} = x = \frac{7}{5} = x$

6. $3^{2x+1} \div 9 = 27 \Rightarrow 3^{2x+1} \div 3^{2} = 3^{3} \Rightarrow 3^{2x+1-2} = 3^{3} \Rightarrow 2x - 1 = 3$

$2x = 4 \Rightarrow x = 2$

7. $(2 \times 2)^{x} = 2^{8} \Rightarrow (2^{2})^{x} = 2^{8} \Rightarrow 2^{2x} = 2^{8} \Rightarrow 2x = 8$

$\Rightarrow \quad x = 4$

8. $(-5)^{4} \div (-5)^{2} = 5^{x}$ $\qquad$ $(-5)^{4-2} = 5^{x}$

$-5x - 5 = (5)^{x}$ $\qquad$ $25 = (5)^{x}$

$5^{2} = (5)^{x}$

$x = 2$

9. $(5 \times 17)^{3} = 5^{x-2} \times 17^{x-2} \Rightarrow (5 \times 17)^{3} = (5 \times 17)^{x-2}$

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

G 1. $(2^{-3})^{2} = (2)^{-6}$ $\qquad$ 2. $= \left(\frac{1}{7}\right)^{5} = (7)^{-5}$

3. $5^{2} \times 5^{3} = (5)^{5} = \left(\frac{1}{5}\right)^{-5}$ $\qquad$ 4. $\left(\frac{10}{69}\right)^{10} = \left(\frac{69}{10}\right)^{-10}$

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

H 1. True $\qquad$ 2. False $\qquad$ 3. False $\qquad$ 4. True

I 1. $5^{3x} = \frac{1}{125} \Rightarrow 5^{3x} = \frac{1}{(5)^3} \Rightarrow 5^{3x} = 5^{-3} \Rightarrow 3x = -3 \Rightarrow x = -1$

2. $5^{x-1} = 5^0 \Rightarrow x - 1 = 0 \Rightarrow x = 1$

A 1. $6\times10^8 + 0\times10^7 + 2\times10^6 + 0\times10^5 + 0\times10^4 + 0\times10^3 + 0\times10^2 + 0\times10^1 + 0\times10^0$

2. $4\times10^1 + 2\times10^0 + 3\times10^{-1} + 0\times10^{-2} + 5\times10^{-3} + 0\times10^{-4} + 0\times10^{-5}$

3. $0\times10^0 + 0\times10^{-1} + 0\times10^{-2} + 0\times10^{-3} + 0\times10^{-4} + 0\times10^{-5} + 0\times10^{-6} \times 0\times10^{-7} + 8\times10^{-8} + 5\times10^{-9}$

4. $3\times10^5 + 0\times10^4 + 0\times10^3 + 0\times10^2 + 0\times10^1 + 0\times10^0$

B 1. 123.4 2. 5800000000000 3. 0.00000302

4. 904000.05807 5. 630.36 6. 3614920

C 1. 9.285×10^{-7} 2. 3.0303×10^{-2} 3. 2.592×10^3

4. 5.0×10^7 5. 2.568×10^{13} 6. 1.00081×10^0

7. 8.75×10^{-4} 8. 1.173098×10^1 g

D Speed of light in 1 sec $= 30\times10^4$ km

Speed of light in 60 sec $= 30\times10^4 \times 60 = 1.8\times10^7$ km/min

E $6.54\times10^7 + 189.5\times10^{10}$ $0.00654\times10^{10} + 189.5\times10^{10}$

$10^{10}(0.00654 + 189.5)$ 189.50654×10^{10}

1.8950654×10^{12}

F $\frac{13.31\times10^{10}}{1.21\times10^{15}}$ $\frac{1331}{121} \times \frac{10^{12}}{10^{17}}$

11×10^{-5} 1.1×10^{-4}

G 1 day = 24 hours

24 hours $= 24\times60\times60$ seconds $= 24\times3600 = 86400$ seconds

So, 1 day = 86400 seconds

1000 days $= 864\times10^5$ seconds $= 8.64\times10^7$ seconds

A 1. 3.46×10^{-8} 2. 4.56×10^{13} 3. 1.21×10^{-11} 4. 9.86×10^{14}

B 1. 0.0045 2. 0.00000302 3. 0.00000003

4. 677685000

C 1. 1.275×10^{-5} m 2. 7×10^{-2}mn 3. 1×10^{-6} m 4. 1.6×10^{-19} c

D 1. $(4.578\times10^{14}) + (2.3\times10^{22})$

$= (4.578 \times 10^{14}) + (2300000000) \times 10^{14}$

$= 10^{14} \times (4.578 + 2300000000) = 10^{14} \times (2300000004.568)$

$= 2.3000000004568 \times 10^{22}$

2. $(3.8 \times 10^7) + (4.6 \times 10^8) = (3.8 \times 10^7) + (46 \times 10^7)$

$= 10^7 \times (3.8 + 46) = 49.8 \times 10^7 = 4.98 \times 10^8$

3. $(7.7 \times 10^5) \times (3 \times 10^8) = 7.7 \times 3 \times 10^{13} = 23.1 \times 10^{13} = 2.31 \times 10^{14}$

4. $(7.89 \times 10^5) - (5.5 \times 10^4) = (78.9 \times 10^4) - (5.5 \times 10^4)$

$= (78.9 - 5.5) \times 10^4 = 75.4 \times 10^4 = 7.34 \times 10^5$

E 1. $0.00005 = 5 \times 10^x \Rightarrow 5 \times 10^{-5} = 5 \times 10^x \Rightarrow 10^{-5} = 10^x$

$x = -5$

2. $0.00000067 = 6.7 \times 10^x \Rightarrow 6.7 \times 10^{-7} = 6.7 \times 10^x \Rightarrow 10^{-7} = 10$

$x = -7$

3. $3.45 \times 10^{13} = 3.45 \times 10^x \Rightarrow 10^{13} = 10^x \Rightarrow 13 = x$

F 1. $\sqrt[4]{81} = (81)^{\frac{1}{4}}$ $(3)^{4 \times \frac{1}{4}} = 3^1 = 3$

2. $\sqrt[3]{-64}$ $[(-4)^3]^{\frac{1}{3}}$ $(-4)^{3 \times \frac{1}{3}}$

-4

3. $\sqrt[3]{48} = 2\sqrt[3]{6}$

4. $\sqrt[2]{0} = 0$

A 1. $\frac{-5}{8}$ 2. $\frac{5}{9}$ 3. $\frac{19}{20}$ 4. $\frac{15}{37}$

B 1. Additive Inverse 2. Identity Property

3. Commutative Property 4. Closure Property

5. Associative Property

C 1. $[-(-x)] = x - \left(\frac{-11}{3}\right)$

$\frac{11}{3} = x$ **Hence Verified**

2. $-\left(\frac{-7}{11}\right) = \frac{+7}{11}$

$x = \frac{7}{11}$ **Hence Verified**

D 1. $\frac{-5}{9}+\frac{8}{9}, \frac{-5+8}{9}=\frac{3}{9}$

$\frac{1}{3}$ is also a rational number

2. $\frac{-19}{18}+\left(\frac{-11}{12}\right), \frac{-19}{18}-\frac{11}{12}$

$\frac{-38-33}{36}=\frac{-5}{36}$ is a rational number.

E $x=\frac{-3}{5}$ and $y=\frac{-7}{10}=x+y,\ \frac{-3}{5}+\left(\frac{-7}{10}\right)$

$\frac{-3}{5}-\frac{7}{10}=\frac{-30-35}{50}=\frac{-65}{50}$

$y+x=\frac{-7}{10}+\left(\frac{-3}{5}\right)=\frac{-7}{10}-\frac{3}{5}=\frac{-35-30}{50}=\frac{-65}{50}$

L.H.S = R.H.S **Hence Proved**

2. $x+y$

$\frac{6}{7}+\left(\frac{-11}{14}\right)=\frac{6}{7}-\frac{11}{14}=\frac{12-11}{14}=\frac{1}{14}=y+x$

$\frac{-11}{14}+\frac{6}{7}=\frac{-11+12}{14}=\frac{1}{14}$

L.H.S = R.H.S **Hence Proved**

F 1. $x-y=\frac{-3}{2}-\frac{4}{5}=\frac{-15-8}{10}=\frac{-23}{10}$

$\Rightarrow y-x \quad \Rightarrow \quad \frac{4}{5}-\left(\frac{-3}{2}\right) \Rightarrow \frac{4}{5}+\frac{3}{2} \Rightarrow \frac{8+15}{10}=\frac{23}{10}$

L.H.S ≠ R.H.S

$x-y \neq y-x$

2. $x-y \Rightarrow \frac{5}{7}-\left(\frac{-8}{21}\right) \quad \Rightarrow \frac{5}{7}+\frac{8}{21} \quad \Rightarrow \frac{15+8}{21}=\frac{23}{21}, y-x$

$\Rightarrow \frac{-8}{21}\frac{-5}{7} \quad \Rightarrow \frac{-8-15}{21} \quad \Rightarrow \frac{-23}{21}$

$x-y \neq y-x$

G To prove $\left(\frac{-2}{3}+\frac{5}{4}\right)+\frac{7}{12}=\frac{-2}{3}+\left(\frac{5}{4}+\frac{7}{12}\right)$

L.H.S $\frac{-8+15}{12}+\frac{7}{12} \Rightarrow \frac{7}{12}+\frac{7}{12} \Rightarrow \frac{14}{12}$

R.H.S $\frac{-2}{3}+\left(\frac{15+7}{12}\right) \Rightarrow \frac{-2}{3}+\frac{22}{12} \Rightarrow \frac{-8+22}{12}=\frac{14}{12}$

L.H.S = R.H.S **Hence Proved**

2. $\left(\frac{3}{5}+\frac{3}{10}\right)+\frac{7}{15}=\frac{3}{5}+\left(\frac{3}{10}+\frac{7}{15}\right)$

L.H.S $\left(\frac{6+3}{10}\right)+\frac{7}{15}, \frac{9}{10}+\frac{7}{15}=\frac{27+14}{30}=\frac{41}{30}$

R.H.S $\frac{3}{5}+\left(\frac{9+14}{30}\right)=\frac{3}{5}+\frac{23}{30}=\frac{18+23}{30}=\frac{41}{30}$

L.H.S = R.H.S

H 1. $\frac{3}{7}+\frac{-5}{11}+\frac{-5}{14}+\frac{3}{11}=\left(\frac{-5}{11}+\frac{3}{11}\right)+\left(\frac{3}{7}+\frac{-5}{14}\right)=\frac{-2}{11}+\left(\frac{6-5}{14}\right)$

$\frac{-2}{11}+\frac{1}{14}=\frac{-28+11}{154}=\frac{-17}{154}$

2. $-5+\frac{3}{10}+\frac{3}{7}+(-3)+\frac{+5}{14}+\frac{7}{20}$

$=[-5+(-3)]+\left(\frac{3}{10}+\frac{7}{20}\right)+\left(\frac{3}{7}+\frac{5}{14}\right)=-8+\left(\frac{6+7}{20}\right)+\left(\frac{6+5}{14}\right)$

$=-8+\frac{13}{20}+\frac{11}{14}=\frac{-1120+91+110}{140}=\frac{-919}{140}$

I To prove $=-\left(\frac{-9}{11}\right)+x\left(\frac{-5}{7}\right)=-\left(\frac{-9}{11}+\frac{5}{7}\right)$

L.H.S $\frac{9}{11}-\frac{5}{7}=\frac{63-5}{77}=\frac{58}{77}$

R.H.S $\frac{9}{11}-\frac{5}{7}=\frac{63-5}{77}=\frac{58}{7}$

L.H.S = R.H.S **Hence Verified**

J To Prove $\left(\frac{2}{3}-\frac{13}{21}\right)\frac{-5}{7} \neq \frac{2}{3}-\left(\frac{13}{21}-\frac{5}{7}\right)$

L.H.S. $\frac{14-13}{21}-\frac{5}{7}=\frac{1}{21}-\frac{5}{7}=\frac{1-15}{21}=\frac{-14}{21}$

R.H.S $=\frac{2}{3}-\left(\frac{13-15}{21}\right)=\frac{2}{3}-\left(\frac{-2}{21}\right)=\frac{2}{3}+\frac{2}{21}$

$\frac{14+2}{21}=\frac{16}{21}$

L.H.S $\neq$ R.H.S **Hence Proved**

A 1. $\frac{1}{-1} = -1$ 2. $5 = \frac{1}{5}$ 3. $-2 \times \frac{-3}{5} = \frac{6}{5} = \frac{5}{6}$

4. $\frac{-5}{8} \times \frac{16}{15} = \frac{-2}{3} = \frac{-3}{2}$

B 1. Distributive Property 2. Multiplicative Property

3. Commutative Property 4. Associative Property

5. Multiplicative Property

C 1. $\frac{-3}{5} \times \frac{11}{13} = \frac{33}{65} = \frac{-11}{13} \times \frac{-3}{5} = \frac{33}{65}$ Hence $\frac{-3}{5} \times \frac{-11}{13} = \frac{-11}{13} \times \frac{-3}{5}$

2. $2 \times \frac{2}{7} = \frac{2}{7} \times 2 = \frac{4}{7} = \frac{4}{7}$ Hence $2 \times \frac{2}{7} = \frac{2}{7} \times 2$

D 1. $x \div y \neq y \div x$

$\frac{2}{5} \div \frac{26}{15}$ $\frac{26}{15} \div \frac{2}{5}$

$\frac{2}{5} \times \frac{15}{26}$ $\frac{26}{15} \times \frac{5}{2}$

$\frac{3}{13}$ $\frac{13}{3}$

Hence $\frac{2}{5} \div \frac{26}{15} \neq \frac{26}{15} \div \frac{2}{5}$

2. $\frac{40}{99} \div 20$ $20 \div \frac{40}{99}$

$\frac{40}{99} \times \frac{1}{20}$ $20 \times \frac{99}{40}$

$\frac{2}{99}$ $\frac{99}{2}$

Hence $\frac{40}{99} \div 20 \neq 20 \div \frac{40}{99}$

E 1. $x \times (y \times z) = (x \times y) \times z$

L.H.S $\frac{1}{2} \times \left(\frac{5}{4} \times \frac{-7}{5}\right) = \frac{1}{2} \times \left(\frac{-35}{20}\right) = \frac{-35}{40}$

R.H.S $= \left(\frac{1}{2} \times \frac{5}{4}\right) \times \frac{-7}{5} = \frac{5}{8} \times \frac{-7}{5} = \frac{-35}{40}$

L.H.S = R.H.S **Hence Verified**

2. L.H.S $\left[\left(\left(\frac{-5}{7}\right) \times \frac{5}{2}\right) \times \frac{7}{5}\right] = \left(\frac{-25}{14}\right) \times \frac{7}{5} = \frac{-5}{2}$

R.H.S $\left[\frac{-5}{7}\times\left(\frac{5}{2}\times\frac{7}{5}\right)\right]=\frac{-5}{7}\times\frac{35}{10}=\frac{-5}{2}$

L.H.S = R.H.S Hence Proved

F 1. L.H.S $x\times(y+z)=\frac{-8}{3}\times\left(\frac{5}{6}+\frac{-7}{12}\right)=\frac{-8}{3}\times\left(\frac{5}{6}-\frac{7}{12}\right)$

$=\frac{-8}{3}\left(\frac{10-7}{12}\right)=\frac{-8}{3}\times\frac{3}{12}=\frac{-2}{3}$

R.H.S $(x\times y)+(y\times z)$

$=\left(\frac{-8}{3}\times\frac{5}{6}\right)+\left(\frac{-8}{3}\times\frac{-7}{12}\right)=\frac{40}{18}+\frac{-56}{36}=\frac{-80+56}{36}=\frac{-24}{36}=\frac{-2}{3}$

L.H.S = R.H.S. **Hence Proved**

2. L.H.S $=\frac{-3}{4}\times\left(\frac{-15}{4}+\frac{8}{12}\right)=\frac{-3}{4}\times\left(\frac{-45+8}{12}\right)=\frac{-3}{4}\times\frac{-37}{12}=\frac{+37}{16}$

R.H.S $\left(\frac{-3}{4}\times\frac{-15}{4}\right)+\left(\frac{-3}{4}\times\frac{8}{12}\right)=\frac{+45}{16}+\frac{-24}{48}=\frac{135-24}{48}$

$\frac{111}{48}=\frac{37}{16}$

L.H.S = R.H.S

G 1. $\left(\frac{2}{7}\times\frac{7}{16}\right)+\left(\frac{2}{7}\times\frac{21^{1}}{4}\right)=\frac{1}{8}+\frac{3}{2}=\frac{2+24}{16}=\frac{26}{16}=\frac{13}{8}$

2. $\left(\frac{-5}{4}\times\frac{8}{5}\right)+\frac{-5}{4}\times\frac{16}{5}=-2+(-4)=-2-4=-6$

I 1. $\frac{-3}{5}\times\frac{-10}{9}\times\frac{21}{-4}\times-6=21$

2. $\frac{3}{11}\times\frac{-5}{6}\times\frac{22}{9}\times\frac{-9}{5}=-1$

H 1. $\frac{2}{7}+\frac{4}{3}$ $\qquad$ $\frac{2}{7}-\frac{4}{3}$

$\frac{6+28}{21}=\frac{34}{21}$ $\qquad$ $\frac{6-28}{21}=\frac{22}{21}$

$\frac{34}{21}\div\frac{22}{21}$ $\qquad$ $\frac{34}{21}\times\frac{21}{-22}=\frac{34}{-22}-\frac{17}{11}$

2. $\frac{5}{4}+\frac{3}{2},\ \frac{5}{4}-\frac{3}{2},\ \frac{5+6}{4}=\frac{11}{4},\ \frac{5-6}{4}=\frac{-1}{4}=\frac{11}{4}\div\frac{-1}{4}$

$\frac{11}{4}\times-4=-11$

A 1. (a) 2. (a) 3. (a) 4. (b)

B

1. False	2. True	3. False	4. True
5. False	6. False	7. True	8. True
9. False	10. True	11. True	12. False
13. True	14. False	15. False	16. False
17. False	18. False	19. True	20. True

C 1. $\sqrt[4]{625} - \sqrt[4]{256} = [(5)^{\frac{1}{4}}]^4 - [(4)^4]^{\frac{1}{4}} = 5 - 4 = 1$

2. $\sqrt[3]{64} + \sqrt[3]{1} = [(4)^3]^{\frac{1}{3}} + [(1)^3]^{\frac{1}{3}} = 4 + 1 = 5$

D 1. $9\times 10^4 + 8\times 10^3 + 7\times 10^2 + 6\times 10^1 + 5\times 10^0 + 8\times 10^{-1}$
$+2\times 10^{-2} + 0\times 10^{-3} + 6\times 10^{-4} + 0\times 10^{-5} + 9\times 10^{-6} + 2\times 10^{-7}$

2. $0\times 10^0 + 0\times 10^{-1} + 0\times 10^{-2} + 0\times 10^{-3} + 0\times 10^{-4} + 0\times 10^{-5}$
$+0\times 10^{-6} + 0\times 10^{-7} + 4\times 10^{-8} + 1\times 10^{-9} + 6\times 10^{-10}$

E

1. 906050.7008	2. 6501.034
3. 100001	4. 0.068250082
5. 0.00009	6. 56.5400

F

1. 1.2756×10^7 **m**	2. 5.8×10^7 km
3. 3.844×10^5 k**m**	4. 1×10^5 right years

Chapter 2
Square and Square roots

A

1. $25\times 25 = 625$	2. $41\times 41 = 1681$
3. $17\times 17 = 289$	4. $3000\times 3000 = 9000000$
5. $110\times 110 = 12100$	6. $90\times 90 = 8100$
7. $20\times 20 = 400$	8. $35\times 35 = 1225$

B

1. No	2. No	3. No	4. No
5. No	6. No	7. No	8. No
9. Yes	10. No	11. Yes	12. No

C $25 = 1 + 3 + 5 + 7 + 9$

$16 = 1 + 3 + 5 + 7$

$81 = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17$

D 1. 9 2. 6 3. 6 4. 4
5. 1 6. 1 7. 4 8. 1 9. 5 10. 9 11. 6
12. 0

C 1. 25 2. 81

F 1. 343
So, $343 = 7 \times 7 \times 7$
It should be multiplied with 7 to be a perfect square.
2. $11250 \Rightarrow 11250 = 2 \times 5 \times 50 + 5 \times 5 \times 3 \times 3$
2 is not paired. So it should be multiplied with 2 to make it a perfect square.
3. $4851 \Rightarrow 4851 = 3 \times 3 \times 7 \times 7 \times 11$
11 is not paired. This numbers is not a perfect square. It should be multiplied with 11 to make it a perfect square.
4. 6561. This is a perfect square of 81.
5. $3200 \Rightarrow 3200 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5$
It should be multiplied with 2 to make it a perfect square.
6. $576 = 3 \times 3 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$
This is a perfect square of 24
7. $117600 = 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 3 \times 7 \times 7$
This number should be multiplied with 6 to get a perfect square as 2 and 3 are not paired.
8. $605 \Rightarrow 605 = 5 \times 11 \times 11$
It should be multiplied with 5 to be a perfect square.
9. $1568 \Rightarrow 1568 = 2 \times 2 \times 2 \times 2 \times 7 \times 7$
It is not a perfect square. it should be multiplied with 2.
10. $54900 \Rightarrow 54900 = 2 \times 2 \times 5 \times 5 \times 3 \times 3 \times 61$
It is not perfect square. It should be multiplied with 61.
11. $175 \Rightarrow 175 = 5 \times 5 \times 7$
It is not a perfect square. It should be multiplied with 7 to be a perfect square.
12. $22050 \Rightarrow 22050 = 5 \times 5 \times 2 \times 7 \times 7 \times 3 \times 3$
This is not a perfect square it should be multiplied with 2.

G 1. 22, 120, 122
Let $m = 11$
$2m = 2 \times 11 = 22$
$m^2 + 1 = (11)^2 + 1 = 121 + 1 = 122$
$m^2 - 1 = (11)^2 - 1 = 121 - 1 = 120$

2. 20, 98, 101

Let $\quad m = 10 \Rightarrow 2m = 2 \times 10 = 20$

$m^2 + 1 = (10)^2 + 1 = 100 + 1 = 101$

$m^2 - 1 = (10)^2 - 1 = 100 - 1 = 99$

So, (20, 98, 101) is not a pythagoras triplet

3. (14, 48, 50)

Let $\quad m = 7 \Rightarrow 2m = 2 \times 7 = 14$

$m^2 + 1 = (7)^2 + 1 = 49 + 1 = 50$

$m^2 - 1 = (7)^2 - 1 = 49 - 1 = 48$

Hence, (14, 48, 50) is a pythagoras triplet.

H 1. Even 2. Even 3. Odd

Squares of even numbers is always even and squares of odd number is always odd.

1. $144 - 1 = 143$ $\quad 143 - 3 = 140$

$140 - 5 = 135$ $\quad 135 - 7 = 128$

$128 - 9 = 119$ $\quad 119 - 11 = 108$

$108 - 13 = 95$ $\quad 95 - 15 = 80$

$80 - 17 = 63$ $\quad 63 - 19 = 44$

$44 - 21 = 23$ $\quad 23 - 23 = 0$

Total no. of subtraction is 12 so $\sqrt{144} = 12$

2. $36 - 1 = 35$ $\quad 35 - 3 = 32$

$32 - 5 = 27$ $\quad 27 - 7 = 20$

$20 - 9 = 11$ $\quad 11 - 11 = 0$

No. of repeated subtraction is 6 so $\sqrt{36} = 6$

3. 169

$169 - 1 = 168$ $\quad 168 - 3 = 165$

$165 - 5 = 160$ $\quad 160 - 7 = 153$

$153 - 9 = 144$ $\quad 144 - 11 = 133$

$133 - 13 = 120$ $\quad 120 - 15 = 105$

$105 - 17 = 88$ $\quad 88 - 19 = 69$

$69 - 21 = 48$ $\quad 48 - 23 = 25$

$25 - 25 = 0$

No. of repeated subtraction is 13 so $\sqrt{169} = 13$

4. 121

$121 - 1 = 120$ $\quad 120 - 3 = 117$

$105 - 9 = 96$ $95 - 11 = 85$

$85 - 13 = 72$ $72 - 15 = 57$

$57 - 17 = 40$ $40 - 19 = 21$

$21 - 21 = 0$

No. of repeated subtraction is 11 so $\sqrt{121} = 11$

B 1. $4356 \Rightarrow 4356 = 2\times 2\times 3\times 3\times 11\times 11$

$\sqrt{4356} = 2\times 3\times 11 \Rightarrow \sqrt{4356} = 66$

2. $7744 \Rightarrow 7744 = 2\times 2\times 2\times 2\times 2\times 2\times 11\times 11$

$\sqrt{7744} = 2\times 2\times 2\times 11 \Rightarrow \sqrt{7744} = 88$

3. $7056 \Rightarrow 7056 = 2\times 2\times 2\times 2\times 3\times 3\times 7\times 7$

$\sqrt{7056} = 2\times 2\times 3\times 7 \Rightarrow \sqrt{7056} = 84$

4. $10000 \Rightarrow 10000 = 2\times 2\times 2\times 2\times 5\times 5\times 5\times 5$

$\sqrt{10000} = 2\times 2\times 5\times 5 \Rightarrow \sqrt{10000} = 100$

5. $3969 \Rightarrow 3969 = 3\times 3\times 3\times 3\times 7\times 7$

$\sqrt{3969} = 3\times 3\times 7 \Rightarrow \sqrt{3969} = 63$

6. $1764 \Rightarrow 1764 = 2\times 2\times 3\times 3\times 7\times 7 = \sqrt{1764} = 2\times 3\times 7 = 42$

7. $5184 \Rightarrow 5184 = 2\times 2\times 2\times 2\times 2\times 2\times 3\times 3\times 3\times 3$

$\sqrt{5184} = 2\times 2\times 2\times 3\times 3 \Rightarrow \sqrt{5184} = 72$

8. $17424 \Rightarrow 17424 = 2\times 2\times 2\times 2\times 3\times 3\times 11\times 11$

$\sqrt{17424} = 2\times 2\times 3\times 11 \Rightarrow \sqrt{17424} = 132$

C 1. $\sqrt{423801} = 651$ 2. $92416 \Rightarrow \sqrt{92416} = 304$

3. $49284 \Rightarrow \sqrt{49284} = 222$ 4. $3969 \Rightarrow \sqrt{3969} = 63$

5. $119025 \Rightarrow \sqrt{119025} = 345$ 6. $2116 \Rightarrow \sqrt{2116} = 46$

7. $193600 \Rightarrow \sqrt{193600} = 440$ 8. $8281 \Rightarrow \sqrt{8281} = 91$

D 1. 4515635

Ans. it should be subtracted with 10.

2. ***Ans.*** It should be subtracted with 1449.
3. ***Ans.*** It should be subtracted with 4.
4. ***Ans.*** It should be subtracted with 1.
5. ***Ans.*** It should be subtracted with 143.
6. ***Ans.*** It should be subtracted with 6.
7. ***Ans.*** It should be subtracted with 6.
8. ***Ans.*** It should be subtracted with 50.

E 1. 26800

Now $(164)^2 = 26896$, $26896 - 26800 = 96$

So, 96 should be added to 26800 to make it a perfect square.

2. $54280 \Rightarrow (233)^2 = 54289 \Rightarrow 54289 - 54280 = 9$
   9 should be added to 54280 to make it a perfect square.
3. $8226900 \Rightarrow (2869)^2 = 8231161 \Rightarrow 8231161 - 8226900 = 4261$
   4261 should be added to 8226900 to get a perfect square.

F 1. $42, 12, 36 \Rightarrow 2\times 2\times 2\times 2\times 3\times 3 = 144 \Rightarrow \sqrt{144} = 12$

2. $25, 18, 15 \Rightarrow 5\times 3\times 5\times 3\times 2 = 450$
   450 is not a perfect square.
   So, $450\times 2 = 900 \Rightarrow \sqrt{900} = 30$
   900 is required perfect square.
3. $9, 10, 11 \Rightarrow 3\times 3\times 2\times 5\times 11 = 990$
   It is not a perfect square.
   $$990\times 110 = 108900 \Rightarrow \sqrt{108900} = 330$$
   108900 is required perfect square

G 1. $1772.41 \Rightarrow \sqrt{1772.41} = 42.1$

2. $4637.61 \Rightarrow \sqrt{4637.61} = 68.1$
3. $82.81 \Rightarrow \sqrt{82.81} = 9.1$
4. $268.96 \Rightarrow \sqrt{268.96} = 16.4$
5. $46.24 \Rightarrow \sqrt{46.24} = 6.8$

H 1. $(154)^2 = 23716 \Rightarrow 23716 - 23471 = 245$
   245 should be added to 23471 to get a perfect square.

I $(25)^2 = 625 \Rightarrow 625 - 600 = 25$
Ans. 25 must be added to 600 to get a perfect square.
$\sqrt{625} = 25$

J $(317)^2 = 100489$
100489 is the least 6 digit perfect square of 317.

Chapter Checkup

A	1. (b)	2. (b)	3. (c)	4. (b)	5. (b)
B	1. False	2. True	3. True	4. False	
	5. True	6. False	7. True	8. False	
	9. False	10. True	11. True	12. True	
C	1. 496	2. 10000	3. 252	4. odd	

D No. of students in the class are 64.

E Area of square playground = side × side
$1024 m^2 = (side)^2 \Rightarrow \sqrt{1024} = side$
Side of the square playground is 32 m.

F $(317)^2 = 100489$

G According to pythagoras theorem

$(H)^2 = (P)^2 + (B)^2 = (12)^2 + (5)^2 = 144 + 25 = 169$

$H = \sqrt{169} = 13$ m

H $(316)^2 = 99856$

99856 is greatest 5 digit number which is a perfect square.

I $2 \times 2 \times 2 \times 5 \times 3$

120 We have to make pairs of 2, 5 and 3.

120 is not a perfect square to make it a perfect square it should be multiplied with 30.

$120 \times 30 = 3600 \Rightarrow \sqrt{3600} = 60$

J 1. 18 2. 25 3. 77 4. 136

K 1. $\sqrt{361} = 19$ 2. $\sqrt{7921} = 89$

3. $\sqrt{60025} = 245$ 4. $\sqrt{480249} = 693$

L 1. $\sqrt{7.29} = 2.7$ 2. $\sqrt{84.821} = 9.21$

3. $\sqrt{0.008281} = 0.091$ 4. $\sqrt{0.053361} = 0.231$

M 1. $256 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$\sqrt{256} = 2 \times 2 \times 2 \times 2 \Rightarrow \sqrt{256} = 16$

2. $1444 = 2 \times 2 \times 19 \times 19 \Rightarrow \sqrt{1444} = 2 \times 19 \Rightarrow \sqrt{1444} = 38$

3. $5184 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3$

$\sqrt{5184} = 2 \times 2 \times 2 \times 3 \times 3 \Rightarrow \sqrt{5184} = 72$

4. $90000 = 2 \times 2 \times 3 \times 3 \times 5 \times 5 \times 5 \times 5 \times 2 \times 2$

$\sqrt{90000} = 2 \times 3 \times 5 \times 5 \times 2 \Rightarrow \sqrt{90000} = 300$

N. $49 - 1 = 48$ $48 - 3 = 45$ $45 - 5 = 40$

$40 - 7 = 33$ $33 - 9 = 24$ $24 - 11 = 13$

$13 - 13 = 0$

Since the no. of subtraction is 7 so the square root is 7.

O So, 164 should be subtracted from 17325 to make it a perfect square.

$17325 - 164 = 17161 \Rightarrow (131)^2 = 17161$

P $(554)^2 = 306916 \Rightarrow 306916 - 306452 = 464$

464 should be added to 306452 to get a perfect square.

Chapter 3
Cube and Cube Roots

A 1. $5\times 5\times 5 = 125$ 2. $18\times 18\times 18 = 5832$
3. $25\times 25\times 25 = 15625$ 4. $100\times 100\times 100 = 1000000$
5. $43\times 43\times 43 = 79507$ 6. $101\times 101\times 101 = 1030301$
7. $2000\times 2000\times 2000 = 8000000000$
8. $36\times 36\times 36 = 46656$

B 1. 6 2. 5 3. 9 4. 0
5. 5 6. 9 7. 2 8. 8

C 1. No 2. Yes 3. Yes 4. No
5. Yes 6. Yes 7. No 8. No

D 1. $27a^3b \Rightarrow 3\times 3\times 3\times a\times a\times a\times b$
It should be multiplied with b^2 to get a perfect cube

2. $364500 = 2\times 2\times 3\times 3\times 3\times 3\times 3\times 3\times 5\times 5\times 5$
It should be multiplied with 2 to get a perfect cube.

3. $5184 = 2\times 2\times 2\times 2\times 2\times 2\times 3\times 3\times 3\times 3$
It should be multiplied with 9.

4. $p^2q^3r \Rightarrow p\times p\times q\times q\times q\times r$
Ans. It should be multiplied with pr^2

5. $2560 = 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 5$
It should be multiplied with $5\times 5 = 25$.

6. $219700 = 2\times 2\times 5\times 5\times 13\times 13\times 13$
it should be multiplied with 5 and 2 that is 10.

7. $2700 = 3\times 3\times 3\times 2\times 2\times 5\times 5$
it should be multiplied with 2 and 5 i.e., 10 to get perfect cube.

8. $392 = 2\times 2\times 2\times 7\times 7$
It should be multiplied with 7.

E 1. $a^3b^2 \Rightarrow \dfrac{a\times a\times a\times b\times b}{b\times b}$
it should be divided with b^2

2. $64a^5 \Rightarrow (4)^3\times a\times a\times a\times a$

It should be divided with a^2.

3. $\frac{4\times 4\times 4\times 4}{4}$

It should be divided with 4 to get a perfect cube.

4. $1701 = \frac{3\times 3\times 3\times 3\times 3\times 7}{3\times 3\times 7}$

It should be divided with 63.

5. $9x^3 \Rightarrow \frac{3\times 3\times x^3}{3\times 3}$

It should be divided with 9.

6. $\frac{2\times 2\times 13\times 13\times 13}{2\times 2}$

It should be divided by 4 to get a perfect cube.

7. $8640 = 2\times 2\times 2\times 2\times 2\times 2\times 3\times 3\times 3\times 5$

It should be divided with 5 to get a perfect cube.

8. $2\times 7\times 7\times 7$

It should be divided with 2 to get a perfect cube.

A

1. $125000 = 5\times 5\times 5\times 5\times 5\times 5\times 2\times 2\times 2$
   $\sqrt[3]{125000} = 5\times 5\times 2 \Rightarrow \sqrt[3]{125000} = 50$
2. $2197 = 13\times 13\times 13 \Rightarrow \sqrt[3]{2197} = 13$
3. $64000 \Rightarrow 64000 = 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 5\times 5\times 5$
   $\sqrt[3]{64000} = 2\times 2\times 2\times 5 \Rightarrow \sqrt[3]{64000} = 40$
4. $27000 = 3\times 3\times 3\times 2\times 2\times 2\times 5\times 5\times 5$
   $\sqrt[3]{27000} = 3\times 2\times 5 \Rightarrow \sqrt[3]{27000} = 30$
5. $3375 \Rightarrow 3375 = 5\times 5\times 5\times 3\times 3\times 3$
   $\sqrt[3]{3375} = 5\times 3 \Rightarrow \sqrt[3]{3375} = 15$
6. $1728 \Rightarrow 1728 = 2\times 2\times 2\times 2\times 2\times 2\times 3\times 3\times 3$
   $\sqrt[3]{1728} = 2\times 2\times 3 \Rightarrow \sqrt[3]{1728} = 12$
7. $13824 = 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 3\times 3\times 3$
   $\sqrt[3]{13824} = 2\times 2\times 2\times 3 = 24$
8. $42875 = 5\times 5\times 5\times 7\times 7\times 7 \Rightarrow \sqrt[3]{42875} = 5\times 7 = 35$
9. $8000 = 2\times 2\times 2\times 2\times 2\times 2\times 5\times 5\times 5$
   $\sqrt[3]{8000} = 2\times 2\times 5 \Rightarrow \sqrt[3]{8000} = 20$

10. $32768 = 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2$
$\sqrt[3]{32768} = 2\times 2\times 2\times 2\times 2 \Rightarrow \sqrt[3]{32768} = 32$

11. $74088 = 2\times 2\times 2\times 3\times 3\times 3\times 7\times 7\times 7$
$\sqrt[3]{74088} = 2\times 3\times 7 = 42$

12. $1000 = 2\times 2\times 2\times 5\times 5\times 5 \Rightarrow \sqrt[3]{1000} = 2\times 5 = 10$

B 1. 91125
091 125
This number can be divided into two groups. So no. of digits in cube root of 91125 is 2.

2. 247673152
This number can be divided into three groups so the no. of digits in cube roots of 247073152 is 3.

3. $57066625 \Rightarrow 057066625$
This number 57066625 can be divided into 3 groups so its cube root will have 3 digit

4. 343 Its cube root will have 1 digit.

5. 1331 001 331
Its cube root will have 2 digit

6. 210 644 875
Its cube root will have 3 digit.

C 1. 2197
The unit digit of 2197 is 7 so unit digit of its cube root will be 3. After striking three digits from right we are left with 2. The numbers whose cube root is less than or equal to 2 is 1. So, the tens digit of its cube root is 1.
$\therefore \quad \sqrt[3]{2197} = 13$

2. 220 592
The unit digit is 2 so its cube root will have 8 at ones place. After striking 3 digits from right, we are left unit 112. The number whose cube root is less than or equal to 110 is 4.
$4^3 < 110 < 5^3 \quad \therefore \sqrt[3]{110592} = 48$

3. 1953125
The unit digit of 1953125 is 5. So unit digit of its cube root will be 5 After striking 3 digits from right we are left with 1953. The number whose cube root is less than or equal to 1953 is 12, $\sqrt[3]{1953125} = 125$.

5. 15625

The unit of 15625 is 5. So unit digit of its cube root will be 5. After striking three digits from right we will have 15. The no whose cube root is less than or equal to 15 is 2.

$\therefore \quad 2^3 < 15 < 3^3 \quad \therefore \sqrt[3]{15625} = 25$

4. 250047

The unit digit of 250047 is 7. So unit digit of its cube root is 3. After striking three digits from the right was left with 250. The number whose cube root is less than or equal to 250 is 6.

$6^3 < 250 < 7^3 \quad \therefore \sqrt[3]{250047} = 63$

6. 3723875

The unit digit of 3723875 is 5. So unit digit of its cube will be 5. After stiking three digits from right we are left with 3273. The number whose cube root is less than or equal to 3273 is 155, $(15^3 < 3273 < (16)^3)$

So $\sqrt[3]{3273875} = 155$

7. 35937

The unit digit of 35937 is 7 so the unit digit of its cube root will be 3. Striking out lost 3 digit, we are left with 35. The member whose cube root is less than or equal to 35 is 3. $3^3 < 35 < 4^3$

$\sqrt[3]{35937} = 33$

8. 21952

The unit digit of 21952 is 2. So unit digit of its cube root will be 8. After striking three digits from right we are left with 21. The number whose cube root is less than or equal to 21 is 2.

$\sqrt[3]{21952} = 28$

9. 175616

The unit digit of 175616 is . So unit digit of its cube root will be 6. After striking three digits from right we are left with 175. The number whose cube root is less than or equal to 175 is 5.

$\sqrt[3]{175616} = 56$

D Volume of cuboidal box = side × side × side

$2744 = (\text{side})^3 \Rightarrow \sqrt[3]{2744} = \text{side}$

$\sqrt[3]{2744} = 2 \times 7 = 14\ \text{m}$

Side of cuboid box = 14 m

$4\times 4\times 4\times a\times a\times a\times b\times b\times b\times b\times b\times b\times 4\times a\times b\times b$

$\sqrt[3]{64a^3b^6} = 4ab^2$

2. $8p^9 \Rightarrow 2\times 2\times 2\times p\times p\times p\times p\times p\times p\times p\times p\times 2\times p\times p\times p$

$\sqrt[3]{8p^9} = 2p^3$

3. $x^3y^3z^3 \Rightarrow \sqrt[3]{x^3y^3z^3} = xyz$

F 1. 3 2. 8 3. 9 4. 6 5. 5

G $2560 = 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 5$

2560 should be multiplied with $5\times 5 = 25$ to be a perfect square.

Chapter Check-up

A 1. (c) 2. (b) 3. (a) 4. (d) 5. (b)

B 1. True 2. True 3. False 4. False
5. True 6. False 7. False 8. False
9. True 10. False

C 1. No

2. 15625

$\Rightarrow 15625 = 5\times 5\times 5\times 5\times 5\times 5$

$\Rightarrow \sqrt[3]{15625} = 5\times 5 = 25$

Ans. Yes, 25

5	15625
5	3125
5	625
5	125
5	25
5	5
	1

3. $\sqrt[3]{2744} = 2\times 7 = 14$

2	2744
2	1372
2	686
7	343
7	49
7	7
	1

Ans. Yes, 14

D $1372 = 2\times 2\times 7\times 7\times 7$

2	1372
2	686
7	343
7	49
7	7
	1

it should be divided with 4 to be a perfect square.

E

2	1080
2	540
2	270
5	135
3	27
3	9
3	3

$1080 = 2\times 2\times 2\times 3\times 3\times 3\times 5$

It should be multiplied with $5\times 5 = 25$

F $4096 = 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2$

2	4096
2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$\sqrt[3]{4096} = 2\times 2\times 2\times 2 = 16$

G Volume = $(\text{Side})^3$

2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$\sqrt[3]{512} = 512 = 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2\times 2 = 8$

Edge = 8 m

H
1. Nearest perfect cube of 682 is 512 whose cube root is 8 so, 682 – 512 = 170. 170 should be subtracted to get perfect cube.
2. Nearest perfect cube of 1320 is 1000 whose cube root is 10. So, 1320 – 1000 = 320. 320 should be subtracted to get a perfect cube.

I. 216 is nearest cube of 210. So 216 – 210 = 6. 6 should be added to 210 to get perfect cube.

J

Number	Cube	Number	Cube
1	1	6	216
2	8	7	343
3	27	8	512
4	64	9	729
5	125	10	1000

Chapter 4
Playing with Numbers

4.1

A 1. $3\times100+5\times10+6$ 2. $5\times100+0\times10+7$
3. $10\times9+9$ 4. $1\times100+5\times10+3$
5. $10\times8+3$ 6. $100\times8+10\times0+9$
7. $100\times3+10\times7+3$ 8. $2\times100+1\times10+3$
9. $2\times100+0\times10+5$
10. $1\times1000+8\times100+8\times10+9$

B 1. 58 2. 358 3. 29 4. 7086 5. 765

C 1. $z=7$ 2. $x=7,\ y=3$ 3. $x=5$
4. $x=6$ 5. $x=5,\ y=6,\ z=3$ 6. $x=8,\ y=2$
7. $x=0,\ y=9,\ z=5$

D 1. $a=8,\ b=7,\ c=9$

Proof
$$\begin{array}{r} 3\ 8\ 0\ 7 \\ +\ 1\ 1\ 7\ 2 \\ \hline 4\ 9\ 7\ 9 \end{array}$$

2. $a=7,\ b=9,\ c=5$ 3. $x=3,\ y=2,\ z=4$
4. $x=5,\ y=1,\ z=1$ 5. $a=3,\ b=5$
6. $a=2,\ b=1$ 7. $a=7,\ b=6,\ c=2$
8. $x=8,\ u=7,\ z=9$

E 1. Yes, because first no end with 0 so it is divisible by 10.
2. $6+2+3+1=12$. Sum of digits is equal to 12 which is divisible by 3. So 6231 is divisible by 3.
3. 50505, 10
   50505 is not divisible by 10 because it does not end with o.
4. 672, 3
   $$6+7+2=15$$
   Sum of digits is 15 which is divisible by 3 so 672 is divisible by 3.
5. 71846963, 2
   it is not divisible by 2 because the number must and with an even number to e divisible by 2.

6. 1234567 $\Rightarrow$ $1+2+3+4+5+6+7=28$
The sum of digits is 28 which is not divisible by 9 so 1234567 is not divisibly by 9.

7. 985, 5
985 is divisible by 5 as it ends with 5.

F 1. $61x6$
It $x = 2 \Rightarrow 6+1+2+6=15$. 15 is divisible by 3 so. 6126 will be divisible by 3.

2. $757x \Rightarrow x = 8$
$7+5+7+8=27$. 27 is divisible by 9. 7578 is divisibly by 9.

3. $9x18 \Rightarrow x = 0$
$9+0+1+8=18$. 18 is divisible by 9. So 9018 is divisibly by 9.

4. $61x6 \Rightarrow x = 5$
$6+1+5+6=18$. 18 is divisible by 9. So 6156 is divisible by 9.

G I AM FINE

H 1. 222 2. 333 4. 315 4. 171

4.2 1.
$$\begin{array}{r} AB \\ \times\ 6 \\ \hline BBB \end{array} \qquad \begin{array}{r} 74 \\ \times\ 6 \\ \hline 444 \end{array}$$

$B = 4$, $A = 7$

2.
$$\begin{array}{r} 4A \\ +\ 98 \\ \hline VB3 \end{array}$$
$A = 5$, $B = 4$, $V = 1$
$$\begin{array}{r} 45 \\ +\ 98 \\ \hline 143 \end{array}$$

3.
$$\begin{array}{r} AB \\ \times\ 5 \\ \hline GAB \end{array}$$
$A = 2$, $B = 5$, $C = 1$
$$\begin{array}{r} 25 \\ \times\ 5 \\ \hline 125 \end{array}$$

4.
$$\begin{array}{r} 2AB \\ +\ AB1 \\ \hline B18 \end{array}$$
$A = 4$, $B = 7$
$$\begin{array}{r} 247 \\ +\ 471 \\ \hline 718 \end{array}$$

B 1
$$\begin{array}{r} P83 \\ \times\ R9 \\ \hline P049 \end{array} \qquad \begin{array}{r} 783 \\ \times\ 29 \\ \hline 7049 \end{array}$$
$$\begin{array}{r} 15QQ\times \\ \hline CCPOP \end{array} \qquad \begin{array}{r} 1566\times \\ \hline 22709 \end{array}$$

$P = 7$, $Q = 6$, $R = 2$, $C = 2$

2.

$$\begin{array}{r} A\,8\,B \\ \times\ B\,9 \\ \hline A\,0\,4\,A \\ 2\,B\,9\,9\,\times \\ \hline B\,0\,5\,B\,A \end{array} \qquad \begin{array}{r} 7\,8\,3 \\ \times\ 3\,9 \\ \hline 7\,0\,4\,7 \\ 2\,3\,4\,9\,\times \\ \hline 3\,0\,5\,3\,7 \end{array}$$

$A = 7, B = 3$

C Let m and n be the two digits. Then:

$$m + n = 9,\ n = 9 - m \Rightarrow 10m + n + 9 = 10n + m$$

$10m + (9 - m) + 9 = 10(9 - m) + m$ Using ...1

$9m + 18 = 90 - 9m \Rightarrow 9m + 9m = 90 - 18$

$$18m = 72$$

$$m = \frac{72}{18}$$

Putting $m = 4$ in $1 \Rightarrow n = 9 - 4 = 5$

So the number is 45

D

35	21	22	32
24	30	29	27
28	26	25	31
23	33	34	20

The magic sum = 110

E 1. 1, 3, 9, 27, 81 2. 1, 2, 2, 4, 8, 32, 256, 8192

F

6	11	10
13	9	5
8	7	12

The magic sum = 27

A 1. (b) 2. (b) 3. (a) 4. (c) 5. (d) 6. (c)

B 1. 2, 5, 10 2. 10 3. Sum of digits
4. *y* 5. *c* 6. 3 7. Magic sum
8. 4 9. 2, 3 10. Same

C 1. False 2. False 3. False 4. True
5. False 6. False 7. True 8. True
9. False 10.True

D QBUV

E CATCH **F** OCMMNO

G 1. 111155556 2. 7777622223

H 1. Subtraction 2. Subtraction
3. Subtraction 4. Subtraction

I 5^2 6^2
$\Rightarrow 1+3+5+7+9+11+13$

J $5^2+6^2+30^2=31^2 \Rightarrow 6^2+7^2+42^2=43^2$

K Let the number be 4
Add 2, $4+2=6$ Multiple by 3 $6\times 3=18$
Subtract 6, $18-6=12$ Divide by $3=\frac{12}{3}=4$

We get the original number.

Chapter 5
Algebraic Expression

A 1. $(y+7)(y+5)\Rightarrow y^2+5y+7y+35\Rightarrow y^2+12y+35$
2. $(x+2)(x+a)\Rightarrow(x^2+9x+2x+18)\Rightarrow x^2+11x+18$
3. $(z-3)(2-5)\Rightarrow z^2-5z-3z+15\Rightarrow z^2-8z+15$
4. $(x+8)(x+2)\Rightarrow x^2+2x+8x+16\Rightarrow x^2+10x+16$

B 1. $(2p-2q-3r)^2\Rightarrow(2p-2q-3r)(2p-2q-3r)$
$4p^2-4pq-6pr-4pq+4q^2+6qr-6qr+9r^2$
$4p^2+9r^2+4q^2-8pq-12pr+12qr$
2. $(x+y-2z)^2\Rightarrow(x+y-2z)(x+y-2z)$
$x^2+xy-2zx+yx+y^2-2yz-2zx-2zy+4z^2$
$x^2+y^2+4z^2+2xy-4zx-4yz$
3. $(x+2y+3z)^2\Rightarrow(x+2y+3z)(x+2y+3z)$
$x^2+2xy+32x+2yx+4y^2+6yz+32x+6yz+9z^2$
$x^2+4y^2+9z^2+4yx+12yz+6zx$

C 1. $(5abc)\times(10a^2b^2c^2)\times(-3a^2b^2c^4)\times(6a^2b^2c^5)$
$5\times 10\times(-3)\times 6\ a^{1+2+2+2}\times b^{1+2+3+2}\times c^{1+2}+4+5-900a^7b^8c^{12}$
2. $-8abc$, $4a^3b^3c^3$, $3a^2b^2c^2$ and $-2bc$
$(-8)\times 4\times 3\times(-2)\times a^{1+3+2}\times b^{1+2+2+1}\times c^{1+2+2+1}\Rightarrow 192a^6b^6c^6$

D $\frac{-4}{\square}xy^3\times\frac{6^2}{\square}x^2y\Rightarrow\frac{-8}{\square}x^3y^4$

To verify

L.H.S at $x = 2,\ y = 1$

$$\frac{(-8)}{7} \times (2)^3 (1)^4 = \frac{-8 \times 8}{7} = \frac{-64}{7}$$

$$\text{R.H.S} = -\frac{4}{3} \times 2 \times (1)^3 \times \frac{6}{7}(2)^2 \times 1 = \frac{-8}{3} \times \frac{24}{7} = \frac{-64}{7}$$

L.H.S = R.H.S **Hence verified**

E

	$(x + 2y)$	$(x - 2y)$
At	$x = 1$	$y = 0$
	(1)	(1)
	$= 1$	

$(x + 2y)(x - 2y) \Rightarrow x^2 - 2yx + 2yx - (2y)^2$

$x^2 - (2y)^2 = x^2 - 4y^2 \Rightarrow (1)^2 - (0)^2$

$(1)^2$

L.H.S = R.H.S **Hence Verified**

A

1. $(3a + 2b)^3 \Rightarrow (a + b)^3 = a^3 + b^3 + 3ab(a + b)$

   $(3a + 2b)^3 = (3a)^3 + (2b)^3 + 3 \times 3a \times 2b(3a + 2b)$

   $= 27a^3 + 8b^3 + 18ab(3a + 2b)$

2. $(p - yz)^3 \Rightarrow (a - b)^3 = a^3 - b^3 - 3ab(a - b)$

   $(p = yz)^3 = p^3 - (yz)^3 - 3pzy(p - yz)$

   $= -p^3 - y^3 z^3 - 3pzy(p - yz)$

3. $(a + 2b)^3 \Rightarrow (a + b)^3 = a^3 + b^3 + 3ab(a + b)$

   $= a^3 + (2b)^3 + 6ab(a + 2b) = a^3 + 8b^3 + 6ab(a + 2b)$

4. $(3x - 2z)^3 \Rightarrow (a - b)^3 = a^3 - b^3 - 3ab(a - b)$

   $= (3x)^3 - (2z)^3 - 3 \times 3x \times 2zr(3x - 22)$

   $= 27x^3 - 8z^3 - 18xz(3x - 2z)$

5. $(a - 7b)^3 \Rightarrow (a - b)^3 = a^3 - b^3 - 3ab(a - b)$

   $= a^3 - (7b)^3 - 3 \times a \times 7b(a - b) = a^3 - 343b^3 - 21ab(a - b)$

6. $(x + 2y)^3 \Rightarrow (a + b)^3 = a^3 + b^3 + 3ab(a + b)$

   $= x^3 + (2y)^3 + 3 \times x \times 2y(x + 2y) \Rightarrow = x^3 + 8y^3 + 6xy(x + 2y)$

B

1. $(2x - z)^3 - (2x + z)^3$

   $(2x)^3 - (z)^3 - 3 \times 2x \times z(2x - z) - [(2x)^3 + (z)^3 + 3 \times 2x \times z(2x + z)]$

   $8x^3 - z^3 - 6xz(2x - z) - [8x^3 + z^3 + 6xz(2x + 2)]$

   $8x^3 - z^3 - 12x^2 z + 6xz^2 - 8x^3 - z^3 - 12x^2 z - 6xz^2 = -2z^3 - 24x^3 z$

$(x)^3 - (y)^3 - 3xy(x-y) - [x^3 + y^3 + 3xy(x+y)]$

$x^3 - y^3 - 3x^2y + 3xy^2 - [x^3 + y^3 + 3x^2y + 3xy^2]$

$x^3 - y^3 - 3x^2y + 3xy^2 - x^3 - y^3 - 3x^2y - 3xy^2 = -2y^3 - 6x^2y$

3. $(2x+5)^3 - (2x-5)^3$

$(2x)^3 + (5)^3 + 3 \times 2x \times 5(2x+5) - [(2x)^3 - (5)^3 - 3 \times 2x \times 5(2x-5)]$

$8x^3 + 125 + 30x(2x+5) - [8x^2 - 125 - 30x(2x-5)]$

$8x^3 + 125 + 60x^2 + 150x - [8x^3 - 125 - 60x^2 + 150x]$

$8x^3 + 125 + 60x^2 + 150x - 8x^3 + 125 + 60x^2 - 150x, = 50 + 120x^2$

C $a^3 + 8b^3 \Rightarrow a^3 + (2b)^3$

Using identify $= (a+b)^3$

$a^3 + b^3 = (a+b)^3 - 3ab(a+b) = (a+2b)^3 - 3a \times 2b(a+2b)$

$= (10)^3 - 6ab(10) = 100 - 60 \times 15 = 1000 - 900 = 100$

D 1. $x^3 - y^3 = (a-b)^3 - 3ab(a-b)$

$(x-y)^3 - 3xy(x-y)$ $\qquad$ $(-8)^3 - 3 \times -12(-8)$

$(-8)^3 + 36(-8)$ $\qquad$ $(-8)^2 + 288$

$-512 + 288$ $\qquad$ -224

2. $x^3 - y^3 = (x-y)^3 - 3xy(x-y)$

$$= \left(\frac{10}{9}\right)^3 - 3 \times \frac{5}{3}\left(\frac{10}{9}\right) = \frac{1000000}{729} - \frac{50}{9} = \frac{5050}{729}$$

E 1. $2x^2(x^2 + 5x - 6) \Rightarrow 2x^4 + 10x^3 - 12x^2$

2. $2y(-y^2 + 3y - 4), -2y^3 + 6y^2 - 8y$

3. $x^2y(3x^2y^2 - 5xy + 7) \Rightarrow 3x^4y^3 - 5x^3y^2 + 7x^2y$

4. $(0.2x + 0.3y)(0.04x^2 - 0.06xy + 0.09y^2)$

$(0.2x + 0.3y)[(0.2)^2 - 0.06xy + (0.3y)^2]$

using $(a+b)[a^2 - ab + b^2] = a^3 + b^3$

$(0.2x)^3 + (0.3y)^3 \Rightarrow 0.008x^3 + 0.027y^3$

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

$= 2x^3 + 4x^2y + 2xy^2 + 3yx^2 + bxy^2 + 3y^3$

$= 2x^3 + 3y^3 + 7x^2y + 8xy^2$

at $x = -1$ and $y = 2$

$= 2(-1)^3 + 3(2)^3 + 7(-1)^2 + 2 + 8(-1)(2)^2$

$= -2 + 24 - 14 - 16 = 4$

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

$[2(-1) + 3(2)][(-1)^1 + 2 \times (-1)(2) + (2)^2]$

$(-2 + 6)(1 - 4 + 4) = 4$

In Both ways we get 4. Hence verified

G 1. $\left(4a+\frac{1}{4a}\right)^2 \Rightarrow (a+b)^2 = a^2+b^2+2ab$

$= (4a)^2 + \left(\frac{1}{4a}\right)^2 + 2\times 4a \times \frac{1}{4a} = 16a^2 + \frac{1}{16a^2} + 2$

2. $\left(9x+\frac{1}{3}\right)^2 \Rightarrow a^2+b^2+2ab = (a+b)^2$

$(9x)^2 + \left(\frac{1}{3}\right)^2 + 2\times 3x \times \frac{1}{3} \Rightarrow 81x^2 + \frac{1}{9} + 6x$

3. $(3a^2+2b^2)(3a^2-2b^2) \Rightarrow (a+b)(a-b) = a^2-b^2$

$(3a^2)^2 - (2b^2)^2 \Rightarrow 9a^4 - 4b^4$

H 1. $(a^2+4)(a^2+4) = (a^2+4)$

Using $(a+b) = a^2+b^2+2ab$

$= (a^2)^2 + (4)^2 + 2a^2 \times 4 = a^4 + 16 + 8a$

2. $(ab+c)(ab+c) \Rightarrow (ab+c)$

$(ab)^2 + (c)^2 + 2ab \times c = a^2b^2 + c^2 + 2abc$

I $\left(x+\frac{1}{x}\right) = \sqrt{5}$

Squaring both the sides

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

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

Again squaring both the sides

$(x^2)^2 + \left(\frac{1}{x^2}\right)^2 + 2x^2 + \frac{1}{x^2} = 9 \Rightarrow x^4 + \frac{1}{x^4} + 2 = 9$

$x^4 + \frac{1}{x^4} = 7$

J 1. $(467)^2 - (33)^3 \Rightarrow (467+33)(467-33)$

$500 \times 434 \Rightarrow 217000$

2. $(79)^2 - (69)^2 \Rightarrow (79-69)(79+69) \Rightarrow 10\times 148$

$\Rightarrow 1480$

3. $97\times 103 = (100-3)(100+3)$

$(100)^2 - (3)^2 = 10000 - 9 = 9991$

4. $153\times 147 = (150+3)(150-3) = (150)^2 - (3)^3$

$22500 - 9 \Rightarrow 22491$

$= 89991$

6. $36 \times 44 = (40-4)(40+4) = (40)^2 - (4)^2 = 1600 - 16 = 1584$

K $(x-y) = 11$

Squaring both the sides

$x^2 + y^2 - 2xy = 121$ $\qquad$ $x^2 + y^2 - 2(6) = 121$

$x^2 + y^2 - 12 = 121$ $\qquad$ $x^2 + y^2 = 121 + 12$

$x^2 + y^2 = 133$

L $\left(x^2 + \frac{1}{x^2}\right) = 66,\ x - \frac{1}{2} \Rightarrow \left(x - \frac{1}{x}\right)^2 = (x)^2 + \left(\frac{1}{x}\right)^2 - 2 \times \frac{1}{x} \times x$

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

Putting the value of $x + \frac{1}{x^2} = 66$

$$\left(x - \frac{1}{x}\right)^2 = 66 - 2 \ \Rightarrow \left(x - \frac{1}{x}\right)^2 = 64$$

$$x - \frac{1}{x} = \sqrt{64} \ \Rightarrow x - \frac{1}{x} = 8$$

M 1. $9x^2 + 30x + 25 \Rightarrow (3x+5)^2$

$(3 \times 11 + 5)^2 (x = 11) \Rightarrow (33+5)^2 \Rightarrow (38)^2 = 1444$

2. $49x^2 - 56xy + 16y^2 \Rightarrow (7x - 4y)^2$

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

A

1.	$x^2 - 2x - 35$	$x^2 - 7x + 5x - 35$
	$x(x-7) + 5(x-7)$	$(x-7)(x-5)$
2.	$x^2 - 7x + 12$	$x^2 - 4x - 3x + 12$
	$x(x-4) - 3(x-4)$	$(x-3)(x-4)$
3.	$x^2 + 11x + 28$	$x^2 + 7x + 4x + 28$
	$x(x+7) + 4(x+7)$	$(x+4)(x+7)$
4.	$x^2 - x - 12$	$x^2 - 4x + 3x - 12$
	$x(x-4) + 3(x-4)$	$(x+3)(x-4)$
5.	$x^2 + 2x - 63$	$x^2 + 9x - 7x - 63$
	$x(x+9) - 7(x+9)$	$(x-7)(x+9)$
6.	$x^2 + 2x - 15$	$x^2 + 5x - 3x - 15$
	$x(x+5) - 3(x+5)$	$(x-3)(x+5)$

B 1. $1-a^6 = 1^2-(a^2)^3 = (1+a)(1-a)(1+a^2+a)(1+a^2-a)$

2. $128x^2 + 54z^3 \qquad 2(64x^3 + 27z^3)$

$2((4x)^3 + (3z)^3)$

Using identity $a^3 + b^3 = (a+b)(a^2-ab+b^2)$

$2[(4x+3z)(16x^2-12xz+9z^2)]$

3. $\frac{1}{8}x^3 - \frac{1}{512}y^3 \Rightarrow \left(\frac{1}{2}x\right)^3 - \left(\frac{1y}{8}\right)^3$

$\left(\frac{x}{2}-\frac{y}{8}\right)\left[\left(\frac{x}{2}\right)^2 - \frac{x}{2}\times\frac{y}{8} + \left(\frac{y}{8}\right)^2\right] \Rightarrow \left(\frac{x}{2}-\frac{y}{16}\right)\left(\frac{x^2}{4}-\frac{xy}{16}+\frac{y}{64}\right)$

4. $1-8p^3 \Rightarrow 1-(2p)^3 \Rightarrow (1-2p)[(1)^2 - 2\times 2p + (2p)^2]$

$(1-2p)(1-4p+4p^2)$

C 1. $15xy + 6x + 10y + 4$

$3x(5y+2) + 2(5y+2) \qquad (3x+2)(5y+2)$

2. $3xy - 4y - 3x + 4 \qquad 3xy - 3x - 4y + 4$

$3x(y-1) - 4(y-1) \qquad (3x-4)(y-1)$

3. $9x^2 + 3xy - 12x - 4y \qquad 3x(3x+y) - 4(3x+y)$

$(3x-4)(3x+y)$

4. $12x - 8 + 3xy - 2y \qquad 4(3x-2) + y(3x-2)$

$(4+y)(3x-2)$

5. $12ab - 8b - 6 + 9a \qquad 12ab + 9a - 8b - b$

$3a(4b+3) - 2(4b+3) \qquad (3a-2)(4b+3)$

6. $x^2 + xy + 9x + 9y \qquad x(x+y) + 9(x+y)$

$(x+y)(x+9)$

A 1. $8x^3 - 27y^3$ by $2x-3y = 8x^3 - 27y^3$

$(2x)^3 - (3y)^3 = \frac{(2x-3y)(4x^2+6xy+9y^2)}{(2x-3y)}$

$= 4x^2 + 6xy + 9y^2$

2. $25x^2yz$ by $3xyz = \frac{25x^2y^2}{3xyz} = \frac{25x}{3}$

3. $x^3 - y^3$ by $x-y = \frac{(x-y)(x^2+xy+y^2)}{(x-y)} = x^2 + xy + y^2$

4. $a^3 + b^3$ by $a+b = \frac{(a+b)(a^2-ab+ab^2)}{(a+b)} = a^2 - ab + b^2$

5. $y^2 + 8y + 15$ by $y + 5 = \dfrac{y^2 + 3y + 5y + 15}{y + 5}$

$= \dfrac{y(y+3) + 5(y+3)}{y+5} = \dfrac{(y+5)(y+3)}{(y+5)} = y + 3$

B 1. $\dfrac{8y^3 - 1000}{2y - 10} = \dfrac{(2y)^3 - (10)^3}{2y - 10} = \dfrac{(2y-10)(4y^2 + 20y + 100)}{(2y-10)}$

$= 4y^2 + 20y + 100$

2. $\dfrac{x^2 + 7x + 12}{x + 3} = \dfrac{x^2 + 4x + 3x + 12}{x + 3} = \dfrac{x(x+4) + 3(x+4)}{(x+3)}$

$= \dfrac{(x+3)(x+4)}{(x+3)} \Rightarrow x + 4$

3. $\dfrac{20ab - 20b^2}{10b} = \dfrac{30b(a-b)}{10b} = 2(a-b)$

4. $\dfrac{a^3 - b^3}{a - b} = \dfrac{(a-b)(a^2 + ab + b^2)}{(a-b)} = a^2 + ab + b^2$

5. $\dfrac{64p^3 - 125q^3}{16p^2 + 200p + 25q^2} = \dfrac{(4p)^3 - (5q)^3}{((4p)^2 + 4p \times 5q + (5q)^2)}$

$= \dfrac{(4p - 5q)(16p^2 + 20pq + 25q^2)}{(4p)^2 + 20pq + 25q^2} = 4p - 5q$

6. $\dfrac{-4ay^2 - 14x^3}{-7x^2} = \dfrac{-7(7y^2 + 2x^3)}{-7x^2} = \dfrac{7y^2}{x^2} + \dfrac{2x^3}{x^2} = \dfrac{7y^2}{x^2} + 2x$

A 1. (c) 2. (c) 3. (b) 4. (c) 5. (b) 6. (a) 7. (a)

B 1. $5a + 3b - 4 + 7a + 6b - 7 + 3a + 2b$

$5a + 3a + 7a + 6b + 2b + 3b - 4 - 7 \Rightarrow 15a + 11b - 11$

2. $3a^2b + (4a^2b) + 9a^2b \Rightarrow 3a^2b - 4a^2b + 9a^2b \Rightarrow -a^2b + 9a^2b$

$\Rightarrow 8a^2b$

3. $\dfrac{7}{2}x^3 - \dfrac{1}{2}x^2 + \dfrac{5}{3} + \dfrac{3}{2}x^3 + \dfrac{7}{4}x^2 - x + \dfrac{1}{3} + \dfrac{3}{2}x^2 - \dfrac{5}{2}x - 2$

$= \dfrac{7}{2}x^3 + \dfrac{3}{2}x^3 - \dfrac{1}{2}x^2 + \dfrac{3}{2}x^2 + \dfrac{7}{4}x^2 + \dfrac{5}{3} + \dfrac{1}{3} - x - \dfrac{5}{2}x - 2$

$\dfrac{10}{2}x^3 + x^2 - \dfrac{2x^2 + 6x^2 + 7x^2}{4} + \dfrac{6}{3} - \dfrac{2x - 5x - 2}{2}$

$5x^3 + \dfrac{11x^2}{4} + 2 - \dfrac{7x}{2} - 2 \Rightarrow 5x^3 + \dfrac{11x^2}{4} - \dfrac{7x}{2}$

4. $\frac{3}{2}a-\frac{5}{4}b+\frac{2}{5}c+\frac{2}{3}a-\frac{7}{2}b+\frac{7c}{2}+\frac{5}{3}a+\frac{5}{2}b-\frac{5}{4}c$

$=\frac{3}{2}a+\frac{2}{3}+\frac{5}{3}a-\frac{5}{4}b-\frac{7}{2}b+\frac{5}{2}b+\frac{2c}{5}+\frac{7}{2}c-\frac{5}{4}c$

$=\frac{9a+4a+10a}{6}-\frac{5b-141+10b}{4}+\frac{8c+70c+225c}{20}$

$=\frac{23a}{6}-\frac{9b}{4}+\frac{53c}{20}$

C 1. $-7x+2y-3z-(3x+4y-7z)-7x+2y-3z-3x-4y+7z$

$-7x-3x+2y-4y-3z+7z \Rightarrow -10x-2y+4z$

2. $\frac{1}{3}y^3+\frac{5}{7}y^2+y-2-\left(\frac{2}{3}y^3-\frac{2}{7}y^2-5\right)$

$\frac{1}{3}y^3+\frac{5}{7}y^2+y-2-\frac{2}{3}y^3+\frac{2}{7}y^2+5$

$\frac{1}{3}-\frac{2}{3}y^3+\frac{5}{7}y^2+\frac{2}{7}y^2-2+5+y \Rightarrow \frac{-1}{3}y^3+y^2+3+y$

3. $\frac{x^3}{3}-\frac{5}{2}x^2+\frac{3}{5}x+\frac{1}{4}-\left(\frac{6}{5}x^2-\frac{4}{5}x^3+\frac{5}{6}+\frac{3}{2}x\right)$

$\frac{x^3}{3}-\frac{5}{2}x^2+\frac{3}{5}x+\frac{1}{4}-\frac{6}{5}x^2+\frac{4}{5}x^3-\frac{5}{6}-\frac{3}{2}x$

$\frac{x^3}{3}+\frac{4}{5}x^3-\frac{5}{2}x^2-\frac{6}{5}x^2+\frac{3}{5}x-\frac{3}{2}x+\frac{1}{4}-\frac{5}{6}$

$\frac{5x^3+12x^3}{15}-\frac{25x^2-12x^2}{10}+\frac{6x-15x}{10}+\frac{3-10}{12}$

$\frac{17x^3}{15}-\frac{37x^2}{10}-\frac{9x}{10}-\frac{7}{12}$

4. $x^2y-\frac{4}{5}xy^2+\frac{4}{3}xy$ from $\frac{2}{3}x^2y+\frac{3}{2}xy^2-\frac{1}{3}xy$

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

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

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

$=\frac{2x^2y-3x^2y}{3}+\frac{15xy^2+8xy^2}{10}-\frac{5}{3}xy$

$-\frac{-x^2y}{}+\frac{23xy^2}{}-\frac{5xy}{}$

D $x-3y+2z+(-4x+9y-11z)-(3x-4y-7z)$

$x-3y+2z-4x+9y-11z-3x+4y+7z$

$x-4x-3x-3y+9y+4y+2z-11z+7z \Rightarrow -6x+10y-2z$

E 1. $[5-3x+2x-(2x-y)]-(3x-7y+9)$

$5-3x+2x-2x+y-3x+7y-9$

$5-6x+8y-9 \Rightarrow -6x+8y-4$

2. $\frac{-2}{7}a^4 \times \frac{-3}{4}a^2b \times \frac{-14}{5}b^2 \Rightarrow \frac{-3a^6b^3}{5}$

F 1. $(-4x^2)\times(-6xy^2)\times(-3yz^2)$

$-72x^3y^3z^2$

2. $\frac{11}{2}x^2y-\frac{9}{4}xy^2+\frac{1}{4}xy-\frac{1}{14}y^2x+\frac{1}{15}yx^2+\frac{1}{2}xy$

$\frac{11}{2}x^2y+\frac{1}{15}x^2y-\frac{9}{4}xy^2-\frac{1}{14}xy^2+\frac{1}{4}xy+\frac{1}{2}xy$

$\frac{7(5x^2y+2x^2y)}{30}-\frac{63xy^2-2xy^2}{28}+\frac{xy+2xy}{4}$

$\frac{167}{30}x^2y-\frac{65}{28}xy^2+\frac{3}{4}xy$

$\frac{167}{30}x^2y-\frac{65}{28}xy^2+\frac{3}{4}xy$

3. $9x^2y+27xy^2 \Rightarrow 9xy(x+3y)$

4. $\frac{-7}{5}xy^2z \times \frac{13}{3}x^2y^2z^2 \Rightarrow \frac{-91}{15}x^3y^3z^3$

G 1. $2a^3(3a+5b) \Rightarrow 6a^4+10a^3b$

2. $-11a(3a+2b) \Rightarrow -33a^2-22ab$

3. $-5a(7a-2b) \Rightarrow -35a^2+15ab$

4. $\frac{-8}{27}xyz\left(\frac{3}{2}xyz^2-\frac{9}{4}xy^2z^3\right)$

$\frac{-8}{27}xyz \times \frac{3}{2}xyz^2-\frac{8}{27}xyz \times \frac{-9}{4}xy^2z^3 \Rightarrow$

$\frac{-4}{9}x^2y^2z^3+\frac{2}{3}x^2y^3z^4$

H 1. $(4m+1)(2m-5) \Rightarrow 8m^2-20m+2m-5$

$8m^2-18m-5$

2. $(3x^2+y^2)(2x^2+3y^2) \Rightarrow 6x^4+9x^2y^2+2x^2y^2+3y^4$

$6x^4+11x^2y^2+3y^4$

3. $(2x-6y)(x-2y) \Rightarrow 2x^2-4xy-6xy+12y^2$

4. $\left(\frac{3}{5}xy+\frac{1}{3}\right)(15x-6y) \Rightarrow 9x^2y-\frac{18xy^2}{5}+5x-2y$

5. $(2xy+3y^2)(3y^2-2) \Rightarrow 6xy^3-4xy+9y^4-6y^2$

6. $(x^6-y^6)(x^2+y^2) \Rightarrow x^8+x^6y^2-y^6x^2-y^8$

I $(3a-2b)=9$

Squaring both sides

$(3a-2b)^2=81$ $\qquad$ $9a^2-12ab+4b^2=81$

$9a^2+4b^2-12(7)=81$ $\qquad$ $9a^2+4b^2-84=81$

$9a^2+4b^2=81+84$ $\qquad$ $9a^2+4b^2=165$

J 1. $9x^2-6x+1 \Rightarrow (3x)^2-2\times 3x\times 1+(1)^2 \Rightarrow (3x-1)^2$

2. $x^2-11x-42 \Rightarrow x^2-14x+3x-42 \Rightarrow x(x-14)+3(x-14)$
$(x-14)(x+3)$

3. $y^2-y-132 \Rightarrow y^2-12y+11y-132 \Rightarrow y(y-12)+11(y-12)$
$(y-11)(y-12)$

4. $12x^2-60x+75 \Rightarrow 3(4x^2-20x+25)$
$3[(2x)^2-2\times 2x\times 5+(5)^2] \Rightarrow 3(2x-5)^2$

5. $x^4+14x^2+49 \Rightarrow (x^2)^2+2\times x^2\times 7+(7)^2 \Rightarrow (x^2+7)^2$

6. $x^4-x-156 \Rightarrow x^2-13x+12x-156 \Rightarrow x(x-13)+12(x-13)$
$(x+12)(x-13)$

K 1. $(x+y)(x^2+2xy+y^2) \Rightarrow (x+y)(x+y)^2 \Rightarrow (x+y)^3$
$(x+y)(x^2+2xy+y^2)=(x+y)^3$
L.H.S at $x=1,\ y=2 \Rightarrow (1+2)[(1)^2+2\times 1\times 2+(2)^2]$
$3(1+4+4) \Rightarrow 3\times 9=27$
R.H.S $(x+y)^3=(1+2)^3=(3)^3=27$
L.H.S = R.H.S **Hence Proved**

2. $(16m^2+n^2-8mn)(4m-n)$
$[(4m)^2+(n)^2-2\times 4m\times n](4m-n) \Rightarrow (4m-n)^2(4m-n)$
$(4m-n)^3 \Rightarrow (16m^2+n^2-8mn)(4m-n)=(4m-n)^3$
L.H.S at $m=-1,\ n=2$
$[16(-1)^2+(2)^2-8\times(-1)(2)][4(-1)-2]$
$(16+4+16)(-6) \Rightarrow 36\times -6=-216$
R.H.S at $m=-1$ and $n=2$
$(4m-n)^3 \Rightarrow (4(-1)-2) \Rightarrow (-4-2)^3$
$(-6)^3 \Rightarrow -216$
L.H.S = R.H.S Hence verified

L 1. $abc-ab-c+1 \Rightarrow ab(c-1)-1(c-1) \Rightarrow (ab-1)(c-1)$

$(p-1)(pq-r^2)$

3. $4x^2+2y^2+x^2y^2+8$ $\qquad$ $4x^2+8+2y^2+x^2y^2$
   $4(x^2+2)+y^2(x^2+2)$ $\qquad$ $(4+y^2)(x^2+2)$
4. $9x^2+6y^2+6x^2+9y^2$ $\qquad$ $9x^2+9y^2+by^2+bx^2$
   $9(x^2+y^2)+b(y^2+x^2)$ $\qquad$ $(a+b)(x^2+y^2)$

M

1. $x^2-16 \Rightarrow x^2-(4)^2 \Rightarrow (x+4)(x-4)$
2. $4-36y^2 \Rightarrow (2)^2-(6y)^2 \Rightarrow (2-6y)(2+6y)$
3. $a^4b^4-c^4 \Rightarrow (a^2b^2-c^2)(a^2b^2+c^2)$
   $(ab+c)(ab-c)(a^2b^2+c^2)$
4. $m^2-(n+p)^2 \Rightarrow (m-n-p)(m+n+p)$
5. $8p^3-2p \Rightarrow (2p)^3-2p \Rightarrow 2p(4p^2-1)$
   $2p(2p+1)(2p-1)$
6. $16x^4-(z-x)^4 \Rightarrow (4x^2)^2-((z-x)^2)^2$
   $[4x^2-(z+x)^2][4x^2+(z-x)^2]$
   $(4x+z+x)(4x-z-x)[4x^2+(z-x)^2]$

N

1. $(4x+3y)3x^2 \Rightarrow 12x^3+9x^2y$
2. $-5a(3a^2-7a) \Rightarrow -15a^3+35a^2$

O

1. $x^2+9x+20$ $\qquad$ $x^2 4x+5x+20$
   $x(x+4)+5(x+4)$ $\qquad$ $(x+5)(x+4)$
2. x^2-6x+8 $\qquad$ $x^2-4x-2x+8$
   $x(x-4)-2(x-4)$ $\qquad$ $(x-2)(x-4)$
3. $m^2+11mn+18n^2 = m^2+9mn+2mn+18x^2$
   $m(m+9n)+2n(m+9n) = (m+2n)(m+9n)$
4. $p^2+5pq-36q^2 = p^2+9pq-4pq-36q^2$
   $= p(p+9q)-4q(p+9q) \Rightarrow (p-4q)(p+9q)$

Chapter 6

Linear equation an One variable

A

1. $\dfrac{3x+5}{2x-1}=\dfrac{2}{5} \Rightarrow 5(3x+5)=2(2x-1)$
   $15x+25=4x-2 \Rightarrow 15x-4x=-2-25 \Rightarrow x=\dfrac{-27}{11}$
2. $\dfrac{2}{}(4x-1)-\left(2x-\dfrac{1+x}{}\right)=\dfrac{1}{}x+\dfrac{4}{}$

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

$$\frac{1}{3}(8x-2-6x+1+x)=\frac{1}{3}(x+4)$$

$$3x-1=x+4 \Rightarrow 3x-x=4+1 \Rightarrow 2x=5$$

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

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

4. $2x-\frac{1}{2}(x-1)=3\left(x-\frac{1}{12}\right) \Rightarrow 2x-\frac{1}{2}x+\frac{1}{2}=3x-\frac{3}{12}=\frac{1}{4}$

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

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

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

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

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

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

2. $\frac{(4+x)(5-x)}{(2+x)(7-x)}=1 \Rightarrow (4+x)(5-x)=(2+x)(7-x)$

$$20-4x+5x-x^2=14-2x+7x-x^2$$

$$20+x-x^2=14-2x+7x-x^2$$

$$-x^2+x^2+x-5x+20-14=0 \; -4x+6=0$$

$$-2(2x-3)=0 \Rightarrow 2x-3=0 \Rightarrow 2x=3$$

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

3. $5-\frac{(2z-4)}{3}=\frac{1}{2}(2z+3) \Rightarrow \frac{15-2z+4}{3}=\frac{2}{2}+\frac{3}{2}$

$$\frac{15}{3}-\frac{2z}{3}+\frac{4}{3}=z+\frac{3}{2} \Rightarrow \frac{-2z}{3}-z=\frac{3}{2}-\frac{4}{3}=\frac{15}{3}$$

$$\frac{-2z-3z}{3}=\frac{+9-8-30}{6} \Rightarrow \frac{-5z}{3}=\frac{-29}{6}$$

$z = \frac{29}{6} \times \frac{3}{5} = \frac{29}{10} = 2\frac{9}{10}$

4. $\frac{9x-5}{7} = \frac{6x+2}{5} \Rightarrow 5(9x-5) = 7(6x+2)$

$45x - 25 = 42x + 14 \Rightarrow 45x - 42x = 14 + 25$

$3x = 39 \Rightarrow x = \frac{39}{3} = 13 \Rightarrow x = 13$

C 1. $\frac{5x-7}{3x} = 2 \Rightarrow 5x - 7 = 6x \Rightarrow 5x - 6x = 7$

$-x = 7 \Rightarrow x = -7$

2. $\frac{2y-4}{3y+2} = \frac{2}{5} \Rightarrow 10y - 20 = 6y + 4 \Rightarrow 10y - 6y = 4 + 20$

$4y = 24 \Rightarrow y = 6$

3. $3(x-1) = 8 \Rightarrow 3x - 3 = 8 \Rightarrow 3x = 8 + 3 \Rightarrow x = \frac{11}{3}$

4. $15 - (3x - 1) = x - 4$ $\qquad$ $15 - 3x + 1 = x - 4$

$15 + 1 + 4 = x + 3x$ $\qquad$ $15 + 5 = 4x$

$20 = 4x$ $\qquad$ $x = 5$

D 1. $\frac{4x+7}{9-3x} = \frac{1}{4}$

$4(4x + 7) = 9 - 3x$ $\qquad$ $16x + 28 = 9 - 3x$

$16x + 3x = 9 - 28$ $\qquad$ $19x = -19$

$x = -1$

2. $\frac{2x+3}{5} = \frac{4x+9}{11}$

$11(2x + 3) = 5(4x + 9)$ $\qquad$ $22x + 33 = 20x + 45$

$22x - 20x = 45 - 33$ $\qquad$ $2x = 12$

$x = 6$

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

$9(6y - 5) = 14y$ $\qquad$ $54y - 45 = 14y$

$54y - 14y = 45$ $\qquad$ $40y = 45$

$y = \frac{45}{40} = \frac{9}{8} = 1\frac{1}{8}$

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

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

1. Let the three constitute numbers be $x_1 x + 2, x + 4$
   $x + x + 2 + x + 4 = 36 \Rightarrow 3x + 6 = 36 \Rightarrow 3x = 30$
   $x = 10$
   Even consecute are $10_1 10 + 2_1 10 + 4 = 10, 12$ and 14
2. Let the length be l
   $\therefore$ Breadth $= \frac{2}{3} l$
   Perimeter $= 2(l + b) \Rightarrow 180 = 2\left(\frac{2}{3} l + l\right)$
   $180 - \frac{4}{3} l + 2l \Rightarrow 180 = \frac{4l + bl}{3} \Rightarrow 180 \times 3 = 10l \Rightarrow 540 = 10l$
   $\frac{540}{10} = l$
   Length $= 54$ **m** Breath $= \frac{2}{3} \times 54 = 36$ m
3. Let my age be x, father's age will be $4x$
   After 4 years i.e., present age $x + 4 + 4x + 4 = 53$
   $5x + 8 = 53 \Rightarrow 5x = 45 \Rightarrow x = 9$

Ans. Father's age will $4 \times 9 = 36$. After 4 years their ages will be 13 and 40.

4. Let Shilpa's age be x
   So, Mother's age $= 4x$
   After 5 years, $4x + 5 = 3(x + 5) \Rightarrow 4x + 5 = 3x + 15$
   $4x - 3x = 15 - 5 \Rightarrow x = 10$
   Shilpa's age $= 10$ years
   Mother's age $= 4x = 4 \times 10 = 40$ years
5. Let one part be x
   Second part $= 200 - x$
   $\frac{1}{3} x = 100 - \frac{x}{2} \Rightarrow \frac{1}{3} x + \frac{x}{2} = 100 \Rightarrow \frac{2x + 3x}{6} = 100$
   $\frac{5x}{6} = 100 \Rightarrow 5x = 600 \Rightarrow x = \frac{600}{5}$
   $x = 120$ First part
   Second Part $= 200 - 120 = 80$
6. Let the three parts be a, b, c
   First part $= x$

Second part $= \frac{5}{6}x$ Third part $= \frac{4}{5} \times \frac{5x}{6} = \frac{2x}{3}$

Sum of three parts $x + \frac{5x}{6} + \frac{2x}{3} = \frac{2x}{3}$

Sum of three parts $x + \frac{5}{6}x + \frac{2x}{3} = 150$

$\frac{6x + 5x + 4x}{6} = 150 \Rightarrow 15x = 150 \times 6 \Rightarrow x = \frac{150 \times 6}{15}$

$x = 60$ first part

Second part $\frac{5}{6} \times 60 = 50$ Third part $= \frac{2 \times 60}{3} = 40$

7. Let Aanya's age be x

So, Bhushan age will be $x + 9$

After 10 years

$x + 9 + 10 = 2(x - 10) \Rightarrow x + 19 = 2x - 20 \Rightarrow x - 2x = -20 - 19$

$-x = -39 \Rightarrow x = 39$

Aanya's age = 39 years

Bhushan's age = 39 + 9 = 48 years

8. Let Total distance be x

Distance covered by car $= \frac{2}{5}$ of x

Distance covered by bus $= \frac{3}{10}$ of x

Distance covered by autorickshow $= \frac{1}{5}$ of x

Distance covered fact = 5 ...1

Total distance covered by car bus ad auto

$\frac{2}{5}x + \frac{3}{10}x + \frac{1}{5}x = \frac{9}{10}x$

Distance covered on foot $= x - \frac{9}{10}x = \frac{1}{10}x$ ...2

from 1 and 2 $\frac{1}{10}x = 5 \Rightarrow x = 50$ km

9. Let the smaller number be x

$\therefore$ greater number $= 2x + 15$

$x + 2x + 15 = 90 \Rightarrow 3x = 90 - 15 \Rightarrow 3x = 75 \Rightarrow x = 25$

Smaller no = 25

greater no. $= 25 \times 2 \times 15 = 50 + 15 = 65$

10. Distance covered by truck = $40 \times 4 = 160$ km

Distance covered by can n three hours try speed = $\frac{\text{distance}}{\text{time}}$

$$= \frac{160}{3} = 53.33 \text{ km/hr}$$

Average speed of the car is 53.33 km/hr

A 1. (d) 2. (d) 3. (c) 4. (a)

B 1. $4x + \frac{3}{5} = 5 \Rightarrow 4x = 5 - \frac{3}{5} \Rightarrow 4x = \frac{25-3}{5} \Rightarrow x = \frac{22}{5} \times \frac{1}{4}$

$= \frac{22}{20} = \frac{11}{10}$

Check at $x = \frac{11}{10} \Rightarrow 4\left(\frac{11}{10}\right) + \frac{3}{5} = \frac{44}{10} + \frac{3}{5} = \frac{44+6}{10} = \frac{50}{10} = 5$

2. $\frac{3}{5}x + 6 = 13 \Rightarrow \frac{3}{5}x = 13 - 6 \Rightarrow \frac{3}{5}x = 7 \Rightarrow x = \frac{7 \times 5}{3} = \frac{35}{3}$

Check at $x = \frac{35}{3} \Rightarrow \frac{3}{5} \times \frac{35}{3} + 6 = 13$

L.H.S = R.H.S

3. $5(2x - 3) - 3(3x - 7) = 5$

$10x - 15 - 9x + 21 = 5 \Rightarrow x = 5 - 21 + 15 \Rightarrow x = -1$

Check at $x = -1 \Rightarrow 5[2(-1) - 3] - 3[3(-1) - 7]$

$5(-2 - 3) - 3(-3 - 7) \Rightarrow 5(-5) - 3(-10) \Rightarrow -25 + 30 = 5$

L.H.S = R.H.S

4. $\frac{3x+8}{3x+7} = 4 \Rightarrow 3x + 8 = 4(3x + 7) \Rightarrow 3x + 8 = 8x + 28$

$3x - 8x = 28 - 8 \Rightarrow -5x = 20 \Rightarrow x = -4$

Checking at $x = -4 \Rightarrow \frac{3(-4)+8}{3(-4)+7} = \frac{-12+8}{-8+7} = \frac{-4}{-1} = 4$

L.H.S = R.H.S

5. $\frac{2x+5}{3} = 3x - 10 \Rightarrow 2x + 5 = 3(3x - 10)$

$2x + 5 = 9x - 30 \Rightarrow 2x - 9x = -30 - 5 \Rightarrow -7x = -35 \Rightarrow x = 5$

Check $\frac{2(5)+5}{3(5)-10} = \frac{10+5}{15-10} = \frac{15}{15} = 3$

L.H.S = R.H.S

6. $\frac{3a-2}{3}+\frac{2a+3}{2}=a+\frac{7}{6} \Rightarrow \frac{3a}{3}-\frac{2}{3}+\frac{2a}{2}+\frac{3}{2}=a+\frac{7}{6}$

$\frac{3a}{3}+\frac{2a}{2}-a=\frac{7}{6}+\frac{2}{3}-\frac{3}{2} \Rightarrow \frac{6a+6a-6a}{6}=\frac{7+4-9}{6}$

$6a=2 \Rightarrow a=\frac{1}{3}$

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

$a-\frac{2}{3}+a+\frac{3}{2}-a \Rightarrow \frac{1}{3}-\frac{2}{3}+\frac{1}{3}+\frac{3}{2}-\frac{1}{3} \Rightarrow \frac{-1}{3}+\frac{3}{2}$

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

L.H.S = R.H.S

7. $\frac{9x+7}{2}=\left(x-\frac{x-2}{7}\right)=36 \Rightarrow \frac{9x+7}{2}-\left(\frac{7x-x-2}{7}\right)=36$

$\frac{9x+7}{2}-\left(\frac{6x-2}{7}\right)=36 \Rightarrow \frac{9x+7}{2}-\frac{6x}{7}-\frac{2}{7}=36$

$\frac{9x}{2}-\frac{6x}{7}=36-\frac{7}{2}+\frac{2}{7} \Rightarrow \frac{63x-12x}{14}=\frac{504-49+4}{14}$

$\frac{51x}{14}=\frac{459}{14} \Rightarrow x=\frac{459}{57}$

Checking at $x = 9$

$\frac{9(a)+7}{2}-\left(9-\frac{9-2}{7}\right)=\frac{81+7}{2}-\left(9-\frac{7}{7}\right)=\frac{88}{2}-(9-1)$

$= 44-9+1=36$

L.H.S = R.H.S

8. $\frac{x+1}{x-1}=\frac{6}{5} \Rightarrow 5(x+1)=6(x-1) \Rightarrow 5x+5=6x-6$

$5x-6x=-6-5 \Rightarrow -x=-11 \Rightarrow x=11$

Checking $\frac{11+1}{11-1}=\frac{12}{10}=\frac{6}{5}$

9. $\frac{2}{3x}-\frac{3}{2x}=\frac{1}{12} \Rightarrow \frac{4x-9x}{6x^2}=\frac{1}{12} \Rightarrow \frac{-5x}{6x^2}=\frac{1}{12}$

$12(-5x)=6x^2 \Rightarrow -60x=6x^2 \Rightarrow x=\frac{60}{6}=-10$

Checking $\frac{2}{3\times(-10)}-\frac{3}{2\times(-10)} \Rightarrow -\frac{2}{30}+\frac{3}{20}$

$$\frac{-4+9}{60} = \frac{5}{60} + \frac{1}{12}$$

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

C Let the third side be x

Two equal sides will be $= 2x - 5$

$x + 2x - 5 + 2x - 5 = 55 \Rightarrow 5x - 10 = 55$

$5x = 65 \Rightarrow x = 13$

Third side = 13 m

Two equal sides are = 21 m, 21m

D Let the breadth be b

length $= b + 20$

Perimeter $= 2(l + b) = 2(b + 20 + b)$

$100 = 4b + 40 \Rightarrow 100 - 40 = 4b$

$60 = 4b \Rightarrow \frac{60}{4} = b$

$b = 15 \Rightarrow l = 15 + 20 = 35$

E Let te denominator be x

So numerator $= x - 6 \Rightarrow \frac{x-6+3}{x} = \frac{2}{3}$

$\frac{x-3}{x} = \frac{2}{3} \Rightarrow 3x - 9 = 2x \Rightarrow x = 9$

Denominator = 9 Numerator = 9 – 6 = 3

Fraction $= \frac{3}{9}$

F Let present age of Tanya be $7x$ and Mayank's age be$5x$

After ten years ratio of their ages will be $\frac{7x+10}{5x+10}$

$\frac{7x+10}{5x+10} = \frac{9}{7} \Rightarrow 7(7x + 10) = 9(5x + 10) \Rightarrow 49x + 70 = 45x + 90$

$49x - 45x = 90 - 70 \Rightarrow 4x = 20 \Rightarrow x = 5$

Tanya's age $= 7 \times 5 = 35$ years

Mayank's age $= 5 \times 5 = 25$ years

G Let the Son's age be x

Five years ago, father's age was $7(x - 5)$

5 years later

$7(x - 5) = 3x + 5 \Rightarrow 7x - 35 = 3x + 5 \Rightarrow 7x - 3x = 5 + 35$

$4x = 40 \Rightarrow x = 10$

Five, years ago father's age = $7(x-5) = 7x - 35 = 70 - 35 = 35$

Present age of father = 35 + 5 = 40 years

H Speed $= \frac{\text{distance}}{\text{time}}$

Let the distance they meet after start be x time $= \frac{\text{distance}}{\text{speed}}$

Time taken by one train $= \frac{x}{100}$

Time taken by other train $= \frac{(75-x)}{80} \Rightarrow \frac{x}{100} = \frac{(75-x)}{80}$

$80x = 7500 - 100x \Rightarrow 180x = 7500$

$x = \frac{750}{18} = 41.67$ km

time they meet $= \frac{41.67}{100} = 0.42$ hours $= 25$ minutes

They will cross at 8:25 am

I Time taken downstrem = 5 hours

Time taken upstream = 5 hours 30 mins

Speed of the stream =1.5 km/h

Let the speed of the steamer in still water be x

Speed downstream = $(x + 1.5)$ km/h

Speed upstream = $(x - 2)$ km/h

Distance covered in 5 hours while going downstream

$= 5(x + 1.5)$

Distance covered in 5.30 hours while going upstreams

$= 5\frac{1}{2}(x - 1.5)$

$5(x + 1.5) = \frac{11}{2}(x - 1.5) \Rightarrow 5x + 12.5 = \frac{11x}{2} - \frac{16.5}{2}$

$5x - \frac{11x}{2} = \frac{-16.5}{2} - 12.5 \Rightarrow \frac{10x - 11x}{2} = \frac{-16.5 - 25.0}{2}$

$-x = -31.5 \Rightarrow x = 31.5$ km

Speed of the steams in still water is 37.5 km

J Let the number of winners be x

$\therefore$ The number of losers $= 63 - x$

$100x + 25(63 - x) = 6000$

$100x + 1575 - 25x = 6000$

$75x = 6000 - 1575 \Rightarrow x = \frac{4425}{75} \Rightarrow x = 59$

No. of winners are 59.

K Let the first angle be x

Second angle $= \frac{1}{3}x$ third angle $= x + 26$

Sum of all angle $= 180° \Rightarrow x + \frac{1}{3}x + x + 26 = 180°$

$$\frac{3x + x + 3x}{3} = 180 - 26 \Rightarrow \frac{7x}{x} = 154 \times 3$$

$$x = \frac{154}{7} \times 3 = 22 \times 3$$

First angle $= 66°$ Second angle $= 22°$

Third angle $= 92°$

Chapter 7
Percentage and Its Applications

A 1. $0.005 \Rightarrow \frac{5}{1000} = 0.5\%$ 2. $\frac{0675}{100} = 75\%$

3. $\frac{7}{12} \times 100 = \frac{175}{3} = 58\frac{1}{3}\%$ 4. 1.07

$\Rightarrow \frac{1.07}{100} = 107\%$

5. $\frac{375}{1000} = 37.5\%$ 6. $\frac{11}{80} \times 100 = \frac{110}{8} = 13\frac{6}{8}\%$

7. $\frac{132}{125} \times 100 = \frac{528}{5} = 105.6\%$ 8. $\frac{3}{4} \times 100 = 75\%$

B 1. $\frac{200}{100} = 2{:}1$ 2. $\frac{20}{300} = 1{:}15$

3. $\frac{75}{100} = \frac{3}{4} = 3{:}4$ 4. $\frac{100}{300} = 1{:}3$

C (i) $0.03\% \Rightarrow \frac{0.03}{100 \times 100} = \frac{3}{10000} = 0.0003$

(ii) $\frac{32}{100} = \frac{8}{25} = 8{:}25$ (iii) $0.3\% \Rightarrow \frac{3}{10 \times 100} = \frac{3}{1000}$

(iv) $5.6 \Rightarrow \frac{56}{\quad} = \frac{56}{\quad} = 0.056$

D 1. 32% of 850 $\Rightarrow \frac{32}{100} \times 850 = 272$

2. 135% of 80 $\Rightarrow \frac{135}{10} \times 80 = 108$

3. $\frac{75}{100} \times 440 = 330$

F 1. 0.5% of $x = 3 \Rightarrow \frac{065}{10 \times 100} \times x = 3$

$\frac{5x}{1000} = 3 \Rightarrow 5x = 3000 \Rightarrow x = \frac{3000}{5} \Rightarrow x = 600$

2. 2.9% of $x = 58 \Rightarrow \frac{269}{100 \times 10} \times x = 58 \Rightarrow \frac{29}{1000} x = 58$

$x = \frac{58000}{29} \Rightarrow x = 2000$

F Let the value before one year be x

$x - \frac{x \times 10}{100} = 38700 \Rightarrow x - \frac{x}{10} = 38700$

$\frac{10x - x}{10} = 38700 \Rightarrow 9x = 387000$

$x = \frac{387000}{9} = 43000$

G Price rose = 10%

Man should reduce his consumption $= \frac{10}{100 + 10} \times 100$

$= \frac{10}{110} \times 100 = \frac{100}{11} = 9\frac{1}{11}\%$

H 20% of present value $= 22500 \times \frac{20}{100} = 4500$

Value after on year = 22500 – 4500 = 18000

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

Value after two years = 18000 – 3600 = 14400

I Let the total number of passengers be x

$\therefore$ Passengers got down at station $X = \frac{40}{100} \times x$

Passengers got down at station $Y = \frac{75}{100} \times x$

Remaining passenger = 12

$$x - \frac{4x}{10} = \frac{10x - 4x}{10} = \frac{6x}{10}$$

After 75% get down at station Y, remaining are

$$\frac{6x}{10} \times \frac{75}{100} = \frac{3x}{4 \times 10} = \frac{3x}{40} \Rightarrow \frac{6x}{10} - \frac{3x}{50} = \frac{34x - 3x}{40} = \frac{21x}{50}$$

J Normal price = 160 40% of normal price $= \frac{40}{100} \times 160 = 64$

Increased Price = 160 + 64 = ₹224

K Let the original price be x

$\therefore$ $$x - \frac{x \times 15}{100} = 306$$

$$100x - 15x = 30600 \Rightarrow 85x = \frac{30600}{85} \Rightarrow = ₹360$$

L Amount of protein $= \frac{20}{100} \times 3900 = 780$

Amount of carbohydrates $= \frac{65}{100} \times 3900 = 2535$

Amount of fats $= \frac{10}{100} \times 3900 = 390$

Amount of other thing $= \frac{5}{100} \times 3900 = 195$

A 1. M.P. = ₹ 550

Discount $= \frac{550 \times 12}{100} = 66$

Selling Price = Marked Price – Discount

= 550 – 66 = ₹484

2. M.P = 210

Discount $= 210 \times \frac{10}{100} = 21$

Selling price = Marked Price – Discount

= 210 – 21 = ₹189

3. M.P. = ₹1200

Discount $= 1200 \times \frac{25}{100} = 300$

Selling price = 1200 – 300 = ₹900

4. M.P. = ₹50

Discount $= 50 \times \frac{2}{100} = 1 = 50 - 1 = ₹49$

B 1. Cost Price $= ₹16800$

Overhead Expenses $= 16800 + 1200 = 18000$

Selling Price $= 19200$

Profit $= SP - CP = 19200 - 18000 = 1200$

Profit% $= \frac{1200}{18000} \times 100 = \frac{120}{18} = 6\frac{2}{3}\%$

C Cost of 1/3rd of land $= \frac{1}{3} \times 150000 = 50000$

At 6% loss sale price $= 50000 \times \frac{100 - 6}{100}$

$= 50000 \times \frac{94}{100} = 47000$

To get 10% profit, sale price $= \frac{100 + 10}{100} \times 150000$

$= \frac{110}{100} \times 150000 = ₹165000$

He has to sale 2/3 rd of land at $= 165000 - 47000 = 118000$

Purchase Price of $\frac{2}{3}$ land $= \frac{2}{3} \times 150000 = 100000$

Gain% $= (118000 - 100000) \times \frac{100}{100000}$

$= \frac{18000}{1000} = 18\%$

D Total cost price including overhead expenses

$= 9800 + 600 = 10400$

Selling price $= 10400 + 10400 \times \frac{8}{100}$

$= 10400 + 832 = 11232$

Amount she gained $= 11232 - 10400 = ₹832$

E Do it yourself

F Given

1. S.P $= ₹2975$ Discount% $= 15\%$

Let the M.P. $= x$ Discount $= MP \times D\%$

$= \frac{x \times 15}{100} = 15\%$ of x

S.P – M.P – Discount

$2975 = x - 15\%\text{ of } x \Rightarrow 2975 = x - \frac{15x}{100}$

$2975 = \frac{100x - 15x}{100} \Rightarrow 2975 = \frac{85x}{100} \Rightarrow x = \frac{297500}{85}$

Marked Price = ₹3500

2. M.P. = 40% × CP + CP (given)

$3500 = \frac{40}{100} \times CP + CP$

$350000 = 40C.P + 100CP \Rightarrow 35000 = 140\,CP$

$\frac{35000}{140} = CP \Rightarrow \frac{35000}{14} = ₹2500 = CP$

3. Profit = SP − CP = 2975 − 2500 = 475

A 1. (c) 2. (b) 3. (d) 4. (c) 5. (c)

B 1. $40 \times \frac{x}{100} = 16 \Rightarrow 4x = 160 \Rightarrow x = 40 \Rightarrow 40\%$

2. $1\text{ kg} = 1000 \Rightarrow 1000 \times \frac{x}{100} = 25 \Rightarrow x = 2.5\%$ **Ans.** 25%

3. 1 litre = 1000 ml

3.5 l = 3500 ml

$3500 \times \frac{x}{100} = 700; \quad x = \frac{700}{35} = 20\%$

Ans. 35%

C 1. $6.25\% \Rightarrow \frac{625}{100 \times 100} = \frac{625}{10000} = \frac{1}{16}$

2. $0.8\% \Rightarrow \frac{8}{10 \times 100} = \frac{8}{1000} = \frac{1}{125}$

3. $0.06\% \Rightarrow \frac{6}{100 \times 100} = \frac{6}{10000} = \frac{3}{5000}$

4. $22.75\% \Rightarrow \frac{2275}{10000} = \frac{91}{400}$

D Value of machine after one year $= 100000 - 100000 \times \frac{5}{100}$

$= 100000 - 5000 = 95000$

Value after 2 years $= 95000 - 95000 \times \frac{5}{100}$

$= 95000 - 4750 = ₹90250$

E Let the C.P be ₹100

M.P. $= 100 + 100 \times \frac{40}{100} \Rightarrow = 140$

Discount $= 140 \times \frac{30}{100} =$ ₹42 SP $= 140 - 42 =$ ₹98

Loss $= 100 - 98 =$ ₹2 Loss% $= 2\%$

F Let Tarun's income be 100

$\therefore$ Arun's income $= \frac{100-20}{100} \times 100 = 80$

Difference in their income is $= 100 - 80 =$ ₹20

$\therefore \quad \frac{x}{100} \times 80 = 20 \Rightarrow x = \frac{200}{8} = 25$

Ans. 25%

G Population after 1 years $= 60000 + 601000 \times \frac{10}{100}$

$= 60000 + 6000 = 66000$

Population after 2 years $= 66000 + 66000 \times \frac{10}{100}$

$= 66000 + 6600 = 72600$

Ans. 72600

H Do it yourself

I M.P $=$ ₹220

Discount $= 10\%$ S.P $= \frac{220(100-10)}{100} = 220 \times \frac{90}{100} = 198$

Profit $=$ ₹10% CP $= 198 \times \frac{100}{110} =$ ₹180

J Let 1st no. be x

Increase by 10% $x + \frac{x}{100} \times 10 = \frac{11x}{10}$

Now decrease by 10%

$\frac{11x}{10} - \left(\frac{11x}{10} \times \frac{10}{100}\right) \Rightarrow \frac{11x}{10} - \frac{11x}{100} \Rightarrow \frac{110x - 11x}{100} = \frac{99x}{100}$

Decrease $x - \frac{99x}{100} \Rightarrow \frac{100x - 99x}{100} = \frac{1x}{100}$

Decrease% is 1%

K Do it yourself

L Let C.P $= 100 \Rightarrow$ M.P $= 100 + \frac{100 \times 20}{100} = 120$

Discount = 10% $\Rightarrow$ S.P. = $120 - \frac{120 \times 10}{100} = 120 - 12 = 108$

Profit = $108 - 100 = 8 \Rightarrow$ Profit% = $\frac{8 \times 00}{100} = 8\%$

M Let the cost of fans be ₹2 and ₹y

$x + y = 3605 \Rightarrow y = 3605 - x$

S.P of first fan = $x + 55\% \times \frac{x}{100} = \frac{115x}{100}$

Second fan = $y - 9\%$ of $y = \frac{91y}{100}$

According to question

$\frac{115x}{100} = \frac{91y}{100} \Rightarrow 115x = 91y$

$115x = 91(3605 - x)$ Putting value of y from

$115x = 328055 - 91x \Rightarrow 206x = 328055$

$x = \frac{328055}{20} \Rightarrow x =$ ₹1592.50

$y = 3605 - 1592.50 = 2012.50$

N Let the number of eggs purchase be x

C.P of 3 eggs = ₹5 $\Rightarrow$ C.P of x egg = $\frac{₹5}{3x}$ and S.P of 5 eggs = ₹12

S.P of x eggs = $\frac{12}{5x}$ Profit = S.P – C.P

$143 = \frac{12x}{5x} - \frac{5}{3x} = \frac{36 - 25}{15x} = \frac{11}{15x} \Rightarrow 143 = \frac{11}{15x} \Rightarrow 143 \times \frac{15}{11} = 195$

The man purchased 195 eggs.

Chapter-8
Simple and Compound Interest

A 1. $P = 10000 \Rightarrow T = 6$ month = $\frac{1}{2}$ years

$R = 10\% \Rightarrow S.I. = \frac{P \times R \times T}{} = \frac{1000 \times 1 \times 10}{}$

$S.I = 500$

Amount $= P + I = 10000 + 500$

Amount $= 10500$

2. $P = 800$ $\quad T = 2$ years

$R = 4\%$ $\quad S.I = \dfrac{P \times R \times T}{100} = \dfrac{800 \times 4 \times 2}{100}$

$S.I = 64$ $\quad$ Amount $= 800 + 64$

Amount $= 864$

3. $P = 9500$ $\quad T = 5$ years

$R = 9.5\%$ $\quad S.I = \dfrac{P \times R \times T}{100} = \dfrac{9500 \times 5 \times 9.5}{100}$

$S.I = 4512.5$

Amount $= 9500 + 4512.5 = 14012.5$

4. $P = 1600 \Rightarrow R = 5\% \Rightarrow A = 2000 \Rightarrow T = ?$

Amount = Principle + Intent

$2000 = 1600 + \text{I} \Rightarrow \quad 2000 - 1600 = I$

$400 = I \Rightarrow S.I = \dfrac{P \times R \times I}{100}$

$400 = \dfrac{1600 \times 5 \times T}{100} \Rightarrow \dfrac{400 \times 100}{1600 \times 5} = T$

Time = 5 years

B $P = 2000 \Rightarrow R = 10 \Rightarrow T = 2$ years

Interest for 1 year $= \dfrac{P \times R \times T}{100} = \dfrac{2000 \times 10 \times 1}{100} = 200$

Amount at the end of 1st year $= 2000 + 200 = 2200$

Interest for 2nd year $= \dfrac{2200 \times 10 \times 1}{100} = 220$

Total Interest$= 200 + 200 = 420$

C $P = 1000 \Rightarrow R = 4\% \Rightarrow T = 2$ years

Interest for 1st year $= \dfrac{P \times R \times T}{100} = \dfrac{1000 \times 4 \times 1}{100} = 40$

Amount at the end of 1st year $= 1000 + 80 = 1040$

Interest for 2nd year $= \dfrac{1040 \times 4 \times 1}{100} = 41.6$

Total Interest $= 41.6 + 40 = 81.6$

D Principal $= 2000 \Rightarrow$ Rate $= 5\% \Rightarrow$ T $= 2$ years

Interest for 1st year $= \dfrac{P \times R \times T}{100} = \dfrac{2000 \times 5 \times 1}{100} = 100$

Amount payable at the end of 1st year $-2000 + 100 = 2100$

Interest for 2nd year $= \frac{2100 \times 5 \times 1}{100} = 105$

Amount payable at the end of 2nd year $= 2100 + 105 = ₹2205$

E $P = 2000 \Rightarrow R = 4\% \Rightarrow T = 3$ years

Interest for 1st year $= \frac{2000 \times 4 \times 1}{100} = 80$

Amount $= 2000 + 80 = 2080$

Interest for 2nd year $= \frac{2080 \times 4 \times 1}{100} = 83.2$

Amount $= 2080 + 83.2 = 2163.2$

Interest for 3rd year $= \frac{2163.2 \times 4 \times 1}{100} = 86.528$

Total Interest $= 80 + 83.2 + 86.52 = 249.72$

F $P = 10400 \Rightarrow R = 4.5\% \Rightarrow T = 3$ years

Interest for 1st year $= \frac{P \times R \times T}{100} = \frac{10400 \times 4.5 \times 1}{100} = 468$

Amount $= P + I = 10400 + 468 = 10868$

Interest for 2nd year $= \frac{10868 \times 4.5 \times 1}{100} = 489.06$

Amount $= 10868 + 489.06 = 11357.06$

Interest for 3rd year $= \frac{11357.06 \times 4.5 \times 1}{100} = 511.06$

Total Interest $468 + 489.06 + 511.06 = ₹1468.12$

A 1. $P = 4000 \Rightarrow R = 5\% \Rightarrow x = 2$ years

$$A = P\left(1 + \frac{R}{100}\right)^n = 4000\left(1 + \frac{5}{100}\right)^2 = 4000 \times \frac{105}{100} \times \frac{105}{100}$$

$A = ₹4410$

2. $P = 5000 \Rightarrow R = 8\% \Rightarrow x = 3$ years

$$A = P\left(1 + \frac{R}{100}\right)^n = 500\left(1 + \frac{8}{100}\right)^3 = 5000 \times \frac{108}{100} \times \frac{108}{100} \times \frac{108}{100}$$

$A = ₹6298.56$

B $P = 64000 \Rightarrow R = 2.5\% \Rightarrow x = 3$ years

$$A = P\left(1 + \frac{R}{100}\right)^n = 64000 \times \frac{102.5}{100} \times \frac{102.5}{100} \times \frac{102.5}{100} = 68921$$

$C.I = A - P = 68921 - 64000$

$C.I = ₹4921$

C $P = 2400 \Rightarrow R = 20 \Rightarrow x = 3$

$$A = P\left(1 + \frac{R}{100}\right)^n = 2400\left(1 + \frac{20}{100}\right)^3 = 2400 \times \frac{2}{10} \times \frac{12}{10} \times \frac{12}{10}$$

$$= 4147.2$$

$C.I = A - P = 4147.2 - 2400 = 1747.2$

D Principal = 7200

Rate = 5% $\Rightarrow n = 2$ years

$$\text{Amount} = P\left(1 + \frac{R}{100}\right)^n = 7200\left(1 + \frac{5}{100}\right)^2$$

$$= 7200 \times \frac{105}{100} \times \frac{105}{100} = 7938$$

$C.I = A - P = 7938 - 7200 = 738$

E $P = 12000 \Rightarrow R = 2 \Rightarrow n = 5\%$

$$A = P\left(1 + \frac{R}{100}\right)^n = 12000\left(1 + \frac{20}{200}\right)^{2\times 2} = 12000\left(1 + \frac{1}{10}\right)^4$$

$$= 12000 \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10} = 17569.2$$

$C.I = A - P = 17569.2 - 12000 = 5569.2$

F 1. $P = 3500 \Rightarrow R = 5\% \Rightarrow n = 3$ years

$$A = P\left(1 + \frac{R}{100}\right)^n = 3500\left(1 + \frac{5}{100}\right)^3$$

$$= 3500 \times \frac{105}{100} \times \frac{105}{100} \times \frac{105}{100}$$

$A = 4051.6875$

$C.I = A - P = 4051.68 - 3500$

$C.I. = 551.68$

2. $P = 5000 \Rightarrow R = 10\% \Rightarrow n = 2$

$$A = P\left(1 + \frac{R}{100}\right)^n = 5000\left(1 + \frac{10}{100}\right)^2 = 5000\left(\frac{11}{10} \times \frac{11}{10}\right)$$

$$= 5000 \times \frac{11}{10} \times \frac{11}{10}$$

$A = 6050$

$CI = A - P = 6050 - 5000$

$C.I. = ₹1050$

3. $P = 100 \Rightarrow R = 2\% \Rightarrow n = 1$ year

$A = P\left(1 + \frac{R}{100}\right) = 100\left(1 + \frac{2}{100}\right)^1 = 100 \times \frac{102}{100}$

$A =$ ₹102

C.I = A - P = $102 - 100 \Rightarrow$ C.I = ₹ 2

4. $P = 3600 \Rightarrow R = 10\% \Rightarrow n = 2$ yrs

$A = P\left(1 + \frac{R}{100}\right)^n = 3600\left(1 + \frac{10}{100}\right)^2 = 3600\left(1 + \frac{1}{10}\right)^2$

$= 3600 \times \frac{11}{10} \times \frac{11}{10}$

$A = 4356 \Rightarrow C.I = 4356 - 3600 \Rightarrow C.I =$ ₹756

G $P = 25000 \Rightarrow n = 3 \Rightarrow R = 15$

$A = P\left(1 + \frac{R}{100}\right)^n = 25000\left(1 + \frac{15}{100}\right)^3$

$= 25000 \times \frac{115}{100} \times \frac{115}{100} \times \frac{115}{100}$

$A = 38021.875$ $C.I = 38021.875 - 25000$

$C.I =$ ₹13021.87

H $P = 12500 \Rightarrow R = 8\% \Rightarrow n = 6$ Months $= \frac{1}{2}$ yrs

$A = P\left(1 + \frac{R}{100}\right)^n = 12500\left(1 + \frac{8}{400}\right)^2 = 12500 \times \frac{51}{10} \times \frac{51}{50}$

$A = 13005$

$C.I = A - P = 13005 - 12500 = 505$

I $I = A - P = 774.40 - 640 = 134.40$

$I = \frac{P \times R \times T}{100} \Rightarrow 134.40 = \frac{640 \times R \times 2}{100}$

$\frac{134.4 \times 10}{64 \times 2 \times 10} = R \Rightarrow \frac{1344}{64} = R \Rightarrow 10.5\% = R$

J $P = 4096 \Rightarrow R = \frac{25}{2}\%$

$n = 18$ months $= 1\frac{1}{2}$ years $= \frac{3}{2}$ years

$A = P\left(1 + \frac{R}{200}\right)^{2 \times \frac{3}{2}} = 4096\left(1 + \frac{25}{400}\right)^3 = 4096\left(1 + \frac{1}{16}\right)^3$

$= 4096 \times \frac{17}{16} \times \frac{17}{16} \times \frac{17}{16} \Rightarrow A = 4913$

1. $P = 500$ $\quad R = 10\%$

   $n = 1$ $\quad A = 500\left(1 + \frac{10}{200}\right)^2$

   $500 \times \frac{21}{20} \times \frac{21}{20} = 551.25 \Rightarrow I = A - P = 551.25 - 500$

   $I = 51.25$

2. $P = 2560 \Rightarrow R = 12\frac{1}{2}\% = \frac{25}{2}\%$

   $n = 1 \Rightarrow A = P\left(1 + \frac{R}{100}\right)^{2n} = 2560\left(1 + \frac{25}{400}\right)^2 = 2560\left(\frac{17}{16} \times \frac{17}{16}\right)$

   $A = 2890$

   $I = A - P = 2890 - 2560$

   $I = 330$

3. $P = 10000$ $\quad R = 8\%$ $\quad n = 1$

   $A = P\left(1 + \frac{R}{200}\right)^{2n} = 10000\left(1 + \frac{8}{200}\right)^{2n} = 10000 \times \frac{208}{200} \times \frac{208}{200}$

   $A = 10{,}816$

   $I = A - P = 10816 - 10000$

   $I = 816$

4. $P = 4000 \Rightarrow n = 1\frac{1}{2} = \frac{3}{2}$ years

   $R = 10\% \Rightarrow A = P\left(1 + \frac{R}{200}\right)^{2n}$

   $= 4000\left(1 + \frac{10}{200}\right)^{2 \times \frac{3}{2}} = 4000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} = 4630.5$

   $C.I = A - P = 4630.5 - 4000$

   $I = 630.5$

5. $P = 8000$ $\quad R = 12\frac{1}{2} = \frac{25}{2}\%$ $\quad n = 2$ years

   $A = P\left(1 + \frac{R}{100}\right)^n = 8000\left(1 + \frac{25}{200}\right)^2 = 8000\left(1 + \frac{1}{8}\right)^2$

$= 8000 \times \frac{9}{8} \times \frac{9}{8}$

$A = 10,125$

$I = A - P = 10{,}125 - 1800 = ₹2125$

6. $P = 4096$

$n = 18 \text{ months} = 1\frac{1}{2} \text{ years} = \frac{3}{2} \text{ years}$

$R = 12\frac{1}{2}\% \Rightarrow A = P\left(1 + \frac{R}{200}\right)^{2n}$

$= 4096\left(1 + \frac{25}{400}\right)^{2\times\frac{3}{2}} = 4096 \times \left(\frac{17}{16}\right)^3 = 4096 \times \frac{17}{16} \times \frac{17}{16} \times \frac{17}{16}$

$A = ₹4913$

1. Let Principal = 100, Rate = 5% Time = 2 years

$C.I = P\left[\left(1 + \frac{5}{100}\right)^2 - 1\right] = 100\left[\left(1 + \frac{1}{20}\right)^2 - 1\right] = 100\left[\frac{21}{20} \times \frac{21}{20} - 1\right]$

$= 100\left[\frac{441}{400} - 1\right] = 100 \times \frac{41}{400} = 10.25$

If C.I is 10.25 principal is = 100

If C.I is ₹164 principal $= \frac{164 \times 100}{10.25}$

C.I = ₹1600

2. Do it yourself

3. $P = ₹2500$ $R = 9\%$ $n = 2 \text{ years}$

$A = P\left(1 + \frac{R}{100}\right)^n = 2500\left(1 + \frac{9}{100}\right)^2 = 2500 \times \frac{109}{100} \times \frac{109}{100}$

$= 2500 \times \frac{109}{100} \times \frac{109}{100} \Rightarrow A = 2970.25$

$C.I = A - P = 2970.25 - 2500$

$C.I = 470.25$

4. $A = P \times \left(1 + \frac{R}{100}\right)^n \Rightarrow 4410 = 4000 \times \left(1 + \frac{5}{100}\right)^n$

$\frac{4410}{4000} = \left(\frac{21}{20}\right)^n \Rightarrow \frac{21 \times 21}{20 \times 20} = \left(\frac{21}{20}\right)^n \Rightarrow \left(\frac{21}{20}\right)^2 = \left(\frac{21}{20}\right)^n$

$n = 2$

5. $P = 16000 \qquad R = 5\% \qquad n = 2$ years

$A = P\left(1 + \frac{R}{100}\right)^n = 16000\left(1 + \frac{5}{100}\right)^2 = 16000 \times \frac{21}{20} \times \frac{21}{20}$

$= 17640$

6. Do it yourself
7. Do it yourself
8. Do it yourself
9. $P = 640$

$A = 774.40 \Rightarrow n = 2$ years $\Rightarrow A = P\left(1 + \frac{R}{100}\right)^2$

$774.40 = 640\left(1 + \frac{R}{100}\right)^2 \Rightarrow \frac{774.40}{640 \times 100} = \left(1 + \frac{R}{100}\right)^2$

$\left(\frac{88}{80}\right)^2 = \left(1 + \frac{R}{100}\right)^2 \Rightarrow \frac{88}{80} - 1 = \frac{R}{100} \Rightarrow \frac{88 - 80}{80} = \frac{R}{100}$

$\frac{8 \times 100}{80} = R \Rightarrow \frac{8 \times 100}{80} = R$

$R = 10\%$ per annum

10. $P = 12000 \Rightarrow R = 5\% \Rightarrow A = 13230$

$n = ? \Rightarrow A = P\left(1 + \frac{R}{100}\right)^n$

$13230 = 12000\left(1 + \frac{5}{100}\right)^n$

$\frac{13230}{12000} = \left(1 + \frac{1}{20}\right)^n \Rightarrow \frac{1323}{1200} = \left(\frac{21}{20}\right)^n$

$\Rightarrow \qquad \left(\frac{21}{20}\right)^2 = \left(\frac{21}{20}\right)^n \Rightarrow n = 2$

11. $P = ? \qquad A = 4177.20 \qquad n = 2$

$R = 18\%$ p.**a** $\qquad A = P\left(1 + \frac{R}{100}\right)^n$

$4177.20 = P\left(1 + \frac{18}{100}\right)^2 \Rightarrow 4177.20 = P \times \frac{118}{100} \times \frac{118}{100}$

$4177.20 \times \frac{100}{118} \times \frac{100}{118} = P \Rightarrow P = ₹3000$

A 1. (b) 2. (c) 3. (d) 4. (d) 5. (a)

B $A = ₹3000$ $n = 2$ years $R = 10\%$

$$A = P\left(1+\frac{R}{100}\right)^n = 3000\left(1+\frac{10}{100}\right)^2 = 3000\left(\frac{11}{10}\times\frac{11}{10}\right)$$

$$= 30\times 121 = ₹3630$$

$$C.I = A - P = 3630 - 3000$$

$A = ₹630$

C $P = 5000$ $n = \frac{3}{2}$ years $R = 16\%$

$$A = P\left(1+\frac{R}{200}\right)^{2\times\frac{3}{2}} \Rightarrow A = 5000\left(1+\frac{16}{200}\right)^3$$

$$A = 5000\times\frac{216}{200}\times\frac{216}{200}\times\frac{216}{200} \Rightarrow A = 6298.56$$

$$C.I = A - P = 6298.56 - 5000$$

$C.I = 1298.56$

D $P = 32500$ $n = 1$ years $R = 12\%$

$$A = P\left(1+\frac{R}{200}\right)^{2n} = 32500\left(1+\frac{12}{200}\right)^2$$

$$= 32500\left(\frac{53}{50}\times\frac{53}{50}\right) = 36517$$

$C.I = A - P = 36517 - 32500$ $C.I = 4017$

E Mr.Sharma

$P = 12500$ $R = 10\%$ $n = 3$ years

$$A = P\left(1+\frac{R}{100}\right)^n = 12500\left(1+\frac{10}{100}\right)^3 = 125000\times\frac{11}{10}\times\frac{11}{10}\times\frac{11}{10}$$

$$= 16637.5$$

$C.I = 16637.5 - 12500 = 4137.5$

Mr. Singh

$P = 72500 \Rightarrow R = 12\% \Rightarrow n = 3$

$$A = 12500\left(1+\frac{12}{100}\right)^3 = 12500\times\frac{112}{100}\times\frac{112}{100}\times\frac{112}{100}$$

$= 17561.6$

Mr. Singh pays ox interest by $5061.6 - 4137.5 = ₹924.1$

F $P = 12000 \qquad R = 5\% \qquad n = ?$

$A = 13230$

$$13230 = 12000\left(1 + \frac{5}{100}\right)^n \Rightarrow \frac{13230}{12000} = \left(1 + \frac{1}{20}\right)^n$$

$$\frac{13230}{12000} = \left(\frac{21}{20}\right)^n \Rightarrow \left(\frac{21}{20}\right)^2 = \left(\frac{21}{20}\right)^n \Rightarrow n = 2$$

G $P = 6400 \Rightarrow n = 3\,\text{yrs} \Rightarrow R = \frac{15}{2}\,\text{yrs}$

$A = ?$

$$A = 6400\left(1 + \frac{15}{200}\right)^3 \Rightarrow A = 6400\left(1 + \frac{3}{40}\right)^3$$

$$= 6400 \times \frac{43}{40} \times \frac{43}{40} \times \frac{43}{40} = ₹7950.7$$

H $P = 16000 \Rightarrow n = \frac{3}{2}\,\text{yrs} \Rightarrow R = 10\%$

$$A = 16000\left(1 + \frac{10}{200}\right)^{2\times\frac{3}{2}} = 16000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$$

$A = 18522$

I $A = 10240 \Rightarrow n = 2 \Rightarrow R = \frac{20}{3} \Rightarrow P = ?$

$$10240 = P\left(1 + \frac{20}{300}\right)^2 \Rightarrow 10240 = P\left(\frac{16}{15} \times \frac{16}{15}\right)$$

$$\frac{10240 \times 15 \times 15}{16 \times 16} = P \Rightarrow P = 9000$$

J $n = 1\,\text{yr} \Rightarrow P = 2000 \Rightarrow R = 8\%$

$$A = 2000\left(1 + \frac{8}{400}\right)^4 = 2000\left(1 + \frac{1}{50}\right)^4 = 2000 \times \frac{51}{50} \times \frac{51}{50} \times \frac{51}{50} \times \frac{51}{50}$$

$A = 2164.86$

K $P = 17000 \qquad R = 15\% \qquad n = \frac{1}{4}$

$$A = 17000\left(1 + \frac{15}{100}\right)^{4\times\frac{1}{4}} = 17000\left(\frac{1+3}{20}\right) = 17000 \times \frac{23}{20}$$

$A = 19550$

Chapter 9
Direct Increase and Compound Variations

A 1

B

Payment Done	806	1798
No. of Days	13	x

$806 : 1798 = 13 : x \Rightarrow \frac{806}{1798} = \frac{13}{x} \Rightarrow 806x = 13 \times 1798$

$x = \frac{13 \times 1798}{806} \Rightarrow x = 29 \text{ days}$

C

No. of men	13	x
length	117m	225m

$13 : x = 117 : 225 \Rightarrow \frac{13}{x} = \frac{117}{225} \Rightarrow \frac{13 \times 225}{117} = x$

$x = 25 \text{ men}$

D

No. of bottles	8	x
No. of Children	5	40

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

$x = 64 \text{ bottle}$

E

No. of patients	60	x
Consumption of milk	1350	1710

$60 : x = 1350 : 1710, \frac{60}{x} = \frac{1350}{1710} \Rightarrow \frac{60 \times 1710}{1350} = x$

$x = 76 \text{ patients}$

F

No. of cardboard	12	294
Thickness	35	x

$$\frac{12}{294}=\frac{35}{x}\Rightarrow 12x=35\times 294\Rightarrow x=\frac{35\times 294}{12}$$

$x = 857.5$ mm

G

No. of Steps	150	360
Distance	125 m	x

$$\frac{150}{360}=\frac{125}{x}\Rightarrow 15x=125\times 36\Rightarrow x=\frac{125\times 36}{15}$$

$\Rightarrow x = 300$ Steps

1.

No. of Cycles	25	x
Price	500	625

$$\frac{25}{x}=\frac{625}{500}\Rightarrow x=\frac{25\times 500}{625}\Rightarrow x=20 \text{ cycles}$$

2.

No. of labourers x	30	x_2
Hours y	7	6
No. of Days z	18	30

$$x_1\times y_1\times z_1=x_2\times y_2\times z_2\Rightarrow 30\times 7\times 18=x\times 6\times 30$$

$$\frac{30\times 7\times 18}{6\times 30}=x\Rightarrow x=21 \text{ labourers}$$

3.

Speed (x)	54 km/h	60 km/h
Time taken (y)	10	x

$$\frac{54}{60}=\frac{x}{10}\Rightarrow\frac{54\times 10}{60}=x\Rightarrow x=9 \text{ hours}$$

4.

No. of pumps (x)	4	x
Time Taken (y)	8	16/3

$$4\times 8=\frac{16}{3}\times x\Rightarrow \frac{4\times 8\times 3}{16}=x\Rightarrow x=6\,\text{pumps}$$

5.

No. of men	125	150
No. of days	180	x

$$\frac{125}{150}=\frac{x}{180}\Rightarrow \frac{125\times 180}{150}=x\Rightarrow 150\,\text{days}=x$$

6.

No. of cow	55	x
No. of days	15	5

$$\frac{15}{5}=\frac{x}{55}\Rightarrow \frac{15\times 55}{5}=x\Rightarrow 165\,\text{cow}=x$$

1.

No. of worker	Days	Money
12	10	21600
20	16	x

$$12\times y\times 10=20\times 21600\times 16$$

$$y=\frac{20\times 21600\times 16}{12\times 10}\Rightarrow y=57600$$

2.

No. of men	No. of hours	No. of days	Area
10	5	12	5
16	4	x	8

Product of means = Product of extremes

$$10\times 4\times x\times 8=16\times 5\times 12\times 5$$

$$x=\frac{16\times 5\times 12\times 5}{}\Rightarrow x=15\,\text{days}$$

3. Do it yourself

4.

No. of men	No. of days
52	35
28	x

$52 \times 35 = 28 \times x \Rightarrow \frac{52 \times 35}{28} = x \Rightarrow x = 65$

5.

No. curtains	Length
9	4 m
x	3 m

$x_1 y_1 = x_2 y_2 \Rightarrow 9 \times 4 = x \times 3 \Rightarrow \frac{36}{3} = x$

$x = 12$ curtains

1. Rakesh and Vikas together complete work in $\frac{1}{10}$ days

Rakesh can do $= \frac{1}{4}$ of work

Rakesh can do $\frac{1}{4}$ of work in 12 days $= \left(\frac{1}{4}\right)\left(\frac{1}{12}\right) = \left(\frac{1}{48}\right)$

$\frac{1}{48}$ + Vikas's work $= \frac{1}{10}$

Vika's work $= \frac{1}{10} - \frac{1}{48} = \frac{48-10}{480} = \frac{38}{480}$

Vikas can do this work in $\frac{480}{38}$ days i.e., $12\frac{12}{19}$ days

2. Priyanka and Manvi together can do work is $= \frac{1}{20}$

Priyanka alone $= \frac{1}{5}\left(\frac{1}{12}\right) = \frac{1}{60}$

Manvi can do $= \frac{1}{20} - \frac{1}{60} = \frac{3-1}{60} = \frac{2}{60} = \frac{1}{30}$

Ans. Manvi can do this work in 30 days

3. Do it yourself

4. X can do work in 1 day $= \frac{1}{9}$

Y can do work in 1 day $= \frac{1}{18}$

Z can do work is 1 day $= \frac{1}{12}$

Together $= \frac{1}{9} + \frac{1}{18} + \frac{1}{12} = \frac{4+2+3}{36} = \frac{9}{36} = \frac{1}{4}$

Together they can do work in 4 hours.

5. $A + B + C = \frac{1}{10} \Rightarrow A's$ work in 1 day $= \frac{1}{40}$

$B\,s$ work in 1 day $= \frac{1}{30}$

C work $= \frac{1}{10} - \frac{1}{40} - \frac{1}{30} = \frac{12-3-4}{120} = \frac{5}{120} = \frac{1}{24}$

C alone can do this work in 24 days.

1. Distance = 200 m + 160 m = 360 m

Time = 18 sec

Speed $= \frac{D}{t} = \frac{360}{18}$ m/s

In km/h $\frac{360}{18} \times \frac{18}{5} = 72$ km/h

2. Speed = 54 km/h $= 54 \times \frac{5}{18}$ m/s $= 15$ m/s

Train covers 15 m in 1 second

Time taken by train to cover 240m $= \frac{240}{15} = 16s$

It passes an electric pole in 11s and 16 s to cross

240 m platform so total time taken 11s + 16 s = 27 seconds

3. Train 1

Speed = 30 km/h $= 30 \times \frac{5}{10} = \frac{25}{3}$ m/s

Train 2 $\Rightarrow$ Speed = 24 km/h

$24 \times \frac{5}{18} = \frac{20}{3}$ m/s

$$\text{Time} = \frac{\text{Total Distance}}{\text{Total Speed}} = \frac{150+180}{\frac{20}{3}+\frac{25}{3}} = \frac{130\times 3}{45} = 22 \text{ seconds}$$

4. Total distance = 110 + 100 = 210
   Relative speed = 46 – 39 = 7 km/h
   $\text{Relative Speed} = 7\times\frac{5}{18} = \frac{35}{18}$ m/s
   $\text{Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{210\times 18}{35} = 108 \text{ sec} = 1 \text{ min } 48 \text{ sec}$

5. Distance = 220 m
   $\text{Relative Speed} = 60 + 6 = 66 \text{ km/h} = 66\times\frac{5}{18} = \frac{55}{3}$
   $\text{Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{220\times 3}{5} = 12 \text{ sec}$

6. Distance = 135 m
   $\text{Relative Speed} = 62 \text{ km/h} - 8 \text{ km/h} = 54 \text{ km/h} = \frac{54\times 5}{100}$
   = 15 m/s
   $\text{Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{135}{15} = 9 \text{ seconds}$

7. Distance = 425 km
   Time = 10: 30 – 2 pm = 8 hour 30 minutes
   $\text{Speed} = \frac{425}{8.5} = 50 \text{ km/h}$

8. Train Cover 80 km in 1 hour
   So in 5 hours = 80 × 5 = 400 km

A 1. (d) 2. (d) 3. (b) 4. (c) 5. (a) 6. (d)

B

No. of pens	15	20	3
cost	600	x_1	x_2

$$\frac{15}{600} = \frac{20}{x_1}$$

1. $x_1 = 20\times\frac{600}{15} = 800$

2. $\frac{20}{800} = \frac{3}{x_2} \Rightarrow x_2 = \frac{3 \times 800}{20} = 120$

C

No. of books	52	x
Amount	525	546

$52 \times 525 = x \times 546$

$\frac{52 \times 525}{546} = x$

$50 \text{ books} = x$

D 1.

x	17	51
y	51	153

2.

x	25	7
y	75	21

x	9	18
y	36	72

E

No. of days	8	20
Payment	600	x

$\frac{8}{600} = \frac{20}{x} \Rightarrow 8x = 20 \times 600 \Rightarrow x = \frac{20 \times 600}{8}$

$x = 1500$

F

No. of men	120	90
No. of days	195	x

$120 \times 195 = 90 \times x \Rightarrow \frac{120 \times 195}{90} = x \Rightarrow 260 \text{ days} = x$

9. With speed of 60 km/h

Distance $= 60 \times 9 = 560 \text{ km}$

Speed $= \frac{d}{t} = \frac{540}{6} = 90$ km/h

Speed should be increased by $= 90 - 60 = 30$ km/h

H Average speed of cycle = 12 km/h

It took = 20 minute $= \frac{20}{60}$ hour $= \frac{1}{3}$ hour

Distance = Speed × Time $= 12 \times \frac{1}{3} = 4$ km

To Cover this distance in 15 minutes

Speed $= \frac{D}{t} = \frac{4}{15} = \frac{4}{\frac{15}{60}} = \frac{4 \times 60}{15} = 16$ km/h

I Train I

Speed = 32 km/h $= 32 \times \frac{5}{18} = \frac{80}{9}$ m/s

Train 2

Speed = 40 km/h $= 40 \times \frac{5}{100} = \frac{100}{9}$ m/s

Time $= \frac{\text{Distance}}{\text{speed}} = \frac{132 + 108}{\frac{80}{9} + \frac{100}{9}} = \frac{240 \times 9}{180} = 12$ seconds

J Time taken by Sudhir = 5 days

Time taken by Vikas = 8 days

Together $= \frac{1}{5} + \frac{1}{8} = \frac{8+5}{40} = \frac{13}{40}$

Time taken together $= \frac{40}{13}$ days i.e, $3\frac{1}{13}$ days

K

Spendifux	No. of students	No. of days
3200	10	32
8000	40	x

L 1. No variation 2. Inverse Variation

3. Inverse Variation

M Together Ram and Shyam take = 4 days

Shyam alone plough field = 6 days

Ram alone can do it in $= \frac{1}{\quad} - \frac{1}{\quad} = \frac{6-4}{\quad} = \frac{1}{\quad}$

Ram alone can do it in 12 days

N Pipe fill the cistern in 1 hour $= \frac{1}{3}$

Let the leak empty the cistern in 1 hr $= \frac{l}{t} \Rightarrow \frac{1}{3} - \frac{l}{t} = \frac{1}{5}$

$$\frac{1}{t} = \frac{1}{3} - \frac{1}{5} \Rightarrow \frac{5-3}{15} = \frac{2}{15}$$

It can be emptied in $\frac{15}{2} = 7\frac{1}{2}$ hours

O Distance = 180 m

Time taken = 9 second

Speed $= \frac{d}{t} = \frac{180}{9}$ 20 m/s

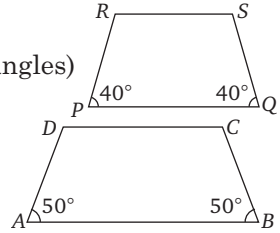
In Km/h $20 \times \frac{18}{5} = \frac{360}{5} = 72$ km/h

P Let the length of the train be x metres then,

$\frac{x}{15} = \frac{x+100}{25} \Rightarrow 25x = 15x + 1500 \Rightarrow 25x - 15x = 1500$

$10x = 1500 \Rightarrow x = 150$ m

Chapter 10
Special Type of Quadrilaterals



A $\angle P + \angle R = 180°$ (Cointerior angles)

$\angle R = 140°$

Similarly $\angle S = 140°$

B $\angle A + \angle D = 180°$ (Cointerior angles)

$\angle D = 130°$

Similarly $\angle C = 130°$

C A parallelogram is a slanting rectangle whose opposite sides are parallel whereas rhombus is slanting square whose adjacent sides are equal.

D 1, 2, 4, 5, 7, ... 360°

$18x = 360° \Rightarrow x = \dfrac{360}{18}$

$\angle P = 2x = 2 \times 20 = 40°$ $\angle Q = 4x = 4 \times 20 = 80°$

$\angle R = 5x = 5 \times 20 = 100°$ $\angle S = 7x = 7 \times 20 = 140°$

2. Yes, because sum of interior angles on the same side of transversal = 180°

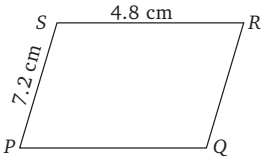
3. No,. because opposites sides are not equal.

E perimeter of parallelogram

= Sum of all sides

= 4.8 + 4.8 + 7.2 + 7.2

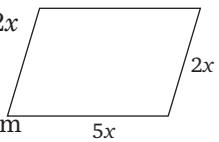
= 24.0 cm



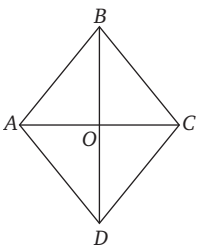
F Perimeter of parallelogram = $5x + 5x + 2x + 2x$

$42 = 14x \Rightarrow x = \dfrac{42}{14}$

Side are $5x = 5 \times 3 = 15$ cm $\Rightarrow 3x = 2 \times 3 = 6$ cm



G 1.



In ΔBOC and ΔDOC

$BC = CD$ (All sides of rhombus an equal)

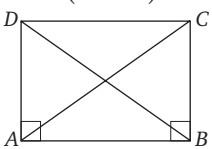
$OC = OC$ (common)

$BO = OD$ (BD and AC bisects side each other)

$\therefore \Delta BOC \cong \Delta DOC$ {SSS}

2. $\therefore$ $\angle BCO = \angle DCO$ (CPCT)

H Given : $ABCD$ is a rectangle



To prove $AC = BD$

Proof In ΔABC and ΔBAD

$AD = BC$ (opp sides of rectangle are equal)

$\angle DAB = \angle CBA = 90°$ (Each angle of rectangle is 90°)

$AB = BA$ (common sides)

$\therefore$ $\angle ABC \cong \angle BAD$ (By SAS conguent condition)

$\therefore$ $AC = BD$

A Perimeter is parallelogram = 24 cm

let one side be x

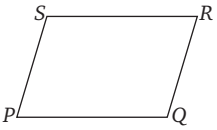
So other side will be $x + 2$

$\therefore\ x + x + 2 + x + x + 2 = 24 \Rightarrow 4x + 4 = 24 \Rightarrow 4x = 20$

$\Rightarrow \qquad x = 5$

So the sides are 5 cm and 7 cm

B Let $\angle P = 70°$



$\angle P + \angle Q = 180°$ (Co interior angles)

$70° + \angle Q = 180°$

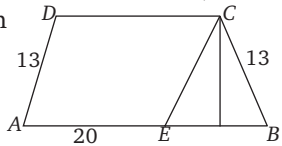
$\angle Q = 110°$

$\angle Q = \angle S = 110°$

(opposite angle of parallelogram are equal)

$\angle P = \angle R = 70^3$ (opposite angles of parallelogram are equal)

C Let ABCD be the given trapezium in which $AB = 20$ cm, $BC = 13$ cm, $AD = 13$ and $DC = 10$ cm



Through C_1 draw EC | | AD,

meeting AB at E

Also, draw $CF \perp AB$

Now, $EB = (AB - AE) = (AB - DC) = (20 - 10) = 10$ cm

Now, In ΔEBC, we have $CE = BC = 13$ cm

So it is an isosceles triangle

Also $CF \perp AB$ So F is the midpoint of EB

$AEF = \frac{1}{2} EB = \frac{1}{2} \times 10 = 5$ cm

$CF = \sqrt{CE^2 - EF^2} = \sqrt{13^2 - 5^2} = \sqrt{169 - 25} = \sqrt{144} = 12$ cm

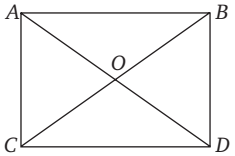
Thus, the distance between parallel sides is 12 cm

$\therefore$ Area of trapezium $ABCD = \frac{1}{2} \times$ (Sum of parallel sides) $\times$ (distance between them)

$= \frac{1}{2}(20 + 10) \times 12 = \frac{1}{2} \times 30 \times 12 = 180\ \text{cm}^2$

D $AD = 10$ cm (given)

$CD = AC = x$ (Let's say)

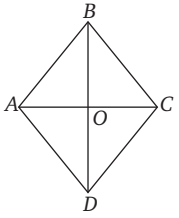


According to pythagoras

$x^2 + x^2 = (10)^2 \Rightarrow 2x^2 = 100 \Rightarrow x^2 = \frac{100}{\quad} = 50$

$x = \sqrt{50} \Rightarrow x = 7.1\text{ cm}$

E Let $ABCD$ is a given rhombus



$AC = 6\text{ cm} \Rightarrow BD = 8\text{ cm}$

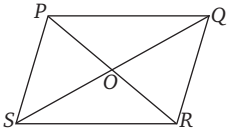
$\Rightarrow BO = \frac{1}{2}BD = \frac{1}{2} \times 8 = 4\text{ cm}$

Similarly $AO = 3\text{ cm}$

In $\Delta AOB \Rightarrow AB^2 = AO^2 + OB^2$ (Pythagorus thusem)

$AB^2 = 4^2 + 3^2 = 16 + 9 \Rightarrow AB^2 = 25 \Rightarrow AB = 5\text{ cm}$

F Let $PQRS$ be the rhombus as shown



Now, Let diagonal QS of rhombus $PQRS$ be equal to one of its side RS

Hence, $PQ = QR = RS = SP = QS$

(All sides of rhombus are equal)

SRQ and SPQ are equilateral triangles

$\angle R = \angle P = 60°$

Now $\angle S + \angle R = 180° \Rightarrow \angle S + 60° = 180° \Rightarrow \angle S = 120°$

$\angle S = \angle Q = 120°$

G $ABCD$ is a square (given)

$\therefore \angle A = \angle B = \angle C = \angle D = 90° \Rightarrow \angle CDA = \frac{1}{2}CDB$

$= \frac{1}{2} \times (90°)$ {$\because AD$ is a diagonal}

$\angle CDA = 45°$

H Let length be $3x$

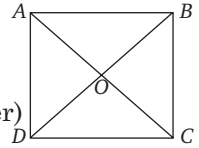
breadth be $2x$

Perimeter $= 2(l + b)$

$30 = 2(3x + 2x) \Rightarrow 30 = 10x \Rightarrow x = 3\text{ cm}$

length $= 3 \times 3 = 9\text{ cm}$ breadth $= 2 \times 3 = 6\text{ cm}$

I Given $ABCD$ is a s square



$\therefore AC = BD$ (Diagonals an equal)

$OA = OC$ and $OB = OD$

(Diagonals bisect each other)

As, $AC = 10 \Rightarrow OA = 5\text{ cm} \Rightarrow OA = OC = 5\text{ cm}$

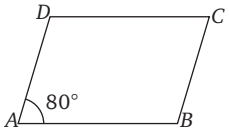
Similarly $OB = OD = 5\text{ cm}$

J Do it yourself

K Do it yourself

L 1. PO, ON; ON, NM; NM, MP 2. 4 pairs

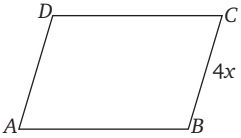
M $\angle A = \angle C = 80°$ (opposite angle of parallelogram are equal)



$\angle A + \angle B = 180° \Rightarrow \angle B = 100°$

$\angle B = \angle D = 100°$ (opposite angle of parallelogram are equal)

N Let $ABCD$ be a parallelogram



$AB = x \Rightarrow BC = 4x$

$AB = DC = x$,

$BC = AD = 4x$ {opposite sides}

$AB + BC + CD + DA = 200 \Rightarrow 2x + 8x = 200 \Rightarrow 10x = 200$

$x = 20\,\text{cm} \Rightarrow AB = 20 = DC \Rightarrow BC = 4 \times 20 = 80\ \text{cm} = AD$

Chapter 11
Construction of Quadrilaterals

Do it yourself

Chapter Check-up

A 1. (b) 2. (c) 3. (c) 4. (b) 5. (b)

B Do it yourself

C Do it yourself

D Do it yourself

E Do it yourself

F Sum of all angles of quadrilateral = 360°

Since all angle are equal

Let's say $x \Rightarrow 4x = 360° \Rightarrow x = \frac{360°}{4} \Rightarrow x = 90°$

This is a parallelogram

This is a square since all the angles are 90°

G Do it yourself

H Do it yourself

I Do it yourself

J Do it yourself

K Do it yourself

L Do it yourself

M Do it yourself

N Do it yourself

O Do it yourself

Let the forth angle be x

$\therefore\ 110°+50°+40°+x=360° \Rightarrow x=360°-200°=160°$

Chapter-12
Identification of dimensional shapes

A 1. Sphere 2. Triangle 3. Hexagon 4. Cylinder

B Do it yourself

C Do it yourself

D Do it yourself

Chapter Check-up

A 1. Tetrahedron 2. Vertex 3. Prism
4. 8, 12, 6

B Do it yourself

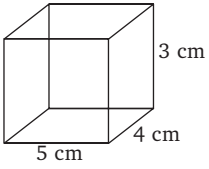
C 1. 6 2. 5 3. 4 4. 6 5. 5

D 1. Square 2. Circle and Rectangle 3. Triangle
4. Triangle and Rectangle

E 1. Triangular Pyramid 2. Hexagonical pyramid

F Do it yourself

G



H Do it yourself

Chapter 13
Area of rectillinear figures

A 1. Area of rectangle $= l \times b = 5 \times 4.5 = 22.5\ cm^2$

2. Area of rectangle $= l \times b = 7 \times 6.3 = 44.1\ \text{cm}^2$

3. Area of rectangle $= l \times b = 8 \times 4.6 = 36.8\ \text{cm}^2$

B 1. Area of square $=$ side $\times$ side $= 6.2 \times 6.2 = 38.44\ \text{cm}^2$

2. Area of square $=$ side $\times$ side $= 4.8 \times 4.8 = 23.04\ \text{cm}^2$

3. Area of square $=$ side $\times$ side $= 6.5 \times 6.5 \Rightarrow 42.25\ \text{cm}^2$

C Area of square $=$ side $\times$ side $\Rightarrow 3600 = (\text{side})^2$

$\sqrt{3600} = \text{side} \Rightarrow 60\ \text{m} = \text{side}$

D Area of four walls of room $= 192\ \text{m}^2$

$2(l + b) \times h = 192 \Rightarrow 2(4 + 4) \times h = 192$

$$16 \times h = 192 \Rightarrow h = \frac{192}{16} \Rightarrow h = 12\ \text{m}$$

E Area of rectangle $= 5 \times$ Area of 5 squares

$125 = 5 \times (\text{side})^2 \Rightarrow \frac{125}{5} = (\text{side})^2 \Rightarrow (\text{side})^2 = 25$

side $= 5$ m

F Let the side be $4x$ and $3x$

Area of rectangle $= 4x \times 3x \Rightarrow 1728 = 12x^2 \Rightarrow \frac{1728}{12} = x^2$

$x = 12$ m

So length $= 4 \times 12 = 48$

Breadth $= 3 \times 12 = 36$

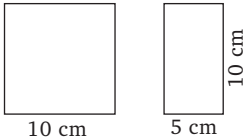
Perimeter $= 2(l + b) = 2(48 + 36) = 2(84) = 168$ m

cost of fencing 1 metre $= 3$

cost of fencing 168 m $= 168 \times 3 = ₹504$

G The rectangle fformed will hour $l = 10$ cm

Area $= l \times b = 10 \times 5 = 50\ \text{cm}^2$ $\quad b = 5$ cm



H Diagonal of the room $= \sqrt{l^2 + b^2 + h^2}$

$= \sqrt{8^2 + 6^2 + 10^2} = \sqrt{64 + 36 + 100} = \sqrt{200} = 10\sqrt{2}$

I Area of 4 walls $= 2(l + b) \times h$

$= 2h(l + b) = 2lh + 2bh = 2 \times 40 \times 35 + 2 \times 30 \times 35$

$= 2800 + 2100$

$= 4900\ \text{m}^2$

Cost of white washing $= 1\text{m}^2 = 2.50$

cost of white working $4900\ \text{m}^2$ ₹12250

J Let length and breadth be $6x$ and $5x$ respectivelly

Area of rectangle $= 6x \times 5x$

$$1080 = 30x^2 \Rightarrow \frac{1080}{30} = x^2 \Rightarrow x = 6$$

Length $= 6x = 6 \times 6 = 36$ m

Breadth $= 5x = 5 \times 6 = 30$ m

K Perimeter of rectangle 24 m $= 2(l + b)$

Area or rectangle $= 27$ m $= l \times b$

$2l + 2b = 24 \Rightarrow l + b = \frac{24}{2} = 12 \Rightarrow l + b = 12 \Rightarrow l = 12 - b$

Put the value of in

$(12 - l) \times b = 27 \Rightarrow 12b - b^2 = 27 \Rightarrow b^2 - 12b + 27 = 0$

$b^2 - 9b - 3b + 27 = 0 \Rightarrow b(b - 9) - 3(b - 9) = 0$

$(b - 3), (b - 9) = 0$

$b - 3 = 0 \quad \therefore \quad$ If $b = 3$

$b = 3 \qquad l = 9$

L Diagonal of square $= 8\sqrt{2} \Rightarrow a\sqrt{2} = 8\sqrt{2}$

$a = 8$ cm a is side of the square

Area of square $= 8 \times 8 = 64$ cm^2

1. Base $= 15.8$ **m** Height $= 14.5$ m

   Area $= b \times h = 15.8 \times 14.5 = 229.1$m^2

2. Let the base be x and height be $3x$

   Area $= b \times h \Rightarrow 108 = x \times 3x \Rightarrow 108 = 3x^2$

   $\frac{108}{3} = x^2 \Rightarrow 36 = x^2 \Rightarrow x = 6$ cm

   base $= 6$ cm $\Rightarrow$ height $= 3 \times 6 = 18$ cm

3. Area of the parallelogram $= b \times h$

   $126 = 14 \times h \Rightarrow \frac{126}{14} = h \Rightarrow h = 9$ cm

4. Area of parallelogram $= b \times h = 18 \times 9 = 162$ dam^2

   162 dam^2 $= 16200$ m^2

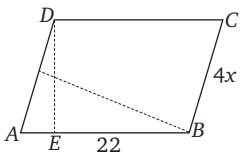
   Cost of watching 1m^2 $= 75$ paise

   Cost of watching 16200 m^2 $= 16200 \times 75$

   $= 1215000$ paise $=$ ₹12150

5. Let $ABCD$ be a parallelogram

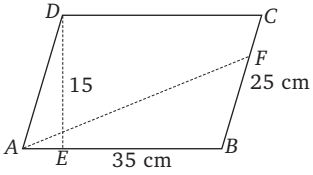
   BF be attitude on AD and DE be attitude on AB



$264 = AD \times BF \Rightarrow 264 = 11 \times BF \Rightarrow \frac{264}{11} = BF$

$BF = 24$ cm

6. Let $ABCD$ be the parallelogram



$AB = 35$ cm $\Rightarrow CB = 25$ cm

$\Rightarrow DE = 15$ cm

To find, $AF = ?$

Area of parallelogram $= AB \times DE$

$= 35 \times 15 = 525\ \text{cm}^2 \Rightarrow 525\ \text{cm}^2 = 25 \times AF \Rightarrow \frac{525}{35} = AF$

21 cm $= AF$

7. Let base be x, height $= 2x$

Area of parallelogram $= x \times 2x$

$392 = 2x^2 \Rightarrow \frac{392}{2} = x^2 \Rightarrow 196 = x^2$

$x = 14$ cm $\Rightarrow$ Base $= 14$ cm

height $= 2 \times 14 = 28$ m

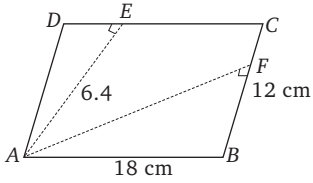
8. Area of parallelogram $= DC \times AF$

$= 18 \times 6.4$

$115.2\ \text{cm}^2 \Rightarrow 115.2\text{cm}^2 = 12 \times AF$

$\Rightarrow \frac{115.2}{12} = AF$

$AF = 9.6$ cm



A 1. Area of triangle $= \frac{1}{2} b \times h = \frac{1}{2} \times 20 \times 12 = 120\text{m}^2$

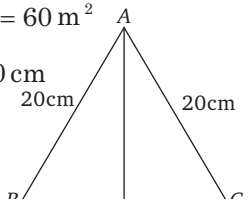
2. Area of triangle $= \frac{1}{2} \times b \times h = \frac{1}{2} \times 15 \times 10 = 75\ \text{m}^2$

3. Area of Triangle $= \frac{1}{2} b \times h = \frac{1}{2} \times 12 \times 18 = 108\ \text{m}^2$

4. Area of triangle $= \frac{1}{2} \times b \times h = \frac{1}{2} \times 12 \times 10 = 60\ \text{m}^2$

B Let ABC be the triangle as shown $BC = 20$ cm

$\therefore\ BD = \frac{1}{2} \times 20 = 10$ cm



According to Pythagoras Theorem

$AB^2 = AD^2 + BD^2 \Rightarrow AB^2 - BD^2 = AD^2 \Rightarrow (20)^2 - (10)^2 = AD^2$

$400 - 100 = AD^2 \Rightarrow 300 = AD^2 \Rightarrow AD = \sqrt{300}$

$AD = 17.32\,\text{cm}$

C Area of rectangle $= l \times b$

$835 = 50 \times b \Rightarrow \dfrac{835}{50} = b \Rightarrow 16.7\text{m} = \text{other side}$

D Perimeter of triangle $= 5x + 6x + 7x$

$72 = 18x \Rightarrow \dfrac{72}{18} = x \Rightarrow x = 4$

Sides are $5 \times 4 = 20$, $6 \times 4 = 24$, $7 \times 4 = 28$

$s = \dfrac{20 + 24 + 28}{2} = \dfrac{72}{2} = 36\,\text{cm}$

Area $= \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{36(36-20)(36-24)(36-28)}$

$= \sqrt{36 \times 16 \times 12 \times 8} = \sqrt{55296} = 235.15\,\text{cm}^2$

E Area of equilateral triangle $= \dfrac{\sqrt{3}}{4}a^2$

$49\sqrt{3} = \dfrac{\sqrt{3}}{4}a^2 \Rightarrow 49\sqrt{3} \times \dfrac{4}{\sqrt{3}} = a^2 \Rightarrow 196 = a^2 \quad a = 14\,\text{m}$

F Area of triangle $= b \times h \times \dfrac{1}{2}$

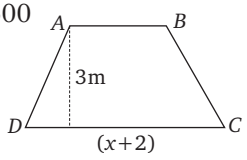
$l \times 48 = 12 \times h \Rightarrow 2 \times \dfrac{48}{12} = h \Rightarrow h = 8\,\text{units}$

G Area of triangular field $= \dfrac{1}{2} \times 250 \times 200 = 25000\,\text{m}^2$

Cost of leveling $1\text{m}^2 = ₹\,0.50$

Cost of leveling $25000 = 25000 \times 0.50 = 12{,}500$

H Area of trapixium $= \dfrac{1}{2}(a+b) \times h$



$12 = \dfrac{1}{2}(x + x + 2) \times 3 \Rightarrow 12 = \dfrac{1}{2} \times 3 \times (2x + 2)$

$12 = \dfrac{1}{2} \times 3 \times 2(2x + 1) \Rightarrow 12 = 3(x + 1) \Rightarrow 12 = 3x + 3$

$12 - 3 = 3x \Rightarrow 69 = 3x \Rightarrow x = 3\,\text{m}$

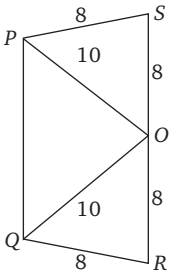
other side $= 5\,\text{m}$

I $S = \dfrac{17 + 21 + 8}{2} = \dfrac{46}{2} = 23\,\text{cm}$

Area of triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{23(23-17)(23-21)(23-8)} = \sqrt{23 \times 6 \times 2 \times 15}$

J Area of above figure = Area of ΔOPQ + Area of ΔPOS + Area of ΔOQR



Area of ΔPOS = Area of ΔOQR

In ΔOQR

$a = 8 \Rightarrow b = 8 \Rightarrow c = 10 \Rightarrow S = \dfrac{8+8+10}{2} = \dfrac{26}{2} = 13$

Area of $\Delta OQR = \sqrt{13(13-8)(13-8)(13-10)}$

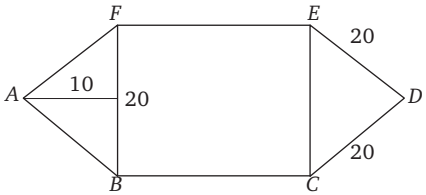
$= \sqrt{13 \times 5 \times 5 \times 3} = 31.22\ \text{m}^2$

Similarly, area of $\Delta POS = 31.22\ \text{cm}^2$

are of $\Delta POQ = \dfrac{\sqrt{3}}{4} a^2 = \dfrac{\sqrt{3}}{4} \times 10 \times 10 = 43.30\ \text{m}^2$

Total are a= 31.22 + 31.22 + 43.30 = 105.74 m^2

K



Area of $BCEF = 20 \times 20 = 400\ \text{m}^2$

Area of $\Delta ECD = \dfrac{\sqrt{3}}{4} a^2 = \dfrac{\sqrt{3}}{4} \times 400 = 173.20$

Area of $\Delta ABF = \dfrac{1}{2} \times 20 \times 10 = 100$

Area of given figure = 100 + 173.20 + 400 = 673.20 m^2

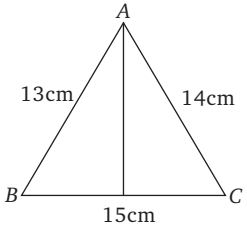
L Do it yourself

A 1. (b) 2. (a) 3. (c) 4. (c) 5. (c)

B Let ABC be a triangle

$AB = 13 = a \Rightarrow\ BC = 15 = b \Rightarrow AC = 14 = c$

$S = \dfrac{13+15+14}{2} = \dfrac{42}{2} = 21$



Area of triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{21(21-13)(21-15)(21-14)}$

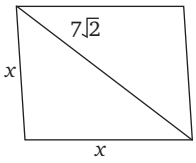
$= \sqrt{21 \times 8 \times 6 \times 7} = \sqrt{7056}$

$= 84\ \text{cm}^2$

$84\text{cm}^2 = \frac{1}{2} \times b \times h \Rightarrow 84 = \frac{1}{2} \times 15 \times h \Rightarrow \frac{84 \times 2}{15} = h$

$h = 11.2$

C Let the side of square be x

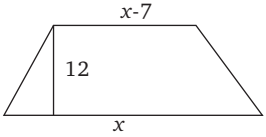


According to pythagoras theorem

$x^2 + x^2 = (7\sqrt{2})^2 \Rightarrow 2x^2 = 49 \times 2 \Rightarrow x^2 = \frac{49 \times 2}{2}$

$x = 7 \Rightarrow$ Area of square $= 7 \times 7 = 49\,\text{cm}^2$

D Let the longer side be x



$\therefore$ Shorter side $x - 7$

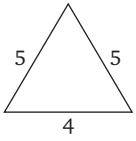
Area of trapizium $= \frac{1}{2}(x + x - 7) \times 12$

$138 = 6(2x - 7) \Rightarrow \frac{138}{6} = 2x - 7 \Rightarrow 23 + 7 = 2x \Rightarrow 30 = 2x$

Longer side $x = 15\,\text{cm}$

Shorter side $= 15 - 7 = 8\,\text{cm}$

E $S = \frac{5 + 5 + 4}{2} = \frac{14}{2} = 7\,\text{cm}$



Area $= \sqrt{7(7-5)(7-5)(7-4)} = \sqrt{7 \times 2 \times 2 \times 3}$

$= \sqrt{84}\,\text{cm} = 2\sqrt{21}\,\text{cm}$

F Let length be $3x$

breadth be $2x$

Area of rectangle $= l \times b$

$150 = 3x \times 2x \Rightarrow 150 = 6x^2 \Rightarrow \frac{150}{6} = x^2$

$x = 5\,\text{m} \Rightarrow l = 15\,\text{m}\ b = 10\,\text{m}$

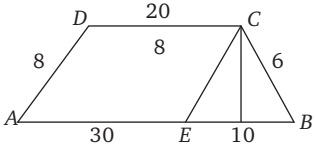
Perimeter of rectangle $= 2(l + b)$

$= 2(15 + 10) = 2 \times 25 = 50\,\text{m}$

Cost of fencing 1 m = 2.75

Cost of fencing 50m $= 50 \times 2.75 = ₹137.50$

G Area of $\Delta EBC = \sqrt{s(s-a)(s-b)(s-c)}$



$S = \frac{10 + 6 + 8}{2} = \frac{24}{2}$

$= \sqrt{12(12-10)(12-6)(12-8)}$

$= \sqrt{12 \times 2 \times 6 \times 4}$

$= \sqrt{576} = 24\,\text{m}$

Area of $\Delta EBC = \frac{1}{-} \times b \times h \Rightarrow \frac{24 \times 2}{\quad} = h$

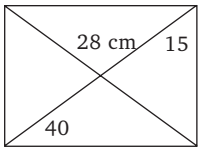
$h = 4.8\,\text{m}$

Area of trapezium $= \frac{1}{2}(20+30)\times 4.8 = \frac{1}{2}(50)\times 4.8$

$= 120\,\text{m}^2$

H Area of quadrilateral $= \frac{1}{2}\times$ diagonal $\times$ sum of $\perp$ distance

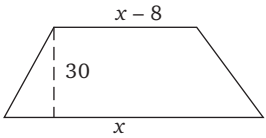
$= \frac{1}{2}\times 28\times(40+15) = 14\times 55 = 770\,\text{cm}^2$



I Area of trapezium $= \frac{1}{2}(x+x-8)\times 30$

$600 = \frac{1}{2}(2x-8)\times 30 = 30x - 120$

$\Rightarrow \frac{600+120}{30} = x$



$\frac{720}{30} = x \Rightarrow x = 24\,\text{m}$, other base $= 24 - 8 = 16\,\text{m}$

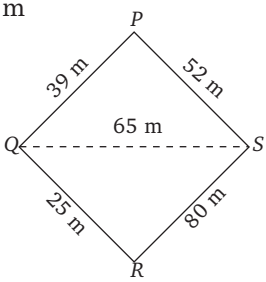
J In $\Delta PQS \Rightarrow S = \frac{39+52+65}{2} \Rightarrow \frac{156}{2} = 78\,\text{m}$

Area of $\Delta PQS = \sqrt{S(s-a)(s-b)(s-c)}$

$= \sqrt{78(78-39)(78-52)(78-65)}$

$= \sqrt{78\times 39\times 13\times 26}$

$= \sqrt{1028196} = 1014\,\text{m}^2$



In $\Delta QSR = \frac{25+65+80}{2} = \frac{170}{2} = 85\,\text{m}$

Are of $\Delta QSR = \sqrt{S(s-a)(s-b)(s-c)}$

$= \sqrt{85(85-80)(85-65)(85-25)} = \sqrt{85\times 5\times 20\times 60} = 714.14$

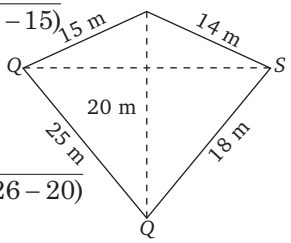
Area of $PQRS = 1014 + 714.19 = 1728.14\,\text{m}^2$

2. In $\Delta PQS = \frac{20+25+15}{2} = \frac{60}{2} = 30$

Area of $PQS = \sqrt{30(30-25)(30-20)(30-15)}$

$= \sqrt{30\times 5\times 10\times 15}$

$= 150\text{m}^2$



In $\Delta QSR\ s = \frac{14+18+20}{2} = \frac{52}{2} = 26\,\text{m}$

Area of $\Delta QSR = \sqrt{26(26-14)(26-18)(26-20)}$

$= 26\times 12\times 8\times 6$

$= \sqrt{14976} = 122.37\text{m}^2$

Area of $PQRS = 150 + 122.37 = 272.37\text{m}^2$

Chapter 14 Data Handling

A

Customers	Tally Marks	Numbers
W	𝍸 𝍸 𝍸 𝍸 𝍸 |||	28
M	𝍸 𝍸 𝍸	15
B	𝍸	5
G	𝍸 |	1
	Total	60

B

Marks	Tally Marks	Frequency
0-10	||	2
10-20	𝍸	5
20-30	𝍸 𝍸	9
30-40	𝍸 ||	7
40-50	𝍸 ||	7
	Total	30

Do it yourself

Chapter Check-up

A Arranging the data in ascending order, we get the height (in cm) as:

128, 132, 139, 140, 142, 143, 146, 148, 149, 152, 154

From the above data we get the following results

1. The height of the tallest boy = 154 cm
2. The height of the shortest boy = 128 cm

B

Number of children	Frequency
0	4
1	7
2	12
3	5
4	6
5	3
6	3

C

Expenses	Frequency
60-70	6
70-80	5
80-90	7
90-100	5
100-110	3
110-120	4

D Do it yourself

Chapter 15 Probability

A Total No. of nuts = 17 No. of good nut = 12
No. of defective nuts = 5
Probability of getting good nut = $\frac{12}{17}$

B $\frac{2}{7}$

C $\frac{1}{4}$

D 1. $\frac{1}{6}$ 2. $\frac{1}{2}$ 3. $\frac{5}{6}$ 4. $\frac{1}{3}$ 5. $\frac{1}{2}$
6. $\frac{2}{3}$ 7. $\frac{1}{6}$

E 1. 0 2. 1

F $\frac{1}{2}$ **G** $\frac{1}{2}$

H $\frac{1}{3}$ **I** $\frac{1}{2}$ **J** $\frac{1}{4}$

A 1. (a) 2. (b) 3. (c) 4. (c)

B $\frac{64}{125}$

C 1. 0.13 2. 0.34 3. 0.44 4. 0.08

D $\frac{1}{2}$ E. $\frac{3}{8}$ **F** $\frac{3}{8}$

G 1. 4/9 2. 1/3 3. 2/9 4. 1

H 1. 1/12 2. 1/6

I 1. 7/20 2. 3/20

Chapter 16
Introduction to Graphs

A Do it yourself

B 1. 15 2. –15 3. 8 4. 9

C 1. Quadrant 1 2. Quadrant IV 3. Quadrant II
4. Quadrant I

D Do it yourself

E 1. (–2, 0) 2. (4, – 6)

F (2nd and 4th)

G Do it yourself

I Do it yourself

A Do it yourself
B 1. 3, 48, 5 2. 3, 4, 25, 36
C Do it yourself
D 1. ₹ 30 2. ₹ 700
E Do it yourself
F 1. 187.5 km
2. 300 km will be covered in 4 hours.
G Do it yourself

A Do it yourself
B 1. Quadrant 111 2. Quadrant IV
3. Quadrant 1
C Do it yourself
D *ABCD* is a square
E Do it yourself
F (4, 0); (5, 0)
G (0, 3); (0, 4)
H

Abscissa	–3	0	–1
Ordinate	–4	4	2

I Do it yourself
J Do it yourself
K Do it yourself
L Do it yourself
M Do it yourself

Model Test Paper-1

A 1. (a) 2. (b) 3. (b) 4. (d)
5. (a) 6. (d)

B 1. $\left(\frac{-1}{3}\right)^3$ 2. $\left(\frac{9}{11}\right)^2$ 3. $\left(\frac{12}{9}\right)^2$ 4. $\left(\frac{-2}{3}\right)^{15}$

5. $\left(\frac{3}{\quad}\right)^5$ 6. $(4)^5$ 7. $\left(\frac{11}{\quad}\right)^4$ 8. $\left(\frac{4}{\quad}\right)^4$

C 1. $0.00005 = 5 \times 10^{x} \Rightarrow 5 \times 10^{-5} = 5 \times 10^{x}$

$10^{-5} = \frac{5}{5} \times 10^{x} \Rightarrow 10^{-5} = 10^{x} \Rightarrow x = -5$

2. $0.00000067 = 6.7 \times 10^{x} \Rightarrow 6.7 \times 10^{-7} = 6.7 \times 10^{x}$

$10^{-7} = 10^{x} \Rightarrow x = -7$

3. $3.45 \times 10^{13} = 3.45 \times 10^{x} \Rightarrow x = 13$

D 1. 1.2756×10^{7} m 2. 5.8×10^{7} km

3. 3.844×10^{5} km 4. 1×10^{5} light years

E 1. 496 2. 10000 3. 252 4. odd

F 1. $256 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$\Rightarrow \sqrt{256} = 2 \times 2 \times 2 \times 2 = 16$

2. $1444 = 2 \times 2 \times 19 \times 19 \Rightarrow \sqrt{1444} = 2 \times 19 = 38$

3. $5184 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3$

$= 2 \times 2 \times 2 \times 3 \times 3 = 72$

4. $9000 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5 \times 5 \times 5$

$\sqrt{90000} = 2 \times 2 \times 3 \times 5 \times 5 = 300$

G 1. $125000 = 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5$

$3\sqrt{125000} = 2 \times 5 \times 5 = 50$

2. $2197 = 13 \times 13 \times 13 \Rightarrow \sqrt[3]{2197} = 13$

3. $64000 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5$

$\sqrt[3]{64000} = 2 \times 2 \times 2 \times 5 = 40$

4. $27000 = 3 \times 3 \times 3 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5$

$\sqrt[3]{27000} = 30$

5. $3375 = 5 \times 5 \times 5 \times 3 \times 3 \times 3 \Rightarrow \sqrt[3]{3375} = 5 \times 3 = 15$

6. $1728 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \Rightarrow \sqrt[3]{1728} = 12$

7. $13824 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$

$\sqrt[3]{13824} = 24$

8. $42875 = 5 \times 5 \times 5 \times 7 \times 7 \times 7 \Rightarrow \sqrt[3]{42875} = 5 \times 7 = 35$

9. $8000 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 \Rightarrow \sqrt[2]{8000} = 20$

10. $74088 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 7 \times 7 \times 7 \Rightarrow \sqrt[3]{74088} = 42$

H 1. $a = 8 \Rightarrow b = 7 \Rightarrow c = 9$

2. $a = 7 \Rightarrow b = 9 \Rightarrow c = 5$

3. $x = 3 \Rightarrow y = 2 \Rightarrow z = 4$

4. $x = 5 \Rightarrow y = 1 \Rightarrow z = 1$

5. $a = 3 \Rightarrow b = 5$

6. $a = 2 \Rightarrow b = 1$

7. $a = 7 \rightarrow b = 6 \rightarrow c = 2$

8. $x = 8 \Rightarrow y = 7 \Rightarrow z = 9$

I Let the digit at one's place be x

Let the digit at ten's place be y

$\therefore\ x + y = 9 \Rightarrow x = 9 - y$

According to question

$9 - y + 10y = 10(9 - y) + y - 9$ $\qquad$ $9 + 9y = 90 - 10y + y - 9$

$9y - 9y = 90 - 9 - 9$ $\qquad$ $18y = 72$

$y = 4$ $\qquad$ $\therefore \quad x = 5$

So the number is 54

J

35	21	22	32
24	30	29	27
28	26	25	31
23	33	34	20

The magic sum = 110

K 1. $z = 7$ $\qquad$ 2. $n = 7, y = 3$ $\qquad$ 3. $n = 5$

4. $x = 6$ $\qquad$ 5. $n = 5, y = 6, z = 3$ $\qquad$ 6. $n = 8, y = 2$

7. $x = 0, y = 9, z = 5$

L Let the denominator be x

$\therefore$ numerator $= x - 6$

$$\frac{x-6+3}{x} = \frac{2}{3} \Rightarrow \frac{x-3}{x} = \frac{2}{3} \Rightarrow 3x - 9 = 2x$$

$x = 9$ denominator

Numerator $= 9 - 6 = 3 \Rightarrow$ fraction $= \frac{3}{9}$

M Let the ages of Tang. are Mayank be $7x$ and $5x$

$$\frac{7x+10}{5x+10} = \frac{9}{7} \Rightarrow 7(7x + 10) = 9(5x + 10) \Rightarrow 49x + 70 = 45x + 90$$

$49x - 45x = 90 - 70 \Rightarrow 4x = 20 \Rightarrow x = 5$

Age of Tanya $= 7 \times 5 = 35$

Age of Mayank $= 5 \times 5 = 25$

N Let the persent age of father = x years

Age of father 5 years age = $(x - 5)$ years

By the problem

Age of his son 5 year ago $= \frac{1}{7}(x - 5)$

Age of father 5 years ago hence = $x + 5$

$\frac{1}{7}(x-5)+0=\frac{x}{7}-\frac{5}{7}+10=\frac{x-5+70}{7}=\frac{x+65}{7}$

Five years hence, the father will be three times as old as his son then.

$3\left(\frac{x+65}{7}\right)=x+5 \Rightarrow 3(x+65)=7(x+5)$

$3x+195=7x+35 \Rightarrow 7x-3x=195-35 \Rightarrow 4x=160$

$x=40$

$\therefore$ Present age of father = 40 years

Age of his son 5 years ago $=\frac{1}{7}(x-5)$

$=\frac{1}{7}(40-5)=\frac{1}{7}\times 35=5$ years

Present age of his son = 5 + 5 = 10 years.

Model Test Paper - 2

A 1. (d) 2. (c) 3. (c) 4. (b) 5. (c)

B 1

C Distance = 160 + 200 = 360 m

Time = 18 seconds Speed $=\frac{\text{Distance}}{\text{Time}}=\frac{360}{18}=20$ m/s

$20\times\frac{18}{5}=\frac{360}{5}=72$ km/h

D Distance = 220 m

Relative Speed = 60 + 6 = 66 km/h $=66\times\frac{5}{18}=\frac{55}{3}$

Time $=\frac{\text{Distance}}{\text{Speed}}=\frac{220\times 3}{55}=12$ seconds

E Distance = 425 km

Time = 8 hours 30 minutes = 8.5 hours

Speed $=\frac{d}{t}=\frac{425}{8.5}=50$ km/h

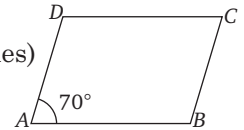
F Let $ABCD$ be the parallelogram and $\angle A = 70°$

$\angle A=\angle C=70°$

$\angle B+\angle A=180°$ (co interior angles)

$\angle B=180°-70°$

$\angle B=110°$



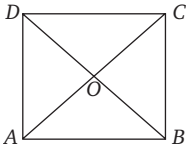
$\angle B=\angle D=110°$ (opposite angles of parallelogram are equal)

G If $AC = 10\,\text{cm}$

$AC = BD = 10\,\text{cm}$ (Diagonal of squares are equal)

$OA = \frac{1}{2} AC = \frac{1}{2} \times 10 = 5\,\text{cm}$

$\Rightarrow OA = OC = OB = OD = 5\,\text{cm}$



H Do it yourself

I Do it yourself

J 1. Tetrahedron 2. Vertex 3. Prism 4. 8, 12, 6

K Area of rectangle $= 5 \times$ Area of square

$125 = 5 \times (\text{side})^2 \Rightarrow \frac{125}{5} = (\text{side})^2 \Rightarrow \text{Side} = 5\,\text{m}$

L 1. Area of triangle $= \frac{1}{2} \times b \times h = \frac{1}{2} \times 12 \times 20 = 120\,\text{m}^2$

2. Base $= 10\,\text{m} = 1000\,\text{cm}$

Area of triangle $= \frac{1}{2} \times b \times h = \frac{1}{2} \times 1000 \times 15$

$= 7500\,\text{cm}^2 = 75\text{m}^2$

3. Area of triangle $= \frac{1}{2} \times b \times h = \frac{1}{2} \times 12 \times 18 = 108\,\text{m}^2$

4. Area of triangle $= \frac{1}{2} \times b \times h = \frac{1}{2} \times 12 \times 10 = 60\,\text{m}^2$

M 1. In $\Delta PQS \Rightarrow S = \frac{39 + 52 + 65}{2} = 78\,\text{m}$

Area of $PQS = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{78(78-39)(78-52)(78-65)} = \sqrt{78 \times 39 \times 26 \times 13}$

$= \sqrt{1028196} = 1014\,\text{m}^2$

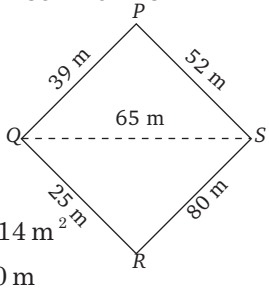
In ΔQSR

$s = \frac{80 + 25 + 65}{2} = \frac{170}{2} = 85\,\text{m}$

$= \sqrt{85(85-80)(85-25)(85-65)}$

$= \sqrt{85 \times 5 \times 60 \times 20} = 714.14\,\text{m}^2$

Area of $PQRS = 1414 + 714.14 = 1728.14\,\text{m}^2$



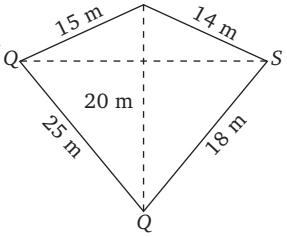
2. In $\Delta PQS \Rightarrow S = \frac{25 + 20 + 15}{2} = \frac{60}{2} = 30\,\text{m}$

Area of $\Delta POS = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{30(30-25)(30-20)(30-15)} = \sqrt{30 \times 5 \times 10 \times 15}$

$= 150\,\text{m}^2$

In ΔSRQ $S = \frac{14+20+18}{2} = \frac{52}{5} = 26$ m



Area of ΔSRQ

$= \sqrt{26(26-20)(26-14)(26-18)}$

$= \sqrt{26 \times 6 \times 12 \times 8} = 122.37 \text{ m}^2$

Area of $PQSR = 272.376 \text{ m}^2$

N Do it yourself

O

Expenses	Frequency
60-70	6
70-80	5
80-90	7
90-100	5
100-110	3
110-120	4

P 1. Interest $= 300 \times \frac{10}{100} = ₹ 30$

2. $x \times \frac{10}{100} = 70$ {let the investment be x}

$x = ₹700$