Chapter 1

Integers

Exercise 1.1

1. Add the following :

Sol : (a) $-63+(-77)=-63-77=-140$

(b) $-393+643=643-393=250$

(c) $459+(-263)=459-263=196$

(d) $-873+276=276-873=-597$

2. Subtract the following :

Sol : (a) -893 from $0=0-(-893)=+893$

(b) 463 from $-289=-289-463=-752$

(c) -137 from $-895=-895-(-137)=-895+137=-758$

(d) -1019 from $1019=1019-(-1019)=1019+1019=2038$

(e) -18 from $-196=-196-(-18)=-196+18=-178$

(f) 0 from $-2095=-2095-0=-2095$

3. Simplify the following :

Sol : (a) $[16-(-2)+(-23-17)]=[16-(-2)+(-40)]=[16+2+(-40)]$
$=[18+(-40)]=[18-40]=-22$

(b) $-119+[(-63)-74]=-119+[-63-74]=-119+[-137]$
$=-119-137=-256$

(c) $-200+[(-13)-(-93)]=-200+[-13+93]$
$=-200+80=-120$

(d) $[85-(-9)]+[(-61)-33]=[85+9]+[-61-33]$
$=94+[-94]=94-94=0$

(e) $48+[(-35-63)]-(-119)=48+[-35-63]+119$
$=48+[-98]+119=48-98+119$
$=167-98=69$

Exercise 1.2

1. Multiply :

Sol : (a) $-9\times7=-63$ (b) $(-13)\times(-12)=156$

(c) $0\times0=0$ (d) $(-29)\times0=0$

(e) $(-15)\times 1=-15$ (f) $1\times 22=22$

(g) $62\times(-8)=-496$ (h) $999\times(-1)=-999$

(i) $(-138)\times(-3)=+414$

2. Using the distributive law to simplify :

Sol : (a) $52\times 27-32\times 52=52\times(27-32)$

$$=52\times(-5)=52\times -5=-260$$

(b) $(-13)\times(-22)+(-13)\times(-11)=(-13)[(-22)+(-11)]$

$$=(-13)[-33]=429$$

(c) $200\times 2543-100\times 2543=2543\times[200-100]$

$$=2543\times 100=254300$$

(d) $(-4)\times 20+20\times(-5)=20\times[(-4)+(-5)]$

$$=20\times[-4-5]=20\times[-9]=-180$$

(e) $31\times 0-0\times(-10)=0\times[31-(-10)]=0\times[31+10]$

$$=0\times[41]=0$$

(f) $39\times(-2)+(-2)\times 10=(-2)[39+10]=(-2)\times 49=-98$

3. Find the value of 'x' :

Sol : (a) $5\times[(-4)-x]=5\times(-4)-5\times 10$

$5\times(-4)-5\times x=-20-50$ (By Distributive property)

$-20-5x=-70$

$-5x=-70+20$

$-5x=-50$

$x=\dfrac{-50}{-5}=\dfrac{10}{1}=10$ $\therefore$ $x=10$

(b) $2\times(3+x)=2\times 3+6\times 2$

$2\times 3+2\times x=2(3+6)$ (By Distributive property)

$6+2x=2\times 9$

$2x=18-6$

$2x=12$

$x=\dfrac{\cancel{12}^{6}}{\cancel{2}_{1}}=6$ $\therefore$ $x=6$

(c) $x\times[(-5)+8]=9\times(-5)+9\times 8$

$x\times[-5+8]=9\times[(-5)+8]$ (By Distributive property)

$x\times 3=9\times[3]$

$3x=27$

$x=\dfrac{\cancel{27}^{9}}{\cancel{3}_{1}}=9$ $\therefore$ $x=9$

(d) $(-32)\times[4+(-4)]=(-32)\times x+(-32)\times(-4)$

$$(-32)\times[4-4]=-32x+128$$

$$(-32)\times 0=-32+128 \Rightarrow 0=-32x+128$$

$$32x=128$$

$$x=\frac{\cancel{128}^{4}}{\cancel{32}_{1}}=4$$

$\therefore$ $\boxed{x=9}$

(e) $x\times[(-10)-(-8)]=(-5)\times(-10)-(-5)\times(-8)$

$$x\times[-10+8]=-5\times[(-10)-(-8)]$$

(By Distributive property)

$$x\times[-2]=-5\times[-10+8]$$

$$-2x=-5\times[-2]$$

$$-2x=10$$

$$x=\frac{10}{-2}=-5$$

$\therefore$ $\boxed{x=-5}$

(f) $3\times(0-x)=3\times 0-3\times 3$

$$3\times(-x)=0-9$$

$$3(-x)=-9$$

$$-3(x)=-9$$

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

$\boxed{\therefore\ x=3}$

4. State the sign of the products, without multiplying :

Sol : (a) $(-2)\times(-5)\times(-3)\times 2\times(-4)=(-1)^4=+\text{ve}$

(b) $(-11)\times 0\times 11=$ No sign

(c) $(-21)\times 1\times(-1)\times(-6)\times 7=(-1)^3$

(d) $1\times(-3)\times 2\times(-4)=(-1)^2=+\text{ve}$

(e) $6\times 5\times(-3)\times 10=(-1)^1=-\text{ve}$

(f) $3\times(-7)\times(-5)\times 2\times(-3)\times(-2)\times(-1)=(-1)^5=-\text{ve}$

(g) $1\times(-3)\times 0\times(-4)=$ No sign

(h) $(-1)\times 1\times 3\times 2\times(-3)=(-1)^2=+\text{ve}$

5. Find the products :

Sol : (a) $(-11)\times 2\times(-3)=-11\times[2\times(-3)]$

$$=-11\times[-6]=66$$

(b) $0\times(-3)\times(-271)=[0\times(-3)]\times(-271)=0\times(-271)=0$

(c) $(-10)\times(-8)\times 9\times(-7) = [-10\times(-8)]\times[9\times(-7)]$
$= [80]\times[-63] = [80\times -63] = -5040$

(d) $(-2)\times(-2)\times(-2)\times(-2)\times(-2)$
$= (-2)\times[(-2)\times(-2)]\times[(-2)\times(-2)]$
$= (-2)[4][4] = (-2)[4\times 4]$
$= -2\times[16] = -32$

(e) $(-5)\times(-10)\times 6 = (-5)\times[-10\times 6]$
$= (-5)\times[-60] = [-5\times -60] = 300$

(f) $(-8)\times 0\times(-4)\times 3\times(-4) = (-8)\times 0\times(-4)\times[3\times(-4)]$
$= (-8)\times 0\times(-4)\times[-12]$
$= (-8)\times 0\times[-4\times -12]$
$= (-8)\times 0\times[48] = (-8)\times[0\times 48]$
$= (-8)\times 0 = 0$

Exercise 1.3

1. Find the value :

Sol : (a) $(-36)\div(-12) = \dfrac{-36}{-12} = 3$ (b) $(-56)\div 14 = \dfrac{-56}{14} = -4$

(c) $245\div(-5) = \dfrac{245}{-5} = -49$ (d) $(-1836)\div(-9) = \dfrac{-1836}{-9} = 204$

(e) $57\div 19 = \dfrac{57}{19} = 3$ (f) $(-71)\div(-71) = \dfrac{-71}{-71} = 1$

(g) $0\div 23 = \dfrac{0}{23} = 0$ (h) $100\div(-10) = \dfrac{100}{-10} = -10$

(i) $(-5676)\div(-132) = \dfrac{-5676}{-132} = 43$

2. Fill in the blanks :

(a) $55\div \underline{y} = -11$

$\dfrac{55}{y} = -11$

$55 = -11\times y$

$y = \dfrac{55}{-11} = -5$

(b) $\underline{y}\div(-12) = -8$

$\dfrac{y}{-12} = -8$

$y = -8\times -12$

$y = 96$

$\therefore \quad y = -5$

(c) $\underline{y} \div (-1) = 307$

$\frac{y}{-1} = 307$

$y = 307 \times -1$

$\therefore \quad y = -307$

(d) $\therefore \quad y = 96$

$327 \div \underline{y} = -1$

$\frac{327}{\underline{y}} = -1$

$327 = -1 \times y$

$\therefore \quad y = -327$

(e) $\underline{y} \div 7 = -9$

$\frac{y}{7} = -9$

$y = -9 \times 7$

$\therefore \quad y = -63$

(f) $\underline{y} \div (-35) = 0$

$\frac{y}{-35} = 0$

$y = 0 \times (-35)$

$\therefore \quad y = 0$

3. State whether the following statements are true or false :

(a) $0 \div (-15) = -15$ (False) (b) $(-17) \div 1 = -1$ (False)

(c) $-9 \div (-9) = 1$ (True) (d) $(-121) \div 11 = 11$ (False)

(e) $90 \div (-15) = -6$ (True) (f) $(-13) \div (-13) = -1$ (False)

4. Simplify :

(a) $|-14 - 1 - 30| \div |30 - 25| = |-45| \div |5| = 45 \div 5 = 9$

(b) $|25 \div (-5)| \div |20 \div -4| = \left|\frac{25}{-5}\right| \div \left|\frac{20}{-4}\right|$

$= |-5| \div |-5| = 5 \div 5 = \frac{5}{5} = 1$

(c) $|-7| \div |7| - |-20| = |-7| \div |7| - 20$ $[|-a| = a]$

$= 7 \div 7 - 20 = \left(\frac{7}{7}\right) - 20 = 1 - 20 = -19$

(d) $|-12 \div 4| \div |6 \div (-2)| = \left|\frac{-12}{4}\right| \div \left|\frac{6}{-2}\right|$

$= |-3| \div |-3| = 3 \div 3 = \frac{3}{3} = 1$

Exercise 1.4

1. The product of $73 \times (-103) = 73 \times (-103) = -7519$

The product of -73×-183 $= -73 \times (-183) = 13359$

$\because \quad -7519 < 0 < 13359$

$\Rightarrow \quad -7519$ is closer to zero.

2. Sum of 105 and 93 $= 105 + 93 = 198$

Sum -90 and -102 $= -90 + (-102) = -90 - 102 = -192$

3. The net value of the share $=$ ₹ 173 – ₹ 2.50 + ₹ 3.70

= (₹ 173 + ₹ 3.70) – ₹ 2.50

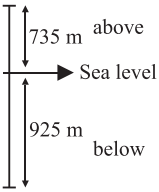
= ₹ 176.70 – ₹ 2.50 = ₹ 174.20

4. The balance amount in her account

= ₹ 85000 + ₹2520 – ₹ 63,960 = ₹ 23560

5. The distance travelled by a package above sea level = 735 m

The distance travelled by the same package below sea level = 925 m



$\therefore$ Vertical distance the package travelled

= 735 m + 925 m

= 1660 m

6. Distance travelled to wards East = 653 m

Distance travelled to wards West = 956 m

$\therefore$ Position of Vidushi from point A

= 956 m – 653 m

= 303 m towards west

7. Distance from above see level to Mt. Everest = 8848 m

Distance from below see level to Mariana Trench = 11034 m

$\therefore$ Vertical height between Mt. Everest and Mariana Trench

= 8848 m + 11034 m = 19882 m

8. Sonia's scores $= +3 - 2 + 4 - 3 + 7 = 9$

John's scores $= -1 + 4 - 3 + 5 - 6 = -1$

Clearly, Sonia won the game by $9 - (-1) = 10$ points.

MCQs **1.** (a) **2.** (b) **3.** (b) **4.** (b)
5. (a) **6.** (c) **7.** (c) **8.** (c)

Mental Maths :

Say true or false :

1. T **2.** F **3.** F **4.** T

Chapter 2

Fractions and Decimals

Exercise 2.1

1. (a) $\frac{2}{3}$

Sol:

$\frac{2}{3}=\frac{2\times2}{3\times2}=\frac{4}{6}$

$\frac{2}{3}=\frac{2\times3}{3\times3}=\frac{6}{9}$

$\frac{2}{3}=\frac{2\times4}{3\times4}=\frac{8}{12}$

$\frac{2}{3}=\frac{2\times5}{3\times4}=\frac{10}{15}$

$\therefore$ $\frac{4}{6},\frac{6}{9},\frac{8}{12},\frac{10}{15}$ are four equivalent fractions

(b) $\frac{6}{7}$

$\frac{6}{7}=\frac{6\times2}{7\times2}=\frac{12}{14}$

$\frac{6}{7}=\frac{6\times3}{7\times3}=\frac{18}{21}$

$\frac{6}{7}=\frac{6\times4}{7\times4}=\frac{24}{28}$

$\frac{6}{7}=\frac{6\times5}{7\times5}=\frac{30}{35}$

$\therefore$ $\frac{12}{14},\frac{18}{21},\frac{24}{28},\frac{30}{25}$ are four equivalent fractions

(c) $\frac{3}{17}$

Sol:

$\frac{3}{17}=\frac{3\times2}{17\times2}=\frac{6}{34}$; $\frac{3}{17}=\frac{3\times3}{17\times3}=\frac{9}{51}$

$\frac{3}{17}=\frac{3\times4}{17\times4}=\frac{12}{68}$; $\frac{3}{17}=\frac{3\times5}{17\times5}=\frac{15}{85}$

$\therefore$ $\frac{6}{34},\frac{9}{51},\frac{12}{68},\frac{15}{85}$ are four equivalent fractions

2. (a) $\frac{3}{5}$ and $\frac{4}{3}$

L.C.M of 3,5 = 15

$\frac{3}{5}=\frac{3\times3}{5\times3}=\frac{9}{15}$

$\frac{4}{3}=\frac{4\times5}{3\times5}=\frac{20}{15}$

Since, 20 > 9

(b) $\frac{6}{7}$ and $\frac{7}{6}$

L.CM. of 7,6 = 42

$\frac{6}{7}=\frac{6\times6}{7\times6}=\frac{36}{42}$

$\frac{6}{7}=\frac{7\times7}{6\times7}=\frac{49}{42}$

Since, 49 > 36

$\Rightarrow \frac{20}{15} > \frac{9}{15}$

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

(c) $\frac{21}{5}$ and $\frac{18}{4}$

L.C.M of $5, 4 = 20$

$\frac{21}{5} = \frac{21 \times 4}{5 \times 4} = \frac{84}{20}$

$\frac{18}{4} = \frac{18 \times 5}{4 \times 5} = \frac{90}{20}$

Since, $90 > 84$

$\Rightarrow \frac{90}{20} > \frac{84}{20}$

$\therefore \frac{18}{4} > \frac{21}{5}$

(d) $\frac{7}{15}$ and $\frac{19}{20}$

L.C.M of $15, 20 = 60$

$\frac{7}{15} = \frac{7 \times 4}{15 \times 4} = \frac{28}{60}$

$\frac{9}{20} = \frac{9 \times 3}{20 \times 3} = \frac{27}{60}$

Since, $28 > 27$

$\Rightarrow \frac{28}{60} > \frac{27}{60}$

$\therefore \frac{7}{15} > \frac{9}{60}$

3. (a) $\frac{1}{2}, \frac{3}{4}, \frac{1}{5}$

L.C.M of $2, 4, 5 = 20$

$\frac{1}{2} = \frac{1 \times 10}{2 \times 10} = \frac{10}{20}$

$\frac{3}{4} = \frac{3 \times 5}{4 \times 5} = \frac{15}{20}$

$\frac{1}{5} = \frac{1 \times 4}{5 \times 4} = \frac{4}{20}$

Since, $15 > 10 > 4$

$\Rightarrow \frac{15}{20} > \frac{10}{20} > \frac{4}{20}$

$\therefore \frac{3}{4}, \frac{1}{2}, \frac{1}{5}$

are in descending order.

(b) $\frac{3}{7}, \frac{2}{5}, \frac{3}{5}$

L.C.M of $7, 5, 5 = 35$

$\frac{3}{7} = \frac{3 \times 5}{7 \times 5} = \frac{15}{35}$

$\frac{2}{5} = \frac{2 \times 7}{5 \times 7} = \frac{14}{35}$

$\frac{3}{5} = \frac{3 \times 7}{5 \times 7} = \frac{21}{35}$

Since, $21 > 15 > 14$

$\Rightarrow \frac{21}{35} > \frac{15}{35} > \frac{14}{35}$

$\therefore \frac{3}{5}, \frac{3}{7}, \frac{2}{5}$

are in descending order.

(c) $\frac{2}{9}, \frac{3}{4}, \frac{5}{2}, \frac{1}{4}$

L.C.M of $2, 4, 9 = 36$

(d) $\frac{4}{5}, \frac{7}{15}, \frac{3}{10}, \frac{2}{4}$

L.C.M of $5, 15, 10, 4 = 60$

$$\frac{2}{9}=\frac{2\times4}{9\times4}=\frac{8}{36}$$
$$\frac{3}{4}=\frac{3\times9}{4\times9}=\frac{27}{36}$$
$$\frac{5}{2}=\frac{5\times18}{2\times18}=\frac{90}{36}$$
$$\frac{1}{4}=\frac{1\times9}{4\times9}=\frac{9}{36}$$

Since, $90>27>9>8$

$$\Rightarrow \frac{90}{36}>\frac{27}{36}>\frac{9}{36}>\frac{8}{36}$$

$\therefore$ $\frac{5}{2}, \frac{3}{4}, \frac{1}{4}, \frac{2}{8}$ are in descending order.

$$\frac{4}{5}=\frac{4\times12}{5\times12}=\frac{48}{60}$$
$$\frac{7}{5}=\frac{7\times4}{15\times4}=\frac{28}{60}$$
$$\frac{3}{10}=\frac{3\times6}{10\times6}=\frac{18}{60}$$
$$\frac{2}{4}=\frac{2\times15}{4\times15}=\frac{30}{60}$$

Since, $48>30>28>18$

$$\Rightarrow \frac{48}{60}>\frac{30}{60}>\frac{28}{60}>\frac{18}{60}$$

$\therefore$ $\frac{4}{5}, \frac{2}{4}, \frac{7}{15}, \frac{3}{10}$ are in descending order.

4. (a) $\frac{4}{15}$ and $\frac{3}{4}$

L.C.M of $4, 15 = 60$

$$\frac{4}{15}=\frac{4\times4}{15\times4}=\frac{16}{60}$$
$$\frac{3}{4}=\frac{3\times15}{4\times15}=\frac{45}{60}$$
$$\therefore \frac{4}{15}+\frac{3}{4}=\frac{16}{60}+\frac{45}{60}$$
$$=\frac{16+45}{60}=\frac{61}{60}=1\frac{1}{60}$$

(b) $\frac{5}{9}$ and $\frac{4}{7}$

L.C.M of $9, 7 = 63$

$$\frac{5}{9}=\frac{5\times7}{9\times7}=\frac{35}{63}$$
$$\frac{4}{7}=\frac{4\times9}{7\times9}=\frac{36}{63}$$
$$\therefore \frac{5}{9}+\frac{4}{7}=\frac{35}{63}+\frac{36}{63}$$
$$=\frac{35+36}{63}=\frac{71}{63}=1\frac{8}{63}$$

(c) $\frac{7}{15}$ and $\frac{12}{20}$

L.C.M of $15, 20 = 60$

$$\frac{7}{15}=\frac{7\times4}{15\times4}=\frac{28}{60}$$
$$\frac{12}{20}=\frac{12\times3}{20\times3}=\frac{36}{60}$$
$$\therefore \frac{7}{15}+\frac{12}{20}=\frac{28}{60}+\frac{36}{60}$$

(d) $\frac{4}{5}$ and $\frac{9}{15}$

L.C.M of $5, 15 = 15$

$$\frac{4}{5}=\frac{4\times3}{5\times3}=\frac{12}{15}$$
$$\frac{9}{15}=\frac{9\times1}{15\times1}=\frac{9}{15}$$
$$\therefore \frac{4}{5}+\frac{9}{15}=\frac{12}{15}+\frac{9}{15}$$

$$= \frac{28+36}{60} = \frac{64}{60}$$

$$= 1\frac{4}{60}$$

(e) $4\frac{1}{2}$ and $3\frac{1}{5}$

$$4\frac{1}{2} = \frac{9}{2},\ 3\frac{1}{5} = \frac{16}{5}$$

Now L.C.M of $2, 5 = 10$

$$\therefore \quad \frac{9}{2} = \frac{9\times 5}{2\times 5} = \frac{45}{10}$$

$$\frac{16}{5} = \frac{16\times 2}{5\times 2} = \frac{32}{10}$$

$$\therefore \quad \frac{45}{10} + \frac{32}{10} = \frac{45+32}{10} = \frac{77}{10} = 7\frac{7}{10}$$

(f) $1\frac{1}{3}$ and $2\frac{1}{9}$

$$1\frac{1}{3} = \frac{4}{3},\ 2\frac{1}{9} = \frac{19}{9}$$

$$\frac{4}{3} + \frac{19}{9} = \frac{4\times 3+19}{9}$$

$$= \frac{31}{9} = 3\frac{4}{9}$$

$$= \frac{12+9}{15} = \frac{21}{15}$$

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

(g) $14\frac{1}{2}$ and 4

$$14\frac{1}{2} = \frac{29}{2},\quad 4 = \frac{4}{1}$$

$$\frac{29}{2} + \frac{14}{1} = \frac{29+4\times 2}{2}$$

$$= \frac{37}{2} = 18\frac{1}{2}$$

(h) 3 and $4\frac{1}{5}$

$$3 = \frac{3}{1},\quad 4\frac{1}{5} = \frac{21}{5}$$

$$\therefore \quad \frac{3}{1} + \frac{21}{5} = \frac{15+21}{5}$$

$$= \frac{36}{5} = 7\frac{1}{5}$$

5. (a) $\frac{2}{15} - \frac{1}{20}$

L.C.M of $15, 20 = 60$

$$\frac{2}{15} = \frac{2\times 4}{15\times 4} = \frac{8}{60}$$

$$\frac{1}{20} = \frac{1\times 3}{20\times 3} = \frac{3}{60}$$

$$\therefore \quad \frac{2}{15} - \frac{1}{20} = \frac{8}{60} - \frac{3}{60}$$

(b) $3\frac{1}{2} - 2\frac{1}{5}$

$$3\frac{1}{2} = \frac{7}{2},\ 2\frac{1}{5} = \frac{11}{5}$$

L.C.M of $2, 5 = 10$

$$\therefore \quad 3\frac{1}{2} - 2\frac{1}{5} = \frac{7}{2} - \frac{11}{5}$$

$$= \frac{7\times 5 - 11\times 2}{10}$$

$$= \frac{8-3}{60} = \frac{5}{60}$$

$$= \frac{1}{12}$$

(c) $4 - 1\frac{1}{2}$

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

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

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

(d) $\frac{6}{5} - 1\frac{1}{6} = \frac{6}{5} - \frac{7}{6}$

$$= \frac{6}{5} \times \frac{6}{6} - \frac{7 \times 5}{6 \times 5}$$

$$= \frac{36}{30} - \frac{35}{30}$$

$$= \frac{36-35}{30} = \frac{1}{30}$$

(e) $4\frac{3}{5} - 2 = \frac{23}{5} - 2$

$$= \frac{23}{5} - \frac{2 \times 5}{1 \times 5}$$

$$= \frac{23}{5} - \frac{10}{5}$$

$$= \frac{23-10}{5} = 2\frac{3}{5}$$

(f) $7\frac{1}{2} - 4\frac{1}{5} = \frac{15}{2} - \frac{21}{5}$

$$= \frac{15}{2} \times \frac{5}{5} - \frac{21 \times 2}{5 \times 2}$$

$$= \frac{75}{10} - \frac{42}{10}$$

$$= \frac{75-42}{10}$$

$$= \frac{33}{10} = 3\frac{3}{10}$$

6. (a) $1\frac{1}{2} + 3\frac{1}{2} + 4$

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

$$= \frac{3 + 7 + 4 \times 2}{2}$$

$$= \frac{18}{2} = 9$$

(b) $2\frac{1}{5} + 1\frac{1}{4} - \frac{1}{2}$

$$= \frac{11}{2} + \frac{5}{4} - \frac{1}{2}$$

$$= \frac{11 \times 2 + 5 \times 1 - 1 \times 2}{4}$$

$$= \frac{22 + 5 - 2}{4}$$

$$= \frac{25}{4} = 6\frac{1}{4}$$

(c) $2\frac{1}{2} - 1\frac{1}{2} + 4$

(d) $4\frac{1}{2} - 1\frac{1}{5} + \frac{2}{5}$

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

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

$$= \left(\frac{2}{2}\right) + 4 = 1 + 4 = 5$$

$$= \frac{9}{2} - \frac{6}{5} + \frac{2}{5}$$

$$= \frac{9 \times 5 - 6 \times 2 + 2 \times 2}{10}$$

$$= \frac{45 - 12 + 4}{10} = \frac{37}{10} = 3\frac{7}{10}$$

7. Rashmi spent money on rent $= \frac{1}{5}$

Rashmi spent money on food $= \frac{2}{5}$

Total spent money on both things $= \frac{1}{5} + \frac{2}{5} = \frac{1+2}{5} = \frac{3}{5}$

Thus, the required fraction is $\frac{3}{5}$.

8. Let total time = 1

Rahim spent time in playing $= \frac{2}{5}$

Rashim on reading study books $= \frac{1}{5}$

Rashim in watching T.V $= 1 - \left(\frac{2}{5} + \frac{1}{5}\right) = 1 - \left(\frac{2+1}{5}\right)$

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

Thus, he spent $\frac{2}{5}$ time in watching T.V.

9. Ramesh solved the part of an exercise $= \frac{2}{9}$

Seema solved the part of this exercise $= \frac{3}{5}$

Now, we compare both part (fraction). L.C.M. of 5, 9 = 45

$$\frac{2}{9} = \frac{2 \times 5}{9 \times 5} = \frac{10}{45} \quad \Big| \quad \frac{3}{5} = \frac{3 \times 9}{5 \times 9} = \frac{27}{45}$$

Since, $10 < 27 \quad \Rightarrow \frac{10}{45} < \frac{27}{45}$

$\therefore \quad \frac{2}{9}$ is lesser part

10. Milk in first packet $= 4\frac{1}{2}\,l = \frac{9}{2}\,l$

Milk second packet $= 5\frac{1}{4}\,l = \frac{21}{4}\,l$

Milk third packet $= 3\frac{3}{4}\,l = \frac{15}{4}\,l$

Total quantity of milk in these packets $= \left(\frac{9}{2} + \frac{21}{4} + \frac{15}{4}\right) l$

$$= \left(\frac{9 \times 2 + 21 + 15}{4}\right) l$$

$$= \frac{54}{4}\,l = \frac{27}{2}\,l = 13\frac{1}{2}\,l$$

Thus, there is $13\frac{1}{2}\,l$ milk in the can.

Exercise: 2.2

1. Fill in the blanks:

(a) $\frac{4}{3} \times 0 = \mathbf{0}$ (b) $2\frac{5}{6} \times 1 = \mathbf{\frac{17}{6}}$ (c) $\frac{3}{17} \times 0 = \mathbf{0}$

(d) $\frac{8}{7} \times \frac{1}{5} = \frac{1}{5} \times \mathbf{\frac{8}{7}}$ (e) $\frac{5}{4} \times \frac{4}{5} = \mathbf{1}$ (f) $\frac{6}{11} \times \mathbf{1} = \frac{6}{11}$

2. (a) $1\frac{1}{3} \times 0 = \frac{4}{3} \times 0 = 0$ (b) $4\frac{3}{4} \times 2 = \frac{19}{4} \times 2 = \frac{19}{2}$

(c) $\frac{3}{7} \times 9 = \frac{27}{7}$ (d) $2\frac{5}{4} \times 8 = \frac{13}{4} \times 8 = 26$

(e) $3\frac{1}{9} \times 21 = \frac{28}{9} \times 21 = \frac{196}{3}$ (f) $6 \times 1\frac{1}{2} = 6 \times \frac{3}{2} = 9$

3. (a) $\frac{3}{9} \times \frac{1}{7} = \frac{1}{3} \times \frac{1}{7} = \frac{1}{21}$ (b) $\frac{8}{9} \times \frac{1}{7} = \frac{8}{63}$

(c) $\frac{7}{9}\times\frac{15}{28}=\frac{7}{9}\times\frac{15}{28}=\frac{5}{12}$ (d) $5\frac{3}{6}\times 2\frac{2}{11}=\frac{33}{6}\times\frac{24}{11}=12$

(e) $7\frac{1}{9}\times 3\frac{2}{16}=\frac{64}{9}\times\frac{50}{16}=\frac{200}{9}$ (f) $10\frac{7}{8}\times 2\frac{1}{24}=\frac{87}{8}\times\frac{49}{24}$

4. (a) $\frac{1}{2}\times\frac{1}{3}\times\frac{1}{4}=\frac{1}{24}$ (b) $\frac{2}{3}\times\frac{3}{4}\times\frac{4}{5}=\frac{2\times3\times4}{3\times4\times5}=\frac{2}{5}$

(c) $\frac{1}{4}\times 2\frac{1}{2}\times\frac{4}{5}=\frac{1}{4}\times\frac{5}{2}\times\frac{4}{5}=\frac{1}{2}$

(d) $1\frac{1}{2}\times\frac{3}{4}\times 3\frac{1}{3}=\frac{3}{2}\times\frac{3}{4}\times\frac{10}{3}=\frac{15}{4}$

(e) $\frac{5}{9}\times 1\frac{2}{3}\times 3\frac{3}{5}=\frac{5}{9}\times\frac{5}{3}\times\frac{18}{5}=\frac{10}{3}$

(f) $4\frac{3}{8}\times\frac{27}{35}\times\frac{7}{9}=\frac{35}{8}\times\frac{27}{35}\times\frac{7}{9}=\frac{21}{8}$

5. (a) $24-24\times\frac{5}{6}=24-4\times5=24-20=4$

(b) $\frac{5}{6}+\frac{2}{7}\times\frac{7}{8}=\frac{5}{6}+\frac{2\times7}{7\times8}=\frac{5}{6}+\frac{1}{4}=\frac{5\times4+6\times1}{24}=\frac{26}{24}=\frac{13}{12}=1\frac{1}{12}$

(c) $2\frac{3}{4}\times\frac{1}{2}-\frac{3}{5}=\frac{11}{4}\times\frac{1}{2}-\frac{3}{5}=\frac{11}{8}-\frac{3}{5}=\frac{11\times5-8\times3}{40}=\frac{31}{40}$

(d) $\frac{2}{7}\times\left(2\frac{1}{3}-\frac{2}{5}\right)=\frac{2}{7}\times\left(\frac{7}{3}-\frac{2}{5}\right)=\frac{2}{7}\times\left(\frac{7\times5-2\times3}{15}\right)$

$=\frac{2}{7}\times\frac{29}{7}=\frac{58}{49}=1\frac{9}{49}$

(e) $\frac{1}{5}\times\frac{11}{13}+7\frac{4}{5}\times\frac{1}{13}=\frac{11}{65}+\frac{39}{5}\times\frac{1}{13}=\frac{11}{65}+\frac{39}{65}$

$=\frac{11+39}{65}=\frac{50}{65}=\frac{10}{13}$

(f) $3\frac{3}{5}\times\left(5\frac{2}{5}-3\frac{1}{6}\right)=\frac{18}{5}\times\left(\frac{27}{5}-\frac{19}{6}\right)$

$=\frac{18}{5}\times\left(\frac{27\times6-19\times5}{30}\right)$

$=\frac{18}{5}\times\frac{67}{30}=\frac{134}{25}$

6. Side of a square $= 5\frac{2}{3}\text{ m} = \frac{17}{3}\text{ m}$

Area of the square $=$ side $\times$ side

$$= \frac{17}{3}\text{ m} \times \frac{17}{3}\text{ m} = \frac{289}{9}\text{ m}^2$$

7. A scooter cover distance in 1 l of petrol $= 32$ km

A scooter cover distance in $3\frac{3}{4}\,l$ of petrol $= 32 \times 3\frac{3}{4}$ km

$$= 32 \times \frac{15}{4} = 120\text{ km}$$

8. Capacity of tank $= 52\,l$

$$\frac{3}{4} \text{ of } 52\,l = \frac{3}{4} \times 52l = 39l$$

Thus, 39 litre water is in the tank.

9. Total periods taught by a teacher $= 6$

The duration of each period $= \frac{2}{3}$ hours

Total duration of 6 periods $= 6 \times \frac{2}{3}$ hours $= 4$ hours

10. Reeta goes in 1 hour $= \frac{5}{7}$ km

$\therefore$ Reeta goes in $3\frac{1}{2}$ hour $= \frac{5}{7} \times 3\frac{1}{2}$ km

$$= \frac{5}{7} \times \frac{7}{2}\text{ km} = \frac{5}{2}\text{ km} = 2\frac{1}{2}\text{ km.}$$

11. Cow gives milk in a day $= 12\frac{1}{2}\,l = \frac{25}{2}\,l$

Cow gives milk in a week $= \frac{25}{2}\,l \times 7 = \frac{175l}{2} = 87\frac{1}{2}\,l$

12. Here given $l = 45\frac{1}{2}\text{ m} = \frac{91}{2}\text{m}$, $b = 16\frac{2}{3}\text{ m} = \frac{50}{3}\text{ m}$

Perimeter of the rectangle $= 2(l + b) = 2\left(\frac{91}{2} + \frac{50}{3}\right)\text{m}$

$$= 2\left(\frac{91\times 3+50\times 2}{6}\right)\text{m}$$

$$= 2\left(\frac{373}{6}\right) = \frac{373}{3} = 124\frac{1}{3}\text{ m}$$

13. Lakshya reads a book in 1 day $= 2\frac{3}{4}$ hr $= \frac{11}{4}$ hr

Lakshya read sthe book in 8 days $= \frac{11}{4}\times 8$ hr $= 22$ hrs

Thus, he take 22 hours to read the entire book.

Exercise-2.3

1. Divide the following?

(a) $\frac{1}{9}\div 7 = \frac{1}{9}\div\frac{7}{1} = \frac{1}{9}\times\frac{1}{7} = \frac{1}{63}$

(b) $\frac{3}{7}\div 7 = \frac{3}{7}\div\frac{7}{1} = \frac{3}{7}\times\frac{1}{7} = \frac{3}{49}$

(c) $42\div\frac{7}{12} = \frac{42}{1}\div\frac{7}{12} = \frac{42}{1}\times\frac{12}{7} = 72$

(d) $9\div\frac{3}{4} = \frac{9}{1}\div\frac{3}{4} = 9\times\frac{4}{3} = 12$

(e) $3\div\frac{2}{21} = \frac{3}{1}\div\frac{2}{21} = \frac{3}{1}\times\frac{21}{2} = \frac{63}{2}$

(f) $1\frac{3}{5}\div 5 = \frac{8}{5}\div\frac{5}{1} = \frac{8}{5}\times\frac{1}{5} = \frac{8}{25}$

(g) $5\frac{2}{3}\div 34 = \frac{17}{3}\div\frac{34}{1} = \frac{17}{3}\times\frac{1}{34} = \frac{1}{6}$

(h) $76\div 6\frac{1}{3} = \frac{76}{1}\div\frac{19}{3} = \frac{76}{1}\times\frac{3}{19} = 12$

(i) $3\frac{6}{7}\div 3 = \frac{27}{7}\div\frac{3}{1} = \frac{27}{7}\times\frac{1}{3} = \frac{9}{7}$

(j) $2\frac{4}{7}\div 8 = \frac{18}{7}\div\frac{8}{1} = \frac{18}{7}\times\frac{1}{8} = \frac{9}{28}$

(k) $\frac{1}{7}\div 2 = \frac{1}{7}\div\frac{2}{1} = \frac{1}{7}\times\frac{1}{2} = \frac{1}{14}$

(l) $6 \div \frac{3}{7} = \frac{6}{1} \div \frac{3}{7} = \frac{6}{1} \times \frac{7}{3} = \frac{14}{1} = 14$

2. (a) $\frac{12}{14} \div \frac{8}{15} = \frac{12}{14} \times \frac{15}{8} = \frac{45}{28}$

(b) $\frac{5}{9} \div \frac{10}{27} = \frac{5}{9} \div \frac{27}{10} = \frac{3}{2}$

(c) $\frac{12}{17} \div \frac{3}{4} = \frac{12}{17} \times \frac{4}{3} = \frac{16}{17}$

(d) $\frac{14}{25} \div \frac{2}{5} = \frac{14}{25} \times \frac{5}{2} = \frac{7}{5}$

(e) $\frac{33}{35} \div 1\frac{4}{7} = \frac{33}{35} \div \frac{11}{7} = \frac{33}{35} \times \frac{7}{11} = \frac{3}{5}$

(f) $2\frac{3}{5} \div \frac{2}{3} = \frac{13}{5} \div \frac{2}{3} = \frac{13}{5} \times \frac{3}{2} = \frac{39}{10}$

(g) $6\frac{5}{17} \div \frac{4}{51} = \frac{107}{17} \times \frac{51}{4} = \frac{321}{4}$

(h) $1\frac{8}{11} \div 1\frac{5}{33} = \frac{19}{8} \div \frac{38}{33} = \frac{19}{8} \times \frac{33}{38} = \frac{33}{16}$

(i) $5\frac{13}{28} \div 2\frac{19}{49} = \frac{153}{28} \div \frac{117}{49} = \frac{153}{28} \times \frac{117}{49} = \frac{17901}{1372}$

3. (a) $\frac{2}{8} \div \left(\frac{4}{7} + \frac{3}{7}\right) = \frac{2}{8} \div \left(\frac{4+3}{7}\right) = \frac{2}{8} \div \frac{7}{7} = \frac{2}{8} \div 1 = \frac{2}{8} \times 1 = \frac{2}{8} = \frac{1}{4}$

(b) $\frac{6}{7} \times \frac{5}{9} \div \frac{15}{27} = \frac{6}{7} \times \frac{5}{9} \times \frac{27}{15} = \frac{6}{7}$

(c) $\frac{13}{4} \times \frac{3}{26} \times \frac{5}{9} = \frac{13 \times 3 \times 5}{4 \times 26 \times 9} = \frac{5}{24}$

(d) $\frac{2}{3} \times \frac{6}{11} \times \frac{22}{15} = \frac{2 \times 2 \times 2}{15} = \frac{8}{15}$

(e) $3\frac{1}{2} \div 1\frac{3}{4} \times 1\frac{1}{2} = \frac{7}{2} \times \frac{4}{7} \times \frac{3}{2} = \frac{3}{1} = 3$

(f) $\frac{4}{7} \div \left(3\frac{1}{3} + 2\frac{4}{5}\right) = \frac{4}{7} \div \left(\frac{10}{3} + \frac{14}{5}\right) = \frac{4}{7} \div \left(\frac{10 \times 5 + 14 \times 3}{15}\right)$

$$= \frac{4}{7} \div \frac{92}{15} = \frac{4}{7} \times \frac{15}{92} = \frac{15}{161}$$

4. Weight of 16 bags $= 12\frac{4}{5}$ kg $= \frac{64}{5}$

Weight of 1 bag $= \left(\frac{64}{5} \div 16\right)$ kg $= \left(\frac{64}{5} \div \frac{16}{1}\right)$ kg $= \left(\frac{64}{5} \times \frac{1}{16}\right) = \frac{4}{5}$ kg

$\therefore$ The weight of 1 bag is $\frac{4}{5}$ kg.

5. ₹ $18\frac{1}{4}$ is the price of 1 kg sugar.

or ₹ $\frac{73}{4}$ is the price of 1 kg sugar.

₹ 1 is the price of $1 \div \frac{73}{4} = \frac{4}{73}$ kg sugar.

₹ 292 is the price of $\frac{4}{73} \times 292 = 16$ kg sugar.

Thus 16 kg of sugar can be bought for ₹ 292

6. The product of two numbers $= \frac{28}{81}$

one number $= \frac{14}{27}$

other number $= ?$

Other number $= \frac{\text{Product of two numbers}}{\text{One number}}$

$$= \frac{\left(\frac{28}{81}\right)}{\left(\frac{14}{27}\right)} = \frac{28}{81} \div \frac{14}{27} = \frac{28}{81} \times \frac{27}{14} = \frac{2}{3}$$

7. The cost of $6\frac{2}{3}$ m of iron wire = ₹ $16\frac{2}{3}$

The cost of 1 m of iron wire $=$ ₹ $16\frac{2}{3} \div 6\frac{2}{3}$

$=$ ₹ $\frac{50}{3} \div \frac{20}{3}$

$=$ ₹ $\frac{50}{3} \times \frac{3}{20} =$ ₹ $\frac{5}{2}$

8. Let his whole journey $= x$ km

Given, $\frac{4}{5}$ of total journey $= 40$ km

$\Rightarrow \quad \frac{4}{5}$ of $x = 40 \qquad \Rightarrow \quad \frac{4}{5}$ of $x = 40$

$\Rightarrow \quad x = \frac{40 \times 5}{4} = 50$

Thus, his whole Journey is 50 km.

9. 28 trousers can be made from $= 63$ m of cloth

1 trouser can be made from $= \frac{63}{28}$ m of cloth

$= 2\frac{1}{4}$ m of the cloth

Thus, $2\frac{1}{4}$m of cloth is required for one trouser.

10.

$$\text{Area of rectangle} = 65\frac{1}{4}\text{ m}^2 = \frac{261}{4}\text{ m}^2$$

$$\text{It breadth} = 5\frac{7}{16}\text{ m} = \frac{87}{16}\text{ m}$$

$$\text{It length} = ?$$

$$\text{Area of rectangle} = \text{length} \times \text{breadth}$$

$$\frac{261}{4}\text{ m}^2 = \frac{87}{16}\text{ m} \times \text{length}$$

$$\therefore \quad \text{length} = \frac{261}{4}\text{ m}^2 \div \frac{87}{16}\text{ m}$$

$$= \frac{261}{4}\text{ m}^2 \times \frac{16}{87\text{ m}} = 12\text{ m}$$

11. Let that number is x, then

$$\frac{5}{12} \div x = 1\frac{17}{18} \qquad \Rightarrow \qquad \frac{5}{12} \times \frac{1}{x} = \frac{35}{18}$$

$$\Rightarrow \qquad x = \frac{5 \times 18}{12 \times 35} = \frac{3}{14}$$

Thus, we have to divide by $\frac{3}{14}$.

12. $\text{Sum} = \frac{65}{12} + \frac{8}{3} = \frac{65-32}{12} = \frac{97}{12}$

$\text{Difference} = \frac{65}{12} - \frac{8}{3} = \frac{65-32}{12} = \frac{33}{12}$

$\therefore \quad \frac{97}{12} \div \frac{33}{12} = \frac{97}{12} \times \frac{12}{33}$

$= \frac{97}{33} = 2\frac{31}{33}$

13. $\text{Sum} = \frac{13}{3} + \frac{6}{7} = \frac{91+18}{21} = \frac{109}{21}$

$\text{Product} = \frac{2}{7} \times 5\frac{1}{2} = \frac{2}{7} \times \frac{11}{2} = \frac{11}{7}$

$\therefore \quad \frac{109}{21} \div \frac{11}{7} = \frac{109}{21} \times \frac{7}{11} = \frac{109}{33} = 3\frac{10}{33}$

14. Somya has money = ₹ 52

Price of 1 chocolate = ₹ $5\frac{1}{5}$ = ₹ $\frac{26}{5}$

Number of chocolates = ₹ 52 ÷ ₹ $\frac{26}{5}$

= ₹ $52 \times \frac{5}{₹\,26} = 10$

$\therefore$ She can buy 10 chocolates.

15. Let Total no. of students = x

Number of girls = 200

Number of boys = $\frac{3}{5}$ of $x = \frac{3x}{5}$

$\therefore \quad x = 200 + \frac{3x}{5} \quad \Rightarrow \quad x - \frac{3x}{5} = 200$

$\Rightarrow \quad \frac{5x-3x}{5} = 200 \quad \Rightarrow \quad \frac{2x}{5} = 200$

$\Rightarrow \quad 2x = 200 \times 5$

$\Rightarrow \quad x = \frac{200 \times 5}{2} = 500$

$\therefore$ Total 500 students in the school.

Exercise 2.4

1. (a) 1.2, 2.25, 3.175, 5.2

1.2 = 1.200
2.25 = 2.250
3.175 = 3.175
5.2 = 5.200

∴ 1.200; 2.250, 3.175, 5.200 are like decimals.

(b) 20.5, 28.235, 120.6, 385.55

20.5 = 20.500
28.235 = 28.235
120.6 = 120.600
385.55 = 385.550

∴ 20.500, 28.235, 120.600 385.550 are like decimals.

2. (a) 63.500, 265.250, 50.626

63.500 = 63.5
265.250 = 265.25
50.626 = 50.626

(b) 72.250, 165.300, 275.35

72.250 = 72.25
165.300 = 165.3
275.35 = 275.35

3. (a) 12. 25, 15.62 and 35.55

$$\begin{array}{r} 12.25 \\ 15.62 \\ +35.55 \\ \hline 63.42 \end{array}$$

Hence,
12.25 + 15.62 + 35.55
= 63.42

(b) 326.123, 210.6 and 632.27

$$\begin{array}{r} 326.123 \\ 210.600 \\ +\ 632.270 \\ \hline 1168.993 \end{array}$$

Hence,
326.123 + 210.6 + 632.27
= 1168.993

(c) 720. 62, 523.690 and 120.007

$$\begin{array}{r} 720.620 \\ 523.690 \\ +120.007 \\ \hline 1364.317 \end{array}$$

Hence, 720.62 + 523.690 + 120.007 = 1364.317

(d) 607.12, 790.657 and 1930.425

$$\begin{array}{r} 607.120 \\ 790.657 \\ +\ 1930.425 \\ \hline 3328.202 \end{array}$$

Hence, 607.12 + 790.657 + 1930.425 = 3328.202

4. (a) 300−126. 75

$$\begin{array}{r} 300.00 \\ -\ 126.75 \\ \hline 173.25 \end{array}$$

Hence, 300 − 126.75
= 173.25

(b) 623.123 − 172.256

$$\begin{array}{r} 623.123 \\ -\ 172.256 \\ \hline 450.867 \end{array}$$

Hence,
623.123−172.256
= 450.867

(c) 1987.5– 928.62

$$\begin{array}{r} 1987.50 \\ -928.62 \\ \hline 1058.88 \end{array}$$

Hence, 1987.5 –928.62

= 1058.88

(d) 3485.26 – 2123.135

$$\begin{array}{r} 3485.260 \\ -2123.135 \\ \hline 1362.125 \end{array}$$

Hence, 3485.26–2123.135

= 1362.125

Exercise-2.5

1. (a) $2.75 \times 10 = 27.5$ (Shift decimal to one place to the right)

(b) $2.01 \times 10 = 20.1$ (Shift decimal to one place to the right)

(c) $3.5 \times 10 = 35.0$ (Shift decimal to one place to the right)

(d) $1.33 \times 10 = 13.3$ (Shift decimal to one place to the right)

(e) $0.13 \times 100 = 13.0$ (Shift decimal to two places to the right)

(f) $8.9 \times 100 = 890.0$ (Shift decimal to two places to the right)

(g) $16.17 \times 100 = 1617$ (Shift decimal to two places to the right)

(h) $2.31 \times 1000 = 2310.0$ (Shift decimal to third places to the right)

(i) $0.2416 \times 100 = 24.16$ (Shift decimal to two places to the right)

(j) $2.61 \times 1000 = 2610.0$ (Shift decimal to third places to the right)

(k) $1.53 \times 1000 = 1530.0$ (Shift decimal to third places to the right)

(l) $6.123 \times 1000 = 6123.0$ (Shift decimal to third places to the right)

2. (a) 1.3×7

Here, Sum of decimal places in given decimal = 1

$$\begin{array}{r} 1\ 3 \\ \times\ 7 \\ \hline 9\ 1 \end{array}$$

Hence, $1.3 \times 7 = 9.1$

(b) 2.57×18

Here, Sum of decimal places in given decimal = 2

$$\begin{array}{r} 2\ 5\ 7 \\ \times\ 1\ 8 \\ \hline 2\ 0\ 5\ 6 \\ 2\ 5\ 7\times \\ \hline 4\ 6\ 2\ 6 \end{array}$$

Hence, $2.57 \times 18 = 46.26$

(c) 1.5×9

Here, Sum of decimal places in given decimal = 1

(d) 0.225×13

Here, Sum of decimal places in given decimal = 3

$$\begin{array}{r} 15 \\ \times 9 \\ \hline 135 \\ \hline \end{array}$$

Hence, $1.5 \times 9 = 13.5$

$$\begin{array}{r} 225 \\ \times 13 \\ \hline 675 \\ 225\times \\ \hline 2925 \\ \hline \end{array}$$

Hence, $0.225 \times 13 = 2.925$

(e) 49.25×25

Here, Sum of decimal places in given decimal = 2

$$\begin{array}{r} 492.5 \\ \times 25 \\ \hline 24625 \\ 9850\times \\ \hline 123125 \\ \hline \end{array}$$

Hence, $49.25 \times 25 = 1231.25$

(f) 19.84×27

Here, Sum of decimal places in given decimal = 2

$$\begin{array}{r} 1984 \\ \times 27 \\ \hline 13888 \\ 3968\times \\ \hline 53568 \\ \hline \end{array}$$

Hence, $19.84 \times 27 = 535.68$

(g) 16.34×79

Here, Sum of decimal places in given decimals = 2

$$\begin{array}{r} 1634 \\ \times 79 \\ \hline 14706 \\ 11438\times \\ \hline 129086 \\ \hline \end{array}$$

Hence, 16.34×79
$= 1290.86$

(h) 0.427×235

Here, Sum of decimal places in given decimals = 3

$$\begin{array}{r} 427 \\ \times 235 \\ \hline 2135 \\ 1281\times \\ 854\times\times \\ \hline 100345 \\ \hline \end{array}$$

Hence, 0.427×235
$= 100.345$

3. (a) 3.6×0.5

Here, Sum of decimal places in given decimals $= 1 + 1 = 2$

(b) 1.2×1.2

Here, Sum of decimal places in given decimals $= 1 + 1 = 2$

$$\begin{array}{r} 36 \\ \times 5 \\ \hline 180 \\ \hline \end{array}$$

Hence, $3.6 \times 0.5 = 1.80$

$$\begin{array}{r} 12 \\ \times 12 \\ \hline 24 \\ 12\times \\ \hline 144 \\ \hline \end{array}$$

Hence, $1.2 \times 1.2 = 1.44$

(c) 0.13×0.6

Here, Sum of decimal places in given decimals $= 2+1 = 3$

$$\begin{array}{r} 13 \\ \times 6 \\ \hline 78 \\ \hline \end{array}$$

Hence, $0.13 \times 0.6 = 0.078$

(d) 2.01×1.1

Here, Sum of decimal places in given decimals $= 2+1 = 3$

$$\begin{array}{r} 201 \\ \times 11 \\ \hline 201 \\ 201\times \\ \hline 2211 \\ \hline \end{array}$$

Hence, $2.01 \times 1.1 = 2.211$

(e) 4.21×7.25

Here, Sum of decimal places in given decimals $= 2+2 = 4$

$$\begin{array}{r} 725 \\ \times 421 \\ \hline 725 \\ 1450\times \\ 2900\times\times \\ \hline 305225 \\ \hline \end{array}$$

Hence, $4.21 \times 7.25 = 30.5225$

(f) 12.23×6.3

Here, Sum of decimal places in given decimals $= 2+1 = 3$

$$\begin{array}{r} 1223 \\ \times 63 \\ \hline 3669 \\ 7338\times \\ \hline 77049 \\ \hline \end{array}$$

Hence, $12.23 \times 6.3 = 77.049$

(g) 12.24×6.5

Here, Sum of decimal places in given decimals $= 2+1 = 3$

$$\begin{array}{r} 1224 \\ \times 65 \\ \hline 6120 \\ 7344\times \\ \hline 79560 \\ \hline \end{array}$$

Hence, $12.24 \times 6.5 = 79.560$

(h) 13.63×1.1

Here, Sum of decimal places in given decimals $= 2+1 = 3$

$$\begin{array}{r} 1363 \\ \times 11 \\ \hline 1363 \\ 1363\times \\ \hline 14993 \\ \hline \end{array}$$

Hence, $13.63 \times 1.1 = 14.993$

(i) 13.25×1.5

Here, Sum of decimal places in given decimals $= 2+1$

$= 3$

$$\begin{array}{r} 1\,3\,2\,5 \\ \times\,1\,5 \\ \hline 6\,6\,2\,5 \\ 1\,3\,2\,5\times \\ \hline 1\,9\,8\,7\,5 \\ \hline \end{array}$$

Hence, $13.25 \times 1.5 = 19.875$

(j) 19.84×27.9

Here, Sum of decimal places in given decimals $= 2+1$

$= 3$

$$\begin{array}{r} 1\,9\,8\,4 \\ \times\,2\,7\,9 \\ \hline 1\,7\,8\,5\,6 \\ 1\,3\,8\,8\,8\times \\ \hline 3\,9\,6\,8\times\times \\ \hline 5\,5\,3\,5\,3\,6 \\ \hline \end{array}$$

Hence, $19.84 \times 27.9 = 553.536$

(k) 0.235×4.8

Here, Sum of decimal places in given decimals $= 3+1 = 4$

$$\begin{array}{r} 2\,3\,5 \\ \times\,4\,8 \\ \hline 1\,8\,8\,0 \\ 9\,4\,0\times \\ \hline 1\,1\,2\,8\,0 \\ \hline \end{array}$$

Hence, $0.235 \times 4.8 = 1.1280$

(l) 1.475×2.112

Here, Sum of decimal places in given decimals $= 3+3 = 6$

$$\begin{array}{r} 2\,1\,1\,2 \\ 1\,4\,7\,5 \\ \hline 1\,0\,5\,6\,0 \\ 1\,4\,7\,8\,4\times \\ 8\,4\,4\,8\times\times \\ \hline 2\,1\,1\,2\times\times\times \\ \hline 3\,1\,1\,5\,2\,0\,0 \\ \hline \end{array}$$

Hence, $1.475 \times 2.112 = 3.115200$

(m) 114.2×2.14

Here, Sum of decimal places in given decimals $= 1+2 = 3$

$$\begin{array}{r} 1\,1\,4\,2 \\ \times\,2\,1\,4 \\ \hline 4\,5\,6\,8 \\ 1\,1\,4\,2\times \\ \hline 2\,2\,8\,4\times\times \\ \hline 2\,4\,4\,3\,8\,8 \\ \hline \end{array}$$

Hence, 114.2×2.14
$= 244.388$

(n) 3.101×1.007

Here, Sum of decimal places in given decimals $= 3+3 = 6$

$$\begin{array}{r} 3\,1\,0\,1 \\ \times\,1\,0\,0\,7 \\ \hline 2\,1\,7\,0\,7 \\ 0\,0\,0\,0\times \\ 0\,0\,0\,0\times\times \\ \hline 3\,1\,0\,1\times\times\times \\ \hline 3\,1\,2\,2\,7\,0\,7 \\ \hline \end{array}$$

Hence, 3.101×1.007
$= 3.122707$

(o) 0.427×23.5

Here, Sum of decimal places in given decimals $= 3+1 = 4$

$$\begin{array}{r} 427 \\ \times 235 \\ \hline 2135 \\ 1281\times \\ 854\times\times \\ \hline 100345 \end{array}$$

Hence, $0.427 \times 23.5 = 10.0345$

(p) $1.3 \times 1.5 \times 2.7$

Here, Sum of decimal places in given decimals $= 1+1 = 3$

$$\begin{array}{r} 15 \\ \times 13 \\ \hline 45 \\ 15\times \\ \hline 195 \end{array} \qquad \begin{array}{r} 195 \\ \times 27 \\ \hline 1365 \\ 390\times \\ \hline 5265 \end{array}$$

Hence, $1.3 \times 1.5 \times 2.7 = 5.265$

(q) $3.5 \times 1.15 \times 2.2$

Here, Sum of decimals places in given decimals $= 1+2+1 = 4$

$$\begin{array}{r} 115 \\ \times 35 \\ \hline 575 \\ 345\times \\ \hline 4025 \end{array}$$

Now 4025×22

$$\begin{array}{r} 4025 \\ \times 22 \\ \hline 8050 \\ 8050\times \\ \hline 88550 \end{array}$$

Hence, $3.5 \times 1.15 \times 2.2 = 8.8550$

(r) $6.7 \times 4.4 \times 1.31$

Here, Sum of decimal places in given decimals $= 1+1+2 = 4$

$$\begin{array}{r} 67 \\ \times 44 \\ \hline 268 \\ 268\times \\ \hline 2948 \end{array}$$

Now 2948×131

$$\begin{array}{r} 2948 \\ \times 131 \\ \hline 2948 \\ 8844\times \\ 2948\times\times \\ \hline 386188 \end{array}$$

Hence, $6.7 \times 4.4 \times 1.31 = 38.6188$

(s) $0.04 \times 0.7 \times 0.02$

Here, Sum of decimal places in given decimals $= 2+1+2 = 5$

$$\begin{array}{r} 7 \\ \times 4 \\ \hline 28 \end{array} \qquad \begin{array}{r} 28 \\ \times 2 \\ \hline 56 \end{array}$$

Hence, $0.04 \times 0.7 \times 0.02 = 0.00056$

(t) $2.3 \times 6.8 \times 5.4$

Here, Sum of decimal places in given decimals $= 1+1+1 = 3$

Now, 1564×54

$$\begin{array}{r} 68 \\ \times 23 \\ \hline 204 \\ 136\times \\ \hline 1564 \\ \hline \end{array} \qquad \begin{array}{r} 1564 \\ \times 54 \\ \hline 6256 \\ 7820\times \\ \hline 84456 \\ \hline \end{array}$$

Hence, $2.3 \times 6.8 \times 5.4 = 84.456$

4. (a) The price of 1m of cloth = ₹ 62.85

$\therefore$ The price of 23m of cloth = ₹ 62.85×23 = ₹ 1445.55

(b) Shubham's monthly salary = ₹ 5500

The part of salary saved by Shubham = 0.2

Shubham's monthly savings = ₹ 5500×0.2

$\because$ Shubham saves in 1 month = ₹ 1100

$\therefore$ Shubham saves in 12 months = ₹ 1100×12 = ₹ 13200

Hence, he will save ₹ 13200 in one year.

(c) $\because$ 1m = 39.37 inches

$\therefore$ 16m = 39.37×16 inches = 629.92 inches

(d) Cost of 1 orange = ₹ 6.45

" " 1 dozen (i.e.,12) oranges = ₹ 6.45×12 = ₹ 77.4

Exercise-2.6

1. (a) $9.69 \div 10$

$$\frac{9.69}{10} = \frac{969}{10 \times 100}$$

$$= \frac{969}{1000} = 0.969$$

(b) $13.05 \div 10$

$$\frac{13.05}{10} = \frac{1305}{10 \times 100}$$

$$= \frac{1305}{1000} = 1.305$$

(c) $34.19 \div 10$

$$\frac{34.19}{10} = \frac{3419}{10 \times 100}$$

$$= \frac{3419}{1000}$$

$$= 3.419$$

(d) $0.01 \div 100$

$$\frac{0.01}{100} = \frac{1}{100 \times 100}$$

$$= \frac{1}{10000}$$

$$= 0.0001$$

(e) $56.192 \div 10$

$$\frac{56.192}{10} = \frac{56192}{10 \times 1000}$$

$$= \frac{56192}{10000} = 5.6192$$

(f) $0.73 \div 100$

$$\frac{0.73}{100} = \frac{73}{100 \times 100} = \frac{73}{10000}$$

$$= 0.0073$$

(g) $479.25 \div 100$

$$\frac{479.25}{100} = \frac{47925}{100 \times 100}$$

$$= \frac{47925}{10000} = 4.7925$$

(h) $100.32 \div 100$

$$\frac{100.32}{100} = \frac{10032}{100 \times 100}$$

$$= \frac{10032}{10000} = 1.0032$$

(i) $10.01 \div 1000$

$$\frac{10.01}{1000} = \frac{1001}{1000 \times 100}$$

$$= \frac{1001}{100000} = 0.01001$$

(j) $167.3 \div 1000$

$$\frac{167.3}{1000} = \frac{1673}{1000 \times 10}$$

$$= \frac{1673}{10000} = 0.01673$$

(k) $0.76 \div 1000$

$$\frac{0.76}{1000} = \frac{76}{1000 \times 100}$$

$$= \frac{76}{100000} = 0.00076$$

(l) $8754.5 \div 1000$

$$\frac{8754.5}{1000} = \frac{8754.5}{1000 \times 10}$$

$$= \frac{87545}{10000} = 8.7545$$

(m) $1.305 \div 9$

$$\frac{1.305}{9} = \frac{1305}{9 \times 100} = \frac{1305}{900}$$

$$= 1.45$$

(n) $188.4 \div 60$

$$\frac{188.4}{60} = \frac{1884}{600}$$

$$= 3.14$$

(o) $231.7 \div 70$

$$\frac{231.7}{70} = \frac{2317}{700}$$

$$= 3.31$$

(p) $49.6 \div 80$

$$\frac{49.6}{80} = \frac{496}{80 \times 10} = \frac{496}{800}$$

$$= 0.62$$

2. (a) $4.9 \div 0.7$

$$\frac{4.9}{0.7} = \frac{49}{07} = \frac{49}{7} = 7$$

(b) $80 \div 1.6$

$$\frac{80}{1.6} = \frac{80 \times 10}{16} = 50$$

(c) $5.45 \div 0.25$

$$\frac{5.45}{0.25} = \frac{545}{25} = 21.8$$

(d) $9.69 \div 1.9$

$$\frac{9.69}{1.9} = \frac{969 \times 10}{19 \times 100} = \frac{51}{10} = 5.1$$

(e) $56.192 \div 3.2$

$$\frac{56.192}{3.2} = \frac{56192 \times 10}{32 \times 100}$$

$$= \frac{1756}{100} = 17.56$$

(f) $289 \div 6.4$

$$\frac{289.6}{6.4} = \frac{2896 \times 10}{64 \times 10}$$

$$= \frac{2896}{64} = 45.25$$

(g) $0.0102 \div 1.7$

$$\frac{0.0102}{1.7} = \frac{102 \times 10}{17 \times 10000}$$

$$= \frac{6}{1000}$$

$$= 0.006$$

(h) $0.759 \div 0.3$

$$\frac{0.759}{0.3} = \frac{759 \times 10}{3 \times 1000}$$

$$= \frac{253}{100} = 2.53$$

(i) $25.395 \div 1.5$

$$\frac{25.395}{1.5} = \frac{25395 \times 10}{15 \times 1000}$$

$$= \frac{1693}{100}$$

$$= 16.93$$

(j) $2.0484 \div 0.18$

$$\frac{2.0484}{0.18} = \frac{20484 \times 10}{18 \times 10000}$$

$$= \frac{20484}{18 \times 100}$$

$$= \frac{1138}{100}$$

$$= 11.38$$

(k) $11.13 \div 0.21$

$$\frac{11.13}{0.21} = \frac{1113 \times 100}{21 \times 100}$$

$$= \frac{1113}{21} = 53$$

(l) $236.6 \div 0.26$

$$\frac{236.6}{0.26} = \frac{2366 \times 100}{26 \times 10}$$

$$= \frac{2366 \times 10}{26}$$

$$= 91 \times 10 = 910$$

(m) $0.8085 \div 0.35$

$$\frac{0.8085}{0.35} = \frac{8085 \times 100}{35 \times 10000}$$

$$= \frac{8085}{35 \times 100}$$

$$= \frac{231}{100}$$

$$= 2.31$$

(n) $21.976 \div 1.64$

$$\frac{21.976}{1.64} = \frac{21976 \times 100}{164 \times 1000}$$

$$= \frac{21976}{164 \times 10}$$

$$= \frac{134}{10}$$

$$= 13.4$$

(o) $131.58 \div 2.15$

$$\frac{131.58}{2.15} = \frac{13158 \times 100}{215 \times 100}$$

$$= \frac{13158}{215} = 61.2$$

(p) $0.759 \div 0.3$

$$\frac{0.759}{0.3} = \frac{759 \times 10}{3 \times 1000}$$

$$= \frac{253}{100} = 2.53$$

3. (a) Let one decimal (a) = 2.15

other decimal (b) = ?

Given, $a \times b = 131.58$

$\Rightarrow$ $2.15 \times b = 131.58$

$$b = \frac{131.58}{2.15} = \frac{13158}{215} = 6.12$$

Thus, other decimal is 61.2

(b) Total sum of money = ₹ 4483.60

Number of workers = 44

Money got by each worker = ₹ $4483.60 \div 44$

= ₹ 101.9

Thus, each worker gets ₹ 101.9

(c) Length of pile = 54.5 cm

Thickness of a book = 3.2 cm

Number of books = $54.4 \div 3.2 = 17$

(d) Length of a piece of cloth = 40.5 m

Length of a shirt required = 2.7 m

$$\text{Number of shirt can be made} = \frac{\text{Length of a piece of cloth}}{\text{Length of a shirt requires}}$$

$$= \frac{40.5 \text{ m}}{2.7 \text{ m}}$$

$$= \frac{405}{27} = 15$$

Thus, 15 shirts can be made from the given piece of cloth.

(e) Cost of 15 steel chairs = ₹ 1706.25

" " 1 " " = ₹ $1706.25 \div 15$

= ₹ 113.75

Thus, cost of 1 steel chair is = ₹ 113.75

MCQs : **1.** (a) **2.** (b) **3.** (c) **4.** (d)
5. (b) **6.** (b) **7.** (b) **8.** (d)

HOTS:

1. Largest fraction $= \frac{10}{11}$, smallest fraction $= \frac{3}{11}$

$\therefore$ Product $= \frac{10}{11} \times \frac{3}{11} = \frac{30}{121}$

2. Give : $\frac{31}{41} \times x = 1 \Rightarrow x = \frac{41}{31}$

3. Sum $= 24.75 + 20.25 = 45$

Difference $= 24.75 - 20.25 = 4.5$

$\therefore$ Product $= 45 \times 4.5 = 202.5$

4. $18.75 \div 2.5 = 7.5$

$18.750 \div 2.50 = 7.5$

Thus, both are same.

Chapter 3

Data Handling

Exercise 3.1

1. (a) First five prime numbers are 2, 3, 5, 7, 11.

$$\text{Mean} = \frac{\text{Sum of all numbers}}{\text{No. of such numbers}}$$

$$= \frac{2+3+5+7+11}{5} = \frac{28}{2} = 5.6$$

(b) First ten composite numbers are 4, 6, 8, 9, 10, 12, 14, 15, 16, 18.

$$\text{Mean} = \frac{\text{Sum of all such numbers}}{\text{No. of such numbers}}$$

$$= \frac{4+6+8+9+10+12+14+15+16+18}{10}$$

$$= \frac{112}{10} = 11.2$$

(c) First five multiples of 6 are 6, 12, 18, 24, 30

$$\text{Mean} = \frac{\text{Sum of multiples of 6}}{\text{No. of multiples of 6}}$$

$$= \frac{6+12+18+24+30}{5}$$

$$= \frac{90}{5} = 18$$

(d) Factors of 24 are 1, 2, 3, 4, 6, 8, 12, 24

$$\text{Mean} = \frac{\text{Sum of all the factors of 24}}{\text{No. of factors of 24}}$$

$$= \frac{1+2+3+4+6+8+12+24}{8} = \frac{60}{8} = 7.5$$

2. (a) 4, 7, 3, 8, 2, 5, 9, 4, 3

$$\text{Mean} = \frac{\text{Sum of the data}}{\text{No. of the data}}$$

$$= \frac{4+7+3+8+2+5+9+4+3}{9} = \frac{45}{9} = 5$$

Range = Maximum data – Minimum data = 9 – 2 = 7

(b) 85, 76, 90, 84, 39, 48, 86, 95, 81 and 75

$$\text{Mean} = \frac{\text{Sum of the data}}{\text{No. of the data}}$$

$$= \frac{85+76+90+84+39+48+86+95+81+75}{10}$$

$$= \frac{759}{10} = 75.9$$

Range = Maximum data – Minimum data

= 95 – 39 = 56

3. Mean height $= \dfrac{\text{Sum of all heights}}{\text{No. of persons}}$

$$= \frac{150\text{cm} + 160\text{cm} + 140\text{cm} + 175\text{cm} + 155\text{cm}}{5}$$

$$= \frac{780}{5} = 156$$

Number of persons whose height is below the mean height are 3.

4. The marks obtained are 85, 76, 90, 85, 39, 48, 56, 95, 81 and 75.

(a) Highest marks obtained by students = 95

Lowest marks obtained by students = 39

(b) Mean marks $= \dfrac{\text{Sum of all the marks}}{\text{No. of students}}$

$$= \frac{85+76+90+85+39+48+56+95+81+75}{10}$$

$$= \frac{730}{10} = 73$$

(c) No. of students securing marks more than the mean marks = 7

5. The height of 10 girls are as follows :

135 cm, 150 cm, 139 cm 128 cm, 151 cm, 132 cm, 146 cm, 149 cm, 143 cm, 141 cm

(a) The height of the tallest girl = 151 cm

(b) The height of the shortest girl = 128 cm

(c) Range of the data = 151 cm − 128 cm = 23 cm

(d) Mean height of the girls $= \dfrac{\text{Sum of the heights}}{\text{No. of girls}}$

$$= \frac{135+150+139+128+151+132+146+149+143+141}{10}$$

$$= \frac{1414}{10} = 141.4$$

(e) No. of girls have height more than the mean height are 5.

6. Mean enrollment $= \dfrac{\text{Sum of enrolled students}}{\text{No. of year}}$

$$= \frac{1555+1670+1750+2013+2540+2820}{6}$$

$$= \frac{12348}{6} = 2058$$

7. Mean weight of new born babies

$$= \frac{\text{Sum of the weight of all the new born babies}}{\text{No. of new born babies}}$$

$$= \frac{(3.4+3.6+3.0+4.0+2.5+3.6+3.8+2.8+3.2+2.6)}{10} \text{ kg}$$

$$= \frac{32.5\,\text{kg}}{10} = 3.25\ \text{kg}$$

8. Mean $= \dfrac{\text{Sum of four numbers}}{4}$

$$32 = \frac{\text{Sum of four numbers}}{4}$$

$32 \times 4 =$ Sum of four numbers

$\Rightarrow 128 =$ Sum of four numbers

Let the fifth number be x.

Then, mean of five numbers $= \dfrac{\text{Sum of four numbers} + x}{5}$

$$31 = \frac{128 + x}{5}$$

$$31 \times 5 = 128 + x$$

$$155 = 128 + x$$

$155 - 128 = x \Rightarrow 27 = x \Rightarrow x = 27$

$\therefore$ Fifth observation is 27.

9. Average of Team A $= \dfrac{\text{Sum of all the games played by team A}}{\text{Total No. of games}}$

$$= \frac{67 + 87 + 90 + 95}{4} = \frac{339}{4} = 84.75$$

Average of Team B $= \dfrac{\text{Sum of all the games played by team B}}{\text{Total no. of games}}$

$$= \frac{82 + 92 + 70 + 65}{4} = \frac{309}{4} = 77.25$$

Average of Team C $= \dfrac{\text{Sum of all games played by team C}}{\text{Total no. of games}}$

$$= \frac{32 + 150 + 65 + 85}{4} = \frac{332}{4} = 83$$

(a) Team A's average is the best.

(b) I shall join team C.

10. Mean= $\dfrac{\text{Sum of five numbers}}{5}$

$\Rightarrow 30 = \dfrac{\text{Sum of five numbers}}{5}$

$\Rightarrow 30 \times 5 = \text{Sum of five numbers}$

$\Rightarrow 150 = \text{Sum of five numbers}$

Let the sixth number be x.

Then mean of six number $= \dfrac{\text{Sum of five numbers} + x}{6}$

$\Rightarrow \qquad 30 = \dfrac{150 + x}{6}$

$\Rightarrow \qquad 30 \times 6 = 150 + x$

$\Rightarrow 180 = 150 + x \Rightarrow 180 - 150 = x \Rightarrow \; x = 30$

$\therefore$ The sixth number (i.e., included number) is 30.

11. Number of family members = 10

Sum of all the family members

$= 4 + 3 + 2 + 2 + 5 + 6 + 7 + 3 + 3 + 5 = 40$

(a) Mean size of families $= \dfrac{\text{Sum of all the family members}}{\text{No. of family members}}$

$= \dfrac{40}{10} = 4$

(b) Required no. of families are 4.

12. Mean of 6 student's marks $= \dfrac{52 + 54 + 55 + 53 + 56 + 54}{6}$

$= \dfrac{324}{6} = 54$

Let the marks of seventh student be x.

Mean of marks $= \dfrac{\text{Sum of 6 student's marks} + x}{7}$

$55 = \dfrac{324 + x}{7}$

$55 \times 7 = 324 + x \qquad \Rightarrow \qquad 385 = 324 + x$

$\Rightarrow \quad 385 - 324 = x \qquad \Rightarrow \qquad 61 = x$

13.

x_i	f_i	$f_i \times x_i$
5	3	$5 \times 3 = 15$
15	P	$15 \times P = 15P$
25	3	$25 \times 3 = 75$
35	6	$35 \times 6 = 210$
45	2	$45 \times 2 = 90$
	$\Sigma f_i = 14 + P$	$\Sigma f_i x_i = 390 + 15P$

$$\text{Mean} = \frac{\Sigma f_i \times x_i}{\Sigma f_i} = \frac{390 + 15P}{14 + P}$$

$$\Rightarrow \quad 25 = \frac{390 + 15P}{14 + P}$$

$$\Rightarrow \quad 25(14 + P) = 390 + 15P$$

$$\Rightarrow \quad 25 \times 14 + 25P = 390 + 15P$$

$$\Rightarrow \quad 350 + 25P = 390 + 15P$$

$$\Rightarrow \quad 25P - 15P = 390 - 350$$

$$\Rightarrow \quad 10P = 40$$

$$\Rightarrow \quad P = \frac{40}{10} = 4$$

14.

Variable (x)	Frequency (f)	$f \times x$
10	5	50
30	9	270
50	12	600
70	8	560
90	6	540
	$\Sigma f = 40$	$\Sigma fx = 2020$

$\therefore$ Mean $= \dfrac{\Sigma fx}{\Sigma f} = \dfrac{2020}{40} = 50.5$

Exercise 3.2

1. Here 20 has maximum frequency.
So made of the given data is 20.
To find the median we first arrange the marks in ascending order.
7, 8, 9, 15, 15, 18, 19, 19, 20, 20, 20, 20, 23, 25, 25.
Here, $n = 15$ (odd)

$\therefore$ Median $= \left(\dfrac{n+1}{2}\right)^{th}$ observation

$= \left(\dfrac{15+1}{2}\right)^{th}$ observattion $= \left(\dfrac{16}{2}\right)^{th}$ observation

$= 8^{th}$ observation $= 19$

Hence, 19 is the median of the scores.
They are not same.

2. Here, 10 occurs 2 times and 12 also occurs 2 times.
Therefore 10 and 12 both occur maximum number of times.
Hence, 10 and 12 are the modes of the given data.
Yes, it has two modes.

3. The run scored in 11 cricket matches are as follows :
60, 15, 120, 50, 100, 80, 90, 89, 15, 70, 15
Arranging in ascending order
15, 15, 15, 50, 60, 70, 80, 89, 90, 100, 120

$$\text{Mean} = \frac{\text{Sum of the run scored}}{\text{Total number of matches}}$$

$$= \frac{15+15+15+50+60+70+80+89+90+100+120}{11}$$

$$= \frac{704}{11} = 64$$

$\therefore$ Mean = 64

Here, $n = 11$ which is odd.

$$\text{Median} = \left(\frac{n+1}{2}\right)^{th} \text{ observation}$$

$$= \left(\frac{11+1}{2}\right)^{th} \text{ observation}$$

$$= \left(\frac{12}{2}\right)^{th} \text{ observation} = 6^{th} \text{ observation}$$

$$= 70$$

$\therefore$ Median = 70

Since 15 occurs maximum number of times

So, 15 is the mode.

4. The heights (in cm) of students are as follows :

155, 161, 145, 149, 150, 145, 152, 145, 140

Mean :

$$\text{Mean} = \frac{\text{Sum of the heights}}{\text{No. of students}}$$

$$= \frac{155+161+145+149+150+145+152+145+140}{9}$$

$$= \frac{1342}{9} = 149.11 \text{ cm}$$

Median : Arranging the given height in ascending order as follows :

140, 145, 145, 145, 149, 150, 152, 155, 161.

here, $n = 9$ which is odd.

$$\text{So, median} = \left(\frac{n+1}{2}\right)^{th} \text{ observation}$$

$$= \left(\frac{9+1}{2}\right)^{th} \text{ observation} = 5^{th} \text{ observation}$$

$\therefore$ Median = 149 cm

Mode : Since 145 cm occurs maximum number of times

So, mode = 145 cm

5. The maximum temp. in (°C) for the first week of a month in Delhi are 37, 35, 36, 39, 36, 33 and 36.

Mean : Mean $= \dfrac{\text{Sum of all the temp.}}{\text{No. of days for the first week}}$

$$= \frac{37+35+36+39+36+33+36}{7}$$

$$= \frac{252}{7} = 36$$

$\therefore$ Mean = 36° C

Median : here $n = 7$ which is odd.

Arranging the data in ascending order

33, 35, 36, 36, 36, 37, 39

$$\text{Median} = \left(\frac{n+1}{2}\right)^{th} \text{ observation}$$

$$= \left(\frac{7+1}{2}\right)^{th} \text{ observation}$$

$$= 4^{th} \text{ observation}$$

$$= 36$$

$\therefore$ Median = 36°C

Mode : Here 36 occurs maximum number of times.

So, mode = 36°C

6. (a) Size 40 is maximum in demand.

(b) This average is mode.

The shopkeeper must buy size 40 maximum.

7. Color red is the most favourite among the girls.

This is called mode.

8. (a) 3, 7, 8, 5, 6, 9, 6, 4, 6

$$\text{Mean} = \frac{3+7+8+5+6+9+6+4+6}{9} = \frac{54}{9} = 6$$

Here $n = 9$ which is odd.

Arranging the data in ascending order

3, 4, 5, 6, 6, 6, 7, 8, 9

$$\text{Median} = \left(\frac{n+1}{2}\right)^{th} \text{ observation}$$

$$= \left(\frac{9+1}{2}\right)^{th} \text{ observation}$$

$$= 5^{th} \text{ observation}$$

$$= 6$$

Since, 6 occurs maximum no. of times

$\therefore$ Mode = 6

(b) 25, 30, 26, 28, 33, 25, 26, 27

$$\text{Mean} = \frac{25+30+26+28+33+25+26+27}{8} = \frac{220}{8}$$

$$= 27.5$$

Here $n = 8$ which is even.

Arranging in ascending order : 25, 25, 26, 26, 27, 28, 30, 33

$$\text{Median} = \frac{1}{2}\left[\left(\frac{n}{2}\right)^{th} \text{observation} + \left(\frac{n}{2}+1\right)^{th} \text{observation}\right]$$

$$= \frac{1}{2}\left[\left(\frac{8}{2}\right)^{th} \text{observation} + \left(\frac{8}{2}+1\right)^{th} \text{observation}\right]$$

$$= \frac{1}{2}[4^{th} \text{ observation} + 5^{\text{th}} \text{ observation}]$$

$$= \frac{1}{2}[26+27] = \frac{1}{2} \times 53 = 26.5$$

$\therefore$ Median = 26.5

Here 25 and 26 occurs two times.

Hence, 25 and 26 are modes.

(c) 3, 4, 1, 5, 6, 4, 2, 4

$$\text{Mean} = \frac{3+4+1+5+6+4+2+4}{8} = \frac{29}{8} = 3.625$$

$\therefore$ Mean = 3.625

Here $n = 8$ which is even

Arranging in ascending order.

1, 2, 3, 4, 4, 4, 5, 6

$$\text{Median} = \frac{1}{2}\left[\left(\frac{n}{2}\right)^{th} \text{observation} + \left(\frac{n}{2}+1\right)^{th} \text{observation}\right]$$

$$= \frac{1}{2}\left[\left(\frac{8}{2}\right)^{th} \text{ observation} + \left(\frac{8}{2}+1\right)^{th} \text{ observation}\right]$$

$$= \frac{1}{2}[4^{th} \text{ observation} + 5^{\text{th}} \text{ observation}]$$

$$= \frac{1}{2}[4+4] = \frac{1}{2} \times 8 = 4$$

Here 4 occurs maximum number of times.

So, mode = 4

(d) Do it same above part (a), (b), (c).

Mean = 28.25 ; Median = 30 ; Mode = 40

9. Preparing the cumulative frequency table, we have :

Variable (x)	Frequency (f)	Cumulative frequency ($x \times y$)
10	3	3
12	4	7
14	6	13
16	5	18
18	2	20
20	9	29
22	6	35
	Total = 35	

Here, $n = 35$ which is odd

So, Median $= \left(\frac{n+1}{2}\right)^{th}$ observation

$$= \left(\frac{35+1}{2}\right)^{th} \text{ term}$$

$= 18^{th}$ term

$= 16$ (since 16 comes under cumulative frequency 18)

Hence, median = 16

10. Preparing the cumulative frequency table, we have :

Weight (in kg) (x)	No. of persons (f)	Cumulative frequency
20	4	4
15	5	9
25	9	18
30	7	25
36	8	33
42	4	37
	Total = 37	

Here, $n = 37$ which is odd.

$$\text{So, Median} = \left(\frac{n+1}{2}\right)^{th} \text{ term}$$

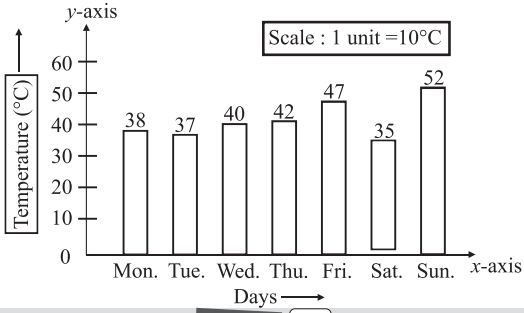
$$= \left(\frac{37+1}{2}\right)^{th} \text{ term}$$

$$= \left(\frac{38}{2}\right)^{th} \text{ term} = 19^{th} \text{ term} = \mathbf{30}$$

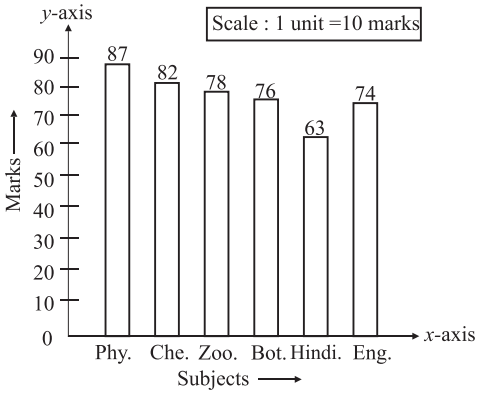
(since 30 comes in between cumulative frequency 18 and 25.)

Exercise 3.3

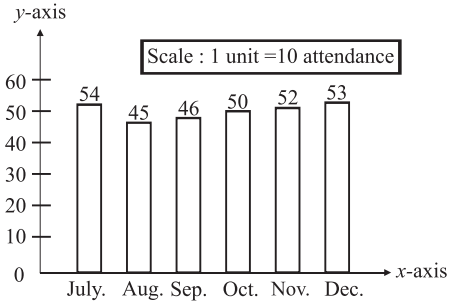
1. We will draw two perpendiculars axis and take days along x-axis and temperature along y-axis. Taking 1 unit = 10°C.



2.

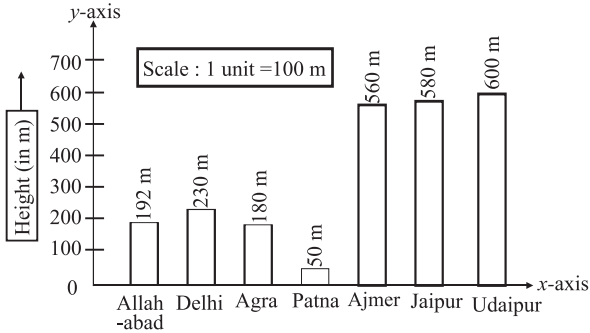


3. We will draw two perpendicular axis and take months along x-axis and attendance along y-axis. Taking 1 unit = 10 students.

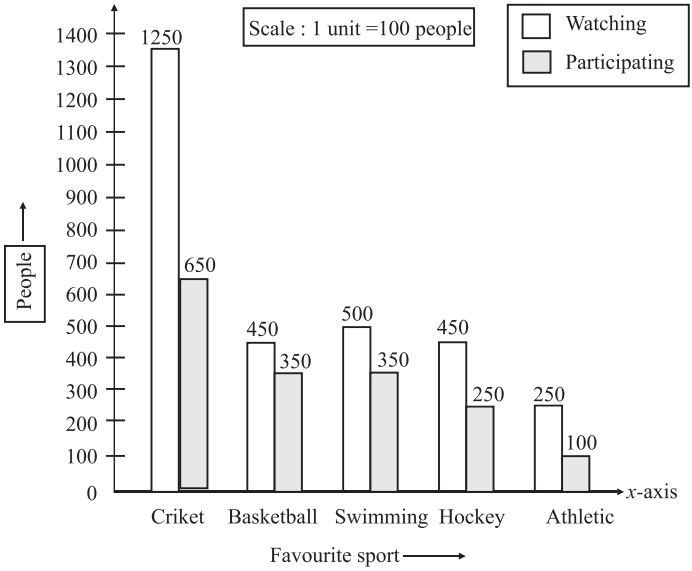


(a) In July, the avg. attendance was maximum.
(b) In Aug., the avg. attendance was minimum.
(c) In Aug. and Sep., the average attendance was less than 50.
(d) In July, Nov. and Dec. the average attendance was more than 50.
(e) Required difference = Max. attendance − Min. attendance
$= 54 - 45 = 9$

4.



5.



(a) The given bar graph show a survey of a colony in their favourite sports watching and participating.

(b) Cricket (c) Athletic (d) Watching

(e) Basketball [$\because$ Watching – Participating = 450 – 350 = 100]

6. (a) Water supply, medical, security and re-creation (b) None

(c) ₹ 115 thousand (d) ₹ 7 thousand less

7. (a) Akshay (b) Meera

MCQs : 1. (d) 2. (c) 3. (c) 4. (b) 5. (b)

Mental Maths :

Do it yourself.

Chapter 4

Simple Equations

Exercise-4.1

1. Write the equations for the following statements :

(a) $n+10=25$ (b) $d-11=40$ (c) $7m=84$

(d) $\frac{1}{2}y=33$ (e) $5b-3=12$ (f) $5x+3=18$

(g) $\frac{1}{6}x-2=8$ (h) $\frac{1}{4}p+4=40$ (i) $8e-8=80$

(j) $\frac{5}{7}+13=20$ (k) $(x+2)-9=53$

2. Write the following equations in statement forms :

(a) $x+3=14 \Rightarrow$ Sum of x and 3 is 14.

(b) $5-y=-3 \Rightarrow$ Difference between 5 and y is – 3.

(c) 16 m = 96 $\Rightarrow$ 16 times m is 96.

(d) $\frac{q}{9}=9 \Rightarrow$ Quotient of q and 9 is 9.

(e) $\frac{3}{4}p=15 \Rightarrow$ Three-fourth of a number p is 15.

(f) $6x+11=35 \Rightarrow$ 6 times x added to 11 gives 35.

(g) $\frac{b}{7}-3=8 \Rightarrow$ 3 less than quotient of b and 7 is 8.

(h) $3x-14=4 \Rightarrow$ 14 less than 3 times x results is 4.

(i) $\frac{y}{5}-7=8 \Rightarrow$ 7 subtracted from one fifth of $y=8$.

(j) $y-5=-12 \Rightarrow 5$ subtracted from y gives -12.

(k) $\frac{-p}{7}=7 \Rightarrow$ Negative of quotient of p and 7 is 7.

3. Form an equation for the following cases.

(a) Let $x, (x+1)$ or $(x-1)$ be two consecutive numbers.
So, according to the questions.

$$x+(x+1)=51$$

or $$(x-1)+x=51$$

So, $$(2x+1)=51$$

or $$(2x-1)=51$$

Thus, $$2x \pm 1=51$$

(b) Let Isha's age be x, then Saurabh's age will be $(x+6)$.
So, according to the questions.

$$x+(x+6)=24$$

$\Rightarrow$ $$x+x+6=24$$

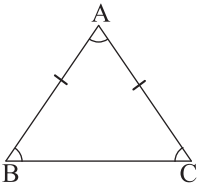
$\Rightarrow$ $$2x+6=24$$

(c) Let x be the required number.

So, according to the questions, $x+\frac{1}{2}x=33$

(d) Let b be the breadth of the rectangl(e)
So, the length of the rectangle will be $2b-6$.
We know that,
The perimeter of the rectangle $=2(l+b)$
Therefore, $2(l+b)=240\,\text{m}$ [where, $l=2b-6$]

(e) According to the questions,



$$\angle B=\angle C=\frac{1}{3}\angle A \text{ (given)}$$

So, $$\angle A+\frac{1}{3}\angle A+\frac{1}{3}\angle A=180^\circ$$

(f) Let x be vaibhav's age,
then Vaibhav's father's ages will be $(3x+4)$.
According the questions,

$$3x+4=43$$

(g) Let x be the runs scored by Gautam, then Rahul scored will be $2x$.

So, according to the questions,

$$2x + x = 100 - 5$$
$$3x = 195$$

(h) Let x be the number of boys, then the number of girls will be $\frac{2}{5}x$.

So, according the questions,

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

Exercise 4.2

1. $x - 5 = 0$

$x = 5$

2. $x + 4 = 0$

$x = -4$

3. $b - 7 = 0$

$b = 7$

4. $y + 8 = 20$

$y = 20 - 8$

$y = 12$

5. $p + 6 = -6$

$p = -6 - 6$

$p = -12$

6. $q + 9 = 9$

$q = 9 - 9$

$q = 0$

7. $5d = 45$

$d = \frac{45}{5}$

$d = 9$

8. $30t = -60$

$t = \frac{-60}{30}$

$t = -2$

9. $\frac{-r}{8} = 6$

$-r = 6 \times 8$

$-r = 48$

$r = -48$

10. $\frac{-a}{11} = \frac{18}{55}$

$-a = \frac{18 \times 11}{55}$

$-a = \frac{18}{5}$

$a = -\frac{18}{5}$

11. $\frac{y}{16} = \frac{7}{48}$

$y = \frac{7 \times 16}{48}$

$y = \frac{7}{3}$

12. $3n - 2 = 22$

$3n = 22 + 2$

$3n = 24$

$n = \frac{24}{3}$

$n = 8$

13. $4x + 9 = 45$

$4x = 45 - 9$

$4x = 36$

$x = \frac{36}{4}$

$x = 9$

14. $14\,l = 56$

$l = \frac{56}{14}$

$l = 4$

15. $15p + 15 = 90$

$15p = 90 - 15$

$15p = 75$

$p = \frac{75}{15}$

$p = 5$

16. $-5x - 8 = 107$

$-5x = 107 + 8$

$-5x = 115$

$x = -\frac{115}{5}$

$x = -23$

17. $4y + 3y = 84$

$7y = 84$

$y = \frac{84}{7}$

$y = 12$

18. $5 + 9x - 7 = 9x - 2 - x$

$9x - 9x + x = -5 + 7 - 2$

$x = 7 - 7$

$x = 0$

19. $x + \frac{1}{2} = 19$

$x = 19 - \frac{1}{2}$

$x = \frac{38 - 1}{2}$

20. $2s - \frac{1}{2} = -\frac{1}{3}$

$2s = -\frac{1}{3} + \frac{1}{2}$

$2s = \frac{-2 + 3}{6}$

$$x = \frac{37}{2}$$

$$2s = \frac{1}{6}$$

$$s = \frac{1}{6 \times 2}$$

$$s = \frac{1}{12}$$

Exercise 4.3

1. $12t + 1 = 37$

$12t = 37 - 1$ (By transposition)

$12t = 36$

$t = \frac{36}{12}$ (By transposition)

$t = 3$

Check : LHS $= 12t + 1$

$= 12 \times 3 + 1$

$= 12 \times 3 + 1$

$= 36 + 1$

$= 37 =$ RHS

2. $\frac{x}{4} + 9 = 7$

$\frac{x}{4} = 7 - 9$ (By transposition)

$\frac{x}{4} = -2$ (By transposition)

$x = -2 \times 4 = -8$

Check : LHS $= \frac{x}{4} + 9$

$= \frac{-8}{4} + 9$

$= -2 + 9$

$= 7 =$ RHS

3. $\frac{5}{2} y = 60$

$y = 60 \div \frac{5}{2}$ (By transposition)

$y = 60 \times \frac{2}{5}$

$y = 12 \times 2$

$y = 24$

Check : LHS $= \frac{5}{2} y$

$= \frac{5}{2} \times 24$

$= 5 \times 12$

$= 60 =$ RHS

4. $2m + \frac{5}{2} = \frac{37}{2}$

$2m = \frac{37}{2} - \frac{5}{2}$ (By transposition)

$2m = \frac{37 - 5}{2}$

Check : LHS $= 2m + \frac{5}{2}$

$= 2 \times 8 + \frac{5}{2}$

$= 16 + \frac{5}{2}$

$2m = \frac{32}{2}$

$2m = 16$

$m = \frac{16}{2}$ (By transposition)

$m = 8$

$= \frac{32+5}{2}$

$= \frac{37}{2} = \text{RHS}$

5. $8z + 20 = 52$

$8z = 52 - 20$ (By transposition)

$8z = 32$

$z = \frac{32}{8}$ (By transposition)

$z = 4$

Check : LHS $= 8z + 20$

$= 8 \times 4 + 20$

$= 32 + 20$

$= 52 = \text{RHS}$

6. $\frac{a}{13} + 6 = 5$

$\frac{a}{13} = 5 - 6$ (By transposition)

$\frac{a}{13} = -1$

$a = -1 \times 13$ (By transposition)

$a = -13$

Check : LHS $= \frac{a}{13} + 6$

$= \frac{-13}{13} + 6$

$= -1 + 6$

$= 5 = \text{RHS}$

7. $-2(y+3) = 7$

$-2y + (-2) \times 3 = 7$ (By transposition)

$-2y - 6 = 7$ (By transposition)

$-2y = 7 + 6$ (By transposition)

$y = \frac{-13}{2}$

Check : LHS $= -2(y+3)$

$= -2\left(-\frac{13}{2} + 3\right)$

$= -2\left(\frac{-13+6}{2}\right)$

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

$= 7 = \text{RHS}$

8. $-3(4-x) = 2x + 5$

$-3 \times 4 + 3x = 2x + 5$

$3x - 2x = 5 + 12$ (By transposition)

$x = +17$

Check : $\text{LHS} = -3(4-x) = -3(4-17) = -3\times(-13) = 39$

$\text{RHS} = 2x+5 = 2\times17+5 = 34+5 = 39$

$\therefore$ LHS = RHS

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

$4x - 3x = \frac{1}{5} + \frac{1}{3}$ (By transposition)

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

$x = \frac{8}{15}$

Check : $\text{LHS} = 4x - \frac{1}{3} = 4\times\frac{8}{15} - \frac{1}{3} = \frac{32}{15} - \frac{1}{3}$

$= \frac{32-5}{15} = \frac{27}{15} = \frac{9}{5}$

$\text{RHS} = \frac{1}{5} + 3x = \frac{1}{5} + 3\times\frac{8}{15} = \frac{1}{5} + \frac{8}{5} = \frac{1+8}{5} = \frac{9}{5}$

$\therefore$ LHS = RHS

10. $4(5x-4)+3(2x-1) = 7$

$4\times5x - 4\times4 + 3\times2x - 3\times1 = 7$

$20x - 16 + 6x - 3 = 7$ (By transposition)

$26x - 19 = 7$

$26x = 26$

$x = \frac{26}{26}$ (By transposition)

$x = 1$

Check : $\text{LHS} = 4(5x-4)+3(2x-1)$

$= 4(5\times1-4)+3(2\times1-1)$

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

$= 4\times1+3\times1$

$= 4+3 = 7\,\text{RHS}$

11. $7x+2(x+2) = 20-(2x-5)$

$7x+2x+2\times2 = 20-2x+5$

$9x+4 = 20-2x+5$

$$9x + 2x = 20 + 5 - 4 \qquad \text{(By transposition)}$$
$$11x = 20 + 1$$
$$x = \frac{21}{11} \qquad \text{(By transposition)}$$

Check : LHS $= 7x + 2(x+2)$

$$= 7 \times \frac{21}{11} + 2\left(\frac{21}{11} + 2\right) = 20 - \frac{42}{11} + 5$$
$$= \frac{220 - 42 + 55}{11} = \frac{277 - 42}{11} = \frac{233}{11}$$

RHS $= 20 - (2x - 5) = 20 - \left(2 \times \frac{21}{11} - 5\right)$

$$= 20 - \frac{42}{11} + 5 = \frac{220 - 42 + 55}{11}$$
$$= \frac{275 - 42}{11} = \frac{233}{11}$$

$\therefore$ LHS = RHS

12. $\frac{y}{5} - \frac{y}{6} = \frac{1}{30}$

$$\frac{6y - 5y}{30} = \frac{1}{30}$$
$$6y - 5y = 1$$
$$y = 1$$

Check : LHS $= \frac{y}{5} - \frac{y}{6}$

$$= \frac{1}{5} - \frac{1}{6}$$
$$= \frac{6-5}{30}$$
$$= \frac{1}{30} = \text{RHS}$$

13. $23 - 4x = -25 + 4x$

$$4x + 4x = 23 + 25 \qquad \text{(By transposition)}$$
$$8x = 48$$
$$x = \frac{48}{8} \qquad \text{(By transposition)}$$
$$x = 6$$

Check : LHS $= 23 - 4x = 23 - 4 \times 6 = 23 - 24 = -1$

RHS $= -25 + 4x = -25 + 4 \times 6 = -25 + 24 = -1$

$\therefore$ LHS = RHS

14. $\frac{2x}{3}-\frac{x}{2}=30$

$\Rightarrow \quad \frac{2\times 2x-3x}{6}=30$

$\frac{4x-3x}{6}=30$

$\frac{x}{6}=30$ (By transposition)

$x=30\times 6$

$x=30\times 6$

$x=180$

Check : LHS $=\frac{2x}{3}-\frac{x}{2}=\frac{2\times 180}{3}-\frac{180}{2}$

$=2\times 60-90=120-90$

$=30=$ RHS

15. $0=18+9(m-2)$

$0=18+9m-9\times 2$

$0=18+9m-18$

$9m=18-18$ (By transposition)

$9m=0$

$m=0$

Check : LHS $=18+9(m-2)=18+9(0-2)$

$=18-9\times 2=18-18=0=$ LHS

16. $5(n-3)=-45$

$5n-5\times 3=-45$

$5n-15=-45$

$5n=-45+15$ (By transposition)

$5n=-30$

$n=-\frac{30}{5}$

$n=-6$

Check : LHS $=5(n-3)=5n-5\times 3$

$=5\times(-6)-15$

$=-30-15$

$=-45=$ RHS

17. $\frac{7b}{8} - 15 = -1$

$\frac{7b}{8} = -1 + 15$ (By transposition)

$\frac{7b}{8} = 14$

$b = \frac{14 \times 8}{7}$

$b = 2 \times 8$

$b = 16$

Check : LHS $= \frac{7b}{8} - 15 = \frac{7}{8} \times 16 - 15 = 7 \times 2 - 15$

$= 14 - 15 = -1 =$ RHS

$\therefore$ LHS = RHS

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

$\frac{x}{4} - \frac{x}{5} = 1$ (By transposition)

$\frac{5x - 4x}{20} = 1$

$\frac{x}{20} = 1$ (By transposition)

$x = 1 \times 20 = 20$

Check : LHS $= \frac{x}{4} = \frac{20}{4} = 5$

RHS $= \frac{x}{5} + 1 = \frac{20}{5} + 1 = 4 + 1 = 5$

$\therefore$ LHS = RHS

19. $34 - 5(n - 1) = 4$

$34 - 5n + 5 = 4$

$34 - 4 + 5 = 5n$ (By transposition)

$30 + 5 = 5n$

$5n = 35$ (By transposition)

$n = \frac{35}{5}$

$n = 7$

Check : LHS $= 34 - 5(n-1) = 34 - 5(7-1)$

$= 34 - 5 \times 6 = 34 - 30 = 4 =$ RHS

20. $3p - 2(2p-5) = 2(p+3) - 8$

$3p - 4p + 10 = 2p + 6 - 8$

$-p + 10 = 2p - 2$ (By transposition)

$2p + p = 10 + 2$ (By transposition)

$3p = 12$

$p = \frac{12}{3}$ (By transposition)

$p = 4$

Check : LHS $= 3p - 2(2p-5)$

$= 3 \times 4 - 2(2 \times 4 - 5) = 12 - 2(8-5)$

$= 12 - 2 \times 3 = 12 - 6 = 6$

RHS $= 2(p+3) - 8 = 2(4+3) - 8$

$= 2 \times 7 - 8$

$= 14 - 8 = 6$

$\therefore$ LHS = RHS

Exercise 4.4

1. Let x be the required number, then three-fourth will be $\frac{3}{4}x$.

So, according to the questions,

$$x + \frac{3}{4}x = 91$$

$$\frac{4x + 3x}{4} = 91$$

$$\frac{7x}{4} = 91$$

$$x = \frac{91 \times 4}{7}$$

$$x = 13 \times 4$$

$$x = 52$$

Hence, 52 is the required number.

2. Let x be the required number.

So, according to the questions,

$$\frac{5}{6} \times x = 60$$
$$5x = 60 \times 6$$
$$5x = 360$$
$$x = \frac{360}{5}$$
$$x = 72$$

Hence, 72 is the required number.

3. Let x be the required number.

So, according to the questions,

$$7 + 2x = 59$$
$$2x = 59 - 7$$
$$2x = 52$$
$$x = \frac{52}{2}$$
$$x = 26$$

Hence, 26 is the require (d)

4. Let x be the required number.

So, according to the questions,

$$5x - 3 = 42$$
$$5x = 42 + 3$$
$$5x = 45$$
$$x = \frac{45}{5}$$
$$x = 9$$

Hence, 9 is the required number.

5. Let x be the required number.

So,
$$\frac{2}{3}x = \frac{1}{3}x + 3$$
$$\frac{2}{3}x - \frac{1}{3}x = 3$$
$$\frac{2x - x}{3} = 3$$
$$\frac{x}{3} = 3$$
$$x = 3 \times 3 = 9$$

Hence, 9 is the required number.

6. Let x, $(x+1), (x+2)$ be the required three number.

So, according to the questions,

$$x+(x+1)+(x+2)=24$$
$$x+x+1+x+2=24$$
$$3x+3=24$$
$$3x=24-3$$
$$3x=21$$
$$x=\frac{21}{3}$$
$$x=7$$

Hence, three consecutive integers is $x, x+1, x+2$

$$7,\ 7+1,\ 7+2$$
$$7, 8, 9$$

7. Let $x+1, x+3$ be the two consecutive even number.

So, $$(x+1)+(x+3)=502$$
$$x+1+x+3=502$$
$$2x+4=502$$
$$2x=502-4$$
$$2x=498$$
$$x=\frac{498}{2}$$
$$x=249$$

Hence, two even consecutive integers are $(x+1); (x+3)$

$$(249+1); (249+3)$$
$$250; 252$$

8. Let x, $(x+2)$ be the two consecutive odd number.

So, $$x+(x+2)=136$$
$$x+x+2=136$$
$$2x+2=136$$
$$2x=136-2$$
$$2x=134$$
$$x=\frac{134}{2}$$
$$x=67$$

Hence, two odd consecutive integers are $x, (x+2)$

$$67, (67+2)$$
$$67, 69$$

9. Let x be the required number.

So,
$$x+\frac{1}{2}x=45$$
$$\frac{2x+x}{2}=45$$
$$\frac{3x}{2}=45$$
$$x=\frac{45\times 2}{3}$$
$$x=15\times 2$$
$$x=30$$

Hence, 30 is the required number.

10. Total number of students = 40

Let the number of boys be x, then the number of girls will be $\frac{3}{5}x$.

So, according to the questions,
$$x+\frac{3}{5}x=40$$
$$\frac{5x+3x}{5}=40$$
$$\frac{8x}{5}=40$$
$$8x=40\times 5$$
$$x=\frac{40\times 5}{8}$$
$$x=5\times 5$$
$$x=25$$

So, number of girls $=\frac{3}{5}x=\frac{3}{5}\times 25=3\times 5=15$

Hence, 15 girls are in the class.

11. Let Sahil's present age be x years, then his mother's are will be $5x$ years.

So, the equation,
$$x+5x=48$$
$$6x=48$$
$$x=\frac{48}{6}$$

$$x = 8 \text{ years}$$

Hence, Sahil's age is 8 years, his mother's age is $8 \times 5 = 40$ years.

12. Let Mayank's present age be x years, then after 15 years Mayank's age will be $4x$.

So,
$$(x+15) = 4x$$
$$4x - x = 15$$
$$3x = 15$$
$$x = \frac{15}{3}$$
$$x = 5 \text{ years}$$

Hence, his present age is 15 years.

13. Let Isha's present age be x years, then her brother's age $(x+5)$.

After 4 years, $\dfrac{x+4}{(x+5)+4} = \dfrac{2}{3}$

$$3x + 12 = 2x + 10 + 8$$
$$3x - 2x = 18 - 12$$
$$x = 6 \text{ years}$$

Hence, Isha's present age is 6 years and her brother's age $(6+5) = 11$ years.

14. Let the breadth of the rectangle be x m.

Then, its length $= (4x-3)$ m

$\therefore$ Perimeter of rectangle $= 2[(4x-3)+x]$

So,
$$2[(4x-3)+x] = 94$$
$$2(4x-3)+2x = 94$$
$$8x - 6 + 2x = 94$$
$$10x = 94 + 6$$
$$x = \frac{100}{10}$$
$$x = 10 \text{ m}$$

Thus, the breadth of the rectangle = 10 m and the length of the rectangle $= 4 \times 10 - 3 = 40 - 3 = 37$ m.

15. Let x, $2x$ and $3x$ be angles of the triangl(e)

So, according to the questions,

Sum of three angles = 180°
$$x + 2x + 3x = 180°$$

$$6x = 180°$$
$$x = \frac{180°}{6}$$
$$x = 30°$$

Hence, the measure of all the angles are : x, $2x$ and $3x$

$30°$, $2 \times 30°$ and $3 \times 30°$

30, 60° and 90°

16. Let the number of 2-rupee coins be x.

$\therefore$ the number of 1-rupee coins = $3x$

value of x 2-rupee coins = ₹ $2x$

value of x 1-rupee coins = ₹ $1 \times 3x$ = ₹ x

Total value of 1-rupee and 2-rupee coins = ₹ $(2x + 3x) = 5x$

Hence, the equation ₹ $(2x + 3x) = 50$

$$5x = 50$$
$$x = \frac{50}{5}$$
$$x = 10$$

Thus, number of 2-rupee coins = 10

and number of 1-rupee coins = $3x = 3 \times 10 = 30$

17. Let the number of 100-rupee notes be x

$\therefore$ the number of 500-rupee notes = $(30 - x)$

value of x 100-rupee notes = ₹ $100x$

value of $(30 - x)$ 500-rupee notes = ₹ $500\ (30 - x)$

total value of 200-rupee and 500-rupee notes

= ₹ $[100x + 500(30 - x)]$

Hence, the equation is $[100x + 500(30 - x)] = 5000$

$$100x + 15000 - 500x = 5000$$
$$-400x = 5000 - 15000$$
$$-400x = -10000$$
$$x = +25$$

Thus, number of 100-rupee note = 25

and number of 500-rupee notes $= 30 - x$

$= 30 - 25 = 5$

18. Let x, x and $3x$ be the isosceles triangl(e)

So, the sum of triangle = 180°

$$x + x + 3x = 180°$$

$$5x = 180°$$
$$x = \frac{180°}{5}$$
$$x = 36°$$

So, the measure of angles of the triangle $x, x, 3x$

$$36, 36, 3 \times 36$$
$$36, 36, 108°$$

MCQs : **1.** (c) **2.** (d) **3.** (d) **4.** (c)
5. (b) **6.** (b) **7.** (b) **8.** (a)
9. (a) **10.** (c)

Chapter 5

Lines and Angles

Exercise 5.1

1. (a) 42°

Let x be the complement of 42°.

So, $42° + x = 90°$

$\Rightarrow x = 90° - 42° = 48°$

(b) 65°

Let y be the complement of 65°.

So, $65° + x = 90$

$\Rightarrow x = 90° - 65°$

$\Rightarrow x = 25°$

(c) 39°

Let x be the complement of 39°.

So, $39° + x = 90°$

$\Rightarrow x = 90° - 39°$

$\Rightarrow x = 51°$

(d) 51°

Let y be the complement of 51°.

So, $51° + x = 90°$

$\Rightarrow x = 90 - 51$

$\Rightarrow x = 39°$

2. (a) 105°

Two angles are supplementary, if their sum is 180°.

Let the supplement of 105° be x.

$\Rightarrow x + 105° = 180°$

$\Rightarrow x = 180 - 105$

(b) 87°

Two angles are supplemendtary if their sum is 180°.

Let the supplement of 87° be x.

$\Rightarrow x + 87° = 180°$

$\Rightarrow x = 75°$

(c) 154°

Let the supplement of 154° be x.

$\Rightarrow x + 154° = 180°$

$\Rightarrow x = 180° - 154°$

$\Rightarrow x = 26°$

$\Rightarrow \quad x = 180 - 87$

$\Rightarrow \quad x = 93°$

(d) 90°

Let the supplement of 90° be x.

$\Rightarrow x + 90° = 180°$

$\Rightarrow \quad x = 180 - 90°$

$\Rightarrow \quad x = 90°$

3. (a) 63°, 117°

Sum = 63° + 117° = 180°

Since, sum of given angles is 180°. So, these are supplementary angles.

(b) 23°, 67°

Sum = 23° + 67° = 90°.

Since, sum of given angles is 90°.

So, these are complementary angles.

(c) 105°, 75°

Sum = 105° + 75° = 180°.

Since, sum of given angles is 180°.

So, these are supplementary angles.

(d) 120°, 60°

Sum = 120° + 60° = 180°

Since, sum of given angles is 180°.

So, these are supplementary angles.

(e) 90°, 90°

Sum = 90° + 90° = 180°

Since, sum of given angles is 180° so, these are supplementary angles.

(f) 60°, 30°

Sum = 60° + 30° = 90°

Since, sum of given angles is 180°.

So, these are complementary angles.

(g) 45°, 135°

Sum = 45° + 135° = 180°

Since, sum of given angles is 180°.

So, these are supplementary angles.

(h) $36°, 54°$

Sum $= 36° + 54° = 90°$

Since, sum of given angles is $90°$.

So, these are complementary angles.

4. Let x is the angle greater than $45°$.

$\therefore$ its complementary angle $= 90° - (45° + x)$

$= 90° - 45° - x$

$= 45° - x$

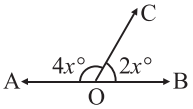
$\Rightarrow$ It will be less than $45°$.

5. Two adjacent supplementary angles from a linear pair.

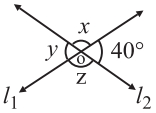
$\therefore \angle AOC + \angle BOC = 180°$

$4x + 2x = 180° \Rightarrow 6x = 180°$

$\Rightarrow \quad x = \dfrac{180}{6} = 30°$



6. Since two lines l_1 and l_2 intersect vertically at a point O. So formed angles are equal.



$\therefore \quad \angle x = \angle z$

and $\angle y = 40°$

But, $\angle x + 40° = 180°$ [by linear pair]

$\Rightarrow \quad \angle x = 180° - 40° = 140°$

Also, $\angle z = \angle x = 140°$

7. Let one angle be $= x$

Then its complement angle be $= (90 - x)$

According to condition, $x = 8(90 - x)$

$x = 720° - 8x$

$x + 8x = 720° \Rightarrow 9x = 720° \Rightarrow x = \dfrac{720}{9} = 80$

$\therefore$ First angle $= x = 80°$

and second angle (its complement) $= (90° - 80°) = 10°$

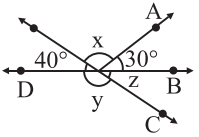
8. In the given figure,

$\angle COD + \angle DOE = 180°$ [by linear pair]

$\angle y + 40° = 180°$

$\angle y = 180 - 40 = 140°$

$\angle DOC + \angle BOC = 180°$ [by linear pair]



$$y + \angle z = 180°$$
$$140° + \angle z = 180°$$
$\angle z = 180° - 140° = 40° \Rightarrow \angle z = 40°$

Since, we know that the sum of all the angles on a straight line is 180°.

So, $\angle EOA + \angle AOB + \angle BOC = 180°$

$$x + 30 + z = 180°$$
$$x + 30 + 40 = 180°$$
$$x = 180° - 70° = 110°$$

Hence, $x = 110°$, $y = 140°$, $z = 40°$

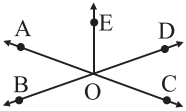
9. (a) No, because they have no common arm.

(b) Yes, because these have a common arm.

(c) No, because they have no common vertex.

(d) No.

10. (a) Obtuse vertically opposite angles : $\angle AOD$ and $\angle BOC$



(b) Adjacent complementary angles : $\angle BOA$ and $\angle AOE$

(c) Equal supplementary angles : $\angle BOE$ and $\angle EOD$

(d) Unequal supplementary angles: ($\angle AOB$ and $\angle BOC$), ($\angle BOC, \angle DOC$)

(e) Adjacent angles that do not form a linear pair : ($\angle AOE$ and $\angle EOD$)

11. Fill in the blanks :

(a) If two angles are supplementary, then their sum measures is ____180°____.

(b) If sum of two angles is one right angle, they are Complementary.

(c) Two angles forming a linear pair are __Supplementary__.

(d) If two lines interest, then vertically opposite angles are ___equal___.

(e) If two adjacent angles are supplementary, then they form a ____lienar____ pair.

(f) A line segment has __two__ end points.

(g) A ray can be extended in __one__ direction only.

(h) An __angle__ is formed when two rays meet.

(i) An angle equal to its complement is ____45°____ .

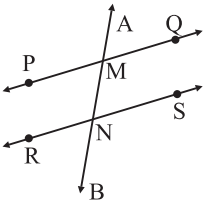
(j) An angle equal to its supplement is ____90°____.

Exercise 5.2

1. (a) All pairs of alternate interior angles :

$\angle QMN$ and $\angle MNR$;

$\angle PMN$ and $\angle MNS$.



(b) All pair of corresponding angles :

PQ is not parallel to RS. So,

no pairs of corresponding angles.

(c) Exterior angles :

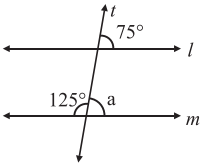
$\angle AMQ$, $\angle AMP$; $\angle RNB$; $\angle SNB$

(d) Pairs of alternative exterior angles :

2. (a) $125° + a = 180°$ [by linear pair]

$a = 180 - 125$

$a = 55°$



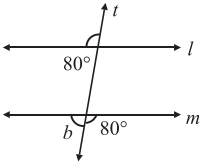
Since corresponding angles are not equal i.e., $a \neq 75°$

So, given pair of lines are not parallel.

(b) $\angle b + 80 = 180°$ [by linear pairs]

$\angle b = 180 - 80°$

$\angle b = 100°$



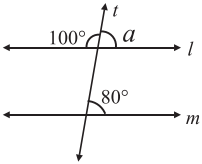
Since, corresponding angles are not equal i.e., $\angle b \neq 80°$

So, given pair of lines are not parallel.

(c) $100 + a = 180$ [by linear pair]

$a = 180 - 100 = 80°$

$a = 80°$

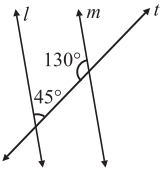


Since, corresponding angles are

equal i.e., $a = 80°$

So, given pair of lines are parallel.

(d) Since, t is a transversal and we know that sum of interior angles on the same side of transversal is 180°.



i.e., $45° + 130° = 175° \neq 180°$

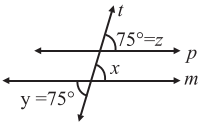
So, given pair of lines are not parallel.

(e) $\angle x = \angle y$ (vertically opp. angles)

$\angle x = 75°$ (given)

Since, $\angle x = \angle z = 75°$

So, lines p and m are parallel.



(f) Here, $\angle a + 60 = 180°$ (by linear pair)

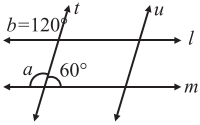
$\angle a = 180° - 60° = 120°$

Again, $\angle a = \angle b = 120°$

[given $\angle b = 120°$]

Since, corresponding angles are equal

i.e., $\angle a = \angle b$



3. Given : $l \parallel m$ and t is a transversal.

$\therefore\ \angle 1 + \angle 2 = 180°$

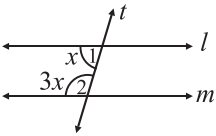
(by consecutive interior angles are supplementary)

So, $x + 3x = 180°$

$4x = 180° \Rightarrow x = \dfrac{180°}{4} = 45°$

$\therefore \quad \angle 1 = x = 45°$

$\angle 2 = 3x = 3 \times 45 = 135°$



4. Given : $l \parallel m$, and t is a transversal

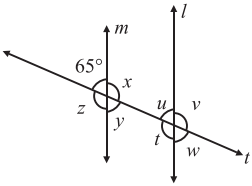
$\angle y = 65°$ (vertically opposite angles)

$\angle x + 65° = 180°$ (by linear pair)

$\therefore \quad \angle x = 180° - 65° = 115°$

$\angle z = \angle x$ (vertically opposite angles)

$\therefore \quad \angle z = 115°$



Again, $\angle u + \angle x = 180°$ (consecutive interior angles are supplementary)

$\therefore \quad \angle u = 180 - \angle x = 180° - 115° = 65°$

$\angle t + \angle y = 180$ (consecutive interior angles are supplementary)

$\angle t + 65° = 180°$

$\angle t = 180° - 65° = 115°$

$\angle w = \angle u$ (vertically opposite angles)

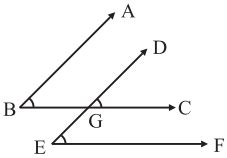
$\therefore \quad \angle w = 65°$

$\angle v = \angle t$ (vertically opposite angles)

$\therefore \quad \angle v = 115°$

5. Given : $AB \parallel DE$ and $BC \parallel EF$.

also, $\angle GEF = 58°$,



(a) $\angle ABC = \angle DGC$ (corresponding angles) ...(1)

$GC \parallel EF$, ED is a transversal

So, $\angle DGC = \angle GEF$ ($\because$ corresponding angles are equal)

$= 58°$ ...(2)

put this value in relation (1).

$\angle ABC = 58°$

(b) $\angle DGC = 58°$ [by relation (2)]

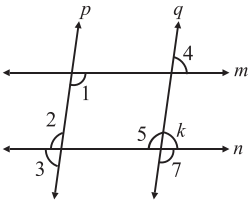
(c) $\angle EGC + \angle FEG = 180°$(consecutive interior angles are supplementary)

$\angle EGC + 58° = 180°$ [given, $\angle GEF = 58°$]

$\therefore \quad \angle EGC = 180° - 58°$

$= 122°$

6. Given : $m \parallel n$ and p, q are transversal.



$\angle 1 = 123°$

also, $\angle 4 = 85°$

$\angle 2 = \angle 1$ ($\because$ Alternate angles are equal)

$\therefore \quad \angle 2 = 123°$

$\angle 2 + \angle 3 = 180°$ (linear pair angles)

$123° + \angle 3 = 180°$

$\therefore \quad \angle 3 = 180° - 123° = 57°$

$\angle k = \angle 4$ (corresponding angles)

$\therefore \quad \angle k = 85°$

$\angle k + \angle 7 = 180°$ (linear pair angles)

$85 + \angle 7 = 180°$

$\therefore \quad \angle 7 = 180 - 85° = 95°$

$\angle 5 = \angle 7$ (vertically opposite angles)

$\therefore \quad \angle 5 = 95°$

7. (a) angle alternate to angle $h = \angle b$

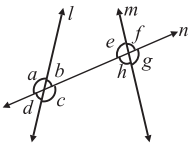
(b) angle alternate to angle $f = \angle d$

(c) angle corresponding to angle $d = \angle h$

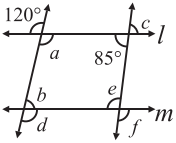
(d) angle linear to angle $a = \angle b$ or $\angle d$

(e) angle adjacent to angle $g = \angle f$ or $\angle h$

(f) angle consecutive to angle $e = \angle b$



8. Given : $l \parallel m$



$\angle c = 85°$ (vertically opposite angles)

$\therefore \quad \angle c = 85°$

$\angle e + 85 = 180°$ (sum of interior angles on the same side of transversal is 180°)

$\angle e = 180° - 85° = 95°$

$\therefore \quad \angle e = 95°$

$\angle f = \angle e$ (vertically opposite angles)

$\therefore \quad \angle f = 95°$

$\angle a = 120°$ (vertically opposite angles)

$\therefore \quad \angle a = 120°$

$\angle d = \angle a$ (corresponding angles)

$\because \quad \angle d = 120°$

$\angle b + \angle d = 180°$ (linear pair angles)

$\angle b + 120° = 180°$

$\angle b = 180 - 120 = 60°$

$\therefore \quad \angle b = 60°$

9. Given : $l \parallel m$ and t is a transversal, $\angle 4 : \angle 3 = 2 : 3$

Let $\angle 4 = 2k$

$\angle 3 = 3k$

Now, we know that

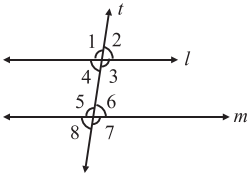
$\angle 4 + \angle 3 = 180°$ (linear pair angles)

$\Rightarrow \quad 2k + 3k = 180°$

$\Rightarrow \quad 2k + 3k = 180°$

$\Rightarrow \quad 5k = 180°$

$\Rightarrow \quad k = \frac{180°}{5} = 36°$



$\therefore \quad \angle 4 = 2k = 2 \times 36° = 72°$

$\angle 3 = 3k = 3 \times 36° = 108°$

Now, $\angle 2 = \angle 4$ (vertically opposite angles)

$\therefore \quad \angle 2 = 72°$

Similarly, $\angle 1 = \angle 3$ (vertically opposite angles)

$\therefore \quad \angle 1 = 108°$

Now, $\angle 8 = \angle 4$ (corresponding angles)

$\therefore \quad \angle 8 = 72°$

Similarly, $\angle 7 = \angle 3$ (corresponding angles)

$\therefore \quad \angle 7 = 108°$

Finally, $\angle 6 = \angle 2$ (corresponding angles)

$\therefore \quad \angle 6 = 72°$

and $\angle 5 = \angle 1$ (corresponding angles)

$\therefore \quad \angle 5 = 108°$

MCQs : **1.** (a) **2.** (d) **3.** (a) **4.** (b) **5.** (c) **6.** (b) **7.** (d) **8.** (c) **9.** (d) **10.** (a)

Chapter 6

The Triangle and its Properties

Exercise 6.1

1. Fill in the blanks :

(a) A triangle has **six** elements.

(b) Vertex opposite to side BC of a triangle ABC is **A**.

(c) Side opposite to angle A of a Δ ABC is **BC**.

(d) In Δ ABC if D is mid point of side BA then its median is **CD**.

(e) In a triangle, we have three median.

(f) The median of a triangle always lie in its interior.

(g) The altitude of an triangle may lie inside or out side of a triangle

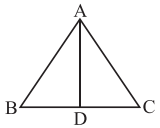
(h) The height of a triangle is also known as its altitude.

(i) A triangle is said to be **isosceles** if two of its sides are of same lenght.

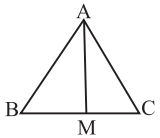
(j) A triangle is said to be equilateral if each of its side is of equal length.

(k) An equilateral triangle is equiangular also.

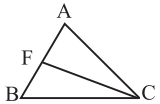
2. (a) ΔABC with median AD



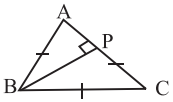
(b) ΔABC with altitude AM.



(c) ΔABC with median CF.



(d) ΔABC with altitude BP.



3. (a) $AB = 4$ cm, $BC = 5$ cm, $CA = 3$ cm

Since all the sides are unequal, so it is a scalene triangle.

(b) $\angle A = 90°$, $BC = 4$ cm, $CA = 5$ cm

Since one angle is 90° so it is a right angled triangle.

(c) $\angle A = 120°$, $AB = 4$ cm, $BC = 7$ cm
Since one angle is 120° So it is an obtuse angled triangle.

(d) $\angle A = 60°$, $\angle B = 30°$, $\angle c = 90°$
Since are angle is 90°, so it is a right angled triangle.

(e) $\angle A = 120°$, $\angle B = 20°$, $\angle c = 40°$
Since one angle is greater than 90°, i.e, obtuse angle, so it is an obtuse angled triangle.

(f) $PQ = 6.5$ cm, $QR = 6.5$ cm, $RP = 6.5$ cm
Since all the sides are equal, so it is an equilateral triangle.

(g) $XY = 7$ cm, $YZ = 7$ cm, $ZX = 4$ cm.
Since two sides are equal, so it is an isosceles triangle.

Exercise 6.2

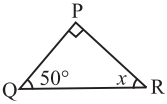
1. (a) 63°, 38°, 79°
Sum of all the angles = 63° + 38° + 79° = 180°
So, these can be measures of the angles of a triangle.

(b) 30°, 55°, 65°
Sum = 30° + 55° + 65° = 150°
Since, sum of all the angles are not equal to 180°.
So, these can't be measures of the angles of a triangle.

(c) 40°, 90°, 50°
Sum = 40° + 90° + 50° = 180°
So, these can be measures of the angles of a triangle.

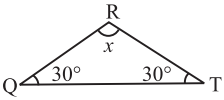
(d) 130°, 40°, 50°
Sum = 130° + 40° + 50° = 220°
Since, sum of all the angles are not equal to 180°.

2. (a) In the given triangle PQR, $\angle P + \angle Q + \angle R = 180°$
(Angle sum property)



$\Rightarrow \quad 90° + 50° + x = 180°$
$\Rightarrow \quad 140° + x = 180°$
$\Rightarrow \quad x = 180° - 140° = 40°$

(b) In the given triangle RST, $\angle R + \angle S + \angle T = 180°$
(Angle sum property)



$\Rightarrow \quad x + 30° + 30° = 180°$
$\Rightarrow \quad x + 60° = 180°$

$\Rightarrow \quad x = 180° - 60° = 120°$

$\Rightarrow \quad x = 120°$

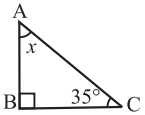
(c) In the given triangle ABC,

$\angle A + \angle B + \angle C = 180°$ (Angle sum property)

$x + 90° + 35° = 180°$

$x + 125° = 180°$

$x = 180° - 125° = 55° \Rightarrow x = 55°$



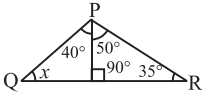
(d) In the given triangle PQR,

$\angle Q + \angle P + \angle R = 180°$ (Angle sum property)

$x + (40° + 55°) + 35° = 180°$

` $x + 130° = 180°$

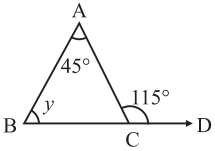
$x = 180° - 130° = 50° \Rightarrow x = 50°$



3. (a) $45° + y = 115°$ (by exterior angle property)

$\Rightarrow y = 115° - 45°$

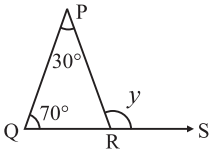
$\Rightarrow y = 70°$



(b) $30° + 70° =$ (by exterior angle property)

$\Rightarrow 100° = y$

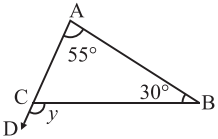
$\Rightarrow \quad y = 100°$



(c) $55° + 35° = y$ (by exterior angle property)

$\Rightarrow \quad 90° = y$

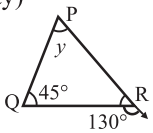
$\Rightarrow \quad y = 90°$



(d) $\angle P + \angle Q = \angle QRS$ (by exterior angle property)

$\Rightarrow y + 45° = 130°$

$\Rightarrow y = 130° - 45° = 85° \Rightarrow y = 85°$



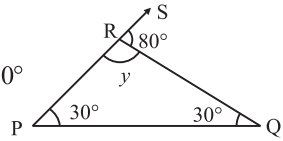
(e) $\angle P + \angle Q + \angle R = 180°$ (Angle sum property)

$\Rightarrow \quad 50° + 30° + y = 180°$

$\Rightarrow \quad 80 + y = 180°$

$\Rightarrow \quad y = 180° - 80° = 100°$

$\Rightarrow \quad y = 100°$



4. Given, $\angle ABC : \angle BAC = 2:3$

Let $\angle ABC = 2x, \angle BAC = 3x$

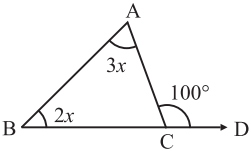
$\angle ABC + \angle BAC = \angle ACD$

(by exterior angle property)

$2x + 3x = 100°$

$5x = 100°$

$x = \frac{100°}{5} = 20°$



$\therefore \angle ABC = 2x = 2 \times 20° = 40°$

$\angle BAC = 3x = 3 \times 20° = 60°$

Now, $\angle ABC + \angle BAC + \angle ACB = 180°$ (Angle sum property)

$40 + 60 + \angle ACB = 180°$

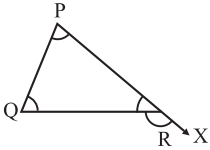
$100 + \angle ACB = 180$

$\angle ACB = 180 - 100 = 80°$

5. Given : $\angle QRX =$ exterior angle

(a) Interior adjacent angles of $\angle QRX = \angle QRP$

(b) Interior opposite angles of $\angle QRX = \angle QPR, \angle PQR$

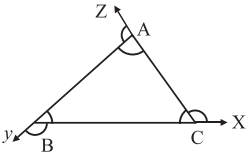


6. (a) $\angle ACX = \angle ABC + \angle BAC$

(By exterior angle property)

$\angle CBY = \angle BAC + \angle ACB$ (")

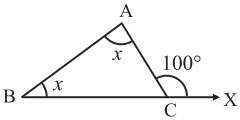
$\angle BAZ = \angle ABC + \angle ACB$ (")



7. $x + x = 100$ (by exterior angle property)

$2x = 100$

$x = \frac{100}{2} = 50°$



Now, $\angle ACB + \angle ACX = 180°$ (by linear pair)

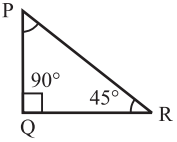
$\angle ACB + 100° = 180°$

$\Rightarrow \angle ACB = 180° - 100° = 80°$

$\therefore \quad \angle ABC = x = 50°$

and $\quad \angle BAC = x = 50°$

8. Given : $\angle Q = 90°$, $\angle R = 49°$



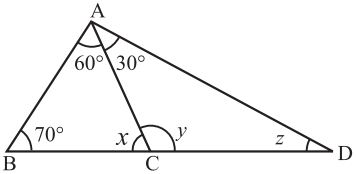
$\angle P + \angle Q + \angle R = 180°$ (Angle sum property)

$\angle P + 90° + 49° = 180°$

$\angle P + 139° = 180°$

$\therefore \quad \angle P = 180 - 139 = 41°$

9. (a)



In ΔABC , $\angle A + \angle B + \angle C = 180°$ (Angle sum property)

$\Rightarrow 60° + 70° + x = 180°$

$\Rightarrow \quad 130° + x = 180°$

$\Rightarrow \quad x = 180° - 130°$

$\Rightarrow \quad x = 50°$

Again, $\angle BAC + \angle ABC = \angle ACD$ (by exterior angle property)

$\Rightarrow \quad 60° + 70° = y$

$\Rightarrow \quad 130° = y \qquad \Rightarrow \quad y = 130°$

In ΔACD,

$\angle CAD + \angle ADC + \angle ACD = 180°$ (Angle sum property)

$\Rightarrow \quad 30° + z + y = 180°$

$\Rightarrow \quad 30° + z + 130 = 180$

$\Rightarrow \quad z + 160 = 180$

$\Rightarrow \quad z = 180° - 160° = 20°$

(b) In ΔACD,

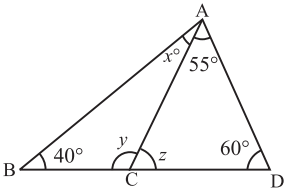
$\angle CAD + \angle ADC + \angle ACD = 180°$

(Angle sum property)

$55° + 60° + z = 180°$

$115° + z = 180°$

$z = 180° - 115° = 65°$



In ΔABC,

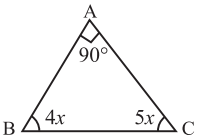
$\angle BAC + \angle ABC = \angle ACD$ (by exterior angle property)

$$x + 40° = z$$
$$x + 40° = 65°$$
$$x = 65° - 40° = 25°$$

In ΔABC, $\angle BAC + \angle ACB + \angle ABC = 180°$ (Angle sum property)

$$x + y + 40° = 180°$$
$$25 + y + 40° = 180°$$
$$y + 65° = 180°$$
$$y = 180° - 65° = 115°$$

10. Let both the acute angles be $4x, 5x$.



In a right triangle, we have

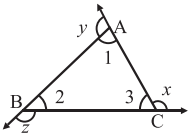
$\angle A + \angle B + \angle C = 180°$ (Angle sum property)

$$90 + 4x + 5x = 180°$$
$$9x = 180° - 90° = 90°$$
$$x = \frac{90°}{9} = 10°$$

$\therefore \quad \angle B = 4x = 4 \times 10° = 40°$

and $\angle C = 5x = 5 \times 10° = 50°$

11. Show that : $x + y + z = 360°$



$\angle x = \angle 1 + \angle 2$ (by Next angle prop.) ...(1)

$\angle z = \angle 1 + \angle 3$ (by Next. angle prop.) ...(2)

$\angle y = \angle 2 + \angle 3$ (by ext. angle prop.) ...(3)

Adding (1), (2), (3)

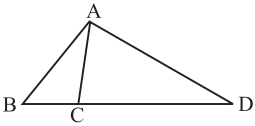
$$\angle x + \angle y + \angle z = \angle 1 + \angle 2 + \angle 1 + \angle 3 + \angle 2 + \angle 3$$
$$= 2(\angle 1 + \angle 2 + \angle 3)$$
$$= 2 \times 180° \qquad [\because \angle 1 + \angle 2 + \angle 3 = 180°]$$
$$= 360° \qquad \text{Hence Proved.}$$

Exercise 6.3

1. (a) $AB + BC > AC \rightarrow$ True

(b) $AC + AD > CD \rightarrow$ True

(c) $AB + AD > BD \rightarrow$ True



(d) $AC + CD > AD \rightarrow$ True

(e) $BC + CA < AB \rightarrow$ False

(f) $AD + AB < BD \rightarrow$ False

2. (a) 7 cm, 13 cm, 16 cm

$(7 + 13)$ cm $= 20$ cm > 16 cm; $(13 + 16)$ cm $= 29$ cm > 7cm

$(7 + 16)$ cm $= 23$ cm > 13cm

Since, sum of any two sides is greater than the third side.

So, 7 cm, 13 cm and 16 cm could be the possible sides of a triangle.

(b) 8 cm, 10 cm, 8 cm

$(8 + 10)$ cm $= 18$ cm > 8 cm; $(10 + 8)$ cm $= 18$ cm > 8 cm;

$(8 + 8)$ cm $= 16 > 10$ cm

Since, sum of any two sides is greater than the third side.

So, 8 cm, 18 cm and 8 cm could be the possible sides of a triangle.

(c) 4 cm, 4 cm, 7 cm

$(4 + 4)$ cm $= 8$ cm > 7 cm; $(4 + 7)$ cm $= 11$ cm > 4 cm;

$(4 + 7)$ cm $= 11$ cm > 4 cm

Since, sum of any two sides is greate than the third side.

So, 4 cm, 4 cm and 7 cm could be the possible sides of a triangle.

(d) 12 cm, 8 cm, 25 cm

$(12 + 8)$ cm $= 20 < 25$ cm; $(8 + 25)$ cm $= 33$ cm;

$(25 + 12)$ cm $= 37$ cm

Since, sum of any two sides is not greater than the third side.

So, 12 cm, 8 cm and 25 cm could not be the possible sides of a triangle.

(e) 15 cm, 6 cm, 5 cm

$(15 + 6)$ cm $= 21 > 5$ cm, $(6 + 5)$ cm $= 11$ cm < 15 cm,

$(15 + 5)$ cm $= 20 < 6$ cm

Since, sum of any two sides is not gretear than the third side.

So, 15 cm, 6 cm and 5 cm could not be the possible sides of a triangle.

(f) 3 cm, 4 cm, 8 cm

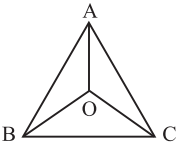
$(3+4)$ cm = 7 cm < 8 cm; $(4+8)$ cm = 12 cm > 3 cm,

$(8+3) = 11$ cm > 4 cm

Since, sum of any two sides is not greater than the third side. So, 3 cm, 4 cm and 8 cm could not be the possible sides of a triangle.

3. (a) $AO + BO > AB \rightarrow$ Yes

(by triangle inequality property)



(b) $OB + OC > BC \rightarrow$ Yes

(by triangle inequality property)

(c) $AO + OC > AC \rightarrow$ Yes. (by triangle inequality property)

(d) $AB + BC > AC \rightarrow$ Yes (by triangle inequality property)

4. Let the third side be x. A triangle can be possible with these side

If, $5 + 8 > x$

$8 + x > 5$

$5 + x > 8$

Putting $x = 3$ and 13 respectively, we get

$5 + 8 = 13 > 3$ $\quad$ $8 + 3 = 11 > 5$

$5 + 3 = 8 = 8$

Putting $x = 13$

$5 + 8 = 13 = 13$ $\quad$ $8 + 13 = 21 > 5$

$5 + 13 = 18 > 8$

5. (a) $OA + OB > AB$ ...(1) (by triangle inequality property)

(b) $OB + OC > BC$ ...(2) (by triangle inequality property)

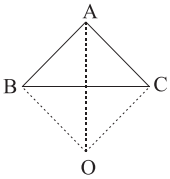
(c) $OA + OC > AC$ ...(3) (by triangle inequality property)

Adding (1), (2), (3) we get

$$(OA + OB) + (OB + OC) + (OA + OC)$$
$$> AB + BC + AC$$

$$2(OA + OB + OC) > AB + BC + AC$$

$$OA + OB + OC > \frac{1}{2}(AB + BC + AC)$$



6. No.

Chapter 7

Comparing Quantities

Exercise-6.1

1. (a) 1 crore to 1 million = 100 lakh : 10 lakh

$$= \frac{100\,\text{lakh}}{10\,\text{lakh}} = 10:1$$

(b) 50 p to ₹ 3 = 50p :₹ 3

$$= 50\text{p} : 300\text{p} \qquad [\because ₹\,1 = 100\text{ p}]$$

$$= \frac{50\text{ p}}{300\text{ p}} = \frac{1}{6} = 1:6$$

(c) 60 minutes to 35 seconds = 60 minutes : 35 seconds

$$= \frac{60 \times 60\text{seconds}}{35\text{seconds}} = \frac{720}{7} = 720:7$$

(d) 16 hrs to 2 days = 16 hrs : 2 days

$$= 16\text{hrs} : 2 \times 24 \text{ hrs} = 16 \text{ hrs} : 48 \text{ hrs}$$

$$= \frac{16\text{hrs}}{48 \text{ hrs}} = \frac{1}{8} = 1:8$$

(e) 160cm to 1 metre = 160 cm : 1 m

$$= 160 \text{ cm}:100\text{cm} = \frac{160\text{cm}}{100\text{cm}} = \frac{8}{5} = 8:5$$

(f) 6 km to 150 m = 6 km : 150m

$$= 6 \times 1000\text{m} : 150\text{m} = 6000\text{m}:150\text{m}$$

$$= \frac{6000\text{m}}{150\text{m}} = \frac{40}{1} = 40:1$$

(g) 7 kg to 140g = 7 kg : 140g

$$= 7 \times 1000\text{g} : 140\text{g}$$

$$= 7000\text{g}:140\text{g}$$

$$= \frac{7000g}{140g} = \frac{50}{1} = 50:1$$

(h) $1.5l$ to $2.7l = \frac{1.5l}{2.7l} = \frac{15}{27} = \frac{5}{9} = 5:9$

(i) 2m to 5 m = 2 m : 5m $= \frac{2\text{m}}{5\text{m}} = \frac{2}{5} = 2:5$

2. Given ratio = 5:3

Sum of ratios = $5+3=8$

Total sum of money = ₹ 1200

First child will get $= \frac{5}{8} \times 1200 =$ ₹ 750

And, other child " " $= \frac{3}{8} \times 1200 =$ ₹ 450

So, each child gets ₹ 750 and ₹ 450 respectively.

3. Let the distance between the two cities A and C is x km.

$\Rightarrow$ $700:x :: 5:11$

$\Rightarrow$ $700: x = 5:11$

$\Rightarrow$ $\frac{700}{x} = \frac{5}{11} \Rightarrow x = \frac{700 \times 11}{5} = 1540$

So, the required distance between A and C is 1540 km.

4. Total number of plants = 1050

The students of school A planted plants = 615

The " " " B " " $= (1050 - 615)$

$= 435$

$\therefore$ Required ratio = Plants of school A : Plants of school B

$= 615:435 = \frac{615}{435} = \frac{41}{39} = 41:39$

5. Let x kg of fuel would be used for two hours flight. Then 600 kg : x kg :: 45 minutes : 2 hours $\Rightarrow$ 600 kg : x kg = 45 minutes : 2 hours $\frac{600\text{ kg}}{x\text{ kg}} = \frac{45\text{ minutes}}{2 \times 60\text{ minutes}}$

$\Rightarrow$ $\frac{600}{x} = \frac{3}{8}$

$x = \frac{600 \times 8}{3} = 1600$

So, 1600 kg of fuel would be used.

6. Let x raffle tickets were sold.

Then, 50 tickets : x tickets : : ₹ 500 : ₹ 1500

$$\Rightarrow \frac{50\,\text{tickets}}{x\,\text{tickets}} = \frac{₹\,500}{₹\,1500}$$

$$\Rightarrow \frac{50}{x} = \frac{1}{3} \Rightarrow x = 50 \times 3 = 150$$

So, 150 tickets were sold by him,

7. Given : a, b, c are in proportion

Then a:b : : b:c

$\Rightarrow$ a : b = b : c

$$\Rightarrow \frac{a}{b} = \frac{b}{c} \Rightarrow \frac{a}{15} = \frac{15}{40}$$

$$\Rightarrow a = \frac{15 \times 15}{40} = \frac{45}{8}$$

8. Total number of students in class VII = 40

Number of students in class VIIA, got grand 'A' = 9

" " " " " VIIB " " 'A' = 8

Clearly, number of students in class VII A is more than number of students in class VII B.

So, section 'A' has better record.

9. (a) 2 : 5 or 3 : 7

$$2 : 5 = \frac{2}{5} = 0.4$$

$$3 : 7 = \frac{3}{7} = 0.428$$

Clearly, 3 : 7 > 2 : 5

(b) 4 : 5 or 5 : 6

$$4 : 5 = \frac{4}{5} = 0.8 \text{ and } 5 : 6 = \frac{5}{6} = 0.833$$

Clearly, 5:6 > 4 : 5

(c) 6:11 or 9:14

$$6 : 11 = \frac{6}{11} = 0.54$$

$9 : 14 = \frac{9}{14} = 0.64$

Clearly, $9 : 14 > 6 : 11$

(d) $1 : 4$ or $6 : 30$

$1 : 4 = \frac{1}{4} = 0.25$ and $6 : 30 = \frac{6}{30} = 0.2$

Clearly, $1 : 4 > 6 : 30$

10. Given, Height of the pole : Height of the tree :: shadow of the pole : shadow of the tree

$\Rightarrow$ 2m : x :: 2.5m : 17.5m

$$\frac{2\text{ m}}{x} = \frac{2.5\text{ m}}{17.5\text{ m}}$$

$$x = \frac{2 \times 175}{25} = 14$$

Hence, the height of the tree is 14 m.

11. Let 'x' kg of sweets is required.

Then, 50 kg of sweets : x kg of sweets :: 200 people : 700 people

$$\Rightarrow \quad \frac{50}{x} = \frac{200}{700} \Rightarrow \frac{50}{x} = \frac{2}{7}$$

$$\Rightarrow \quad x = \frac{50 \times 7}{2} = 175$$

Here, 175 kg of sweets is required for 700 people.

12. (a) $4 : x :: 20 : 35$

$$\frac{4}{x} = \frac{20}{35}$$

$$x = \frac{4 \times 35}{20} = 7$$

(b) $2.5 : 7.5 :: x : 10.5$

$$\frac{2.5}{7.5} = \frac{x}{10.5}$$

$$x = \frac{2.5 \times 10.5}{7.5} = 3.5$$

(c) $x : 19 :: 142 : 71$

$$\frac{x}{19} = \frac{142}{71}$$

$$x = \frac{19 \times 142}{71}$$

$$x = 38$$

(d) $21 : 35 :: 33 : x$

$$\frac{21}{35} = \frac{33}{x}$$

$$x = \frac{33 \times 35}{21}$$

$$x = 55$$

(e) $196 : x :: x : 1$

$$\frac{196}{x} = \frac{x}{1} \Rightarrow x^2 = 196 \qquad \Rightarrow \quad x = \sqrt{196} = 14$$

Exercise-7.2

1. 10 workers are paid = ₹ 1680

1 worker is paid = ₹ $\frac{1680}{10}$

28 workers are paid = ₹ $\frac{1680}{10} \times 28$ = ₹ 4704

Hence, ₹ 4704 will be paid to 28 workers.

2. 10 men dig a well in = 9 days

1 " " " " = 9×10 days

So, 15 " " " = $\frac{9 \times 10}{15}$ days = 6 days

Hence, 15 men can dig the same well in 6 days.

3. 5 men can eat bananas = 30

1 men " " = $\frac{30}{5}$

12 men " " = $\frac{30 \times 12}{5} = 72$

Hence, 12 men can eat 72 bananas.

4. 30 apples weight = 6 kg

1 apple weighs = $\frac{6}{30}$ kg

1080 such apples weight = $\frac{6 \times 1080}{30} = 216$ kg

Hence, 1080 such apples weigh will be 216 kg.

5. In 1 hr 30 min (i,e., 90 min) the train covers distance = 90 m

In 1 min " " " = $\frac{90}{90}$m

In 4 hr 30 min (i.e., 270 min) " " " = $\frac{90}{90} \times 270$ m

= 270 m

So, the train will traved 270 m in 4 hr 30 minutes.

6. The monthly fee collection of 350 students $= ₹\,385000$

" " " " 1 students $= \dfrac{₹\,385000}{350}$

" " " " 58 students $= \dfrac{₹\,385000}{350} \times 58$

$= ₹\,63800$

7. The cost of 15 envelopes $= ₹\,37.50$

The " " 1 envelope $= ₹\,\dfrac{37.50}{15}$

The " " 20 envelopes $= \dfrac{₹\,37.50 \times 20}{15} = ₹\,50$

$\therefore$ In ₹ 50, the number of envelops comes $= 20$

In ₹ 1 " " " " $= \dfrac{20}{50}$

In ₹ 300 " " " " $= \dfrac{20}{50} \times 300 = 120$

Hence, 120 envelopes comes in ₹ 300

8. Total wages of 30 labourers $= ₹\,3450$

" " " 1 labourer $= ₹\,\dfrac{3450}{30}$

" " " $(30 + 10 = 40)$ labourers $= ₹\,\dfrac{3450}{30} \times 40 = ₹\,4600$

Hence, total wages of 40 labourers would be ₹ 4600.

9. Time = 7 hr

Speed = 48 km/hr

Distance covered = ?

We know that

$d = S \times T$

$= 48 \times 7$

$= 336$ km

Now, speed is decreased by 20 km/hr.

$\therefore \quad S = (48 - 20)$ km/hr

$= 28$ km/hr

$d = 336$ km

$T = ?$

$T = \dfrac{d}{s} = \dfrac{336}{28} = 12$ hr

Hence, it will take 12 hours to cover the same distance.

10. Working 8 hours daily, a man takes $= 12$ days

" 1 hour daily, the man will take $= \frac{12}{8}$ days

" 6 hours daily, the " " " $= \frac{12}{8} \times 6 = 9$ days

Hence, the same work will be completed in 9 days.

11. Aman takes 5 hours to paint a wall.

So, Aman's 1 hour's work $= \frac{1}{5}$ part of the wall

Vivek takes 6 hours to paint the same wall.

So, Vivek's 1 hour's work $= \frac{1}{6}$ part of the wall

Both 1 hour's work $= \left(\frac{1}{5} + \frac{1}{6}\right)$ part of the wall

$= \frac{6+5}{30} = \frac{11}{30}$ part of the wall

$\frac{11}{30}$ part of the work is done in 1 hours.

So, 1 part of the work is done in $\frac{1}{\left(\frac{11}{30}\right)}$ hour $= 1 \times \frac{30}{11}$ hour

$= \frac{30}{11} = 2\frac{8}{11}$hr

Hence, together they will paint the wall in $2\frac{8}{11}$ hours.

Exercise-7.3

1. (a) $32\% = \frac{32}{100} = \frac{8}{25} = 8:25$

(b) $6\frac{1}{4}\% = \frac{25}{4}\% = \frac{25}{4 \times 100} = \frac{1}{16} = 1:6$

(c) $0.35\% = \frac{0.35}{100}\% = \frac{35}{100 \times 400} = \frac{7}{2000} = 7:2000$

(d) $200\% = \frac{200}{100} = \frac{2}{1} = 2:1$

(e) $15\frac{2}{3}\% = \frac{47}{3}\% = \frac{47}{3\times100} = \frac{47}{300} = 47:300$

(f) $0.05\% = \frac{0.05}{100} = \frac{5}{100\times100} = \frac{1}{2000} = 1:2000$

(g) $102\% = \frac{102}{100} = \frac{51}{50} = 51:50$

(h) $15.25\% = \frac{15.25}{100} = \frac{1525}{100\times100} = \frac{61}{400} = 61:400$

(i) $\frac{1}{4}\% = \frac{1}{4\times100} = \frac{1}{400} = 1:100$

2. (a) $25\% = \frac{25}{100} = 0.25$

(b) $0.3\% = \frac{0.3}{100} = \frac{3}{1000} = 0.003$

(c) $\frac{5}{4}\% = \frac{5}{4\times100} = \frac{1}{80}$

$= 0.0125$

(d) $2\frac{1}{3}\% = \frac{7}{3}\% = \frac{7}{3\times100}$

$= \frac{7}{300} = 0.023$

(e) $145\% = \frac{145}{100} = 1.45$

(f) $1\frac{1}{4}\% = \frac{5}{4}\%$

$= \frac{5}{4\times100} = \frac{5}{400}$

$= 0.0125$

(g) $0.035\% = \frac{35}{100\times1000}$

$= \frac{35}{100000} = 0.00035$

(h) $1.25\% = \frac{125}{100\times100} = \frac{125}{10000}$

$= 0.0125$

(i) $36\% = \frac{36}{100} = 0.36$

3. (a) $30\% = \frac{30}{100} = \frac{3}{10}$

(b) $12\frac{1}{2}\% = \frac{25}{2\times100} = \frac{1}{8}$

(c) $1.45\% = \frac{1.45}{100} = \frac{145}{100\times100}$

$= \frac{29}{2000}$

(d) $0.5\% = \frac{0.5}{100} = \frac{8}{100\times10}$

$= \frac{1}{200}$

(e) $0.24\% = \frac{0.24}{100} = \frac{24}{100 \times 100}$

$= \frac{3}{1250}$

(f) $3\frac{1}{4}\% = \frac{13}{4}\%$

$= \frac{13}{4 \times 100} = \frac{13}{400}$

(g) $9\% = \frac{9}{100}$

(h) $25\frac{2}{3}\% = \frac{77}{3}\% = \frac{77}{3 \times 100}$

$= \frac{77}{300}$

(i) $140\% = \frac{140}{100} = \frac{7}{5}$

4. (a) 25% of ₹ 100

$= \frac{25}{100} \times ₹100$

$= ₹25$

(b) $4\frac{1}{2}$% of ₹ 180

$= \frac{9}{2}$% of ₹180

$= \frac{9}{2 \times 100} \times 180$

$= \frac{81}{10} = ₹8.1$

(c) 2.25% of 1000 m

$= \frac{2.25}{100}$ of 1000 m

$= \frac{225 \times 1000 \text{ m}}{100 \times 100}$

$= 22.5$ m

(d) $15\frac{1}{3}$% of 18

$= \frac{46}{3}$% of 18

$= \frac{46}{3} \times 18 = 46 \times 6$

$= 276$

(e) 0.5% of 250 km

$= \frac{0.5}{100} \times 250$ km

$= \frac{5 \times 250}{100 \times 10} = \frac{5}{4}$ km

(f) 20% of 12.25 km

$= \frac{20}{100} \times 12.25$ km

$= \frac{12.25}{5}$ km $= 2.45$ km

(g) 140% of 5 kg

$= \frac{140 \times 5}{100}$ kg

$= 7$ kg

(h) $3\frac{1}{3}$% of 60 litres

$= \frac{10}{3}$% of 60 l

$= \frac{10}{3 \times 100} \times 60\ l = 2l$

(i) 1.05% of ₹100

$= \frac{1.05}{100} \times ₹\,100$

$= \frac{105}{100 \times 100} \times 100$

$= ₹\,1.05$

(j) 21.5% of 1650 kg

$= \frac{21.5}{100} \times 1650$

$= \frac{215}{1000} \times 1650$

$= 354.75$

5. (a) $\frac{51}{100} = \left(\frac{51}{100} \times 100\right)\% = 51\%$

(b) $2\frac{3}{5} = \left(\frac{13}{5} \times 100\right)\% = 260\%$

(c) $\frac{75}{40} = \left(\frac{75}{40} \times 100\right)\% = 187.5\%$ or $187\frac{1}{2}\%$

(d) $6\frac{1}{4} = \left(\frac{25}{4} \times 100\right)\% = 625\%$

(e) $\frac{1}{7} = \left(\frac{1}{7} \times 100\right)\% = 14\frac{2}{7}\%$

(f) $\frac{7}{15} = \left(\frac{7}{15} \times 100\right)\% = \frac{140}{3}\% = 46\frac{2}{3}\%$

(g) $12\frac{1}{3} = \left(\frac{37}{3} \times 100\right)\% = \frac{3700}{3}\% = 1233\frac{1}{3}\%$

(h) $\frac{2}{35} = \left(\frac{2}{35} \times 100\right)\% = \frac{40}{7}\% = 5\frac{5}{7}\%$

(i) $\frac{19}{200} = \left(\frac{19}{200} \times 100\right)\% = \frac{19}{2}\% = 9.5\%$ or $9\frac{1}{2}\%$

6. (a) $0.04 = \frac{4}{100} = \frac{4 \times 100}{100}\% = 4\%$

(b) $2.35 = \frac{235}{100} = \left(\frac{235 \times 100}{100}\right)\% = 235\%$

(c) $7.50 = \frac{750}{100} = \left(\frac{750}{100} \times 100\right)\% = 750\%$

(d) $0.23 = \frac{23}{100} = \left(\frac{23}{100} \times 100\right)\% = 23\%$

(e) $0.0008 = \frac{8}{10000} = \left(\frac{8}{10000} \times 100\right)\% = 0.08\%$

(f) $7.25 = \frac{725}{100} = \left(\frac{725}{100} \times 100\right)\% = 725\%$

(g) $0.07 = \frac{7}{100} = \left(\frac{7}{100} \times 100\right)\% = 7\%$

(h) $1.204 = \frac{1204}{1000} = \left(\frac{1204}{1000} \times 100\right)\% = 120.4\%$

(i) $15.2 = \frac{152}{10} = \left(\frac{152}{10} \times 100\right)\% = 1520\%$

7. (a) $1:5 = \frac{1}{5} = \left(\frac{1}{5} \times 100\right)\% = 20\%$

(b) $2:3 = \frac{2}{3} = \left(\frac{2}{3} \times 100\right)\% = \frac{200}{3}\%$

(c) $25:75 = \frac{25}{75} = \left(\frac{25}{75} \times 100\right)\% = \frac{100}{3}\% = 33\frac{1}{3}\%$

(d) $20:25 = \frac{20}{25} = \left(\frac{20}{25} \times 100\right)\% = 80\%$

(e) $11:125 = \frac{11}{125} = \left(\frac{11}{125} \times 100\right)\% = \frac{44}{5}\% = 8\frac{4}{5}\%$

(f) $7:5 = \frac{7}{5} = \left(\frac{7}{5} \times 100\right)\% = 140\%$

(g) $13:20 = \frac{13}{20} = \left(\frac{13}{20} \times 100\right)\% = 65\%$

(h) $9:10 = \frac{9}{10} = \left(\frac{9}{10} \times 100\right)\% = 90\%$

(j) $10:36 = \frac{10}{36} = \left(\frac{10}{36} \times 100\right)\% = \frac{250}{9}\% = 27\frac{7}{9}\%$

8. Income of Sita =₹ 1500

Money spent by Sita =₹ 575

Money saved by Sita =₹ 1500 − ₹ 575 =₹ 925

$\therefore$ Required percent of income $= \left(\dfrac{\text{Money Saved}}{\text{Total Income}} \times 100\right)\%$

$$= \left(\frac{₹\ 925}{₹\ 1500} \times 100\right)\%$$

$$= ₹\ \frac{185}{3} = ₹\ 61\frac{2}{3}\%$$

9. $y\%$ of $250 = 21$

$\Rightarrow \quad \dfrac{y}{100} \times 250 = 21$

$\Rightarrow y = \dfrac{21 \times 100}{250} = \dfrac{42}{5} \qquad \Rightarrow \quad y = \dfrac{42}{5}$

10. Let the number be x.

then, $\quad 3\dfrac{1}{4}\%$ of $x = 13$

$\Rightarrow \quad \dfrac{13}{4}\%$ of $x = 13$

$\Rightarrow \quad \dfrac{13}{4 \times 100} \times x = 13$

$\Rightarrow \quad x = \dfrac{13 \times 400}{13} = 400$

11. Let the number be x.

Then, 0.05% of $x = 200$

$\Rightarrow \quad \dfrac{5}{100}\%$ of $x = 200$

$\Rightarrow \quad \dfrac{5}{100}\%\, x = 200$

$\Rightarrow \quad x = \dfrac{200 \times 100}{5} = 4000$

12. Let the number be x.

Then, 10% of $x = 5$

$\Rightarrow \quad \dfrac{10}{100} \times x = 5$

$\Rightarrow \quad x = \dfrac{5 \times 100}{10} = 50$

13. Total marks = 80

Marks obtained by Nishant = 40

Percent of marks $= \left(\frac{40}{80} \times 100\right)\% = 50\%$

Hence, he get 50% marks.

14. Total oranges = 120

Number of oranges distributed among students = 25

Remaining organges in the basket = 120 – 25 = 95

Percentage of oranges left $= \left(\frac{95}{120} \times 100\right)\% = \frac{475}{6} = 79\frac{1}{6}\%$

15. (a) Required $\% = \frac{₹\,100 \times 100}{₹\,500} = \frac{100}{5} = 20\%$

(b) Required $\% = \frac{160\text{ m} \times 100}{5\text{ km}} = \frac{160\text{ m}}{5 \times 1000\text{ m}} \times 100 = \frac{16}{5} = 3\frac{1}{5}\%$

(c) Required $\% = \frac{75\text{ p} \times 100}{₹\,8} = \frac{75\text{ p}}{8 \times 100\text{ p}} \times 100 = \frac{75}{8} = 9\frac{3}{8}\%$

(d) Required $\% = \frac{0.5 \times 100}{5} = \frac{5}{5 \times 10} \times 100 = 10\%$

(e) Required$\% = \frac{450\text{ gm}}{2.75\text{ kg}} \times 100 = \frac{450\text{ gm}}{2.75 \times 1000\text{ gm}} \times 100$

$= \frac{45}{2.75} = \frac{45 \times 100}{275} = \frac{180}{11} = 16\frac{4}{11}\%$

(f) Required $\% = \frac{12\text{ min}}{3\text{ hours}} \times 100 = \frac{12\text{ min}}{3 \times 60\text{ min}} \times 100$

$= \frac{20}{3} = 6\frac{2}{3}\%$

(g) Required$\% = \frac{80\text{apples}}{120\text{apples}} \times 100$

$= \frac{200}{3} = 66\frac{2}{3}\%$

(h) Required $\% = \frac{20}{200} \times 100$

$= 10\%$

(i) Required $\% = \frac{3\text{ kg}}{15\text{ kg}} \times 100 = 20\%$

16. Passed candidates % = 90%

Failed candidates = 80

$\therefore$ Failed candidates % = 100 − 90 = 10%

Let x candidates had appeared in the examination.

Then, 10% of $x = 80$

$$\frac{10}{100}\ x = 80$$

$$x = \frac{80 \times 100}{10} = 800$$

Hence, 800 candidates had appeared in the examination,

17. Mohit % of marks $= \left(\frac{630 \times 100}{900}\right)\% = 70\%$

And Vidhi % of marks $= \left(\frac{650 \times 100}{900}\right)\% = 65\%$

Since, 70% > 65%

Hence, Mohit's performance is better.

18. Total Journey travelled = 50 km + 200 km = 250 km

$\therefore$ Per cent of journey travelled by bus $= \left(\frac{50\text{ km} \times 100}{250\text{ km}}\right)\%$

$= 20\%$

And, Percent of Journey travelled train $= \left(\frac{200\text{ km} \times 100}{250\text{ km}}\right) = 80\%$

19. Minimum passing marks = 36%

Pass marks for the exam = marks obtained + failed by marks

= 180 + 36 = 216

Let Total (i.e., maximum) marks = x

Then, 36% of $x = 216$

$$\frac{36}{100} \text{ of } x = 216$$

$$\frac{36}{100} \times x = 216$$

$$x = \frac{6 \times 100}{36} = 600$$

Hence, the maximum marks is 600.

20. Price increased by $= 12\%$

Present price = ₹ 896

Let the original price be ₹ x.

$\because \quad x + 12\%$ of $x =$ ₹ 896

$$x + \frac{12x}{100} = ₹\ 896$$

$$\frac{112x}{100} = ₹\ 896$$

$$x = \frac{₹\ 896 \times 100}{112} = ₹\ 800$$

Hence, its original price is ₹ 800.

21. Girls % in the school $= 35\%$

Number of boys $= 910$

Boys % in the school $= 100 - 35 = 65\%$

Let total students are x.

Then, 65% of $x = 910$

or, $$\frac{65}{100} \times x = 910$$

or, $$x = \frac{910 \times 100}{65} = 1400$$

$\therefore$ Total enrolments (i.e., students) in the school are 1400.

Number of girls $= 1400 - 910 = 490$

Exercise-7.4

1. (a) S.P = ₹ 400, Profit = ₹ 35

C.P = S.P − Profit

= ₹ 400 − ₹ 35 = ₹ 365

(b) S.P = ₹ 1250, Profit = ₹ 250

C.P = S.P − Profit

= ₹ 1250 − ₹ 250 = ₹ 1000

(c) S.P = ₹ 1250, Loss = ₹ 150

$\because$ S.P = C.P − Loss

$\therefore$ C.P = S.P + Loss

= ₹ 1250 + ₹ 150 = ₹ 1400

(d) S.P = ₹ 1800, Loss = ₹ 325

$\because$ S.P = C.P − Loss

$\therefore$ C.P = S.P + Loss

= ₹ 1800 + ₹ 325 = ₹ 2125

2. (a) C.P = ₹ 250, Profit = ₹ 22

$\therefore$ S.P = C.P + Profit

= ₹ 250 + ₹ 22 = ₹ 272

(b) C.P = ₹ 720, Profit = ₹ 105

$\therefore$ S.P = C.P + Profit

= ₹ 720 + ₹105 = ₹ 825

(c) C.P = ₹ 790, Loss = ₹ 20

$\therefore$ S.P = C.P − Loss

= ₹ 790 − ₹ 20 = ₹ 770

(d) C.P = ₹ 1550, Loss = ₹ 220

$\therefore$ S.P = C.P − Loss

= ₹ 1550 − ₹ 220 = ₹ 1330

3. Complete the following table :

Sol:

	CP	**SP**	**Profit**	**Loss**	**Profit or Loss %**
(a)	₹ 700	₹ 650	—	**₹ 50**	$\mathbf{7\frac{1}{7}\%}$
(b)	₹ 500	**₹ 525**	₹ 25	—	**5%**
(c)	₹ 480	**₹ 440**	—	₹ 40	$\mathbf{8\frac{1}{3}\%}$
(d)	**₹ 700**	₹ 770	₹ 70	—	**10%**
(e)	₹ 900	**₹ 840**	—	₹ 60	$\mathbf{6\frac{2}{3}\%}$

4. C.P. of 15 dozen pens = ₹ 60 × 15 = ₹ 900

S.P. of 15 dozen (i.,e 180) pens = ₹ 6.50 × 180 = ₹ 1170

Since, S.P. > C.P., so, there is a profit

Profit = S.P. − C.P. = ₹ 1170 − ₹ 900 = ₹ 270

Hence, his gain is ₹ 270.

5. C.P. of 16 notebooks = S.P. of 12 notebooks

Let the C.P. of 1 notebook be x.

Then, C.P. of 12 notebooks = $12x$

S.P. of 12 notebooks = C.P. of 16 nootbooks = $16x$

∴ Profit = S.P. of 12 notebook − C.P. of 12 notebooks

$= 16x - 12x = 4x$

So, Profit % $= \frac{x}{4x} \times 100 = 25\%$

Hence, the gain is 25%.

6. Let C.P. of 1 banana = ₹ 1

Loss = C.P. of 36 bananas − S.P. of 36 bananas

S.P. of 4 bananas = C.P. of 36 bananas − S.P. of 36 bananas

⇒ S.P. of 4 bananas + S.P. of 36 bananas

= C.P. of 36 bananas

⇒ S.P. of 40 bananas = C.P. of 36 bananas

Let C.P. of 1 banana = ₹ 1

Then C.P. of 36 bananas = ₹ 36 = S.P. of 40 bananas

⇒ S.P. of 40 bananas = ₹ 36

S.P. of 1 bananas = ₹ $\frac{36}{40}$ = ₹ $\frac{9}{10}$

Loss = C.P. of 1 bananas − S.P. of 1 bananas

$= ₹\,1 - ₹\,\frac{9}{10} = ₹\left(1 - \frac{9}{10}\right) = ₹\,\frac{1}{10}$

Loss % $= \frac{\text{Loss}}{\text{C.P of 1 bananas}} \times 100 = \frac{\left(\frac{1}{10}\right)}{1} \times 100 = \frac{100}{10} = 10$

Hence, his loss % is 10%.

7. S.P. of a table = ₹ 1320, gain = 10%, C.P. = ?

Gain = 10% of C.P.

C.P. is not given to us. So, let C.P. = ₹ x

$\Rightarrow$ gain = 10% of ₹ $x = \frac{10}{100} \times x =$ ₹ $\frac{x}{10}$

$\Rightarrow$ C.P. = S.P. – P.

$\Rightarrow$ ₹ $x =$ ₹ 1320 – ₹ $\frac{x}{10}$ $\Rightarrow$ ₹ $\left(x + \frac{x}{10}\right) =$ ₹ 1320

$\Rightarrow$ ₹ $\frac{11x}{10} =$ ₹ 1320 $\Rightarrow x = \frac{120}{11} \times 10$

$\Rightarrow x = 1200$

Hence, C.P. of the table is ₹1200.

8. C.P. of a radio set = ₹300., profit = 25%

S.P. of a radio set = ?

Profit % $= \frac{\text{Profit}}{\text{C.P.}} \times 100 \Rightarrow 25 = \frac{P}{300} \times 100$

$P = 25 \times 3 =$ ₹ 75

$\therefore$ S.P. of a radio set = C.P. + P.

= ₹ 300 + ₹ 75 = ₹ 375

C.P. for Akash = ₹ 375, loss = 10%

Loss % $= \frac{\text{Loss}}{\text{C.P}} \times 100 \Rightarrow 10 = \frac{\text{Loss}}{375} \times 100$

Loss % $= \frac{375 \times 10}{100} =$ ₹ 37.5

S.P. for Akash = C.P. – loss = ₹ 375 – ₹ 37.5

= ₹ 337.5

This S.P. is the cost price for Kuldeep.

Hence, kuldeep buy it for ₹ 337.5

9. C.P. of 100 articles = ₹ 4000

Overall profit = 20% of ₹ 4000 = ₹ 800

S.P. of 100 articles = C.P. + profit

= ₹ 4000 + ₹ 800 = ₹ 4800

Now, C.P. of 20 article = ₹ $\frac{4000}{100} \times 20 =$ ₹ 800

Profit = 5% of ₹ 800 $= \frac{5}{100} \times 800 =$ ₹ 40

$\therefore$ S.P. = C.P. + Profit = ₹ 800 + ₹ 40 = ₹ 840

C.P. of 80 article $= ₹\frac{4000}{100} \times 80 = ₹\,3200$

Let he should sell the remaining articles at y % profit.

$\therefore$ Profit = y% of ₹ 3200 $= \frac{y}{100} \times 3200 = 32y$

$\therefore$ S.P. = C.P. + Profit $= ₹\,3200 + 32y$

Total S.P. = C.P. + Profit $= 840 + 3200 + 32y = ₹\,4040 + 32x$

$₹\,4800 = ₹\,(4040 + 32y)$

$₹\,32y = ₹\,(4800 - 4040) = ₹\,760$

$y = \frac{760}{32} = \frac{95}{4}$% or 23.75%

10. S.P. of one article $= ₹\,3.75$

Profit% on it = 25%

Profit = 25% of C.P. $= \frac{25}{100} \times \text{C.P.} = \frac{\text{C.P.}}{4}$

C.P. of one article = S.P. – profit

$\Rightarrow$ C.P. $= ₹\,315 - \frac{\text{C.P.}}{4} \Rightarrow$ C.P. $+ \frac{\text{C.P.}}{5} = ₹\,375$

$\Rightarrow \frac{5}{4}$ C.P. $= ₹\,375$ $\Rightarrow$ C.P. $= \frac{₹\,375 \times 4}{5} = ₹\,300$

S.P. of other orticle $= ₹\,375$

Loss % on it = 25%

Loss = 25% of C.P. $= \frac{25}{100} \times \text{C.P.} = \frac{\text{C.P.}}{4}$

C.P. of other article = S.P. + Loss

$\Rightarrow$ C.P. = S.P. $+ \frac{\text{C.P.}}{4}$ $\Rightarrow$ C.P. $- \frac{\text{C.P.}}{4} = ₹\,375$

$\Rightarrow \frac{3}{4}$ C.P. $= ₹\,375$ $\Rightarrow$ C.P. $= ₹\frac{375 \times 4}{3} = ₹\,500$

Now, Total S.P. of both articles $= \text{S.P}_1 + \text{S.P}_2$

$= ₹\,375 + ₹\,375$

$= ₹\,750$

Total C. P of both article $= \text{C.P}_1 + \text{C.P}_2$

$= ₹\,300 + ₹\,500 = ₹\,800$

Since, C. P > S. P, So there is a loss.

$$\text{Loss } \% = \frac{\text{loss}}{\text{Total C.P}} \times 100 = \frac{₹(800-750)}{₹800} \times 100$$

$$= \frac{₹50}{₹800} \times 100 = \frac{25}{4} = 6\frac{1}{4}\%$$

11. C.P of the old computer = ₹ 20000

Amount spent on its upgradation = ₹ 2250

∴ Total investment (new C.P) = ₹ (20000 + 2250) = ₹22250

S.P of the old computer = ₹ 25810

Clearly, S.P > C.P

∴ Profit = S.P − C.P

= ₹ 25810 − ₹ 22250 = ₹ 3560

Hence, her gain is ₹ 3560 in the transaction

12. C.P of a flat = ₹ 1775000

Amount spent on its interior decoration = ₹ 125000

∴ Total investment (new C. P) = ₹ (1775000 + 125000)

= ₹ 1900000

Profit % on it = 20%

$$\therefore \text{ Profit} = \frac{20}{100} \times 1900000 = ₹\,380000$$

S.P of the flat = New C.P + Profit

= ₹ 1900000 + ₹ 380000 = ₹ 2280000

Exercise-7.5

1. Calculate the interest and amount in the following cases:

	Principle in ₹ (P)	Rate p.a. (R)	Time (T)	Interest (I)	Amount (A)
(a)	700	6%	2 years	₹ 84	₹ 784
(c)	1000	8%	3 year	₹ 240	₹ 1240
(d)	10000	15%	2 years	₹ 3000	₹ 13000

2. $P = ₹\,7300$, $R = 10\%$ p.a, $T = 2$ years

$$\text{S.I} = \frac{P \times R \times T}{100} = ₹\,\frac{7300 \times 10 \times 2}{100} = ₹\,1460$$

3. R= ?, $P =$ ₹ 800, $A =$ ₹ 1000, $T = 2$ years

I = $A - P =$ ₹ 1000 − ₹ 800 = ₹ 200

Now, $I = \dfrac{P \times R \times T}{100} \Rightarrow 200 = \dfrac{800 \times R \times 2}{100}$

$\therefore \quad R = \dfrac{2000}{8 \times 2} = \dfrac{100}{8} = \dfrac{25}{2} = 12\dfrac{1}{2}$ % p.a

4. $T = ?$, Let P = ₹ x, then $A =$ ₹ $1.5x$, $R = 10\%$ p.a

$I = A - P = 1.5x - x = 0.5x$

$\therefore \quad T = \dfrac{I \times 100}{P \times R} = \dfrac{0.5x \times 100}{x \times 10} = 5$ years

5. $R = 12\%$ p.a, $T = 3$ years, $I =$ ₹ 180

Let she borrowed ₹ y.

Now, $$I = \frac{P \times R \times T}{100}$$

$$180 = \frac{y \times 12 \times 3}{100}$$

$$y = \frac{180 \times 100}{12 \times 3} = 500$$

Hence, she borrowed ₹ 500.

6. Here given : $R = 10\%$, $A =$ ₹ 150, $T = 5$ year, $P = ?$

$$I = \frac{P \times R \times T}{100} \Rightarrow I = \frac{P \times 10 \times 5}{100} \Rightarrow I = \frac{P}{2} \qquad ...(1)$$

again $\quad I = A - P$

$\Rightarrow \quad \dfrac{P}{2} =$ ₹ $150 - P \qquad$ [by 1]

$\Rightarrow \quad \dfrac{P}{2} + P =$ ₹ $150 \Rightarrow \dfrac{3}{2}P =$ ₹ $150 \Rightarrow P = \dfrac{₹\,150 \times 2}{3}$

$\Rightarrow \quad P =$ ₹ 100

Hence, a sum of ₹ 100, would produce ₹ 150 in 5 years.

7. Given : $A_1 =$ ₹ 2200 $\qquad A_2 =$ ₹ 2800

$T_1 = 1$ year $\qquad T_2 = 4$ years

Let, $R_1 = r\%$ $\qquad R_2 = r\%$

$P_1 = P \qquad P_2 = P$

$$I_1 = \frac{P_1 \times R_1 \times T_1}{100} \qquad I_2 = \frac{P_2 \times R_2 \times T_2}{100}$$

$$I_1 = \frac{P \times r \times 1}{100} \qquad I_1 = \frac{P \times r \times 4}{100}$$

$$I_1 = \frac{\text{Pr}}{100} \quad ...(1) \qquad I_2 = \frac{4\,\text{Pr}}{100} \quad ...(3)$$

and $\quad I_1 = A_1 - P_1 \qquad$ and $\quad I_2 = A_2 - P_2$

$$\frac{\text{Pr}}{100} = 2200 - P \qquad I_2 = 2800 - P$$

$$\frac{\text{Pr}}{100} + P = 2200 \quad ...(2) \qquad \frac{4\,\text{Pr}}{100} + P = 2800 \quad ...(4)$$

Subtracting quation (2) from equation (4), we get

$$\frac{4\,\text{Pr}}{100} + P - \left(\frac{\text{Pr}}{100} + P\right) = 2800 - 2200$$

$$\frac{4\,\text{Pr}}{100} + P - \frac{\text{Pr}}{100} - P = 600$$

$$\frac{4\,\text{Pr}}{100} - \frac{\text{Pr}}{100} = 600 \quad \Rightarrow \left(\frac{4\,\text{Pr} - \text{Pr}}{100}\right) = 600$$

$$\frac{3\,\text{Pr}}{100} = 600$$

$$\text{Pr} = \frac{600 \times 100}{3} = 20000$$

Put this value in equation (1), we get,

$$I_1 = \frac{20000}{100} = ₹\ 200$$

From $\quad I_1 = \text{A}_1 - \text{P}_1$

$\Rightarrow \quad 200 = 2200 - P \qquad [\because P_1 = P\ ]$

$$P = 2200 - 200 = 2000$$

$\therefore \quad P = ₹\ 2000$

Put this value in equation (5), we get

$$2000 \times r = 20000$$

$$r = \frac{20000}{2000} = 10$$

$\therefore \quad r = 10\%$

8. $P = ₹\,800,\quad R = 12.5\%$ p.a, $I = ₹\,125,\ T = ?$

by $I = \dfrac{P \times R \times T}{100} \Rightarrow 125 = \dfrac{800 \times 12.5 \times T}{100}$

$\Rightarrow T = \dfrac{125}{8 \times 12.5} = \dfrac{125 \times 10}{8 \times 125} = \dfrac{10}{8} = \dfrac{5}{4}$

$\Rightarrow \quad T = 1\dfrac{1}{4}$ year or 1 year 3 months.

9. Let the principal (P) be x

Amount (A) = $3x$ Rate (R) = ?

Time (T) = 16 years

$$I = A - P = 3x - x = 2x$$

$$R = \frac{I \times 100}{P \times T} = \frac{2x \times 100}{x \times 16} = \frac{200}{16}$$

$\therefore \quad R = 12.5\%$

10. Let the sum be x.

$T_1 = 2$ years $\quad T_2 = 3$ years $\quad R_1 = 8\% \quad R_2 = 12\%$

Given, $\quad S.I_1 = S.I_2 - 120$

$\Rightarrow \dfrac{P \times R_1 \times T_1}{100} = \dfrac{P \times R_2 \times T_2}{100} - 120$

$\Rightarrow \dfrac{P \times 8 \times 2}{100} = \dfrac{P \times 12 \times 3}{100} - 120$

$\Rightarrow \dfrac{36P}{100} - \dfrac{16P}{100} = 120 \qquad \Rightarrow \dfrac{36P - 16P}{100} = 120$

$\Rightarrow 20P = 120 \times 100 \qquad \Rightarrow P = \dfrac{120 \times 100}{20} = 600$

Hence, the required sum is ₹ 600.

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

Mental Maths :

1. In a transaction if there is a loss of 20%, then SP = CP – 20% of ___C.P___.
2. Amount = ___P___ + ___S.I___.
3. 300 marks out of 400 is ___75%___.

4. Fractional represetation of 16.25% is _____.
5. If an item is sold for ₹ 990 at a profit of 10%, then its C.P = ____₹ 900____.
6. If x% of 1250 = 250, then x = _____20_____.
7. 80% of 80 is _____64_____.

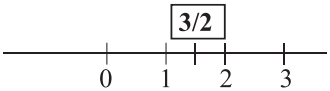
Chapter 8

Rational Numbers

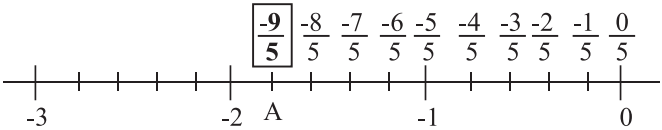
Exercise-8.1

1. Negative rational number : (b), (d), (f)
   Positive rational number : (a), (c), (e)

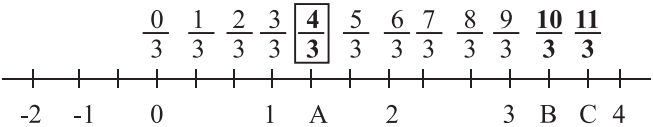
2. (a) $\frac{3}{2}$ =



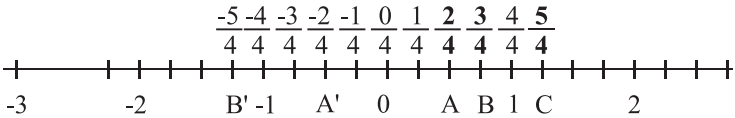
(b)



(c) $\frac{4}{3}, \frac{10}{3}, \frac{11}{3}$



(d) $\frac{-5}{4}, \frac{-2}{4}, \frac{2}{4}, \frac{3}{4}, \frac{5}{4}$



3. (a) $\frac{15}{17} = \frac{15}{17}$ (Standard form)

(b) $\frac{-14}{-49} = \frac{14}{49} = \frac{2}{7}$ (Standard form)

(c) $\frac{-16}{56} = \frac{-16}{56} = \frac{-4}{14} = -\frac{-2}{7}$ (Standard form)

(d) $\frac{72}{-108} = \frac{-72}{108} = \frac{-8}{12} = \frac{-2}{3}$ (Standard form)

4. (a) $\frac{7}{10}$ (b) $\frac{3}{8}$ (c) $\frac{-3}{-5}$

$\therefore \left|\frac{7}{10}\right| = \frac{7}{10}$ $\therefore \left|\frac{3}{8}\right| = \frac{3}{8}$ $\therefore \left|\frac{-3}{-5}\right| = \frac{3}{5}$

(d) $\frac{-6}{13}$ (e) $\frac{7}{-9}$

$\therefore \left|\frac{-6}{13}\right| = \frac{6}{13}$ $\therefore \left|\frac{7}{-9}\right| = \frac{7}{9}$

5. (a) $\frac{1}{7} = \frac{1\times 2}{7\times 2} = \frac{2}{14}$; $\frac{1}{7} = \frac{1\times 7}{7\times 3} = \frac{3}{21}$;

$\frac{1}{7} = \frac{1\times 4}{7\times 4} = \frac{4}{28}$; $\frac{1}{7} = \frac{1\times 5}{7\times 5} = \frac{7}{35}$

So, the four equivalent rational numbers of $\frac{1}{7}$ are

$\frac{2}{14}, \frac{3}{21}, \frac{4}{28}, \frac{7}{35}$.

(b) $\frac{-5}{8} = \frac{-5\times 2}{8\times 2} = \frac{-10}{16}$; $\frac{-5}{8} = \frac{-5\times 3}{8\times 3} = \frac{-15}{24}$

$\frac{-5}{8} = \frac{-5\times 4}{8\times 4} = \frac{-20}{32}$; $\frac{-5}{8} = \frac{-5\times 5}{8\times 5} = \frac{-25}{40}$

So, the four equivalent rational numbers of $\frac{-5}{8}$ are

$\frac{-10}{16}, \frac{-15}{24}, \frac{-20}{32}, \frac{-25}{40}$.

(c) $\frac{4}{9}=\frac{4\times 2}{9\times 2}=\frac{8}{18}$; $\frac{4}{9}=\frac{4\times 3}{9\times 3}=\frac{12}{27}$;

$\frac{4}{9}=\frac{4\times 4}{9\times 4}=\frac{16}{36}$; $\frac{4}{9}=\frac{4\times 5}{9\times 5}=\frac{20}{45}$

So, the four equivalent rational numbers of $\frac{4}{9}$ are

$$\frac{8}{18},\frac{12}{27},\frac{16}{36},\frac{20}{45}.$$

(d) $\frac{6}{13}=\frac{6\times 2}{13\times 2}=\frac{12}{26}$; $\frac{6}{13}=\frac{6\times 3}{13\times 3}=\frac{18}{39}$;

$\frac{6}{13}=\frac{6\times 4}{13\times 4}=\frac{24}{52}$; $\frac{6}{13}=\frac{6\times 5}{13\times 5}=\frac{30}{65}$

So, the four equivalent rational numbers of $\frac{6}{13}$ are

$$\frac{12}{26},\frac{18}{39},\frac{24}{52},\frac{30}{65}.$$

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

$\Rightarrow\ -2\times x=3\times 6$

$\Rightarrow\ x=\frac{18}{-2}=-9$

$\Rightarrow\ x=-9$

(b) $\frac{6}{-7}=\frac{42}{x}$

$\Rightarrow\ 6\times x=-7\times 42$

$\Rightarrow\ x=\frac{-7\times 42}{6}$

$\Rightarrow\ x=-49$

(c) $\frac{9}{-5}=\frac{x}{25}$

$\Rightarrow\ 9\times 25=x\times -5$

$\Rightarrow\ \frac{9\times 25}{-5}=x$

$\Rightarrow\ \frac{45}{-1}=x$

$\Rightarrow\ -45=x$ or, $x=-45$

(d) $\frac{12}{48}=\frac{x}{-12}$

$\Rightarrow\ 48\times x=12\times -12$

$\Rightarrow\ -x=\frac{-12\times -12}{48}$

$\Rightarrow\ x=-3$

(e) $\frac{-64}{36}=\frac{16}{x}$

$\Rightarrow\ -64\times x=16\times 36$

(f) $\frac{25}{42}=\frac{x}{21}$

$\Rightarrow\ 42\times x=21\times 25$

$\Rightarrow \quad x = \dfrac{16 \times 36}{-64}$

$\Rightarrow \quad x = \dfrac{36}{-4}$

$\Rightarrow \quad x = \dfrac{9}{-1}$

$\Rightarrow \quad x = -9$

$\Rightarrow \quad x = \dfrac{21 \times 25}{42}$

$\Rightarrow \quad x = \dfrac{25}{2}$

7. (a) $\dfrac{-4}{3}, \dfrac{5}{-6}$

L.C.M of 3, 6 = 6

$\dfrac{-4}{3} = \dfrac{-4 \times 2}{3 \times 2} = \dfrac{-8}{6}$

$\dfrac{5}{-6} = \dfrac{5 \times (-1)}{-6 \times (-1)} = \dfrac{-5}{6}$

Now, $\dfrac{-8}{6}$? $\dfrac{-5}{6}$

Since, $-8 < -5$

So, $\dfrac{-8}{6} < \dfrac{-5}{6}$

or, $\dfrac{-4}{3} < \dfrac{5}{-6}$

(b) $\dfrac{-4}{7}, \dfrac{2}{3}$

L.C.M of 7, 3 = 21

$\dfrac{-4}{7} = \dfrac{-4 \times 3}{7 \times 3} = \dfrac{-12}{21}$

$\dfrac{2}{-3} = \dfrac{2 \times -7}{-3 \times -7} = \dfrac{-14}{21}$

Now, $\dfrac{-12}{21}$? $\dfrac{-14}{21}$

Since, $-14 < -12$

So, $\dfrac{-14}{21} < \dfrac{-12}{21}$

or, $\dfrac{2}{-3} < -\dfrac{4}{7}$

(c) $\dfrac{7}{12}, \dfrac{3}{14}$

L.C.M of 12, 14 = 84

$\dfrac{7}{12} = \dfrac{7 \times 7}{12 \times 7} = \dfrac{49}{84}$

$\dfrac{3}{14} = \dfrac{3 \times 6}{14 \times 6} = \dfrac{18}{84}$

Now, $\dfrac{49}{84}$? $\dfrac{18}{84}$

Since, $18 < 49$

So, $\dfrac{18}{84} < \dfrac{49}{84}$

(d) $\dfrac{-9}{13}, \dfrac{7}{-12}$

L.C.M of 12, 13 = 156

$\dfrac{-9}{13} = \dfrac{-9 \times 12}{13 \times 12} = \dfrac{-108}{156}$

$\dfrac{7}{-12} = \dfrac{7 \times (-13)}{-12 \times (-13)} = \dfrac{-91}{156}$

Now, $\dfrac{-108}{156}$? $\dfrac{-91}{156}$

Since, $-108 < -91$

So, $\dfrac{-108}{156} < \dfrac{-91}{156}$

or, $\frac{3}{14} < \frac{7}{12}$

8. (a) $\frac{1}{2}, \frac{-2}{4}, \frac{-5}{-6}$

L.C.M of 2, 4, 6 = 12

$\frac{1}{2} = \frac{1\times 6}{2\times 6} = \frac{6}{12}$

$\frac{-2}{4} = \frac{-2\times 3}{4\times 3} = \frac{-6}{12}$

$\frac{-5}{-6} = \frac{5\times 2}{6\times 2} = \frac{10}{12}$

Since, $-6 < 6 < 10$

or $\frac{-6}{12} < \frac{6}{12} < \frac{10}{12}$

So, $\frac{-2}{4}$ is the smallest rational number.

(b) $\frac{2}{-3}, \frac{-5}{6}, \frac{-6}{7}$

L.C.M of 3, 6, 7 = 42

$\frac{2}{-3} = \frac{2\times -14}{-3\times -14} = \frac{-28}{42}$

$\frac{-5}{6} = \frac{-5\times 7}{-6\times 7} = \frac{-35}{42}$

$\frac{-6}{7} = \frac{-6\times 6}{7\times 6} = \frac{-36}{42}$

Since, $-36 < -35 < -28$

or, $\frac{-36}{42} < \frac{-35}{42} < \frac{-28}{42}$

So, $\frac{-6}{7}$ is the smallest rational number.

(c) $\frac{4}{8}, \frac{-5}{6}, \frac{11}{-24}$

L.C.M of 8, 6, 24 = 24

$\frac{4}{8} = \frac{4\times 3}{8\times 3} = \frac{12}{24}$

$\frac{-5}{6} = \frac{-5\times 4}{6\times 4} = \frac{-20}{24}$

$\frac{11}{-24} = \frac{11\times(-1)}{-24\times(-1)} = \frac{-11}{24}$

Since, $-20 < -11 < 12$

or $\frac{-20}{24} < \frac{-11}{24} < \frac{12}{24}$

So, $\frac{-5}{6}$ is the smallest rational number.

9. (a) $\frac{3}{10}, \frac{6}{15}, \frac{-11}{5}, \frac{1}{6}$

L.C.M of 5, 6, 10, 15 = 30

(b) $\frac{-9}{10}, \frac{-5}{20}, \frac{7}{12}, \frac{2}{5}$

L.C.M of 5, 10, 12, 20 = 60

$\frac{3}{10} = \frac{3\times3}{10\times3} = \frac{9}{30}$

$\frac{6}{15} = \frac{6\times2}{15\times2} = \frac{12}{30}$

$\frac{-11}{5} = \frac{-11\times6}{5\times6} = \frac{-66}{30}$

$\frac{1}{6} = \frac{1\times5}{6\times5} = \frac{5}{30}$

Since, $12 > 9 > 5 - 66$

or $-66 < 5 < 9 < 12$

$\frac{-66}{30} < \frac{5}{30} < \frac{9}{30} < \frac{12}{30}$

$\therefore \frac{-11}{5} < \frac{1}{6} < \frac{3}{10} < \frac{6}{15}$ are in ascending order.

$\frac{-9}{10} = \frac{-9\times6}{10\times6} = \frac{-54}{60}$

$\frac{-5}{20} = \frac{-5\times3}{20\times3} = \frac{-15}{60}$

$\frac{7}{12} = \frac{7\times5}{12\times5} = \frac{35}{60}$

$\frac{2}{5} = \frac{2\times12}{5\times12} = \frac{24}{60}$

Since, $-54 < -15 < 24 < 35$

or, $\frac{-54}{60} < \frac{-15}{60} < \frac{24}{60} < \frac{35}{60}$

$\therefore \frac{-9}{10} < \frac{-5}{20} < \frac{2}{5} < \frac{7}{12}$

are in ascending order.

10. (a) $\frac{5}{8}, \frac{7}{6}, \frac{-3}{8}, \frac{11}{12}$

L.C.M of 6, 8, 12, = 24

$\frac{5}{8} = \frac{5\times3}{8\times3} = \frac{15}{24}$

$\frac{7}{6} = \frac{7\times4}{6\times4} = \frac{28}{24}$

$\frac{-3}{8} = \frac{-3\times3}{8\times3} = \frac{-9}{24}$

$\frac{11}{12} = \frac{11\times2}{12\times2} = \frac{22}{24}$

Since, $28 > 22 > 15 > -9$

or $\frac{28}{24} > \frac{22}{24} > \frac{15}{24} > \frac{-9}{24}$

$\therefore \frac{7}{6} > \frac{11}{12} > \frac{5}{8} > \frac{-3}{8}$ are in descending order.

(b) $\frac{7}{9}, \frac{5}{6}, \frac{11}{12}, \frac{-1}{3}, \frac{-5}{6}$

L.C.M of 3, 6, 9, 12 = 36

$\frac{7}{9} = \frac{7\times4}{9\times4} = \frac{28}{36}$

$\frac{5}{6} = \frac{5\times6}{6\times6} = \frac{30}{36}$

$\frac{11}{12} = \frac{11\times3}{12\times3} = \frac{33}{36}$

$\frac{-1}{3} = \frac{-1\times12}{3\times12} = \frac{-12}{36}$

$\frac{-5}{6} = \frac{-5\times6}{6\times6} = \frac{-30}{36}$

Since, $33 > 30 > 28 > -12 > -30$.

or, $\frac{33}{36} > \frac{30}{36} > \frac{28}{36} > \frac{-12}{36} > \frac{-30}{36}$

$\therefore \frac{11}{12} > \frac{5}{6} > \frac{7}{9} > \frac{-1}{3} > \frac{5}{6}$ are in descending order.

Exercise-8.2

1. (a) $\frac{3}{2}$ and $\frac{5}{2}$

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

(b) $\frac{-7}{9}$ and $\frac{-3}{4}$

$\therefore \quad \frac{-7}{9}+\frac{-3}{4}=\frac{(-7)\times 4+(-3)\times 9}{36}$

$=\frac{-28-27}{36}$

$=\frac{-55}{36}$

(c) $\frac{7}{6}$ and $\frac{-1}{5}$

$\frac{7}{6}+\left(\frac{-1}{5}\right)=\frac{7}{6}-\frac{1}{5}$

$=\frac{7\times 5-5\times 6}{30}$

$=\frac{35-30}{30}=\frac{1}{6}$

(d) $\frac{-5}{11}$ and $\frac{3}{2}$

$\frac{-5}{11}+\frac{3}{2}=\frac{-5\times 2+3\times 11}{22}$

$=\frac{-10+33}{22}=\frac{23}{22}$

(e) $\frac{7}{-5}$ and $\frac{11}{5}$

$\therefore \quad \frac{7}{-5}+\frac{11}{4}=\frac{-7}{5}+\frac{11}{5}$

$=\frac{-7+11}{5}$

$=\frac{4}{5}$

(f) $\frac{3}{-4}$ and $\frac{18}{20}$

$\therefore \quad \frac{3}{-4}+\frac{18}{20}=\frac{-3}{4}+\frac{18}{20}$

$=\frac{-3\times 5+18\times 1}{20}$

$=\frac{-15+18}{20}=\frac{3}{20}$

2. (a) $\frac{-3}{4}+\frac{4}{5}=\frac{-3\times 5+4\times 4}{20}=\frac{-15+16}{20}=\frac{1}{20}$

(b) $\frac{-2}{15}+\frac{3}{4}=\frac{-2\times 4+3\times 15}{60}=\frac{-8+45}{60}=\frac{37}{60}$

(c) $\frac{-5}{6}+\frac{7}{15}=\frac{-5\times 5+7\times 2}{30}=\frac{-25+14}{30}=\frac{-11}{30}$

(d) $\frac{1}{3}+\frac{-5}{6}+\frac{1}{18}=\frac{6+(-5)\times 4+1}{18}=\frac{6-15+1}{18}=\frac{-8}{18}=\frac{-4}{9}$

(e) $\frac{-9}{21}+\frac{5}{-7}+\frac{2}{3}=\frac{-9\times1+5\times(-3)+2\times7}{21}$

$=\frac{-9-15+14}{21}=\frac{-10}{21}$

(f) $3\frac{1}{7}+\frac{-5}{14}+\frac{-5}{21}=\frac{22}{7}+\frac{(-5)}{14}+\frac{(-5)}{21}$

$=\frac{22\times6+(-5)\times3+(-5)\times2}{42}$

$=\frac{132-15-10}{42}=\frac{107}{42}$

3. (a) $\frac{-19}{9}-2=\frac{-19-18}{9}=\frac{-37}{9}$

(b) $2-\left(\frac{-18}{11}\right)=\frac{2}{1}+\frac{18}{11}=\frac{2\times11+18\times1}{11}=\frac{22+18}{11}=\frac{40}{11}$

(c) $\frac{2}{3}-\frac{3}{4}=\frac{2\times4-3\times3}{12}=\frac{8-9}{12}=\frac{-1}{12}$

(d) $\frac{11}{5}-\frac{7}{5}=\frac{11-7}{5}=\frac{4}{5}$

(e) $\frac{9}{10}-\left(\frac{-5}{8}\right)=\frac{9}{10}+\frac{5}{8}=\frac{9\times8+5\times10}{80}=\frac{122}{80}=\frac{61}{40}$

(f) $\frac{5}{63}-\left(\frac{-6}{21}\right)=\frac{5}{63}+\frac{6}{21}=\frac{5\times1+6\times3}{63}=\frac{23}{63}$

4. (a) $\frac{3}{10}\times\frac{-19}{2}\times\frac{10}{19}=\frac{-3}{2}$

(b) $\frac{9}{2}\times\frac{-7}{5}=\frac{-63}{10}$

(c) $\frac{6}{-5}\times\frac{9}{11}=\frac{-54}{55}$

(d) $\frac{3}{-5}\times\frac{-5}{3}\times\frac{1}{7}=\frac{1}{7}$

(e) $\frac{3}{7}\times\frac{-2}{5}\times\frac{5}{11}=\frac{-6}{77}$

(f) $\frac{16}{-5}\times\frac{3}{8}\times\frac{10}{3}=\frac{2\times10}{-5}=-4$

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

(b) $\frac{2}{3}\div\frac{5}{11}=\frac{2}{3}\times\frac{11}{5}=\frac{22}{15}$

(c) $\frac{-4}{5}\div12=\frac{-4}{5}\div\frac{12}{1}=\frac{4}{5}\times\frac{1}{12}=\frac{-1}{15}$

(d) $\frac{12}{-13} \div \frac{1}{26} = \frac{12}{-13} \times \frac{26}{1} = \frac{24}{-1} = -24$

(e) $\frac{3}{13} \div \frac{-4}{65} = \frac{3}{13} \times \frac{65}{-4} = \frac{15}{-4} = \frac{-15}{4}$

(f) $\frac{21}{-36} \div \frac{30}{44} = \frac{21}{-36} \times \frac{44}{30} = \frac{77}{-90} = \frac{-77}{90}$

6. (a) $\frac{2}{3} \times \frac{5}{7} \div \frac{4}{9} = \frac{2}{3} \times \frac{5}{7} \times \frac{9}{4} = \frac{15}{14}$

(b) $\frac{5}{4} - \frac{7}{6} + \frac{-2}{3} = \frac{5 \times 3 - 7 \times 2 + (-2) \times 4}{12} = \frac{-7}{12}$

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

(d) $2\frac{1}{5} \times \left(\frac{6}{7} + 1\frac{1}{7}\right) = \frac{11}{5}\left(\frac{6}{7} + \frac{8}{7}\right)$

$= \frac{11}{5}\left(\frac{6+8}{7}\right) = \frac{11}{5} \times \frac{14}{7} = \frac{22}{5}$

(e) $\left(\frac{2}{13} \div \frac{1}{7}\right) \times \frac{26}{14} = \frac{2}{13} \times \frac{7}{1} \times \frac{26}{14} = 2$

(f) $\frac{4}{5} + \frac{-13}{15} + \frac{-11}{45} = \frac{4 \times 9 + (-13) \times 3 + (-11) \times 1}{45}$

$= \frac{36 - 39 - 11}{45} = \frac{-14}{45}$

(g) $\left(\frac{8}{5} \times \frac{-3}{2}\right) + \left(\frac{3}{10} \times \frac{11}{8}\right) = \frac{-24}{10} + \frac{33}{80}$

$= \frac{-24 \times 8 + 33 \times 1}{80} = \frac{-159}{85}$

(h) $2\frac{3}{4} - \frac{5}{8} + \frac{-5}{12} + 1\frac{1}{6} = \frac{11}{4} - \frac{5}{8} + \frac{-5}{12} + \frac{7}{6}$

$= \frac{11 \times 6 - 5 \times 3 + (-5) \times 2 + 7 \times 4}{24}$

$= \frac{66 - 15 - 10 + 28}{24} = \frac{69}{24} = \frac{23}{8}$

Exercise-8.3

1. (a) $\frac{1}{12}$

Prime factors of denominater 12 are $2\times2\times3$ which are other than 2 and 5. So, $\frac{1}{12}$ is non terminating decimal.

(b), (d), (e) are terminating decimals.

(c), (f), (g), (h) are non-terminating decimals because its prime factors of denominator are factors other than 2 or 5.

2. (a) $\frac{2}{11}=0.18$ (b) $\frac{11}{8}=1.375$ (c) $\frac{16}{32}=0.5$

(d) $\frac{26}{25}=1.04$ (e) $\frac{49}{15}=3.26$ (f) $\frac{85}{12}=7.083$

(g) $\frac{26}{500}=0.052$ (h) $\frac{303}{125}=2.424$

3. (a) $3.125=\frac{3125}{1000}=\frac{25}{8}=3\frac{1}{8}$

(b) $5.005=\frac{5005}{1000}=\frac{1001}{200}=5\frac{1}{200}$

(c) $2.\overline{3}$

Let $x=2.\overline{3}=2.333$ ... (1)

Multiply it by 10 on both sides

$10x=23.333$ ... (2)

Subtract (1) from (2), we get

$$10x-x=23.\overline{3}-2.\overline{3}$$

$$9x=21.0$$

$$x=\frac{21}{9}=\frac{7}{3}$$

$$\therefore \quad 2.\overline{3}=\frac{7}{3}=2\frac{1}{3}$$

(d) $1.4\overline{7}$

Let $x = 1.4\overline{7}$ ...(1)

multiply it by 10 on both sides

$10x = 14.\overline{7}$ ...(2)

Again, multiply it by 10 on both sides

$$100x = 147.\overline{7}$$

Subtract (2) from (3), we get

$$100x - 10x = 147.\overline{7} - 14.\overline{7}$$

$$90x = 133$$

$$x = \frac{133}{90} = 1\frac{43}{90}$$

$\therefore \quad 1.4\overline{7} = 1\frac{43}{90}$

(e) $0.1\overline{3}$

Let $x = 0.1\overline{3}$ ...(1)

$10x = 1..\overline{3}$ ...(2)

$100x = 13.\overline{3}$ ...(3)

Subtract (2) from (3) we get,

$$100x - 10x = 13.\overline{3} - 1.\overline{3}$$

$$90x = 12$$

$$x = \frac{12}{90} = \frac{2}{15}$$

$\therefore \quad 0.1\overline{3} = \frac{2}{15}$

(f) $3.\overline{185}$

Let $x = 3.\overline{185} = 3.185185$ ...(1)

$1000x = 3185.\overline{185} = 3185.185185$ ...(2)

subtract (1) from (2) we get,

$$1000x - x = 1385.\overline{185} - 3.\overline{185}$$

$$999x = 3182$$

$$x = \frac{3182}{999} = 3\frac{185}{999}$$

$\therefore \qquad 3.\overline{185} = 3\frac{185}{999}$

(g) $0.8\overline{3}$

Let $x = 0.8\overline{3}$ ...(1)

$10x = 8.\overline{3}$ ...(2)

$100x = 83.\overline{3}$ ...(3)

Now, subtracting (2) from (3), we get

$$100 - 10x = 83.\overline{3} - 8.\overline{3}$$

$$90x = 75$$

$$x = \frac{75}{90} = \frac{5}{6}$$

$\therefore \qquad x = 0.8\overline{3} = \frac{5}{6}$

(h) $12.68 = \frac{1268}{100} = \frac{317}{25} = 12\frac{17}{25}$

4. Only (a) & (b) can be expressed as rational numbers.

5. (a) $3.\overline{5} + 4.\overline{7}$

Let $x = 3.\overline{5}$ ...(1)

$10x = 35.\overline{5}$ ...(2)

Subtracting (1) from (2), we get

$$10x - x = 35.\overline{5} - 3.\overline{5}$$

$$9x = 32$$

$$x = \frac{32}{9}$$

Again, let $y = 4.\overline{7}$ ...(3)

$10y = 47.\overline{7}$ ...(4)

Subtracting (3) from (4), we get

$$10y - y = 47.\overline{7} - 4.\overline{7}$$

$$9y = 43$$

Hence, $3.\overline{5} + 4.\overline{7} = \frac{32}{9} + \frac{43}{9} = \frac{32+43}{9}$

$$= \frac{75}{9} = \frac{25}{3} = 8\frac{1}{3}$$

(b) $0.\overline{2}+0.\overline{3}+0.\overline{4}$

Let $a = 0.\overline{2}$ ...(1)

$10a = 2.\overline{2}$ ...(2)

Subtracting, (1) from (2) , we get

$$10a - a = 2.\overline{2} - 0.\overline{2}$$

$$9a = 2$$

$$a = \frac{2}{9}$$

Similarly, let $b = 0.\overline{3}$

$\Rightarrow$ $b = \frac{3}{9}$

and $c = 0.\overline{4}$

$\Rightarrow$ $c = \frac{4}{9}$

Hence, $0.\overline{2}+0.\overline{3}+0.\overline{4} = a+b+c$

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

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

$$= 1$$

Exercise-8.4

1. Let 'a' should be added

then, $\left(\frac{1}{3}+\frac{1}{4}+\frac{1}{5}\right)+a = 4$

$\Rightarrow$ $a = 4-\left(\frac{1}{3}+\frac{1}{4}+\frac{1}{5}\right) = 4-\left(\frac{20+15+12}{60}\right)$

$$= 4-\frac{47}{60} = \frac{240-47}{60} = \frac{193}{60}$$

$$= 3\frac{13}{60}$$

2. Let 'a' should be added

Then, $\frac{-5}{8} + a = \frac{5}{9}$

$$a = \frac{5}{9} + \frac{5}{8} = \frac{5\times 8 + 5\times 9}{72} = \frac{85}{72}$$

$$a = 1\frac{13}{72}$$

3. Weight of one packet of chocolates $= \frac{9}{4}$kg

" " other " " $= \frac{10}{7}$ kg

Total weight of chocolates $= \frac{9}{4} + \frac{10}{7} = \frac{9\times 7 + 4\times 10}{28}$

$$= \frac{103}{28} = 3\frac{19}{28} \text{ kg}$$

4. 35 shirts required cloth $= \frac{49}{2}$ m

1 shirt " " $= \left(\frac{49}{2} \div 35\right)$ m

$$= \left(\frac{49}{2} \times \frac{1}{35}\right) \text{m} = \frac{7}{10} \text{ m}$$

5. Sum $= \frac{12}{5} + \frac{13}{7} = \frac{12\times 7 + 13\times 5}{35} = \frac{149}{35}$

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

$\therefore$ Required division $= \frac{149}{35} \div \frac{2}{7}$

$$= \frac{149}{35} \times \frac{7}{2} = \frac{149}{10} = 14\frac{9}{10}$$

6. Meenu spent pocket money $= \frac{3}{4}$

Money spent on books $= \frac{1}{2}$

" " " movie $= \frac{1}{6}$

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

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

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

$= \frac{3 \times 3 - 4 \times 2}{12} = \frac{1}{12}$

7. Amount paid by Jatin $= \frac{1}{3}$

" " Ankit $= \frac{1}{4}$

Rest part paid by Sunil $= 1 - \left(\frac{1}{3} + \frac{1}{4}\right)$

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

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

$\therefore \frac{5}{12}$ part of the bill paid by Sunil

MCQs : 1. (b) 2. (c) 3. (a) 4. (a) 5. (a)
6. (b) 7. (b) 8. (c) 9. (d) 10. (b)

Mental Maths :

Fill in the blanks :

a. $x \div \frac{2}{3} = \frac{2}{7}$

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

$x = \frac{-4}{21}$

b. $\frac{7}{8} \div x = -1$

$\frac{7}{8} \times \frac{1}{x} = -1$

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

c. $x \div \frac{-19}{30} = 0$

$x \times \frac{30}{-19} = 0$

$x = 0$

d. $18 \div x = \frac{-6}{7}$

$-18 \times \frac{1}{x} = \frac{-6}{7}$

$x = 21$

Chapter 9

Mensuration

Exercise 9.1

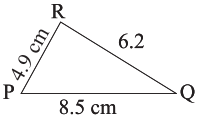
1. (a) $PQ = 8.5$ cm, $QR = 6.2$ cm, $PR = 4.9$ cm

Perimeter = Sum of the lengths of all the three sides

$= PQ + QR + PR$

$= 8.5 + 6.2 + 4.9$

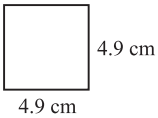
$= 19.6$ cm



(b) Side of square = 7.9 cm

Perimeter of a square = $4 \times$ side

$= 4 \times 7.9 = 31.6$ cm



(c) $l = 46\frac{1}{2}$ m, $b = 23\frac{1}{2}$ m

Perimeter of a rectangular park

$= 2(l + b)$

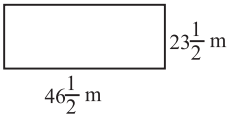
$= 2\left(46\frac{1}{2} + 23\frac{1}{2}\right)$ m

$= 2\left(46 + \frac{1}{2} + 23 + \frac{1}{2}\right)$

$= 2\left(69 + \frac{1}{2} + \frac{1}{2}\right)$

$= 2(69 + 1) = 2(70)$

$= 140$ m



(d) $b = 49.9$ m, $l = 51.1$ m

Perimeter of rectangular field $= 2(l + b)$

$= 2(51.1 + 49.9)$ m

$= 2 \times 101 = 202$ m

2. (a) $AB = 2.5$ cm, $BC = 8.5$ cm, $CA = 7.9$ cm

Perimeter $= AB + BC + CA$

$= 2.5$ cm $+ 8.5$ cm $+ 7.9$ cm $= 18.9$ cm

(b) Side of square $= 7\frac{1}{7}$ m

Perimeter $= 4 \times$ side

$$= 4 \times 7\frac{1}{7} = 4 \times \frac{50}{7} = \frac{200}{7} = 28\frac{4}{7} \text{ m}$$

(c) $l = 40\frac{2}{3}$ m $= \frac{122}{3}$ m, $b = 19\frac{1}{2}$ m $= \frac{39}{2}$ m

Perimeter $= 2(l + b)$

$$= 2\left(\frac{122}{3} + \frac{39}{2}\right) \text{ m}$$

$$= 2\left(\frac{2 \times 122 + 3 \times 39}{6}\right)$$

$$= 2\left(\frac{244 + 117}{6}\right)$$

$$= 2 \times \frac{361}{6}$$

$$= \frac{361}{3} = 120\frac{1}{3}$$

(d) Perimeter of the given figure

$= 4 + 2 + 3 + 2 + 3 + 2 + 1 + 1$

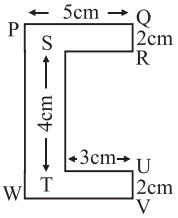
$= 18$ m

(e) Perimetr of the given figure

$= PQ + QR + RS + ST + TU + UV + VW + WP$

$= (5 + 2 + 3 + 4 + 3 + 2 + 5 + 8)$ cm

$= 32$ cm



3. Given : $b = 48$ m,

Perimeter of wire = 3 km 72 m, $l = ?$

We know that, $P = 2 \times (l + b)$

$$3.72 \text{ km} = 2(l + 48)$$
$$3072 \text{ m} = 2l + 96$$
$$3072 - 96 = 2l$$
$$2976 = 2l$$
$$\Rightarrow \quad \frac{2976}{2} = l$$
$$\Rightarrow \quad 1488 \text{ m} = l$$
$$\Rightarrow \quad l = 1.488 \text{ km or } 1488 \text{ m}$$

4. Given : Perimeter of square = 120 m

Let length of rectangle = $3x$

breadth of square = $2x$

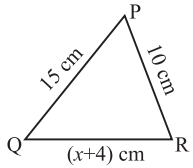
Perimeter of square = 2 × Perimeter of rectangle

$$120 = 2 \times [2 \times (l + b)]$$
$$120 = 4(3x + 2x)$$
$$120 = 4 \times 5x$$
$$120 = 20x$$
$$x = \frac{120}{20} = 6$$

$\therefore$ Breadth of the rectangle $= 2x = 2 \times 6 = 12$ m

5. Perimeter of triangle $= PQ + QR + PR$

$$50 = 15 + (x + 4) + 10$$
$$\Rightarrow \quad 50 = 29 + x$$
$$\Rightarrow \quad 50 - 29 = x$$
$$\Rightarrow \quad x = 21 \text{ cm}$$



Exercise 9.2

1. (a) $r = 10.5$ cm

Circumference $= 2\pi r$

$= 2 \times \frac{22}{7} \times 10.5 = 66$ cm

(b) $r = 4.55$ cm

Circumference $= 2\pi r$

$= 2 \times \frac{22}{7} \times 4.55 = 28.6$ cm

(c) $r = 4.2$ cm

Circumference $= 2\pi r$

$= 2 \times \frac{22}{7} \times 4.2 = 26.4$ cm

(d) $r = 7$ cm

Circumference $= 2\pi r$

$= 2 \times \frac{22}{7} \times 7 = 44$ cm

2. (a) $d = 14$ cm

Circumference $= \pi d$

$= \frac{22}{7} \times 14 = 44$ cm

(b) $d = 28$ cm

Circumference $= \pi d$

$= \frac{22}{7} \times 28 = 88$ cm

(c) $d = 10$ cm

Circumference $= \pi d$

$= \frac{22}{7} \times 10 = \frac{220}{7}$

$= 31\frac{3}{7}$ cm

(d) $d = 7$ cm

Circumference $= \pi d$

$= \frac{22}{7} \times 7 = 22$ cm

3. (a) $C = 44$ cm

by $C = 2\pi r$

$44 = 2 \times \frac{22}{7} \times r$

$\frac{44 \times 7}{44} = r$

$7 = r$

$\therefore \quad r = 7$ m

(b) $C = 22$ m

by $C = 2\pi r$

$22 = 2 \times \frac{22}{7} \times r$

$\frac{22 \times 7}{22 \times 2} = r$

$\frac{7}{2} = r$

$\therefore \quad r = \frac{7}{2} = 3.5$ cm

(c) $C = 66$ m

by $C = 2\pi r$

$66 = 2 \times \frac{22}{7} \times r$

$\frac{66 \times 7}{2 \times 22} = r$

(d) $C = 30.8$ cm

by $C = 2\pi r$

$30.8 = 2 \times \frac{22}{7} \times r$

$\frac{30.8 \times 7}{2 \times 22} = r$

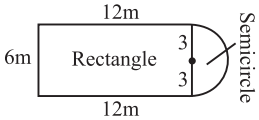
$$\frac{21}{2} = r \Rightarrow r = \frac{21}{2} \qquad 4.9 = r \Rightarrow r = 4.9 \text{ cm}$$

$$\Rightarrow r = 10\frac{1}{2} \text{ m}$$

4. (a) Perimeter of the given figure $= (2l + b) + (\pi d)$

$$= (2 \times 12 + 6) + \left(\frac{22}{7} \times 3\right)$$

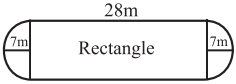
$$= 30 + \frac{66}{7} = \frac{276}{7} = 39\frac{3}{7} \text{ m}$$



(b) Perimeter of the given figure
= Perimeter of rectangle + Perimeter of 2 semi-circle.

$$= (\pi r + \pi r) + (2l + 2b - 2b) = 2\pi r + 2l$$

$$= 2 \times \frac{22}{7} \times 7 + 2 \times 28 = 44 + 56 = 100 \text{ m}$$

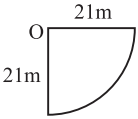


(c) Perimeter $= \left(\frac{2\pi r}{4}\right) + r + r$

$$= \frac{\pi r}{2} + 2r$$

$$= \frac{22}{7} \times \frac{21}{2} + 2 \times 21$$

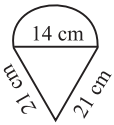
$$= 33 + 42 = 75 \text{ m}$$



(d) Perimeter $= \pi r + 2l$

$$= \frac{22}{7} \times 7 + 2 \times 21 \qquad \left[\because r = \frac{d}{2} = \frac{14}{2} = 7\right]$$

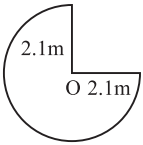
$$= 22 + 42 = 64 \text{ cm}$$



(e) Perimeter $= \frac{3}{4}(2\pi r) + 2r$

$$= \frac{3}{4}\left(2 \times \frac{22}{7} \times 2.1\right) + 2 \times 2.1$$

$$= 3 \times 11 \times 0.3 + 4.2 = 14.1 \text{ m}$$



5. Given: $C_1 : C_2 = 5 : 3$, $r_1 : r_2 = ?$

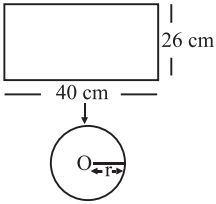
We know that $C = 2\pi r$

$\therefore \qquad C_1 : C_2 = 2\pi r_1 : 2\pi r_2$

$\Rightarrow \quad 5:3 = 2\pi r_1 : 2\pi r_2$

$\Rightarrow \quad \frac{5}{3} = \frac{2\pi r_1}{2\pi r_2} \Rightarrow \frac{r_1}{r_2} = \frac{5}{3} \Rightarrow r_1 : r_2 = 5:3$

6. Perimeter of the wire $= 2(l + b)$



$= 2(40 + 26)$ cm

$= 2 \times 66$ cm $= 132$ cm

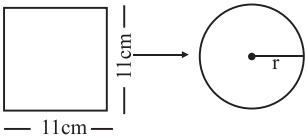
Circumference of circle = Perimeter of wire

$\Rightarrow \quad 2\pi r = 132$

$\Rightarrow 2 \times \frac{22}{7} \times r = 132 \Rightarrow r = \frac{132 \times 7}{2 \times 22} = 21$

$\therefore \; r = 21$ cm

7. Perimeter of wire $= 4 \times$ Side



$= 4 \times 11 = 44$ cm

Circumference of circular ring

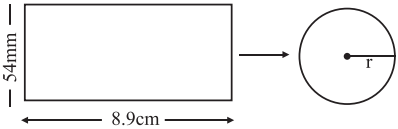
= Perimeter of wire

$\Rightarrow \quad 2\pi r = 44$ cm

$\Rightarrow \pi d = 44 \Rightarrow d = \frac{44}{\pi} = \frac{44 \times 7}{22} = 14$

$\therefore \; d = 14$ cm

8. Perimeter of wire



$= 2(l + b)$

$= 2(8.9$ cm $+ 54$ mm$)$

$= 2(89$ mm $+ 54$ mm$)$

$= 2 \times (143)$ mm

$= 286$ mm

Circumference of circle = Perimeter of wire

$\Rightarrow \quad 2\pi r = 286$

$\Rightarrow \quad 2 \times \frac{22}{7} \times r = 286$

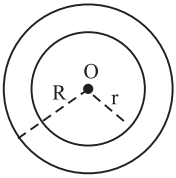
$\Rightarrow \quad r = \frac{286 \times 7}{2 \times 22} = \frac{143 \times 7}{22} = \frac{1001}{22}$

$\Rightarrow \quad r = 45.5$ mm

9. Circumference of outer circle $= 132$ cm

$\Rightarrow \quad 2\pi R = 132$ cm

$\Rightarrow 2 \times \frac{22}{7} \times R = 132$ cm



$\Rightarrow \quad R = \frac{132 \times 7}{2 \times 22} = 21$ cm

Circumference of inner circle = 88 cm

$\Rightarrow \quad 2\pi r = 88$

$\Rightarrow \quad 2 \times \frac{22}{7} \times r = 88$

$\Rightarrow \quad r = \frac{88 \times 7}{2 \times 22} = 14$ cm

$\therefore$ The required difference between the radii

$= (R - r)$

$= (21 - 14)$ cm $= 7$ cm

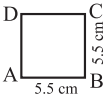
Exercise 9.3

1. (a) $AB = 5.5$ cm

Area of square = $(\text{Side})^2$

$= (5.5)^2$

$= 30.25 \text{ cm}^2$

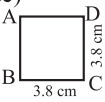


(b) $BC = 3.8$ cm

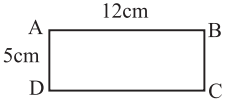
Area of square = $(\text{side})^2$

$= (3.8)^2$

$= 14.44 \text{ cm}^2$



2. (a) $AB = 12$ cm, $AD = 5$ cm

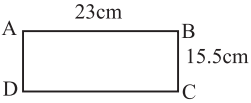


Area of rectangle $ABCD$

= length × breadth

$= 12 \times 5 = 60 \text{ cm}^2$

(b) $BC = 15.5$ cm, $AB = 23$ cm



Area of rectangle $ABCD$

= length × breadth

$= 23 \times 15 = 345 \text{ cm}^2$

3. Area of a squares field = $(\text{side})^2$

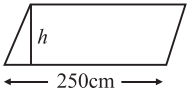
$= (20.9)^2 = 436.81 \text{ m}^2$

$\because$ Cost of 1 m^2 area levelling = ₹ 9

$\therefore$ Cost of 436.81 m^2 area levelling = ₹ (436.81×9)

= ₹ 3931.29

4. Area of parallelogram = 2.25 m^2



Area of parallelogram = base × altitude

$$2.25 = 250 \times h$$

$$h = \frac{2.25}{2.5} = \frac{2.25}{2.50} = \frac{225}{250} \qquad [\because 1 \text{ m} = 100 \text{ cm}]$$

$$= 0.9 \text{ m.}$$

5. Let original length of the side of the square be x unit.

Then Area of the square = $(\text{side})^2$

$$= (x)^2 = x^2 \text{ unit}^2$$

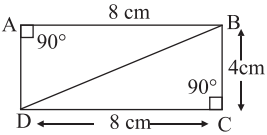
Now, side becomes $= \frac{2}{5}(x) = \frac{2x}{5}$

Now, Area of the square = $(\text{New side})^2$

$$= \left(\frac{2}{5}x\right)^2 = \frac{4}{25}x^2 \text{ unit}^2$$

$$= \frac{4}{25} \text{ times of its original area.}$$

6. Area of $\Delta\, ABD = \frac{1}{2} \times \text{base} \times \text{height}$



$$= \frac{1}{2} \times 8 \times 4 = 16 \text{ cm}^2$$

Area of $\Delta\, CDB = \frac{1}{2} \times \text{base} \times \text{height}$

$$= \frac{1}{2} \times 8 \times 4 = 16 \text{ cm}^2$$

7. Area of rectangular field = Area of the square

$$l \times b = (\text{side})^2$$

$$9.0 \times b = (5.4)^2$$

$$b = \frac{5.4 \times 5.4}{9} = 3.24$$

$\therefore$ The breadth of the rectangle is 3.24.

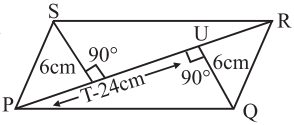
8. Area of $\Delta = 50 \text{ cm}^2$, Altitude = 8 cm

lengtth of base = ?

Area of $\Delta = \frac{1}{2} \times$ base $\times$ altitude (height)

$50 = \frac{1}{2} \times b \times 8 \Rightarrow b = \frac{50 \times 2}{8} = 12.5$ cm

9. Given : $PR = 24$ cm, $QU = ST = 6$ cm



Area of parallelogram $PQRS$

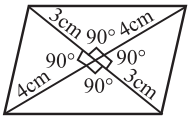
= Area of ΔPRS + Area of ΔPRQ

$= \frac{1}{2} \times b \times h + \frac{1}{2} \times b \times h = 2\left(\frac{1}{2} \times b \times h\right) = b \times h$

$= 24 \times 6 = 144 \text{ cm}^2$

10. Given : $d_1 = 8$ cm,

$d_2 = 6$ cm



Area of rhombus

$= 4 \times$ (Area of one right angled Δ)

$= 4 \times \left(\frac{1}{2} \times 4 \times 3\right) = 24 \text{ cm}^2$

Second Method : by the following formula :

Area of rhombus $= \frac{1}{2} \times d_1 \times d_2 = \frac{1}{2} \times 8 \times 6 = 24 \text{ cm}^2$

11. Area of the surface $= l \times b$

$= 4 \text{ m} \times 2.5 \text{ m} = 10 \text{ m}^2$

Area of 1 tile $= l \times b$

$= 10 \text{ cm} \times 10 \text{ cm} = \frac{1}{10} \text{ m} \times \frac{1}{10} \text{ m}$

$= \frac{1}{100} \text{ m}^2$

$\therefore$ Number of tiles $= \frac{\text{Area of the surface}}{\text{Area of 1 tile}} = \frac{10 m^2}{\left(\frac{1}{100}\right) m^2}$

$= 10 \times 100 = 1000$

12. Let length and breadth of a rectangle be l and b respectively.

Area of a rectangle = Length $\times$ Breadth= $l \times b$ … (1)

When length and breadth are increased, then

$L = l + 30,\ B = b + 30$

$\therefore$ Area of new rectangle = Length × Breadth

$= (l + 30)(b + 40)$

$= lb + 40l + 30b + 1200 \quad \ldots (2)$

$\therefore$ Amount of Area increased $= (lb + 40l + 30b + 1200) - lb$

$= 40l + 30b + 1200$

13. Given : $b : h = 4 : 5$, Area of $\Delta = 90$ sq m.

Let base $(b) = 4x$, height $(h) = 5x$

Now, by formula, we have

Area of $\Delta = \frac{1}{2} \times$ base × height

$\Rightarrow 90 = \frac{1}{2} \times 4x \times 5x \Rightarrow 90 = 10x^2 \Rightarrow 9 = x^2$

$\Rightarrow x = \sqrt{9} = 3$

$\therefore$ Base $(b) = 4x = 4 \times 3 = 12$ m, Height $(h) = 5x = 5 \times 3 = 15$ m

Exercise 9.4

1. Length of garden = 90 m

Breadth of garden = 75 m

$\therefore$ Area of the garden

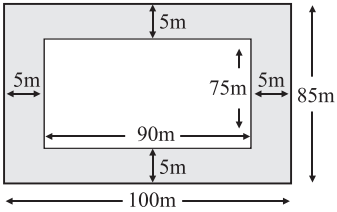
$= 90 \times 75 = 6750\ \text{m}^2$

Length of outer garden

$= 90 + 5 + 5 = 100$ m

Breadth of outer garden

$= 75 + 5 + 5 = 85$ m



$\therefore$ Area of the outer garden $= 100 \times 85 = 8500\ \text{m}^2$

$\therefore$ Area of the path = Area of the outer garden – Area of the garden

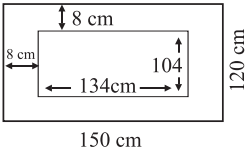
$= 8500 - 6750 = 1750$ sq.m.

2. Length of outer painting = 150 cm

Breadth of outer painting = 120 cm

Area of painting with margin

$= l \times b = 150 \times 120 = 18000\ \text{cm}^2$



Length of painting without margin $= 150 - 8 - 8 = 134$ cm

Breadth of painting without margin $= 120 - 8 - 8 = 104$ cm

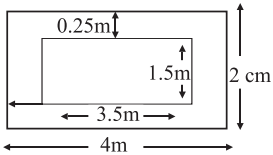
$\therefore$ Area of actual painting $= l \times b = 134 \times 104 = 13936 \text{ cm}^2$

3. Length of table $= (4 - 0.25 - 0.25)$ m

$= 3.5$ m

Breadth of table

$= (2 - 0.25 - 0.25) = 1.5$ m



Area of Table top $= l \times b = 3.5 \times 1.5 = 5.25 \text{ m}^2$

$\because$ The cost of polishing 1 m^2 area = ₹ 25

$\therefore$ The cost of polishing 5.25 m^2 area = ₹ (25×5.25)

= ₹ 131.25

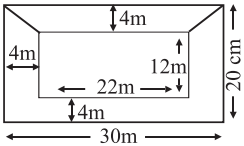
4. Length of the carpet = 30 m

Breadth of the carpet = 20 m

Area of the carpet $= l \times b$

$= 30 \times 20$

$= 600 \text{ m}^2$



After cutting off 4 m wide strip from all around

Length of the remaining carpet $= (30 - 4 - 4)$ m $= 22$ m

Breadth of the remaining carpet $= (20 - 4 - 4)$ m $= 12$ m

$\therefore$ Area of the remaining carpet $= l \times b$

$= 22 \times 12 = 264 \text{ m}^2$

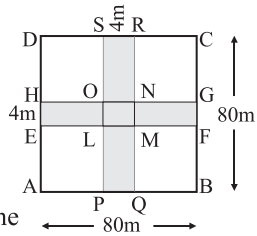
Area of strip cut-out $= 600 - 264 = 336 \text{ m}^2$

5. Area of the path along the length i.e., the area of rectangle $EFGH = l \times b$

$= 80 \times 4 = 320 \text{ m}^2$

Area of the path along the breadth i.e., the area of rectangle $PQRS = l \times b$

$= 80 \times 4 = 320 \text{ }^2\text{m}$



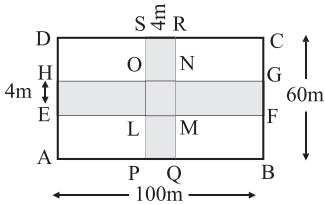
Area of the central square i.e., Area of the square $LMNO = (\text{Side})^2 = 4 \times 4 = 16 \text{ m}^2$

$\therefore$ Area of the paths $= (320 \text{ m}^2 + 320 \text{ m}^2) - 16 \text{ m}^2$

$= 640 \text{ m}^2 - 16 \text{ m}^2 = 624 \text{ m}^2$

Hence, the area of the path is 624 m^2.

6. (a) Area of rectangle $EFGH = 100\text{ m} \times 4\text{m} = 400\text{ m}^2$



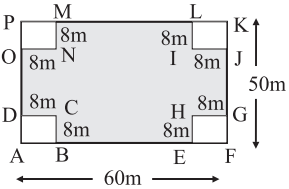
Area of rectangle $PQRS = 60 \times 4 = 240\text{ m}^2$

Area of the central square $LMNO = 4 \times 4 = 16\text{ m}^2$

$\therefore$ Area of the paths $= (400\text{ m}^2 + 240\text{ m}^2) - 16\text{ m}^2$

$= (640 - 16)\text{ m}^2 = 624\text{ m}^2$

(b) Area of rectangle $AFKP = l \times b$



$= 60 \times 50 = 3000\text{ m}^2$

Area of 1 square (i.e., square $ABCD$) = $(\text{side})^2 = 8 \times 8 = 64$ m

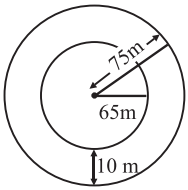
2

Area of 4 squares $= 4 \times 64 = 256\text{ m}^2$

Now, Area of shaded region $= 3000\text{ m}^2 - 256\text{ m}^2$

$= 2744\text{ m}^2$

7. Let inner radius $(r) = 65$ m



Outer radius $(R) = (65 + 10)$ m

$= 75$ m

Area of inner circle $= \pi r^2$

$= \pi(65)^2\text{ m}^2$

Area of outer circle $= \pi R^2 = \pi(75)^2\text{m}^2$

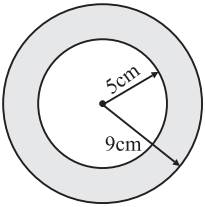
$\therefore$ Area of the flower garden i.e., shaded region

$= \pi(R^2 - r^2)$

$= \pi(75^2 - 65^2) = \dfrac{22}{7} \times (75 + 65)(75 - 65)$

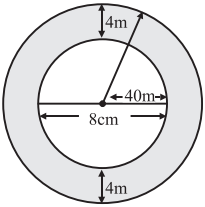
$$= \frac{22}{7} \times 140 \times 10 = 220 \times 20 = 4400 \text{ m}^2$$

8. Area of the shaded region



$$= \pi(R^2 - r^2)$$
$$= \pi(9^2 - 5^2)$$
$$= \frac{22}{7} \times (9+5)(9-5)$$
$$= \frac{22}{7} \times 14 \times 4 = 176 \text{ cm}^2$$

9. Here, $r = \frac{D}{2} = \frac{80}{2} = 40$ m



$R = (r+4) = 40$ m + 4 m = 44 mm

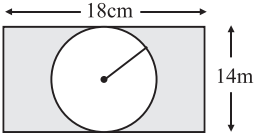
Area of circular road $= \pi(R^2 - r^2)$

$$= \pi(44^2 - 40^2)$$
$$= \frac{22}{7}(44+40)(44-40)$$
$$= \frac{22}{7} \times 84 \times 4 = 22 \times 12 \times 4 = 1056 \text{ m}^2$$

$\because$ Cost of constructing the road 1 m^2 = ₹ 10

$\therefore$ Cost of constructing the road 1056 m^2 = ₹ 1056×10 = ₹ 10560

10. $l = 18$ cm, $b = 14$ cm



Area of the rectangle $= l \times b$

$$= 18 \times 14 = 252 \text{ cm}^2$$

radius of circle(r) $= \frac{\text{diameter}}{2} = \frac{14}{2} = 7$ cm

Area of the circle $= \pi r^2$

$$= \frac{22}{7} \times (7)^2 = \frac{22}{7} \times 7 \times 7 = 154 \text{ cm}^2$$

$\therefore$ Area of the shaded portion $= 252 \text{ cm}^2 - 154 \text{ cm}^2$

$$= 98 \text{ cm}^2$$

MCQs 1. (d) 2. (c) 3. (c) 4. (a) 5. (c)

Chapter

10 Algebraic Expressions

Exercise 10.1

1. Add :

(a) $3x^2 + (-7x^2) + 5x^2$

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

$= 8x^2 - 7x^2 = x^2$

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

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

$= \left(-2 + \frac{4}{3} - \frac{1}{6} + \frac{1}{3}\right)x^2y^2 = \left(\frac{-12+8-1+2}{6}\right)x^2y^2$

$= \frac{10-13}{6}x^2y^2 = -\frac{1}{2}x^2y^2$

(c) $2x^2 - 2y^2 + 3y^2 - 7x^2 + 5x^2 - y^2$

$= (2-7+5)x^2 + (3-2-1)y^2$

$= (7-7)x^2 + (3-3)y^2$

$= 0 + 0 = 0$

(d) $\frac{3}{2}x^2y - \frac{1}{2}xy + 3x^2y + 2xy - \frac{1}{2}x^2y + \frac{3}{2}xy$

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

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

$= \frac{8}{2}x^2y + \frac{6}{2}xy = 4x^2y + 3xy$

(e) $2x^2 + (-3y^2 + 4z^2) + (2y^2 - 3x^2 + 4z^2) + (2y^2 - 3x^2 + 4z^2)$

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

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

$= (2-6)x^2 + (4-3)y^2 + 12z^2$

$= -4x^2 + y^2 + 12z^2$

(f) $\left(3x^2+\frac{2}{3}x+1\right)+\left(-5x^2-\frac{1}{4}x+\frac{2}{5}\right)+\left(2x^2\ \frac{5}{12}x-\frac{7}{5}\right)$

$=(3-5+2)x^2+\left(\frac{2}{3}-\frac{1}{4}-\frac{5}{12}\right)x+\left(1+\frac{2}{5}-\frac{7}{5}\right)$

$=0.x^2+\left(\frac{8-3-5}{12}\right)x+\left(\frac{5+2-7}{5}\right)$

$=0.x^2+0.x+0=0$

2. Subtract :

(a) $3x^2-(-7x^2)=3x^2+7x^2=10x^2$

(b) $(-2x^2y^2)-\frac{1}{6}x^2y^2 \ =-2x^2y^2-\frac{1}{6}x^2y^2$

$=\frac{-12x^2y^2-x^2y^2}{6}=\frac{-13}{6}x^2y^2$

(c) $a+b-(-a-b)=a+b+a+b$

$=2a+2b=2(a+b)$

(d) $-a^2+2a-\frac{1}{2}\left(a^2-2a+\frac{1}{2}\right)$

$=-a^2+2a-\frac{1}{2}-a^2+2a-\frac{1}{2}$

$=-2a^2+4a-1$

(e) $(2z^2-3x^2+4y^2)-(2x^2+3y^2-4z^2)$

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

$=-5x^2+y^2+6z^2$

(f) $1-(3+2x+3y-z) \ =1-3-2x-3y+z$

$=-2x-3y+z-2$

3. Subtract :

(a) $[(3+4z+3y-x)+(3x+2y-3z+2)]-(3x+4y-2z)$

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

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

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

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

$=-x+y+3z+5$

(b) $[(5x^2-2x)+(3x^2-x+3)]-[(3x^2+2x-1)+(-2x^2+3x-5)]$

$=[5x^2-2x+3x^2-x+3]-[3x^2+2x-1-2x^2+3x-5]$

$=[8x^2-3x+3]-[x^2+5x-6]$

$= 8x^2 - 3x + 3 - x^2 - 5x + 6$
$= 7x^2 - 8x + 9$

4. Simplify :

(a) $(a^2 - b^2) - (2a^2 - 2b^2) = a^2 - b^2 - 2a^2 + 2b^2$
$= -a^2 + b^2 = b^2 - a^2$

(b) $(2a^2 - 2b^2) - (a^2 - b^2) = 2a^2 - 2b^2 - a^2 + b^2$
$= a^2 - b^2$

(c) $(x + y) - \frac{1}{2}(2 + x - 2y) = \left(x + y - \frac{1}{2} \times 2 - \frac{1}{2}x + \frac{1}{2}2y\right)$
$= \left(x - \frac{1}{2}x\right) + \left(y + \frac{1}{2}2y\right) - 1$
$= \left(\frac{2x - x}{2}\right) + (y + y) - 1$
$= \frac{1}{2}x + 2y - 1$

(d) $[5z - (x + 2y)] - [3x - (y - 2z)]$
$= [5z - x - 2y] - [3x - y + 2z]$
$= (5z - x - 2y - 3x + y - 2z) = -4x - y + 3z$

(e) $\left(\frac{1}{2}x^2 + \frac{1}{2}y^2 + \frac{1}{2}z^2\right) - \left(\frac{1}{2} + \frac{3}{2}x^2 + \frac{5}{2}y^2 + \frac{7}{2}z^2\right)$
$= \frac{1}{2}x^2 + \frac{1}{2}y^2 + \frac{1}{2}z^2 - \frac{1}{2} - \frac{3}{2}x^2 - \frac{5}{2}y^2 - \frac{7}{2}z^2$
$= \left(\frac{1}{2} - \frac{3}{2}\right)x^2 + \left(\frac{1}{2} - \frac{5}{2}\right)y^2 + \left(\frac{1}{2} - \frac{7}{2}\right)z^2 - \frac{1}{2}$
$= \frac{(1-3)}{2}x^2 + \left(\frac{1-5}{2}\right)y^2 + \left(\frac{1-7}{2}\right)z^2 - \frac{1}{2}$
$= -x^2 - 2y^2 - 3z^2 - \frac{1}{2}$

Exercise 10.2

1. Find the following products :

(a) $2a^2 \times (-3ab)$
$= 2 \times (-3) \times a^2 \times ab = -6a^3b$

(b) $\frac{6}{5}ab \times 2b^2 \times 0 = \frac{6 \times 2}{5}ab \times b^2 \times 0 = \frac{12}{5} \times 0 \times ab^3 = 0$

(c) $6x \times (-2xy) = 6 \times (-2) \times x \times xy = -12x^2 y$

(d) $-3xy \times (-4xy) = (-3) \times (-4) \times y \times xy$

$= 12x^2 y^2$

2. Find the following products :

(a) $\left(\frac{5}{6}x^5\right)\left(\frac{-3}{10}y^4\right)\left(\frac{9}{5}xy\right) = \left(\frac{5}{6} \times \frac{-3}{10} \times \frac{9}{5}\right) x^5 \times y^4 \times xy$

$= \frac{-9}{2 \times 10} x^6 y^5 = \frac{-9}{20} x^6 y^5$

(b) $(-2x^6 y)\left(\frac{6}{22}xy^4\right)\left(\frac{11}{12}x^3 y^3\right)$

$= \left(-2 \times \frac{6}{22} \times \frac{11}{12}\right) \times x^6 y \times xy^4 \times x^3 y^3 = -\frac{1}{2}x^{10} y^8$

(c) $\left(-\frac{1}{3}x^2\right)\left(\frac{-2}{3}y\right)\left(\frac{-4}{5}xyz\right)$

$= \left(-\frac{1}{3} \times \frac{-2}{3} \times \frac{-4}{5}\right) \times x^2 \times y \times xyz = \frac{-8}{45}x^3 y^2 z$

3. Simplify, and verify the result for the given values :

(a) $(-3x^2)(4xy^3)\left(\frac{-2}{3}x^3\right)$ for $x = \frac{3}{4}$ and $y = 3$

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

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

$= 4 \times 2x^{2+1+3} y^3 = 8x^6 y^3$

$= 8 \times \left(\frac{3}{4}\right)^6 \times 3^3 = 8 \times \frac{3^{6+3}}{4} = \frac{4 \times 2 \times 3^9}{46}$

$= \frac{2 \times 3^9}{4^5} = \frac{39366}{1024} = \frac{19683}{512}$

(b) $\left(\frac{-8}{6}p^3\right)(2q^4)\left(\frac{-8}{3}pq\right)$ for $p = \frac{3}{8}$ and $q = 3$

$= \left(\frac{-8}{6}\right) \times 2 \times \left(\frac{-8}{3}\right) \times p^3 \times q^4 \times pq$

$$= \frac{128}{18} \times p^{3+1} q^{4+1} = \frac{128}{18} \times p^4 q^5$$

$$= \frac{64}{9} \times \left(\frac{3}{8}\right)^4 \times (3)^5$$

$$= \frac{64}{9} \times \frac{3\times3\times3\times3}{8\times8\times8\times8} \times \frac{3\times3\times3\times3\times3}{1}$$

$$= \frac{9}{64} \times 9\times9\times3 = \frac{2187}{64}$$

4. Find the following products :

(a) $3a(a-3) \quad = 3a\times a - 3a\times 3 = 3a^2 - 9a$

(b) $-3x^2(2x+7) = -3x^2\times 2x + 7\times(-3x^2) = -6x^3 - 21x^2$

(c) $10y(0.02x^2 - 0.02y) = 10y\times 0.02x^2 - 10y\times 0.02y$

$= 0.2x^2y - 0.2y^2 = 0.2(x^2y - y^2)$

(d) $3a^3(6a+7) = 3a^3\times 6a + 3a^3\times 7 = 18a^4 + 21a^3$

(e) $\frac{3}{4}a(a^3+b^3) = \frac{3}{4}a\times a^3 + \frac{3}{4}a\times b^3$

$= \frac{3}{4}a^4 + \frac{3}{4}ab^3 = \frac{3a^4}{4} + \frac{3ab^3}{4}$

(f) $0.2s(0.02s + 0.002r) = 0.2s\times 0.02s + 0.2s\times 0.002r$

$= 0.04s^2 + 0.0004sr$

(g) $3a^2(2a^2-4) = 3a^2\times 2a^2 - 3a^2\times 4 = 6a^4 - 12a^2$

(h) $2x^3(2x^2 - 4y^2) = 2x^3\times 2x^2 - 4y^2 + 2x^3$

$= 4x^5 - 8x^3y^2$

(i) $\frac{-2}{3}\times x\left(\frac{3}{4}x + \frac{3}{8}y\right) = \frac{-2}{3}\times\frac{3}{4}x^2 + \left(\frac{-2}{3}\right)\times\left(\frac{3}{8}\right)yx$

$= -\frac{1}{2}x^2 - \frac{1}{4}yx$

5. Prove that commutative property hold good for the following prodcts. Verify the same for the given values of the litr(e)

(a) $3p^6\times(-4q^2)$; $p=-1, q=-2$

$= 3\times(-4)\times p^6\times q^2$

$= -12\times p^6q^2$

$= -12\times(-1)^6\times(-2)^2$

$= -12\times 1\times 4$

$= -48$

(b) $\frac{-3}{8} pq^2 \times \frac{4}{9} p^2qr,\ p = 1, q = -1, r = 2$

$= \left(\frac{-3}{8} \times \frac{4}{9}\right) pq^2 \times p^2qr = -\frac{1}{6} p^3q^3r$

$= -\frac{1}{6} \times (1)^3 \times (-1)^3 \times (2) = \frac{1 \times 2}{6} = \frac{1}{3}$

6. Multiply and find the value of each product for a $a = 2, b = 0.5$, $c = 0.1$.

(a) $32a^2(1-2a) = 32 \times 2^2(1-2\times 2) = 32 \times 4(1-4)$

$= -32 \times 4 \times 3 = -384$

(b) $ab(a^3 - b^3) = 2 \times 0.5(2^3 - (0.5)^3) = 10 \times (8 - 0.125)$

$= 10 \times (7.875) = 78.75$

7. Prove that the commutative property holds good for the followin(g) Verify the same for the given values of the literals.

(a) $1.25xy\left(x + \frac{x}{0.5y} + \frac{1}{y}\right); x = 2,\ y = -1$

$= 1.25 \times 2 \times (-1)\left(2 + \frac{2}{0.5 \times (-1)} + \frac{1}{(-1)}\right) = -2.50 \times \left(2 - \frac{20}{5} - 1\right)$

$= -2.50 \times (2 - 4 - 1) = -2.50 \times (2 - 5)$

$= -2.50 \times (-3) = 7.50$ or $1.25xy\left(x + \frac{x}{0.5\,y} + \frac{1}{y}\right)$

$= 1.25\,x^2y + \frac{1.25}{0.50}x^2 + 1.25x$

$= 1.25 \times (2)^2(-1) + \frac{125}{50} \times (2)^2 + 1.25 \times 2$

$= 1.25 \times 4 \times (-1) + \frac{125 \times 4}{50} + 2.50$

$= --5.00 + \frac{500}{50} + 2.50$

$= -5.00 + 10 + 2.50$

$= 5.00 + 2.50 = 7.50$

Since, both are same in quantity.

So, commutative property holds goo(d)

(b) $\frac{3}{4}ab\left(a^2-\frac{1}{2}b^2+4\right)$; $a=\frac{1}{2}$, $b=-1$

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

$$=-\frac{3}{8}\times\left[\frac{1}{4}-\frac{1}{2}+4\right]=-\frac{3}{8}\times\left[\frac{1-2+16}{4}\right]$$

$$=\frac{-3}{8}\times\frac{15}{4}=\frac{-45}{32}$$

or $\frac{3}{4}ab\left(a^2-\frac{1}{2}b^2+4\right)=\frac{3}{4}a^3b-\frac{3}{8}ab^3+3ab$

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

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

$$=-\frac{3}{32}+\frac{3}{16}-\frac{3}{2}=\frac{-3+6-48}{32}$$

$$=\frac{-51+6}{32}=\frac{-45}{32}$$

Both are same in quantity.

So, commutative property holds goo(d)

8. Simplify :

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

$=2a^3+2ab^2-2b^3-2ab^2+2$

$=2a^3-2b^3+2=2(a^3-b^3+1)$

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

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

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

(c) $x^2(3x^3-2x^2+1)-x(x^4-2x^3+x)$

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

(d) $a^3(b^3-c^3)+b^3(c^3-a^3)+c^3(a^3-b^3)$

$=a^3b^3-a^3c^3+b^3c^3-b^3a^3+a^3c^3-b^3c^3=0$

(e) $a^2b(b^2-2a)+a(b-a^2b)-b(a+2a^3)$

$=a^2b^3-2a^3b+ab-a^3b-ab-2a^3b$

$=a^2b^3-5a^3b$

(f) $\frac{5}{9}x(x^2-x^3)-\frac{1}{3}x^2(x^3-x)+\frac{1}{3}x^3-\frac{1}{3}x^5$

$=\frac{5}{9}x^3-\frac{5}{9}x^4-\frac{1}{3}x^5+\frac{1}{3}x^3+\frac{1}{3}x^3-\frac{1}{3}x^5$

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

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

$=\frac{11}{9}x^3-\frac{5}{9}x^4-\frac{2}{3}x^5$

Exercise 10.3

1. Multiply, using both the horizontal and the vertical methods, and hence, verify that they produce the same result.

(a) $(2a^3+3b)(6a-4b^2)$

Vertical Method :

$$\begin{array}{r} 2a^3+3b \\ \times\ 6a-4b^2 \\ \hline -8a^3b^2-12b^3 \\ 12a^4+18ab \\ \hline \text{LHS } = 12a^4-12b^3-8a^3b^2+18ab \end{array}$$

Horizontal Method :

$(2a^3+3b)\times(6a-4b^2) = 2a^3(6a-4b^2)+3b(6a-4b^2)$

$= 12a^4-8a^3b^2+18ab-12b^3$

RHS $= 12a^4-12b^3-8a^3b^2+18ab$

Since, LHS = RHS,

hence, they produce the same result.

(b) $(6p^5-5q^2)(4p+7q)$

Vertical Method :

$$\begin{array}{r} 6p^5-5q^2 \\ \times\ 4p+7q \\ \hline 42p^5q-35q^3 \\ 24p^6-20pq^2 \\ \hline 24p^6+42p^5q-35q^3\ 20pq^2 \end{array}$$

Horizontal Method :

$(6p^5-5q^2)\times(4p+7q) = 6p^5(4p+7q)-5q^2(4p+7q)$

$= 24p^6+42p^5q-20pq^2-35q^3$

$$= 24p^6 + 42p^5q - 35q^3 - 20pq^2$$

Since, LHS = RHS,

hence they produce the same result.

2. Multiply the binomials.

(a) $(3x-7y)(7x+2y) = 3x(7x+2y) - 7y(7x+2y)$

$= 21x^2 + 6xy - 49xy - 14y^2$

$= 21x^2 - 43xy - 14y^2$

(b) $(x^5 - y^5)(x^5 + y^5) = x^5(x^5 + y^5) - y^5(x^5 + y^5)$

$= x^{10} + x^5y^5 - x^5y^5 - y^{10} = x^{10} - y^{10}$

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

$= \frac{1}{3}a \times \frac{2}{5}a + \frac{1}{3}ab - \frac{2}{5}ab - b^2$

$= \frac{2}{15}a^2 + \frac{5-6}{15}ab - b^2$

$= \frac{2}{15}a^2 - \frac{1}{15}ab - b^2$

3. Simplify the following and arrange the power of any one literal in descending order :

(a) $\frac{1}{3}(2a^3 - 3b^2)(3a^2 - 2b)$

$= \frac{1}{3}[2a^3(3a^2 - 2b) - 3b^2(3a^2 - 2b)]$

$= \frac{1}{3}[6a^5 - 4a^3b - 9a^2b^2 + 6b^3]$

$= \frac{1}{3} \times 6a^5 - \frac{4}{3}a^3b - \frac{1}{3} \times 9a^2b^2 + \frac{1}{3} \times 6b^3$

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

(b) $(3x^2 - 2y)(4x^2 - y)$

$= 3x^2(4x^2 - y) - 2y(4x^2 - y)$

$= 3x^2 \times 4x^2 - 3x^2 \times y - 2y \times 4x^2 + 2y \times y$

$= 12x^4 - 3x^2y - 8x^2y + 2y^2$

$= 12x^4 - 11x^2y + 2y^2$

(c) $(3x+(-y))(-x+y^2)$
$= 3x(-x+y^2)+(-y)(-x+y^2)$
$= -3x^2+3xy^2+xy-y^3$
$= -3x^2+xy+3xy^2-y^3$

4. Find the products of the following binomials.

(a) $(2a^2+3b)(2a^2+3b)$
$= 2a^2(2a^2+3b)+3b(2a^2+3b)$
$= 2a^2\times 2a^2+2a^2\times 3b+3b\times 2a^2+3b\times 3b$
$= 4a^4+6a^2b+6a^2b+9b^2 = 4a^4+12a^2b+9b^2$

(b) $(-4p+7q)(-4p+7q)$
$= (-4p)(-4p+7q)+7q(-4p+7q)$
$= 16p^2-28pq+49q^2-28pq$
$= 16p^2-56pq+49q^2$

(c) $\left[\frac{2}{3}x+\frac{5}{7}y\right]\left[\frac{2}{3}x+\frac{5}{7}y\right] = \frac{2}{3}x\left[\frac{2}{3}x+\frac{5}{7}y\right]+\frac{5}{7}y\left[\frac{2}{3}x+\frac{5}{7}y\right]$
$= \frac{4}{9}x^2+\frac{10}{21}xy+\frac{10}{21}xy+\frac{25}{49}y^2$
$= \frac{4}{9}x^2+\frac{20}{21}xy+\frac{25}{49}y^2$

5. Find the following products :

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

(b) $(4x-3y+4)(2x-3)$
$= 2x(4x-3y+4)-3(4x-3y+4)$
$= 2x\times 4x-2x\times 3y+2x\times 4-3\times 4x+3\times 3y-3\times 4$
$= 8x^2-6xy+8x-12x+9y-12$
$= 8x^2-4x-6xy+9y-12$

(c) $(x^2-xy+y^2)(x+y)$
$= x(x^2-xy+y^2)+y(x^2-xy+y^2)$
$= x^2\times x-x\times xy+x\times y^2+y\times x^2-y\times xy+y\times y^2$
$= x^3-x^2y+xy^2+x^2y-xy^2+y^3$
$= x^3+y^3$

(d) $(x^2+xy+y^2)(x-y)$
$= x(x^2+xy+y^2)-y(x^2+xy+y^2)$
$= x\times x^2+x\times xy+x\times y^2-y\times x^2-y\times xy-y\times y^2$

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

(e) $(x+4)(x-4)(x-1)$
$= (x+4)[x(x-4) - 1(x-4)]$
$= (x+4)[x \times x - x \times 4 - x + 4]$
$= (x+4)(x^2 - 4x - x + 4)$
$= (x+4)(x^2 - 5x + 4)$
$= x^2(x+4) - 5x(x+4) + 4(x+4)$
$= x^2 \times x + x^2 + 4 - 5x \times x - 5x \times 4 + 4 \times x + 4 \times 4$
$= x^3 + 4x^2 - 5x^2 - 20x + 4x + 16$
$= x^3 - x^2 - 16x + 16$

6. Simplify :

(a) $(2y+3)(y-2) - (5y+3)(y-2)$
$= (y-2)[(2y+3) - (5y+3)]$
$= (y-2)(2y+3-5y-3)$
$= (y-2)(-3y)$
$= (-3y) \times y - 2 \times (-3y)$
$= -3y^2 + 6y$

(b) $(3x-4y)(x+y) + (5x+7y)(x-y)$
$= 3x \times x + 3x \times y - 4y \times x - 4y \times y + 5x \times x - 5x \times y$
$+7y \times x - 7y \times y$
$= 3x^2 + 3xy - 4xy - 4y^2 + 5x^2 - 5xy + 7xy - 7y^2$
$= 8x^2 + xy - 11y^2$

(c) $(3x+4y)(3x-4y) - (3x+4y)^2$
$= (3x+4y)[(3x-4y) - (3x+4y)]$
$= (3x+4y)(3x-4y-3x-4y)$
$= (3x+4y)(-8y)$
$= 3x \times (-8y) + 4y(-8y)$
$= -24xy - 32y^2$
$= -32y^2 - 24xy$

(d) $(5a-3)(a+4) - (2a+5)(3a-4)$
$= a(5a-3) + 4(5a-3) - 3a(2a+5) + 4(2a+5)$
$= 5a^2 - 3a + 20a - 12 - 6a \quad -15a + 8a + 20$
$= -a^2 + 17a - 7a + 20 - 12$
$= -a^2 + 10a + 8$

MCQs **1.** (c) **2.** (c) **3.** (c) **4.** (a)
5. (b) **6.** (c) **7.** (d) **8.** (b)

HOTS

When $x = 2,\ y = -1$ and $z = 2$

$$\frac{\frac{4}{x}-\frac{2}{y}}{\frac{y}{x}+\frac{x}{2}} = \frac{\frac{4}{3}-\frac{2}{-1}}{\frac{-1}{3}+\frac{3}{2}} = \frac{\frac{4+6}{3}}{\frac{-2+9}{6}}$$

$$= \frac{\frac{10}{3}}{\frac{7}{6}} = \frac{10\times 6}{7\times 3} = \frac{10}{7}\times 2 = \frac{20}{7}$$

Chapter

11 Exponents and Powers

Exercise-11.1

1. (a) $(10)^5$ Base = 10, exponent = 5

(b) $(3)^7$ base = 3, exponent = 7

(c) $(-4)^6$ base = -4, exponent = 6

(d) $(-4)^2$ base = -4, exponent = 2

(e) $\left(\frac{-3}{7}\right)^5$ Base = $\frac{-3}{7}$, Exponent = 5

(f) $\left(\frac{2}{3}\right)^7$ base = $\frac{2}{3}$, exponent = 7

(g) $(-7)^5$ base = -7, exponent = 5

(h) $(7)^7$ base = 7, exponent = 7

2. (a) $7\times 7\times 7 = 7^3$

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

(c) $(-3)\times(-3)\times b\times b\times b = (-3)^2\times b^3$

(d) $a\times a\times a\times b\times b\times c\times c\times d = a^3 b^2 c^2 d$

(e) $2\times 2\times 2\times b\times c\times c\times b = 2^3\times b^2\times c^2$

(f) $(-3)\times(-3)\times(-3)\times p\times p\times q = (-3)^3\times p^2\times q$

(g) $(-x)\times(-x)\times(-x)\times y\times y\times z = (-x)^3\times y^2\times z$

3. (a) $128 = 2\times 2\times 2\times 2\times 2\times 2\times 2 = 2^7$

(b) $2187 = 3\times 3\times 3\times 3\times 3\times 3\times 3 = 3^7$

(c) $169 = 13 \times 13 = 13^2$

(d) $2401 = 7 \times 7 \times 7 \times 7 = 7^4$

(e) $432 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 = 2^4 \times 3^3$

(f) $5929 = 7 \times 7 \times 11 \times 11 = 7^2 \times 11^2$

4. (a) 5^4 or 4^5

$5^4 = 5 \times 5 \times 5 \times 5 = 625$

$4^5 = 4 \times 4 \times 4 \times 4 \times 4 = 1024$

Clearly, $4^5 > 5^4$

(b) 2^6 or 6^2

$2^6 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$

$6^2 = 6 \times 6 = 36$

Clearly, $2^6 > 6^2$

(c) 3^5 or 5^3

$3^5 = 3 \times 3 \times 3 \times 3 \times 3 = 243$

$5^3 = 5 \times 5 \times 5 = 125$

Clearly, $3^5 > 5^3$

(d) 7^2 or 2^7

$7^2 = 7 \times 7 = 49$

$2^7 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$= 128$

Clearly, $2^7 > 7^2$

(e) 3^2 or 2^3

$3^2 = 3 \times 3 = 9$

$2^3 = 2 \times 2 \times 2$

$= 8$

Clearly, $3^2 > 2^3$

(f) 2^{20} or 20^2

$2^{20} = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 1048576$

$20^2 = 20 \times 20 = 400$

Clearly, $2^{20} > 20^2$

5. (a) $1200 = 2 \times 2 \times 2 \times 2 \times 3 \times 5 \times 5 = 2^4 \times 3 \times 5^2$

(b) $2250 = 2 \times 3 \times 3 \times 5 \times 5 \times 5 = 2 \times 3^2 \times 5^3$

(c) $1080 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 = 2^3 \times 3^3 \times 5$

(d) $720 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 = 2^4 \times 3^2 \times 5$

(e) $1600 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5 = 2^6 \times 5^2$

(f) $3200 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5 = 2^7 \times 5^2$

(g) $864 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 = 2^5 \times 3^3$

(h) $5324 = 2 \times 2 \times 11 \times 11 \times 11 = 2^2 \times 11^3$

(i) $4500 = 2 \times 2 \times 3 \times 3 \times 5 \times 5 \times 5 = 2^2 \times 3^2 \times 5^3$

6. (a) $3 \times 10^2 = 3 \times 10 \times 10 = 300$

(b) $6 \times 2^4 = 6 \times 2 \times 2 \times 2 \times 2 = 96$

(c) $3 \times 4^2 = 3 \times 4 \times 4 = 48$

(d) $5^3 \times 2^3 = (5 \times 5 \times 5) \times (2 \times 2 \times 2) = 125 \times 8 = 1000$

(e) $(-1)^5 \times 7^3 = (-1)\times(-1)\times(-1)\times(-1)\times(-1)\times 7\times 7\times 7 = -343$

(f) $3^2 \times 10^3 = 3\times 3\times 10\times 10\times 10 = 9\times 1000 = 9000$

(g) $2^5 \times 5 = 2\times 2\times 2\times 2\times 2\times 5 = 32\times 5 = 160$

(h) $3^4 \times 5 = 3\times 3\times 3\times 3\times 5 = 405$

7. (a) $(-3)^2 \times (-5)^2 = (-3)\times(-3)\times(-5)\times(-5) = 9\times 25 = 225$

(b) $(-1)^5 \times (-3)^4 = (-1)\times(-1)\times(-1)\times(-1)\times(-1)\times(-3)\times(-3)$
$\times(-3)\times(-3) = -81$

(c) $(-2)^3 \times (-3)^3 = (-2)\times(-2)\times(-2)\times(-3)\times(-3)\times(-3)$
$= -8\times -27 = 216$

(d) $(-5)^2 \times 2^4 = (-5)\times(-5)\times 2\times 2\times 2\times 2 = 25\times 16 = 400$

(e) $(-7)^2 \times (-2)^5 = (-7)\times(-7)\times(-2)\times(-2)\times(-2)\times(-2)\times(-2)$
$= 49\times(-32) = -1568$

(f) $(-2)^4 \times (-3)^3 = (-2)\times(-2)\times(-2)\times(-2)\times(-3)\times(-3)\times(-3)$
$= 16\times -27 = -432$

8. (a) 1.8×10^{15} and 1.5×10^{20}

$1.8\times 10^{15} = 1.8\times 10\times 10^{14} = 18\times 10^{14}$

and $1.5\times 10^{20} = 1.5\times 10\times 10^{19} = 15\times 10^{19}$

Number of digits in 15×10^{19} is greater than number of digits in 18×10^{14}.

Hence, $1.5\times 10^{20} > 1.8\times 10^{15}$

(b) 2.7×10^{11} and 3.0×10^{15}

$2.7\times 10^{11} = 2.7\times 10\times 10^{11} = 27\times 10^{11}$

Number of digits in 30×10^{14} is greater than number of digits in 27×10^{11}

Hence, $3.0\times 10^{15} > 2.7\times 10^{11}$

(c) 2.8×10^{20} and 3.5×10^{18}

$2.8\times 10^{20} = 2.8\times 10\times 10^{19} = 28\times 10^{19}$

$3.5\times 10^{18} = 3.5\times 10\times 10^{17} = 35\times 10^{17}$

Number of digits in 28×10^{19} is greater than number of digits in 35×10^{17}.

Hence, $2.8\times 10^{20} > 3.5\times 10^{18}$

(d) 1.008×10^{15} and 2.009×10^{20}

$1.008\times 10^{15} = 1.008\times 1000\times 10^{12} = 1008\times 10^{12}$

$2.009\times 10^{20} = 2.009\times 1000\times 10^{17}$

Number of digit in 2009×10^{17} is greater than number of digits in 1008×10^{12}.

Hence, $2.009\times10^{20} > 1.008\times10^{15}$.

9. (a) $10000 = 10\times10\times10\times10 = (10)^4$

(b) $125 = 5\times5\times5 = 5^3$

(c) $\dfrac{-32}{243} = \dfrac{-2\times-2\times-2\times-2\times-2}{3\times3\times3\times3\times3} = \left(-\dfrac{2}{3}\right)^5$

(d) $\dfrac{8}{729} = \dfrac{2\times2\times2}{9\times9\times9} = \left(\dfrac{2}{9}\right)^3$

(e) $\dfrac{-2187}{128} = \dfrac{(-3)\times(-3)\times(-3)\times(-3)\times(-3)\times(-3)\times(-3)}{2\times2\times2\times2\times2\times2\times2}$

$= \left(\dfrac{-3}{2}\right)^7$

(f) $\dfrac{81}{2401} = \dfrac{3\times3\times3\times3}{7\times7\times7\times7} = \left(\dfrac{3}{7}\right)^4$

(g) $\dfrac{243}{1024} = \dfrac{3\times3\times3\times3\times3}{4\times4\times4\times4\times4} = \left(\dfrac{3}{4}\right)^5$

Exercise-11.2

1. Fill in the blanks:

(a) $(2658)^\circ = 1$

(b) $\dfrac{3^5\times7^9}{7^9\times3^5} = 3^{5-5}\times7^{9-0} = 3^0\times9^0 = 1\times1 = 1$

(c) $(3^4)^5 = 3^{4\times5} = 3^{20}$

(d) $\dfrac{(7561)^{30}}{(7561)^{29}} = (7561)^{30-29} = (7561)^1 = 7561$

(e) $\dfrac{2^8}{2^5} = 2^{8-5} = 2^3 = 8$

(f) $3^0\times3^5\times3^{-5} = 1\times3^{5-5} = 3^0 = 1$

(g) $(3^5)^7 = 3^{35}$

(h) $\dfrac{(5^5)^8}{(5^8)^5} = \dfrac{5^{5\times8}}{5^{8\times5}} = \dfrac{5^{40}}{5^{40}} = 1$

2. (a) $3^2 \times 3^4 \times 3^7 = 3^{2+4+7} = 3^{13}$ $(\because a^m \times a^n = a^{m+n})$

(b) $6^{15} \div 6^{10} = 6^{15-10} = 6^5$ $(\because a^m \div a^n = a^{m-n})$

(c) $a^7 \times a^5 = a^{7+5} = a^{12}$ $(\therefore a^m \times a^n = a^{m+n})$

(d) $7^x \times 7^2 = 7^{x+2}$

(e) $(27)^2 \div 3^3 = (3^3)^2 \div 3^3 = 3^6 \div 3^3 = 3^3$ $(\because (a^m)^n = a^{mn})$

(f) $(3^4)^2 \div 3^5 = 3^8 \div 3^5 = 3^{8-5} = 3^3$

(g) $(2^{20} \div 2^{12}) \times 2^3 = (2^{20-12}) \times 2$

$= 2^8 \times 2^3 = 2^{8+3} = 2^{11}$ $(\because a^m \times a^n = a^{m+n})$

(h) $8^t \div 8^3 = 3^{t-3}$ $(\therefore a^m \div a^n = a^{m-n})$

(i) $(3^4)^2 \div (3^2) = 3^8 \div 3^2 = 3^{8-2} = 3^6$ $(\because a^m \div a^n = a^{m-n})$

(j) $(5^3 \div 5^2) \times 5^3 = 5^{(3-2)} \times 5^3 = 5^{1+3} = 5^4$ $(\because a^m \times a^n = a^{m+n})$

(k) $(2^7)^2 \div 2^7 = 2^{14} \div 2^7 = 2^{14-7} = 2^7$ $(\because (a^m)^n = a^{mn})$

3. (a) $\dfrac{2^3 \times 3^4 \times 8}{3 \times 64} = \dfrac{2^3 \times 3^4}{2^3 \times 3^1} = 3^{4-1} = 3^3$

(b) $(5^2 \times 5^4) \div 5^3 = 5^{2+4} \div 5^4 = 5^{6-4} = 5^2$

(c) $(125)^4 \div (25)^3 = (5^3)^4 \div (5^2)^3$

$= 5^{12} \times 5^6$ $[\because a^m \div a^n = a^{m-n}]$

$= 5^{12-6} = 5^6$

(d) $\dfrac{3 \times 7^4 \times 11^2}{21 \times 11} = \dfrac{3 \times 7^4 \times 11^{2-1}}{3 \times 7} = 7^{4-1} \times 11^1 = 7^3 \times 11 = 7^3 \times 11$

(e) $\dfrac{3^7 \times 3^2}{(3^4)^2} = \dfrac{3^{7+2}}{3^8} = \dfrac{3^9}{3^8} = 3^{9-8} = 3^1$

(f) $(2^0 + 3^0) \times (5^0) = (1+1) \times 1$ $[\because a^0 = 1]$

$= 2 \times 1 = 2$

(g) $\dfrac{2^8 \times a^5 \times b^3}{4^2 \times a^2 \times b} = \dfrac{2^8 \times a^{5-2} \times b^{3-1}}{(2^2)^2}$ $\left[\dfrac{a^m}{a^n} = a^{m-n}\right]$

$= \dfrac{2^8}{2^4} \times a^3 \times b^2 = 2^{8-4} \times a^3 \times b^2 = 2^4 a^3 b^2$

(h) $\left(\dfrac{a^7}{b^2}\right) \times \left(\dfrac{b^5}{a^2}\right) = a^{7-2} \times b^{5-2} = a^5 \times b^3$

(i) $(2^3 \div 2)^4 = (2^{3-1})^4 = (2^2)^4 = 2^8$ $[\because a^m \div a^n = a^{m-n}]$

(j) $(2^0 \times 3^0 + 3^0 \times 4^0) \times 3^0 = (1\times1+1\times1)\times1 = 2$ $[\because a^0 = 1]$

(k) $\dfrac{75\times77}{5^3\times21} = \dfrac{75\times77}{5\times5\times5\times21} = \dfrac{11}{5}$

(l) $\dfrac{108\times25^2}{2^6\times5^2} = \dfrac{2^2\times3^3\times(5^2)^2}{2^6\times5^2} = \dfrac{3^3\times5^4}{2^{6-2}\times5^2}$

$= \dfrac{3^3\times5^{(4-2)}}{2^4}$

$= \dfrac{3^3\times5^2}{2^4}$

4. (a) $216\times192 = (2\times2\times2\times3\times3\times3)\times(2\times2\times2\times2\times2\times2\times3)$

$= 2^9\times3^4$

(b) $1024\times9 = 2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times3\times3$

$= 2^{10}\times3^2$

(c) $1536 = 2\times2\times2\times2\times2\times2\times2\times2\times2\times3$

$= 2^9\times3$

5. (a) $\dfrac{(3^5)\times7^3}{(27)^3\times7} = \dfrac{3^5\times7^{3-1}}{(3^3)^3}$ $[\because a^m \div a^n = a^{m-n}]$

$= \dfrac{3^5\times7^2}{3^9} = 3^{5-9}\times7^2$

$= 3^{-4}\times7^2 = \dfrac{7^2}{3^4} = \dfrac{49}{81}$

(b) $\dfrac{25\times125\times t^7}{10^5\times t^2} = \dfrac{5^2\times5^3\times t^{7-2}}{(2\times5)^5} = \dfrac{5^{2+3}\times t^5}{2^5\times5^5}$

$= \dfrac{5^5\times t^5}{5^4\times2^5} = \dfrac{t^5}{2^5} = \dfrac{t^5}{2^5} = \left(\dfrac{t}{2}\right)^5$

(c) $\dfrac{3^5\times10^5\times75}{5^3\times(6)^3} = \dfrac{3^5\times(2\times5)^5\times75}{5^3\times(2\times3)^3}$

$= \dfrac{3^5\times2^5\times5^5\times(5\times5\times3)}{5^3\times2^3\times3^3}$

$= 3^{5-3}\times2^{5-3}\times5^{5-3}\times(5^2\times3^1)$

$= 3^{2+1}\times2^2\times5^{2+2} = 3^3\times2^2\times5^4$

$= 27\times4\times625 = 67500$

(d) $\dfrac{3^5 \times 75 \times a^3 \times b^2}{3^6 \times 5^2 \times b^2 \times a^3} = \dfrac{3^5 \times (5 \times 5 \times 3) \times a^3 \times b^2}{3^6 \times 5^2 \times b^2 \times a^3}$

$= \dfrac{3^{5+1} \times 5^2 \times a^{3-3} \times b^{2-2}}{3^6 \times 5^2}$

$= \dfrac{3^6 \times 5^{2-2} \times a^0 \times b^0}{3^6}$

$= 3^{6-6} \times 5^0 \times 1 \times 1$ $\quad [\because a^0 = 1]$

$= 3^0 \times 1 \times 1 = 1 \times 1 = 1$

Exercise-11.3

1. (a) $23456700 = \dfrac{23456700 \times 10^5}{10^5} = 2.34567 \times 10^7$

(b) $23.45628 = \dfrac{2345628 \times 10}{100000 \times 10} = \dfrac{2345628 \times 10^1}{1000000} = 2.345628 \times 10$

(c) $73925.6 = \dfrac{739256 \times 10^4}{10 \times 10^4} = \dfrac{739256 \times 10^4}{100000} = 7.3956 \times 10^4$

(d) $1005678900 = \dfrac{10056789 \times 10^2 \times 10^7}{10^7} = 1.0056789 \times 10^9$

(e) $725682.900 = \dfrac{725682900}{100} = \dfrac{7256829 \times 10^6}{10^6} = 7.256829 \times 10^6$

(f) $923.45 = \dfrac{92345}{100} = \dfrac{92345 \times 100}{100 \times 100} = 9.2345 \times 10^2$

(g) $30000000000 = 3.0 \times 10^{10}$

(h) $49672000000 = 49672 \times 10^6 = \dfrac{49672}{10^4} \times 10^6 \times 10^4$

$= 4.9672 \times 10^{10}$

(i) $30895600 = 308956 \times 10^2 = \dfrac{308956 \times 10^2 \times 10^5}{10^5}$

$= 3.08956 \times 10^7$

(j) $9823500000 = 98235 \times 10^5 = \dfrac{98235}{10^4} \times 10^5 \times 10^4$

$= 9.8235 \times 10^9$

(k) $30089625000 = 30089625 \times 10^3 = \dfrac{30089625 \times 10^3 \times 10^7}{10^7}$

$= 3.0089625 \times 10^{10}$

(l) $92157890000 = 9215789 \times 10^4 = \dfrac{9215789}{10^6} \times 10^4 \times 10^6$

$= 9.215789 \times 10^{10}$

2. (a) $384000000 \text{ m} = \dfrac{384 \times 10^6 \times 10^2}{10^2} = 3.84 \times 10^8 \text{ m}$

(b) $300000 \text{ km/sec} = 3.0 \times 10^5 \text{ km/sec}$

(c) $1{,}27{,}56{,}000 \text{ m} = \dfrac{12756 \times 10^3 \times 10^4}{10^4} = 1.2756 \times 10^7 \text{ m}$

(d) $700000000 = 7 \times 10^8 = 7.0 \times 10^8$

(e) $100000000000 = 1.0 \times 10^{11}$

(f) $12000000000 = 12 \times 10^9 = \dfrac{12}{10} \times 10^9 \times 10$

$= 1.2 \times 10^{10}$ years old

(g) $60{,}230{,}000{,}000{,}000{,}000{,}000{,}000 = 6023 \times 10^{19}$

$= \dfrac{6023}{10^3} \times 10^{19} \times 10^3$

$= 6.023 \times 10^{22}$ molecules

(h) $1027000000 = 1027 \times 10^6 = \dfrac{1027}{10^3} \times 10^6 \times 10^3 = 1.027 \times 10^9$

(i) $1353000000 = 1353 \times 10^6 = \dfrac{1353}{10^3} \times 10^6 \times 10^3 = 1.353 \times 10^9$

MCQs : **1.** (a) **2.** (a) **3.** (c) **4.** (c)
5. (a) **6.** (b) 7. (a) **8.** (b)

Mental Maths :

Fill in the blanks:

1. $2^5 \times 2^3 \times \left(\dfrac{1}{2}\right)^6 = \dfrac{2^{5+3} \times (1)^6}{(2)^6} = \dfrac{2^8 \times 1}{2^6} = 2^{8-6} = 2^2 = \mathbf{4}$

2. $(-3)^5 \div \left(\dfrac{-1}{5}\right)^3 = (-3)^5 \times \left(\dfrac{5}{-1}\right)^3 = \dfrac{(-1)^5 \times 3^5 \times 5^3}{(-1)^3}$

$$= \frac{-243 \times 125}{-1} = \mathbf{30375}$$

3. $-\left|\left(\frac{7}{9}\right)^2\right| = -\left|\frac{49}{81}\right| = -\mathbf{\frac{49}{81}}$

4. The receprocal of $\left(\frac{7}{5}\right)^4$ is $\left(\mathbf{\frac{5}{7}}\right)^4$.

5. $8^{17} \div 8^{23} = \frac{1}{8^x}$

$\Rightarrow \frac{1}{8^{23-17}} = \frac{1}{8^x} \Rightarrow \frac{1}{8^6} = \frac{1}{8^x} \qquad \Rightarrow 8^x = 8^6 \Rightarrow x = \mathbf{6}$

6. $\{(10)^{10}\}^{10} = 10^{10\times10} = \mathbf{10}^{100}$

7. $\frac{243}{1024} = \frac{3}{4} \times \frac{3}{4} \times \frac{3}{4} \times \frac{3}{4} \times \frac{3}{4} = \left(\frac{3}{4}\right)^5$

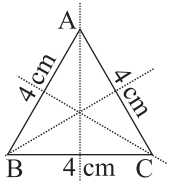
8. $(-1)^8 = (-1)\times(-1)\times(-1)\times(-1)\times(-1)\times(-1)\times(-1)\times(-1)$

Chapter

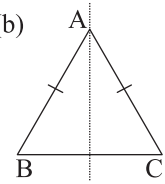
12 Symmetry

Exercise 12.1

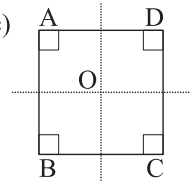
1. (a)



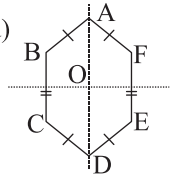
(b)



(c)

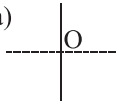


(d)

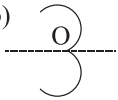


2. Draw the lines of symmetry and the point of symmetry of the given figures :

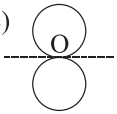
(a)



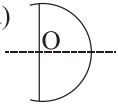
(b)



(c)



(d)

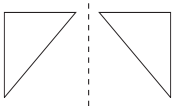


3. Daw the mirror image of each of the following :

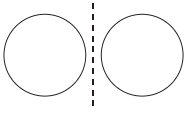
(a)

(b)

(c)



(d)

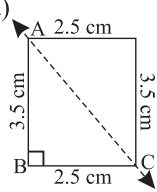


4. (a) $AB = DC, AD = BC$ and $\angle ABC = \angle ADC$

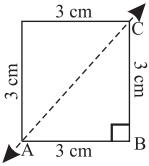
(b) $PS = RS$, $PQ = RQ$ and $\angle SPQ = \angle SRQ$

5.

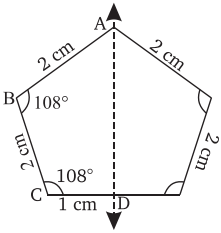
(a)



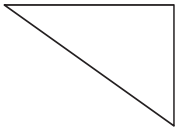
(b)



(c)



6. (a)



(b)

(c)

7. (a) infinite lines of symmetry (b) 2 lines of symmetry

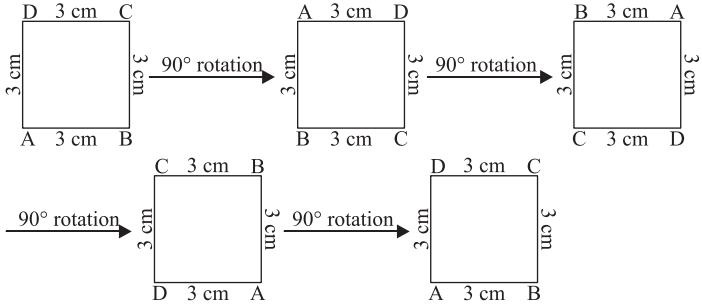
(c) 2 lines of symmetry (d) No lines of symmetry

Exercise 12.2

1. (a) F (b) T (c) T (d) F (e) T (f) F (g) F

2. 5 is the order of rotational symmetry of a regular pentagon.

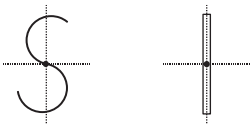
3.



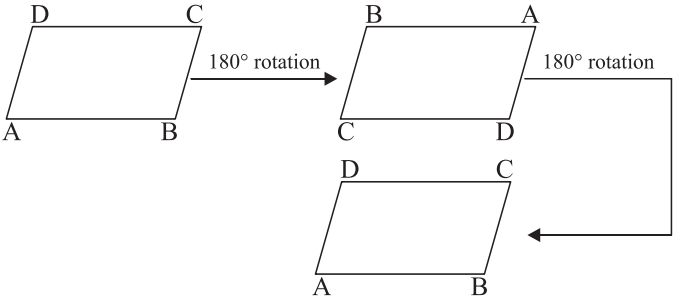
Since the square *ABCD* shown at right will match itself 4 times as it is rotated, it is said to have rotational symmetry of order 4.

4. (a), (c) and (e) are rotational symmetry.

5. H, I and X **6.** A, E and C **7.**



8. Parallelogram



MCQs 1. (c) 2. (c) 3. (a) 4. (a) 5. (c)
6. (d) 7. (b) 8. (b) 9. (c) 10. (c)

Mental Maths :

1. Do it yourself

2. Do it yourself

Chapter 13

Visualising Solid Shapes

Exercise 13

1. (a)  Cube (b)  Cuboid

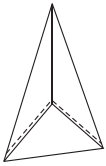
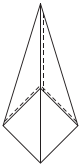
(c)  Cone (d)  Sphere

(e)  Triangular prism (f)  Cylinder

(g)  Rectangular pyramid (h)  Hemisphere

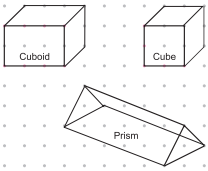
2. (a) (iii) (b) (i) (c) (iv) (d) (ii)

3.

Solids	Figure	Value of $V + F - E$
(a) Cube		$8 + 6 - 12 = 2$
(b) Cuboid		$8 + 6 - 12 = 2$
(c) Triangular prism		$6 + 5 - 9 = 2$
(d) Triangular pyramid		$4 + 4 - 6 = 2$
(e) Square pyramid		$5 + 5 - 8 = 2$

4. (a)

5.



6. (c)

7. (a) No. of cubes in row $1 = 3 \times 1 = 3$

No. of cubes in row $2 = 3 \times 1 = 3$

No. of cubes in row $3 = 3 \times 2 = 6$

No. of cubes in row $4 = 3 \times 2 = 6$

No. of cubes in row $5 = 3 \times 3 = 9$

No. of cubes in row $6 = 3 \times 3 = 9$

$\therefore$ Total no. of cubes $= 3 + 3 + 6 + 6 + 9 + 9 = 36$

(b) No. of cubes in row $1 = 1 \times 1 = 1$

No. of cubes in row $2 = 2 \times 2 = 2$

No. of cubes in row $3 = 3 \times 3 = 9$

No. of cubes in row $4 = 4 \times 4 = 16$

$\therefore$ Total no. of cubes $= 1 + 2 + 9 + 16 = 28$

8. There should be 50 packs on 2 full shelves.

9. Triangular prism.

10. (a) and (c)

MCQs : 1. (b) 2. (a) 3. (b) 4. (b) 5. (d)