4. Decimals

Exercise 4.1

1. (a) $0.9 = \frac{9}{10}$ (b) $0.6 = \frac{\overset{3}{\cancel{6}}}{\underset{5}{\cancel{10}}} = \frac{3}{5}$ (c) $0.08 = \frac{\overset{2}{\cancel{8}}}{\underset{25}{\cancel{100}}} = \frac{2}{25}$

(d) $0.15 = \frac{\overset{3}{\cancel{15}}}{\underset{20}{\cancel{100}}} = \frac{3}{20}$ (e) $0.053 = \frac{53}{1000}$ (f) $0.224 = \frac{\overset{28}{\cancel{224}}}{\underset{125}{\cancel{1000}}} = \frac{28}{25}$

2. (a) $6.4 = \frac{\overset{32}{\cancel{64}}}{\underset{5}{\cancel{10}}} = \frac{32}{5} = 6\frac{2}{5}$ (b) $6.5 = \frac{\overset{33}{\cancel{165}}}{\underset{2}{\cancel{10}}} = \frac{32}{2} = 16\frac{1}{2}$

(c) $8.36 = \frac{\overset{209}{\cancel{836}}}{\underset{25}{\cancel{100}}} = \frac{209}{25} = 8\frac{9}{25}$ (d) $4.275 = \frac{\overset{171}{\cancel{4275}}}{\underset{40}{\cancel{1000}}} = \frac{171}{40} = 4\frac{11}{40}$

(e) $25.06 = \frac{\overset{1253}{\cancel{2506}}}{\underset{50}{\cancel{100}}} = \frac{1253}{50} = 25\frac{3}{50}$ (f) $7.004 = \frac{\overset{1751}{\cancel{7004}}}{\underset{250}{\cancel{1000}}} = \frac{1751}{250} = 7\frac{1}{50}$

3. (a) 2.3 (b) 1.65 (c) 1.589

(d) 5.413 (e) 6.25 (f) $\frac{18}{5} = 3.6$

4. **Like decimals :** Fractions having the same number of digits in denominators and different numerators.

5. Ascending order

(a) 6.05, 6.4, 6.45, 6.5, 6.54

(b) 0.33, 3.003, 3.033, 3.3, 3.303

6. Descending order

(a) 73.03, 8.73, 8.073, 7.33, 7.3

(b) 88.8, 88.08, 8.88, 8.088, 8.008

7. (a)
$$\begin{array}{r} 9.6 \\ 14.8 \\ 3.7 \\ +5.9 \\ \hline 34.0 \end{array}$$
(b)
$$\begin{array}{r} 23.7 \\ 106.94 \\ 68.9 \\ +29.5 \\ \hline 229.04 \end{array}$$
(c)
$$\begin{array}{r} 72.8 \\ 7.68 \\ 16.23 \\ +0.7 \\ \hline 97.41 \end{array}$$
(d)
$$\begin{array}{r} 18.6 \\ 34.75 \\ 8.345 \\ +9.7 \\ \hline 71.395 \end{array}$$

8. (a)
$$\begin{array}{r} 92.40 \\ -59.63 \\ \hline 32.77 \end{array}$$
(b)
$$\begin{array}{r} 204.0 \\ -56.8 \\ \hline 147.2 \end{array}$$
(c)
$$\begin{array}{r} 216.20 \\ -127.38 \\ \hline 88.82 \end{array}$$

(d)
$$\begin{array}{r} 70.680 \\ -39.875 \\ \hline 30.805 \end{array}$$
(e)
$$\begin{array}{r} 523.120 \\ -348.237 \\ \hline 174.883 \end{array}$$
(f)
$$\begin{array}{r} 600.000 \\ -458.573 \\ \hline 141.427 \end{array}$$

9. (a) 36.15

(b) $19.267 + 31.01 + 0.002 =$

$$\begin{array}{r} 19.267 \\ 31.010 \\ +00.002 \\ \hline 50.279 \end{array}$$

(c)
$$\begin{array}{r} 38.01 \\ -0.07 \\ \hline 37.94 \end{array} \qquad \begin{array}{r} 11.650 \\ +0.001 \\ \hline 11.651 \end{array} \qquad \therefore \quad \begin{array}{r} 37.940 \\ +1\ 1.651 \\ \hline 49.591 \end{array}$$

(d)
$$\begin{array}{r} 32.06 \\ -0.70 \\ \hline 31.36 \end{array} \qquad \therefore \quad \begin{array}{r} 4.396 \\ +31.360 \\ \hline 35.756 \end{array}$$

(e)
$$\begin{array}{r} 30.0 \\ -19.6 \\ \hline 10.4 \end{array} \qquad \begin{array}{r} 49.4 \\ +33.3 \\ \hline 82.7 \end{array} \qquad \therefore \quad \begin{array}{r} 10.4 \\ +82.7 \\ \hline 93.1 \end{array}$$

(f)
$$\begin{array}{r} 15.25 \\ -7.86 \\ \hline 7.39 \end{array} \qquad \begin{array}{r} 11.340 \\ +0.005 \\ \hline 11.335 \end{array} \qquad \therefore \quad \begin{array}{r} 7.390 \\ +1\ 1.335 \\ \hline 18.725 \end{array}$$

10. Quantity bought by Mrs. Sindhu = 51.50 kg + 25.65 + 4.25 kg = 8.14 kg
and, quantity bought by Mrs. Santosh = 65.20 + 19.65 kg + 6.15 kg = 91 kg
∴ difference between both quantity = 91 – 81.4 = **9.6 kg**

11. Remaining milk left with the milkman = 25.400 – (10.250 + 6.450) *l*
= 25.400 – 16.7
= 8.7 *l* = 8 *l* 700 ml

12. Sumit got money as gift = ₹ 195.50 + ₹ 150.40 + ₹ 85.65 = ₹ 431.55

Exercise 4.2

1. (a) $94.6 \times 11 = \frac{946 \times 11}{10} = \frac{10406}{10} = 1040.6$

(b) $25.645 \times 2 = \frac{25645 \times 2}{1000} = \frac{51290}{1000} = 51.29$

(c) $13.459 \times 7 = \frac{13459 \times 7}{1000} = \frac{94213}{1000} = 94.213$

2. (a) $6.179 \times 10 = 61.79$ (b) $14.007 \times = 140.07$ (c) 2479.5
(d) 9 (e) 1/4 (f) 4736000
(h) 1945

3. (a) $23.2 \times 1.96 = \frac{232}{10} \times \frac{196}{100} = \frac{45472}{1000} = \mathbf{45.472}$

(b) $2.6 \times 1.8 = \frac{26}{10} \times \frac{18}{10} = \frac{468}{100} = \mathbf{4.68}$

(c) $18.75 \times 0.002 = \frac{1875}{100} \times \frac{2}{1000} = \frac{3750}{100000} = \mathbf{00375}$

(d) $9.46 \times 0.002 = \frac{946}{100} \times \frac{18}{100} = \frac{17028}{10000} =$ **1.7028**

(e) $24.65 \times 17.2 = \frac{2465}{100} \times \frac{172}{10} = \frac{423980}{1000} =$ **423.98**

(f) $123.45 \times 0.007 = \frac{12345}{100} \times \frac{7}{1000} = \frac{86415}{100000} =$ **0.86415**

(g) $4.0006 \times 0.003 = \frac{40006}{10000} \times \frac{3}{1000} = \frac{120018}{10000000} =$ **0.0120018**

(h) $45.61 \times 0.12 = \frac{4561}{100} \times \frac{12}{100} = \frac{54732}{10000} =$ **5.4732**

4. (a) $2.765 \times 3.97 = 105.205$ (b) $26.5 \times 0.0397 = 1.05205$

(c) $2.65 \times 0.00397 = 0.0105205$ (d) $2.65 \times 39700 = 105205$

5. (a) $1.1 \times 2.2 = 0.484$ (b) 3.375

(c) 0.08 (d) 6.25

6. ∵ Cost of 1 m cloth = ₹ 150.50

∵ Cost of 14.25 m = $150.50 \times 14.25 =$ ₹ **2144.625**

7. Sugar in 1 bag = 85.25 kg

∴ Sugar in 29 such bags = $29 \times 85.25 =$ **2472.25 kg**

8. Let, length of the playground = 352.85 m

breadth of the playground = 155.25 m

∴ Area of the playground = (length × breadth)

= 352.85 × 155.25

= 54779.9625

= **54799.963 sq.m.**

9. Wages for labourer for 1 hour = ₹ 24.60

labourer work for = 6.5 hours

∴ Money earned by the labourer = 24.60 × 6.5 = ₹ **159.90**

10. Distance covered by Samuel in 1 hour = 50.75 km

∴ distance covered by Samuel in 3.25 hours $= (3.25 \times 50.75)$ km

= **164.9375 km**

Exercise 4.3

1. (a) $7.2 \div 4 = \frac{\overset{18}{\cancel{72}}}{10} \times \frac{1}{\underset{1}{\cancel{4}}} = \frac{18}{10} = 1.8$ (b) $6.3 \div 9 = \frac{\overset{7}{\cancel{63}}}{10} \times \frac{1}{\underset{1}{\cancel{9}}} = \frac{7}{10} = 0.7$

(c) $3.24 \div 9 = \frac{\overset{36}{\cancel{324}}}{100} \times \frac{1}{\underset{1}{\cancel{9}}} = \frac{36}{100} = 0.36$ (d) $60.72 \div 12 = \frac{6072}{100} \times \frac{1}{12} = \frac{506}{100} = 5.06$

(e) $58.944 \div 8 = \frac{58944}{1000} \times \frac{1}{8} = \frac{7368}{1000} = 7.368$

(f) $85.956 \div 12 = \frac{85956}{1000} \times \frac{1}{12} = \frac{7163}{1000} = 7.163$

(g) $82.04 \div 14 = \frac{8204}{100} \times \frac{1}{14} = \frac{586}{100} = 5.86$

(h) $77.055 \div 15 = \frac{77055}{1000} \times \frac{1}{15} = \frac{5137}{1000} = 51.37$

(i) $3.45 \div 25 = \frac{345}{100} \times \frac{1}{25} = \frac{13.8}{100} = \frac{138}{1000} = 0.138$

(j) $1.877 \div 25 = \frac{1877}{1000} \times \frac{1}{25} = \frac{75.08}{1000} = \frac{7508}{1000 \times 100} = \frac{7508}{100000} = 0.07508$

(k) $1302.4 \div 16 = \frac{13024}{10} \times \frac{1}{16} = \frac{814}{10} = 81.4$

(l) $1125.3 \div 11 = \frac{11253}{10} \times \frac{1}{11} = \frac{1023}{10} = 102.3$

2. (a) $\frac{1423}{100 \times 10} = \frac{1423}{1000} = 1.423$

(b) $\frac{2364}{100 \times 10} = 2.364$

(c) $\frac{576}{100 \times 10} = 0.576$

(d) $\frac{347}{1000 \times 10} = \frac{347}{10000} = 0.0347$

(e) $\frac{456}{1000 \times 10} = \frac{456}{10000} = 0.0456$

(f) $\frac{5}{100 \times 10} = \frac{5}{1000} = 0.005$

(g) $\frac{71}{10 \times 100} = \frac{71}{1000} = 0.071$

(h) $\frac{23756}{100 \times 100} = \frac{23756}{10000} = 2.3756$

3. (a) $\frac{49}{10} \times \frac{1}{0.7} = \frac{49 \times 10}{10 \times 7} = \mathbf{7}$

(b) $\frac{441}{10} \times \frac{1}{2.1} = \frac{441 \times 10}{10 \times 21} = \mathbf{21}$

(c) $\frac{252}{100} \times \frac{1}{1.2} = \frac{\overset{21}{\cancel{252}} \times \overset{1}{\cancel{10}}}{\underset{10}{\cancel{100}} \times \underset{1}{\cancel{12}}} = \frac{21}{10} = \mathbf{2.1}$

(d) $\frac{969}{100} \times \frac{1}{1.9} = \frac{969}{100} \times \frac{10}{19} = \frac{51}{10} = \mathbf{5.1}$

(e) $\frac{305}{1000} \times \frac{1}{0.9} = \frac{\overset{145}{\cancel{1305}}}{1000} \times \frac{10}{9} = \frac{145}{100} = \mathbf{1.45}$

(f) $\frac{25395}{1000} \times \frac{10}{15} = \frac{1693}{100} = \mathbf{16.93}$

(g) $\frac{20484}{10000} \times \frac{100}{18} = \frac{1138}{100} = 11.38$

(h) $\frac{\overset{1756}{\cancel{56192}}}{1000} \times \frac{10}{32} = \frac{1756}{100} = \mathbf{17.56}$

(i) $\frac{\overset{91}{\cancel{2366}}}{10} \times \frac{100}{\underset{1}{\cancel{26}}} = 9 \times 10 = \mathbf{910}$

(j) $\frac{\overset{25}{\cancel{625}}}{\underset{1}{1000}} \times \frac{1000}{\underset{1}{\cancel{25}}} = \frac{25}{1} = \mathbf{25}$

(k) $\frac{\overset{108}{\cancel{1296}}}{\underset{1}{\cancel{1000}}} \times \frac{\overset{1}{\cancel{1000}}}{\underset{9}{\cancel{108}}} = \frac{\overset{12}{\cancel{108}}}{\underset{1}{\cancel{9}}} = \mathbf{12}$

(l) $\frac{745}{\underset{1}{\cancel{100}}} \times \frac{\overset{1}{\cancel{100}}}{32} = \frac{745}{32} = \mathbf{23.28125}$

4. Sohail travels in 17 minutes = 11.05 km

Sohail travels in 1 minutes $= \frac{11.05}{17}$ km

$\therefore$ Sohail travels in 19.5 minutes $= \frac{11.05}{17} \times 19.5 = \frac{215.475}{17} = \mathbf{12.675\ km}$

5. The cost of 16.5 kg onions = ₹ 255.75

The cost of 1 kg onions = ₹ $\frac{255.75}{16.5}$

The cost of 2 kg onions = ₹ $\frac{255.75}{16.5} \times 2 = \frac{511.5}{16.5}$ = ₹ **31**

6. Area of Rectangle = 915.9 sq.m.; breadth = ?
length = 35.5 m

∴ breadth = $\frac{\text{Area}}{\text{length}} = \frac{915.9}{35.5} = 25.8$

7. Perimeter = 260.8 m

Area of the square = $\left(\frac{P}{4}\right)^2 = \frac{P^2}{16} = \frac{26.08 \times 26.08}{16}$

$= \frac{68016.64}{16}$ = **4251.04 sq.m**

8. Cost of 19 books = ₹ 1206.50
Cost of 1 books = 1206.50 ÷ 19 = ₹ 63.5
Cost of 22 books = 22 × 63.5 = ₹ 1397
∴ Rashmi should pay (₹ 1397 – ₹ 1206.50) = ₹ **190.5** more for the books.

9. Cost of 11 l of oil = ₹ 940.50
Cost of 1 l of oil = 940.50 ÷ 11 = ₹ 85.5
Cost of 15 l of oil = 15 × 85.5 = ₹ 1282.5

10. 17 shirts are stitched in = 316.24 m of cloth

1 shirts are stitched in = $\frac{316.25}{17}$ m of cloth

∴ 24 shirts are stitched in = $24 \times \frac{316.25}{17} = \frac{7590}{17}$ = **446.70 m of cloth**

11. Total capacity of the tank = 53.75 *l*
Capacity of 1 jar = 2.15 *l*

Number of jars = 53.75 ÷ 2.15 = $\frac{5375}{215}$ = **25**

∴ 25 jars are required to empty the full tank.

12. Total length of the ribbon = 52.80 m
Total length of 1 ribbon piece of = 1.65 m

∴ No. of ribbon to be cut from the length of ribbon = 52.80 ÷ 1.65 = $\frac{5280}{165}$ = **32**

13. Cost of 254.509 *l* of Petrol = ₹ 11452.50

∴ Cost of 1 *l* of petrol = 11452.50 ÷ 254.50

$= \frac{1145250}{25450}$ = ₹ 45

MCQ's

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

Formative Assessment-1

1. (d) **2.** (d) **3.** (c) **4.** (c) **5.** (c) **6.** (b) **7.** (b) **8.** (c) **9.** (a) **10.** (c) **11.** (b) **12.** (a) **13.** (b) **14.** (b)
15. (b) **16.** (c) **17.** (b) **18.** (b) **19.** (c) **20.** (b)

5. Powers

Exercise 5.1

1. (a) $2^7 = 2\times2\times2\times2\times2\times2\times2 = 128$ (b) $9^4 = 9\times9\times9\times9 = 6561$

(c) $12^2 = 12\times12 = 144$ (d) $6^4 = 6\times6\times6\times6 = 1296$

(e) $8^3 = 8\times8\times8 = 512$ (f) $10^4 = 10\times10\times10\times10 = 10000$

(g) $7^3 = 7\times7\times7 = 343$ (h) $10^3 = 10\times10\times10 = 1000$

2. (a) 7^5 (b) x^3 (c) $3^2\times5^3$ (d) $3^2\times x^3$

(e) $a^2\times b^2\times c^2\times d$ $m^3\times n^2$ (g) $4^3\times t^3$

(h) $10^2\times3^3$ (i) $x^3\times y^3$

(j) $p^3\times q^2$ (k) $3^4\times7^3$

(l) $m^2\times n^2\times p^2\times q$

3. (a) $625 = 5\times5\times5\times5 = 5^4$ (b) $7203 = 3\times7\times7\times7\times7 = 3^1\times7^4$

(c) $256 = 2\times2\times2\times2\times2\times2\times2\times2 = 2^8$

(d) $343 = 7\times7\times7 = 7^3$ (e) $216 = 2^3\times3^3$

(f) $100000 = 10^5 = (2\times5)^5 = 2^5\times5^5$

(g) $32768 = 2^{15}$ (h) $729 = 3^6$

4. (a) $2^8 = 2\times2\times2\times2\times2\times2\times2\times2 = 256$

$8^2 = 8\times8 = 64$

Since 256 > 64, so 2^8 is greater than 8^2.

(b) $2^5 = 2\times2\times2\times2\times2 = 32$

$5^2 = 5\times5 = 25$

Since 32 > 25, so 2^5 is greater than 5^2.

(c) $3^6 = 3\times3\times3\times3\times3\times3 = 729$

$6^3 = 6\times6\times6 = 216$

since 729 > 216, so 3^6 is greater than 6^3.

(d) $2^3 = 2\times2\times2 = 8$, $3^2 = 3\times3 = 9$

since 9 > 8, so 3^2 is greater than 2^3.

(e) $3^5 = 3\times3\times3\times3\times3 = 243$, $5^3 = 5\times5\times5 = 125$

since 243 > 125, so 3^5 is greater than 5^3.

(f) $2^6 = 2\times2\times2\times2\times2\times2 = 64$, $6^2 = 6\times6 = 36$

since 64 > 36, so 2^6 is greater than 6^2.

5. (a) $540 = 54\times10$

$= (2\times27)\times(2\times5)$

$= (2\times3\times3\times3)\times(2\times5)$

$= 2^2\times3^3\times5^1$

(b) $72 = 8\times9$

$= (2\times2\times2)\times(3\times3)$

$= 2^3\times3^2$

(c) $432 = 2 \times 216$
$= 2 \times (6 \times 6 \times 6)$
$= 2 \times (2 \times 3 \times 2 \times 3 \times 2 \times 3)$
$= (2 \times 2 \times 2 \times 2) \times (3 \times 3 \times 3)$
$= 2^4 \times 3^3$

(d) $1000 = 10 \times 10 \times 10$
$= (2 \times 5)\ (2 \times 5) \times (2 \times 5)$
$= (2 \times 2 \times 2) \times (5 \times 5 \times 5)$
$= 2^3 \times 5^3$

(e) $9000 = 9 \times 1000$
$= (3 \times 3) \times (10 \times 10 \times 10)$
$= 3^2 \times (2 \times 5 \times 2 \times 5 \times 2 \times 5)$
$= 3^2 \times (2^3 \times 5^3)$
$= 2^3 \times 3^2 \times 5^3$

(f) $36000 = 36 \times 1000$
$= (6 \times 6) \times (10 \times 10 \times 10)$
$= (2 \times 3 \times 2 \times 3)$
$\times (2 \times 5 \times 2 \times 5 \times 2 \times 5)$
$= 2^5 \times 3^2 \times 5^3$

6. (a) $2^4 \times 3^2 = (2 \times 2 \times 2 \times 2) \times (3 \times 3) = 16 \times 9 = 144$

(b) $3 \times 4^3 = 3 \times (4 \times 4 \times 4) = 3 \times 64 = 192$

(c) $2^4 \times 5 = (2 \times 2 \times 2 \times 2) \times 5 = 16 \times 5 = 80$

(d) $2 \times 10^4 = 2 \times (10 \times 10 \times 10 \times 10) = 20000$

(e) $7^2 \times 2^2 = (7 \times 7 \times 7) \times (2 \times 2)$
$= 49 \times 4 = 196$

(f) $0 \times 10^8 = 0 \times (10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10)$
$= 0 \times 10000000 = 0$

(g) $5^2 \times 3^2 = (5 \times 5) \times (3 \times 3) = 25 \times 9 = 225$

(h) $6^3 \times 2^4 = (6 \times 6 \times 6 \times 6) \times (2 \times 2 \times 2 \times 2) = 216 \times 16 = 3456$

7. (a) $(-6)^3 = (-6) \times (-6) \times (-6) = -216$

(b) $(-5) \times (-2)^3 = (-5) \times (-2) \times (-2) \times (-2) = (-5) \times (-8) = 40$

(c) $(-3)^3 \times (-5)^2 = (-3 \times -3 \times -3) \times (-5 \times -5) = -27 \times 25 = -675$

(d) $(-2)^4 \times (-10)^3 = (-2) \times (-2) \times (-2) \times (-10) \times (-10) \times (-10)$
$= 16 \times (-1000) = 16000$

(e) $(-4)^2 \times (-5)^2 = (-4) \times (-4) \times (-5) \times (-5)$
$= 16 \times 25 = 400$

(f) $(-8)^2 \times (-3)^2 = (-8) \times (-3) \times (-3)$
$= 64 \times 9 = 576$

(g) $(-5) \times (-1)^4 = (-5) \times (-1) \times (-1) \times (-5) = (-5) \times 1 = -5$

(h) $(-16) \times (-1)^7 = (-16) \times (-1) \times (-1) \times (-1) \times (-1) \times (-1) \times (-1)$
$= (-16) \times -1 = 16$

8. (a) $2 \times 10^{12} = 2 \times 1000000000000 = 2000\,000\,000\,000$
$3 \times 10^{16} = 3 \times 10000000000000000 = 30000000000000000$
$\therefore \quad 3 \times 10^{16} > 2 \times 10^{12}$

(b) $1.5 \times 10^{15} = \frac{15}{10} \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10^8$
$= 15000000 \times 10^8 = 150000000 \times 10^7$

$4.5\times10^8 = \frac{45}{10}\times10\times10^7 = 45\times10^7$

$\because$ $150000000 > 45$

$\therefore$ $1.5\times10^{15} > 4.5\times10^8$

(c) $4\times10^{14} = 4\times10^{14}$

$3\times10^{18} = 3\times10^4\times10^{14} = 3\times10000\times10^{14}$

$= 30000\times10^{14}$

$\because$ $30000 > 4$

$\therefore$ $3\times10^{18} > 4\times10^{14}$

(d) $2.5\times10^{12} = 2.5\times10^5\times10^7 = \frac{25}{10\times}\times10\times10\times10\times10\times10\times10^7$

$= 250000\times10^7$

$\because$ $250000 > 35$

$\therefore$ $2.5\times10^{12} > 3.5\times10^8$

(e) $1.7\times10^8 = \frac{17}{10}\times10\times10^7 = 17\times10^7$

$3\times10^{18} = 3\times10^{11}\times10^7 = 3\times100000000000\times10^7$

$= 3000000\,00000\times10^7$

$\because$ $3000000\,00000 > 17$

$\therefore$ $3\times10^{18} > 1.7\times10^8$

(f) $1.9\times10^{12} = \frac{19}{10}\times10^9\times10^3 = \frac{19}{10}\times1000\,000\,000\times10^3 = 1900000000\times10^3$

$= 190000\,00000\times10^2$

$2.9\times10^3 = \frac{29}{10}\times10\times10^2 = 29\times10^2$

$\because$ $190000\,00000 > 29$

$\therefore$ $1.9\times10^{12} > 2.9\times10^3$

Exercise 5.2

Rule : 1 $a^m \times a^m = a^{m+n}$

2. $a^m \div a^n = a^{m-n}$ or $\frac{a^m}{a^n} = a^{m-n}$

3. $(a^m) = a^{m.n}$

4. $a^m \times b^m = (ab)^m$

5. $a^0 = 1$

1. (a) $3^9 \times 3^2 = 3^{9+2} = 3^{11}$

(b) $5^3 \times 5^4 = 5^{3+4} = 5^7$

(c) $7^5 \times 7^3 = 7^{5+3} = 7^8$

(d) $2^{10} \times 2^3 = 2^{10+3} = 2^{13}$

(e) $6^3 \times 6^4 \times 6^2 = 6^{3+4+2}$

(f) $(-3)^2 \times (-3)^9 \times (-3)^7 = (-3)^{2+9+7} = (-3)^{18}$

(g) $m \times m^2 \times m^3 = m^1 \times m^2 \times m^3 = m^{1+2+3} = m^6$

(h) $\left(\frac{1}{4}\right)^6 \times \left(\frac{1}{4}\right)^2 = \left(\frac{1}{4}\right)^{6+2} = \left(\frac{1}{4}\right)^8$

(i) $\left(\frac{-1}{2}\right)^3 \times \left(\frac{-1}{2}\right)^4 = \left(\frac{-1}{2}\right)^{3+4} = \left(\frac{-1}{2}\right)^7$

(j) $\left(\frac{-3}{5}\right)^6 \times \left(\frac{-3}{5}\right)^3 \times \left(\frac{-3}{5}\right)^5 = \left(\frac{-3}{5}\right)^{6+3+5} = \left(\frac{-3}{5}\right)^{14}$

(k) $\left(\frac{-2}{3}\right) \times \left(\frac{-2}{3}\right)^4 \times \left(\frac{-2}{3}\right)^6 = \left(\frac{-2}{3}\right)^{1+4+6} = \left(\frac{-2}{3}\right)^{11}$

(l) $a^4 \times a^5 \times a^3 = a^{4+5+3} = a^{12}$ (m) $b^4 \times b^2 \times b^3 = b^{4+2+3} = b^9$

(n) $x^2 \times x^4 \times x^8 = x^{2+4+8} = x^{14}$ (o) $p^6 \times p^2 \times p^4 = p^{6+2+4} = p^{12}$

(p) $n^6 \times n^2 \times n^{10} = n^{6+2+10} = n^{18}$ (q) $a^2 \times 1^{10} \times a^4 = a^{2+10+4} = a^{16}$

(r) $(-4)^2 \times (-4)^3 \times (-4)^6 = (-4)^{2+3+6} = (-4)^{11}$

(s) $(-6)^2 \times (-6)^5 \times (-6)^5 \times (-6)^4 = (-6)^{2+5+4} = (-6)^{11}$

(t) $(-7) \times (-7)^3 \times (-7)^4 = (-7)^{1+3+4} = (-7)^8$

(u) $(-4)^2 \times (-4)^3 \times (-4)^4 = (-4)^{2+3+4} = (-4)^9$

2. (a) $\frac{3^5}{3^2} = 3^{5-2} = 3^3 \left[\because \frac{a^m}{a^n} = a^{m-n}\right]$ (b) $\frac{4^6}{4^3} = 4^{6-3} = 4^3 \left[\text{by } \frac{a^m}{a^n} = a^{m-n}\right]$

(c) $\frac{6^8}{6^4} = 6^{8-4} = 6^4$ (d) $\frac{10^{12}}{10^5} = 10^{12-5} = 10^7$

(e) $\frac{12^5}{12^3} = 12^{5-3} = 12^2$ (f) $\frac{(-2)^8}{(-2)^6} = (-2)^{8-6} = (-2)^2$

(g) $\frac{(-5)^{10}}{(-5)^4} = (-5)^{10-4} = (-5)^6$ (h) $\frac{(-6)^8}{(-6)^3} = (-6)^{8-3} = (-6)^5$

(i) $\frac{4^5}{4^2} = 4^{5-2} = 4^3$ (j) $\frac{7^{12}}{7^6} = 7^{12-6} = 7^6$

(k) $\frac{x^5}{x^3} = x^{5-3} = x^2$ (l) $\frac{y^5}{y^2} = y^{5-2} = y^3$

(m) $\frac{a^{10}}{a^6} = a^{10-6} = a^4$ (n) $\frac{\left(\frac{1}{2}\right)^{10}}{\left(\frac{1}{2}\right)^5} = \left(\frac{1}{2}\right)^{10-5} = \left(\frac{1}{2}\right)^5$

(o) $\frac{\left(\frac{-4}{7}\right)^{11}}{\left(\frac{-4}{7}\right)^5} = \left(\frac{-4}{7}\right)^{11-5} = \left(\frac{-4}{7}\right)$ (p) $\frac{\left(\frac{-1}{2}\right)^{11}}{\left(\frac{-1}{2}\right)^5} = \left(\frac{-1}{2}\right)^{11-5} = \left(\frac{-1}{2}\right)^6$

(q) $\frac{(0.5)^7}{(0.5)^3} = (0.5)^{7-3} = (0.5)^4$ (r) $\frac{(2.5)^6}{(2.5)^3} = (2.5)^{6-3} = (2.5)^3$

(s) $\frac{(6.8)^{10}}{(6.8)^4} = (6.8)^{10-4} = (6.8)^6$ (t) $\frac{\left(\frac{x}{y}\right)^6}{\left(\frac{x}{y}\right)^4} = \left(\frac{x}{y}\right)^{6-4} = \left(\frac{x}{y}\right)^2$

3. (a) $(3^4)^5 = 3^{4\times5} = 3^{20}$ [by $(a^m)^n = a^{m.n}$]

(b) $(7^3)^4 - 7^{3\times4} = 7^{12}$ [$\because (a^m/n = a^{m.n}$]

(c) $(10^3)^6 = 10^{3\times6} = 10^{18}$ [$\because (a^{m/n} = a^{m.n}$]

(d) $(5^{10})^4 = 5^{10\times4} = 5^{40}$ (e) $(6^{10})^7 = 6^{10\times7} = 6^{70}$

(f) $(12^6)^3 = 12^{6\times3} = 12^{18}$ (g) $(8^4)^9 = 8^{4\times9} = 8^{36}$

(h) $(10^5)^{11} = 10^{5\times11} = 10^{55}$

4. (a) $(3^2)^4 = (3^2 \times 3^2 \times 3^2 \times 3^2) = 3^{(2+2+2+2)} = 3^8 = 6561$

$(3^2)\times 4 = (3\times3)\times4 = 9\times4 = 36$

$\because$ $6561 > 36$

$\therefore$ $(3^2)^4 > (3)^2 \times 4$

(b) $(4^3)^5 = 4^3 \times 4^3 \times 4^3 \times 4^3 \times 4^3 = 4^{(3+3+3+3+3)} = 4^{15}$

$= 1073741824$

$(4^3)\times 5 = (4\times4\times4)\times5 = 64\times5 = 320$

clearly, $(4^3)^5 > (4^3)\times 5$

5. (a) $(3^3)^5 \times (3^4)^2 = (3)^{3\times5} \times (3)^{4\times2} = 3^{15} \times 3^8 = 3^{15+8} = 3^{23}$

[$\because (a^m)^n = a^{m\times n}$ and $a^m \times a^n = a^{m+n}$]

(b) $(7^2)^5 \times (7^3)^6 = 7^{2\times5} \times 7^{3\times6} = 7^{10} \times 7^{18} = 7^{10+18} = 7^{28}$

(c) $(5^3)^6 \times (5^2)^4 = 5^{3\times6} \times 5^{2\times4} = 5^{18} \times 5^8 = 5^{18+8} = 5^{26}$

(d) $(2^{10})^3 \times (2^5)^4 = 2^{10\times3} \times 2^{5\times4} = 2^{30} \times 2^{20} = 2^{(30+20)} = 2^{50}$

(e) $(9^2)^3 \times (9^3)^4 = (9)^{2\times3} \times (9)^{3\times4} = 9^6 \times 9^{12} = 9^{6+12=9^{18}}$

(f) $(10^3)^4 \times (10^5)^3 = (10)^{3\times4} \times (10)^{5\times3} = 10^{12} \times 10^{15} = 10^{12+15} = 10^{27}$

(g) $(2^4)^3 \times (2^3)^2 \times (2^2)^4 = (2)^{4\times3} \times (2)^{3\times2} \times (2)^{2\times4}$

$= 2^{12} \times 2^6 \times 2^8 = 2^{(12+6+8)} = 2^{26}$

(h) $(3^2)^3 \times (3^3)^2 \times (3^4)^3 = (3)^{2\times3} \times (3)^{3\times2} \times (3)^{4\times3}$

$= 3^6 \times 3^6 \times 3^{12} = 3^{6+6+12} = 3^{24}$

6. (a) $5^2 \times 3^2 = (5\times3)^2 = (15)^2$ (b) $6^4 \times 10^4 = (6\times10)^4 = (60)^4$

(c) $(-2)^5 \times (4)^5 = (-2)^5 \times (2\times2)^5$ (d) $10^3 \times (-6)^3 = (10\times(-6)^3 = (-60)^3$

(e) $13^2 \times 5^2 = (13\times5)^2 = (65)^2$ (f) $(-6)^4 \times 3^4 = (-6\times3)^4 = (-18)^4$

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

(h) $(-a)^4 \times (-b)^4 = (-a \times -b)^4 = (ab)^4$ $[\because (-) \times (-) = +]$

7. (a) $(3a)^5 = (3a) \times (3a) \times (3a) \times (3a) \times (3a)$

$= (3 \times 3 \times 3 \times 3 \times 3) \times (a \times a \times a \times a \times a) = 3^6 \times a^5$

(b) $(4 \times 3)^6 = (4 \times 3) \times (4 \times 3) \times (4 \times 3) \times (4 \times 3) \times (4 \times 3) \times (4 \times 3)$

$= (4 \times 4 \times 4 \times 4 \times 4 \times 4) \times (3 \times 3 \times 3 \times 3 \times 3 \times 3) = 4^6 \times 3^6$

(c) $(2 \times b)^4 = (2 \times b) \times (2 \times b) \times (2 \times b) \times (2 \times b)$

$= (2 \times 2 \times 2 \times 2) \times (b \times b \times b \times b) = 2^4 \times b^4$

(d) $(7 \times 3)^{10} = (7 \times 3) \times (7 \times 3) \times (7 \times 3) \times (7 \times 3) \times (7 \times 3) \times (7 \times 3)$

$\times (7 \times 3) \times (7 \times 3) \times (7 \times 3) \times (7 \times 3)$

$= (7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7) \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$

$= 7^{10} \times 3^{10}$

(e) $(-6a)^3 = (-6a) \times (-6a) \times (-6a) = (-6 \times -6 \times -6) \times (a \times a \times a)$

$= (-b)^3 \times (a)^3$

(f) $(a \times b)^{10} = (a \times b) \times (a \times b) \times (a \times b) \times (a \times b) \times (a \times b) \times (a \times b)$

$\times (a \times b) \times (a \times b) \times (a \times b) \times (a \times b)$

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

$= a^{10} \times b^{10}$

(g) $(8 \times -b) = (8 \times -b) \times (8 \times -b) \times (8 \times -b) \times (8 \times -b) \times (8 \times -b) \times (8 \times -b)$

$\times (8 \times -b) \times (8 \times -b) \times (8 \times -b) \times (8 \times -b)$

$= (8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8) \times (-b \times -b \times -b \times -b \times -b$

$\times -b \times -b \times -b \times -b \times -b)$

$= 8^{11} \times (-b)^{11}$

(h) $(-8 \times x)^{15} = (-8 \times x) \times (-8 \times x) \times (-8 \times x) \times (-8 \times x) \times (-8 \times x) \times (-8 \times x)$

$\times (-8 \times x) \times (-8 \times x) \times (-8 \times x) \times (-8 \times x) \times (-8 \times x)$

$\times (-8 \times x) \times (-8 \times x) \times (-8 \times x) \times (-8 \times x) (-8 \times -8 \times -8 \times -8$

$\times -8 \times -8 \times -8 \times -8 \times -8 \times -8 \times -8 \times -8 \times -8 \times -8 \times -8)$

$\times (x \times x \times x \times x \times x \times x \times x \times x \times x \times x \times x \times x \times x \times x \times x \times x \times x)$

$= (-8)^{15} \times (x)^{15}$

8. (a) $2^3 \times 2^2 \times 5^5 = 2^{(3+2)} \times 5^5$

$= 2^5 \times 5^5 = (2 \times 5)^5 = 10^5$ $[\because a^m \times b^m = (a \times b)^m]$

(b) $(6^2 \times 6^4) \div 6^3 = 6^{(2+4)} = 6^6 \div 6^3 = 6^{6-3} = 6^3$ $[\because a^m \div b^n = a^{m-n}]$

(c) $\left(\frac{3^7}{3^2}\right) \times 3^5 = (3^{7-2}) \times 3^5 = 3^5 \times 3^5 = 3^{5+5} = 3^{10}$

(d) $(2^3 \times 2)^2 = (2^3 \times 2^1)^2 = (2^{3+1})^2 = (2^4)^2 = 2^{4 \times 2} = 2^8$

(e) $\left(\frac{a^5}{a^3}\right) \times a^8 \times (a^{5-3}) \times a^8 = a^{2+8} = a^{10}$

(f) $\left(\frac{4^6 \times a^8 b^5}{4^3 \times a^5 b^2}\right) = \left(\frac{4^6}{4^3}\right) \times \left(\frac{a^8}{a^5}\right) \times \left(\frac{b^5}{b^2}\right) = (4^{6-3}) \times (a^{8-5}) \times (b^{5-2})$

(g) $\frac{2^8 \times a^5}{4^3 \times a^3} = \frac{2^8 \times a^5}{(2^2)^3 \times a^3} = \frac{2^8}{2^6} \times \frac{a^5}{a^3} = (2^{8-6}) \times (a^{5-3})$

$= 2^2 \times a^2 = (2 \times a)^2 = (2a)^2$

(h) $\frac{3^8 \times 3^2}{3^4 \times 3^3} = \frac{3^{8+2}}{3^{4+3}} = \frac{3^{10}}{3^7} = 3^{10-7} = 3^3$

MCQ's

1. (c) **2.** (b) **3.** (b) **4.** (c) **5.** (c) **6.** (b) **7.** (a) **8.** (b) **9.** (b) **10.** (c)

6. Algebraic Expressions

Exercise 6.1

1. (a) $y - x$ (b) $\frac{x+y}{2}$ (c) $z \times z = z^2$

(d) $\frac{p \times q}{4} = \frac{pq}{4}$ (e) $x^2 + y^2$ (f) $3(m \times n) + 5 = 3mn + 5$

2. (a) $x^2 + y^2 + z^2 =$ trinomial (b) $14xyz =$ monomials

(c) $-10 =$ binomials (d) $y + 2z =$ binomials

(e) $3x - 4 + 9y =$ trinomials [$\because$ It has 3 terms]

(f) $15z^2 - 2 =$ binomials [$\because$ It has 3 terms]

(g) $a^2 + b^2 + 9c^2 =$ Trinomial [$\because$ It has 3 terms]

(h) $pq + rq - 4 =$ trinomials [$\because$ It has 3 terms]

3. (a) like terms $= (9a^2, -4a^2)$ and $(3b^2, 2b^2)$

(b) like terms $= (2yz, -4yz, 9yz)$ and $(3xy, \frac{-19}{2} yx)$

(c) like terms $= (a^2b^2c, -9a^2cb^2)$

(d) like terms $= (pqr, -32pqr)$

(e) like terms $= (x^2y, yx^2, 4x^2y)$

(f) like terms $= (-xy^2, 2xy^2)$

4. (a) Numerical co-efficients $= \left(\frac{-15}{2}, -30, 6, 4\right)$

(b) Numerical co-effcients $= (9, -1, -10, -11)$

(c) Numerical co-efficients $= (-7, 2, -16, 18)$

(d) Numerical co-efficients $= \left(\frac{-3}{5}, 9, -18\right)$

5. (a) $10y^2z = y^2(10z)$ $\therefore$ Co-efficien of $y^2 = (10z)$

(b) $-14xy^3z = y^2(-14xyz)$ $\therefore$ Co-efficient of $y^2 = (-14xyz)$

(c) $8y^2 = y^2\ (8)$ $\therefore$ Co-efficient of $y^2 = 8$

(d) $\frac{5}{6}y^2x^2z = y^2\left(\frac{5}{6}x^2z\right)$ $\therefore$ Co-efficient of $y^2 = \left(\frac{5}{6}x^2z\right)$

(e) $11x^2y^2z^2 = y^2\ (11x^2z^2)$ $\therefore$ Co-efficient of $y^2 = 11x^2z^2$

(f) $32x^2y^4z = y^2\ (32x^2y^2z)$ $\therefore$ Co-efficient of $y^2 = 32x^2y^2z$

6. (a) $-5y = y(-5)$ $\therefore$ Coefficient of $y = -5$

(b) $2ab = a(2b)$ $\therefore$ Coefficient of $a = 2b$

(c) $-7xy = y(-7x)$ $\therefore$ Coefficient of $y = -7x$

(d) $-3pq = p(-3q)$ $\therefore$ Coefficient of $p = -3q$

(e) $9xy^2 = y^2\ (9x)$ $\therefore$ Coefficient of $y^2 = 9x$

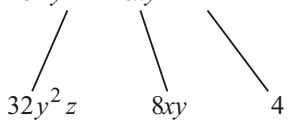
(f) $x^3 + 1 = 2^3\ (1) + 1$ $\therefore$ Coefficient of $x^3 = 1$

(g) $-x^2 = x^2\ (-1)$ $\therefore$ Coefficient of $x^2 = -1$

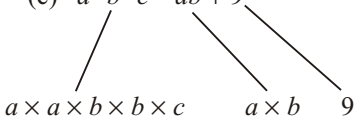
(h) $\frac{-5}{7}x^2y = x^2\left(\frac{-5}{7}y\right)$ $\therefore$ Coefficient of $xc^2 = \frac{-5}{7}y$

7. (a) $-16xyz + 4yz$

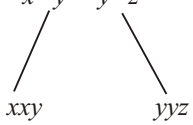
(b) $32y^2z - 8xy - 4$



(c) $a^2b^2c - ab + 9$



(d) $x^2y - y^2z$



8. (a) $-16xyz + 4yz$

Degree of $-16xyz = 3$

Degree of $4yz = 2$

$\therefore$ Degree of $-16xyz + 4yz = 3$ $(\because\ x'.y'.z' = 1+1+1 = 3)$

(b) $32y^2z - 8xy - 4$

Degree of $32y^2z = 2 + 1 = 3$

Degree of $-8xy = 1 + 1 = 2$

Degree of $-4 = 0$

$\therefore$ Degree of $32y^2z - 8xy - 4 = 3$

(c) $a^2b^2c - ab + 9$

Degree of $a^2b^2c = 2 + 2 + 1 = 5$

Degree of $-ab = 1 + 1 = 2$

Degree of $9 = 0$

$\therefore$ Degree of $x^2y - y^2z = 3$

(d) $x^2 y - y^2 z$

Degree of $x^2 y = 2 + 1 = 3$

Degree of $- y^2 z = 2 + 1 = 3$

$\therefore$ Degree of $x^2 y - y^2 z = 3$

9. (a) Degree of $4 = 0$

Degree of $y^2 = 2$

$\therefore$ Degree of $4 = 0$

(b) Degree of $4 = 0$

Degree of $- y^3 = 3$

$\therefore$ Degree of $(4 - y^3) = 3$

(c) Degree of $1 = 0$

Degree of $- 2t = 1$

Degree pf $(1 - 2t + t^2 - 3t^3) = 3$

$\therefore$ Degree of $(x^2 + xy) = 2$

(d) Degree of $x^2 = 2$

Degree of $xy = 1 + 1 = 2$

$\therefore$ Degree of $(x^2 + xy) = 2$

(e) Degree of $4x^3 = 3$

Degree of $- 3x^2 = 2$

Degree of $5x = 1$

Degree of $- 6 = 0$

$\therefore$ Degree of $(4x^2 - 3x^2 + 5x - 6) = 3$

(f) Degree of $x^2 y = 2 + 1 = 3$

Degree of $- xy^2 = 1 + 2 = 3$

Degree of $7xy = 1 + 1 = 2$

Degree of $- 3 = 0$

$\therefore$ Degree of $(x^2 y - xy^2 + 7xy - 3) = 3$

(g) Same as (f)

(h) Degree of $4x^3 = 3$

Degree of $- 7x^2 y = 2 + 1 = 3$

Degree of $5xy^2 = 1 + 2 = 3$

Degree of $- 2 = 0$

$\therefore$ Degree of $(x^3 - 7x^2 y + 5xy^2 - 2) = 3$

(i) Degree of $xy^2 = 1 + 2 = 3$

Degree of $4x^2 y = 2 + 1 = 3$

Degree of $- 7x^2 y = 2 + 1 = 3$

Degree of $- 3xy^2 = 1 + 2 = 3$

Degree of $3 = 3$

$\therefore$ Degree of $(xy^2 + 4x^2 y - 7x^2 y - 3xy^2 + 3) = 3$

Exercise 6.2

1. (a) $24xy + 19xy + (- 4xy) = 43xy - 4xy = 39xy$

(b) $5y^3 + 26y^3 + 10y^3 + (- 3y^3) = 41y^3 - 3y^3 = 38y^3$

(c) $- 10ab^2 c + (- ab^2 c) + 15ab^2 c + ab^2 c = - 10ab^2 c - ab^2 c + 15ab^2 c + ab^2 c$

$= 5ab^2 c$

(d) $3x^2 + (- 10x^2) + 4x^2 = 3x^2 - 10x^2 + 4x^2 = 7x^2 - 10x^2 = - 3x^2$

(e) $8x^2 y + (- 11x^2 y) + (- 8x^2 y) = 8x^2 y - 11x^2 y - 8x^2 y = - 11x^2 y$

(f) $4x^2 y + (- 3xy^2) + (- 5xy^2) + 5x^2 y = 4x^2 y - 3xy^2 - 5xy^2 + 5x^2 y = 9x^2 y - 8xy^2$

2. by column method :

(a) $x^2 + y^2 + 2xy$
$3x^2 + y^2 - 4xy$
$x^2 + y^2 + 0xy$
$5x^2 + 3y^2 - 2xy$

(b) $3ab + 4b$
$10a - 9b$
$16a + 2b$
$29a - 3b$

(c) $x^2 y + xy^2$
$-11x^2 y + 10xy^2$
$-10x^2 y - 11xy^2$
$-20x^2 y + 0$

(d) $14x^2 + 2x + 5$
$5x^2 + 0x + 6$
$19x^2 + 2x + 11$

(e) $4abc + 6a^2 + 7b$
$0abc + 10a^2 + 14b$
$-2abc - 3a^2 + 06$
$2abc + 13a^2 + 216$

(f) $2x^2 + 4y^2 + 5$
$-x^2 + 3y^2 + 10$
$-2x^2 - 4y^2 - 10$
$-x^2 + 3y^2 + 5$

(g) $6x^3 - 3x^2 + 6x - 4$
$4x^3 + 0x^2 + 5x - 10$
$0x^3 + x^2 + 0x - 6$
$10x^3 - 2x^2 + 11x - 20$

3. By column method :

(a) $-14xy$
$10xy$
$-2xy$

(b) $3x^2$
$14x^2$
$11x^2$

(c) $-10x^3 y$
$-5x^3 y$
$-5x^3 y$

(d) $-6ab$
$-18ab$
$-24ab$

(e) $9a^2 b$
$-a^2 b$
$10a^2 b$

(f) $6pq$
$-19pq$
$-13pq$

4. (a) $-x^2 - 2xy + y^2$
$x^2 - xy + y^2$
$- \quad + \quad -$
$-2x^2 - xy$

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

(c) $6p^3 - 4p$
$4p^3 + 3p^2 - 2p$
$- \quad - \quad +$
$2p^3 - 3p^2 - 2p$

(d) $6a - 8b - 10$
$5a - 3b + 15$
$- \quad + \quad -$
$a - 5b - 25$

(e) $10y + 14$
$3x^2 - 5y + 7$
$- \quad + \quad -$
$-3x^2 + 15y + 7$

(f) $3x^2 - 4x + 2$
$-x^2 - 2x + 7$
$+ \quad + \quad -$
$4x^2 - 2x - 5$

(g) $2x^2$

$-6x^2 + 8y + 9$

$+ \quad - \quad -$

$8x^2 - 8y - 9$

(h) $-2a^2 + 3ab - 2b^2$

$5a^2 - 7ab + 5b^2$

$- \quad + \quad -$

$-7a^2 + 10ab - 7b^2$

5. (a) $11xy - x^2 - 4$

$-14xy + 5x^2$

$-3xy + 4x^2 - 4$

$\therefore \quad -3xy + 4x^2 - 4$

$15xy + x^2 + 2$

$12xy + 5x^2 - 2$

6. (a) $5a^2 - b^2 + 6$

$-4a^2 - b^2 + 15$

$a^2 - 2b^2 + 21$

$\therefore \quad a^2 - 2b^2 + 21$

$a^2 + b^2$

$2a^2 - b^2 + 21$

7. **Step 1 :**

$p^2 - q^2 + pq$

$+2p^2 + 4q^2$

$- \quad -$

$3p^2 + 3q^2 + pq$

Step 2 :

$3p^2 + 3q^2 + pq$

$-p^2 + 2pq$

$+ \quad -$

$4p^2 + 3q^2 - pq$

8. **Step 1 :**

$-7a^2b + 9$

$-3ab^2 + 2$

$+ \quad -$

$-7a^2b - 3ab^2 + 11$

Step 2 :

$-7a^2b - 3ab^2 + 11$

$10a^2b + 4ab^2$

$- \quad -$

$-17a^2b - 7ab^2 + 11$

9. $10x^3 - 4x^{2+6}$

$5x^3 - 11x^2 - 4$

$- \quad + \quad +$

$5x^3 + 7x^2 + 10$

10. $14xyz + 6xy$

$-xyz + 7xy$

$+ \quad -$

$15xyz - xy$

11. $P = 2x^2 + 3xy - 5y^2,\ Q = -5x^2 + 2xy + 3y^2\ R = -3x^2 + 5xy - 2y^2$

$P + Q + R = (2x^2 + 3xy - 5y^2) + (-5x^2 + 2xy + 3y^2) - (-3x^2 + 5xy - 2y^2)$

$= 2x^2 + 3xy - 5y^2 - 5x^2 + 2xy + 3y^2 + 3x^2 - 5xy + 2y^2$

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

$= (5x^2 - 5x^2) + (5xy - 5xy) + (5y^2 - 5y^2)$

$= 0 + 0 + 0 = 0$

$= 0$ henced proved.

12. Here, we have to subtract $2x^3 - 7x^2 - 5x + 6$ from $x^3 - 2x^2 + x + 4$

$x^3 - 2x^2 + x + 4$

$2x^3 - 7x^2 - 5x + 6$

$- \quad + \quad + \quad -$

$-x^3 + 5x^2 + 6x - 2$

13. Here, we have to subtract $2x^3 + 4x^2 + 3x + 1$ from $9x^2 + 7x - 2$

$$\begin{array}{r} 9x^2 + 7x - 2 \\ 4x^2 + 3x + 1 + 2x^3 \\ - \quad - \quad - \quad - \\ \hline 5x^2 + 4x - 3 - 2x^3 \end{array}$$

14. $\therefore$ Required other expression $= x^2 - y^2 + 3y - 5$ (on subtraction)

$$\begin{array}{r} 2y^2 + 2x - y - 10 \\ - \quad - \quad + \quad + \\ \hline x^2 - 3y^2 - 2x + 4y + 5 \end{array}$$

Exercise 6.3

1. Given $x = 2, y = 1$

(a) $2x + 3 = 2 \times 2 + 3 = 7$

(b) $4y - 6 = 4 \times 1 - 6 = 4 - 6 = -2$

(c) $4x^2 - 5 = 4 \times (2)^2 - 5 = 4 \times 4 - 5$

(d) $y^2 - 2y = (1)^2 - 2 \times 1 = 1 - 2 = -1$

(e) $x^2 + y^2 - xy = (2)^2 + 1^2 - 2 \times 1 = 4 + 1 - 2$ (f)

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

2. Given $a = 2, b = -2, c = 1$

(a) $2abc + 1 = 2 \times 2 \times (-2) \times 1 = -8 + 1 = -7$

(b) $a^3 + b^3 + c^3 = (2)^3 + (-2)^3 + (1)^3 = 8 - 8 + 1 = 1$

(c) $a^2b + ab^2 = (2)^2 \times (-2) + 2 \times (-2)^2 = 4 \times (-2) + 2 \times 4 = -8 + 8 = 0$

(d) $ab + bc + ac = 2 \times (-2) + (-2) \times 1 + 2 \times 1 = -4 - 2 + 2 = -4$

(e) $a^2b + b^2c + c^2a = (2)^2.(-2) + (-2)^2.1 + (1)^2.2 = -8 + 4 + 2 = -8 + 6 = -2$

(f) $-a^2b - a^2c - 2a^2 = -(2)^2 \times (-2) - (2)^2 \times 1 - 2(2)^2$

$= -4 \times (-2) - 4 \times 1 - 2 \times 4$

$= 8 - 4 - 8 = -4$

(g) $-ab^2c + a^2bc - abc^2 = -(2) \times (-2)^2 \times 1 + (2)^2 \times (-2) \times 1 - 2 \times (-2) \times (1)^2$

(h) $a^2 - b^2 - c^2 - 2ab - 2bc - 2ac = (2)^2 - (-2)^2 (-1)^2 - 2 \times (-2)$

$= -2(-2) \times 1 - 2 \times 2 \times 1$

$= 4 - 4 - 1 + 8 + 4 - 4 = -1 + 8 = 7$

(i) $a^3 + b^3 + c^3 - 3abc = (2)^3 + (-2)^3 + (1)^3 - 3 \times 2 \times (-2) \times 1$

$= 8 - 8 + 1 + 12 = 13$

(j) $2a^2 + 2b^2 - 2c^2 = 2 \times (2)^2 + 2 \times (-2)^2 - 2 \times (1)^2 = 2 \times 4 + 2 \times 4 - 2 \times 1$

$= 8 + 8 - 2 = 16 - 2 = 14$

3. (a) $4p + q - 6p + q = (4p - 6p) + (q + q) = -2p + 2q$

$= -2 \times (-1) + 2 \times 1$ [Put $p = -1, 1 = 1$]

$= 2 + 2 = 4$

(b) $7p^2 + q^2 - 8p^2 - q^2 = (7p^2 - 8p^2) + (q^2 - q^2)$ [Put $p = -1$]

$= -p^2 = -(1)^2 = (-1) = -1$

(c) $10pr - 2qr - 6pr + 4pq = (10pq + 4pq) - 2qr - 6pr$

$= 14pq - 2qr - 6pr$ (Put $p = 1, q = 1, r = 2$)

$= 14 \times (-1) \times 1 - 2\,51 \times 2 - 6 \times (-1) \times 2$

$= -14 - 4 + 12 = -18 + 12 = -6$

(d) $pqr - 6pqr + 7q^2 - 4p^2 = (pqr - 6pqr) + 7q^2 - 4p^2$

$= (-5pqr) + 7q^2 - 4p^2$

$= [-5 \times (-1) \times 1 \times 2] + 7(1)^2 - 4(-1)^2$

[Putting $p = -1, q = 1, r = 2$]

$= 10 + 7 - 4 = 17 - 4 = 13$

(e) $5p^2 - 6q - 7r^2 + 6p^2 - 5q^2 + 2r^2$

$= (5p^2 + 6p^2) + (-6q^2 - 5q^2) + (-7r^2 + 2r^2)$

$= 11p^2 + (-11q^2) + (-5r)^2$

$= 11.(-1)^2 - 11.(1)^2 - 5.(2)^2$ [Putting $p = -1, q = 1, r = 2$]

$= 11 - 11 - 20 = -20$

(f) $5(p + q) - 3p - 2q = 5p + 5q - 3p - 2q = (5p - 3p) + (5q - 2q)$

$= 2p + 3q$ [Puting $p = -1, q = 1$]

$= 2 \times (-1) + 3 \times 1$

$= -2 + 3 = 1$

4. (a) $x + 7 + 4(x - 5) = x + 7 + 4x - 20 = 5x + 7 - 20$

$= 5x - 13$

Put $x = 2$ in $(5x - 13)$, we have

$5x - 13 = 5 \times 2 - 13 = 10 - 13 = -3$

(b) $3(x + 2) + 5x - 7 = 3x + 6 + 5x - 7$

$= (3x + 5x) + (6 - 7) = 8x - 1$

Put $x = 2$ in $(8x - 1)$, we have

$8x - 1 = 8 \times 2 - 1 = 16 - 1 = 15$

(c) $6x + 5(x - 2) = 6x + 5x - 10 = 11x - 10$

Put $x = 2$ in $(11x - 10)$, we have

$11x - 10 = 11 \times 2 - 10 = 22 - 10 = 12$

(d) $4(2x - 1) + 3x + 11 = 8x - 4 + 3x + 11 = (8x + 3x) + (11 - 4)$

$= 11x + 7$

Put $x = 2$ in $(11x + 7)$, we have

$11x + 7 = 11 \times 2 + 7 = 22 + 7 = 29$

5. (i) Put $z = 10$, in

$z^3 - 3(z - 10) = 10^3 - 3(10 - 10) = 1000 - 3 \times 0 = 1000$

(ii) Put $p = -10$, in

$p^2 - 2p - 100 = (-10)^2 - 2 \times (-10) - 100$

$= 100 + 20 - 100 = 20$

MCQ's

1.(b) **2.** (c) **3.** (b) **4.** (a) **5.** (c) **6.** (b) **7.** (c) **8.** (c) **9.** (a) **10.** (d).

7. Unitary Method/Percentages

Exercise 7.1

1. Cost of 8 kg of sugar = ₹ 96

Cost of 1 kg of sugar ₹ $96 \div 8 = \frac{\overset{12}{\cancel{96}}}{\underset{1}{\cancel{8}}} =$ ₹ 12

Cost of 40 kg of sugar = ₹ $12 \times 40 =$ ₹ 480

2. Money spent by me in 3 weeks (i.e., in 21 days) = ₹ 243 $\begin{bmatrix} \because 1 \text{ week} = 7 \text{ day} \\ 3 \text{ week} = 3 \times 7 = 21 \text{ days} \end{bmatrix}$

Money spent by me in 1 day = ₹ $\frac{243}{21}$

Money spent by me in 365 days (i.e. 1 year) = $\frac{₹\ 243 \times 365}{21}$ $[\because 1 \text{year} = 365 \text{days}]$

= ₹ 4223.57

3. 120 chocolates are packed in = 4 boxes

1 chocolate is packed in = $\frac{4}{120}$ boxes

$\therefore$ 210 chocolates are packed in = $\frac{\overset{1}{\cancel{4}}}{\underset{3}{\cancel{120}}} \times 210$ boxes $= \frac{21}{3} = 7$ boxes

4. A cart deliver wheat in 3 loads = 390 kg

A cart delivers wheat in 1 loads = $\frac{390}{13}$ kg

A cart delivers wheat in 5 loads = $\frac{\overset{30}{\cancel{390}}}{\underset{1}{\cancel{13}}} \times 5 = 30 \times 5 = 150$

5. Cost of 17 bags cement = ₹ 1674.50

Cost of bag cement = ₹ $\frac{1674.50}{17}$

Cost of 5 bags in = ₹ $\frac{1674.50}{17} \times 5$

= ₹ 98.5 × 5 = ₹ 492.50

6. $\because$ Per anum (1 year = 12 months) salary = ₹ 91,200

1 month salary = ₹ $\frac{91200}{2}$

$\therefore$ 9 months salary = ₹ $\frac{\overset{7600}{\cancel{91200}}}{\underset{1}{\cancel{12}}} \times 9$

= ₹ $7600 \times 9 =$ ₹ 68,400

7. Distance travelled by a jet plane in 3 hours = 2700 km

Distance travelled by a jet plane in 1 hour = $\frac{2700}{3}$

Distance travelled by a jet plane in $7\frac{1}{2} = \left(\frac{15}{2}\right)$ hours $= \frac{\overset{450}{\cancel{900}}}{\underset{1}{\cancel{3}}} \times \frac{15}{\underset{1}{\cancel{2}}}$

$= 450 \times 15 = 6750$ km

8. Cyclist covers 23 km in = 1 hour

Cyclist covers 1 km in $= \frac{1}{23}$ hour

Cyclist covers 161 km in $= \frac{1}{123} \times 161 = 7$ hours

9. Train travels 390 km in = 6 hours

Train travels 1 km in $= \frac{6}{390}$ hours

Train travels 1365 km trip $= \frac{6}{\underset{65}{\cancel{390}}} \times \overset{105}{\cancel{1365}} = \frac{\overset{21}{\cancel{105}}}{\underset{1}{\cancel{5}}} = 21$ hours

10. A water pipe can fill 250 litre tank in = 2 hr. 30 min $= 2\frac{1}{2}$ hr. $= \frac{5}{2}$ hr.

A water pipe can fill 1 litre tank in $= \frac{5}{2} \times 250 = \frac{5}{2} \times \frac{1}{250}$ hr.

A water pipe can fill $\frac{9}{10}$ litre = (225 l) in $= \frac{5}{2} \times \frac{1}{250} \times \left(\frac{9}{10} \times 250\right)$

$\left[\because \frac{9}{10} \text{ of the tank} = \frac{9}{10} \times 250 = 225\,l\right]$

$= \frac{5}{2} \times \frac{9}{\underset{2}{10}} = \frac{9}{4}$ hr.

$= \frac{9}{\underset{1}{4}} \times \overset{15}{60}$ min $= 9 \times 15$ min

$= 135$ min $= 2$ hr. 15 min.

11. In ₹ 1517.75 cloth can be purchased = 27 m

In ₹ 1 cloth can be purchased $= \frac{27\text{ m}}{1518.75}$

In ₹ 1068.75 cloth can be purchased $= \frac{\cancel{27}}{\underset{56.25}{\cancel{1518.75}}} \times 1068.75 = \frac{1068.75}{56.25}$

$= 19$ m of cloth

12. Cost of 75 envelopes = ₹ 637.50

Cost of 1 envelopes = ₹ $\frac{637.50}{75}$ = ₹ 8.50

Cost of 23 envelopes = ₹ $\frac{637.50}{75} \times 23$ = ₹ 195.50

$\because$ Cost of 1 envelope = ₹ 8.50

$\because$ Cost of 800 such envelopes = ₹ 8.50 × 800 = ₹ 6800

13. Number of chair in ₹ 5120 = 20

Number of chair in ₹ 1 $= \frac{20}{5120}$

Number of chair in ₹ 7936 $= \frac{20}{\cancel{5120}_{256}} \times \overset{31}{\cancel{7936}} = 31$

14. Cost of repairing a road of 1 mile (i.e. 1.6 km) = ₹ 24,000

Cost of repairing a road of 1 km = ₹ $\frac{24000}{1.6}$ = ₹ 15000

15. Cost of 30 pens = ₹ 45

Cost of 1 pen = ₹ $\frac{45}{30}$

Cost of 45 pens = ₹ $\frac{45}{\cancel{30}_{2}} \times \overset{3}{\cancel{45}} = \frac{45 \times 3}{2} = \frac{135}{2}$ = ₹ 67.5

16. Cost of 4 TV set = ₹ 1,12,000

Cost of 1 TV set = ₹ $\frac{1{,}12{,}000}{4}$

Cost of 23 TV sets $= \frac{112000}{4} \times 23 = 28000 \times 23$ = ₹ 6,44,000

17. Man travelled 420 km in = 12 hours

Man travelled 1 km in = 12 ÷ 420

Man travelled $\frac{1}{630}$ km in $= \frac{12}{400} \times 630 = 18$

Exercise 7.2

1. (a) $\frac{1}{2} = \frac{1}{2} \times 100\% = 50\%$

(b) $\frac{2}{5} = \frac{2}{\cancel{5}} \times \overset{20}{\cancel{100}}\% = 40\%$

(c) $\frac{24}{80} = \frac{24}{\cancel{80}_{4}} \times \overset{5}{\cancel{100}}\% = \frac{\overset{6}{\cancel{24}} \times 5}{\cancel{4}_{1}}\% = 30\%$

(d) $\frac{21}{70} = \frac{\overset{3}{\cancel{21}}}{\cancel{70}} \times 100\% = 30\%$

(e) $\frac{33}{50} = \frac{33}{\cancel{50}_{1}} \times \overset{2}{\cancel{100}}\% = 66\%$

(f) $\frac{5}{60} = \frac{5}{\cancel{60}_{3}} \times \overset{5}{\cancel{100}}\% = \frac{25}{3}\% = 8\frac{1}{3}\%$

2. (a) $2.05 = \frac{205}{100} = 205\%$

(b) $0.92 = \frac{92}{100} = 92\%$

(c) $0.09 = \frac{09}{100} = 9\%$

(d) $5.98 = \frac{598}{100} = 598\%$

(e) $0.4 = \frac{4}{100} \times \frac{4 \times 10}{10 \times 10} = \frac{40}{100} = 40\%$

(f) $50.2 = \frac{502}{10} = \frac{5020}{100} = 5020\%$

(g) $0.275 = \frac{275}{100} = \frac{275}{100 \times 10} = \frac{27.5}{100} = 27\%$

(h) $0.02 = \frac{2}{100} = 2\%$

(i) $0.001 = \frac{1}{1000} = \frac{1}{100 \times 100} = \frac{0.1}{100} = 0.1\%$

3. (a) $25\% = \frac{\overset{1}{\cancel{25}}}{\underset{4}{\cancel{100}}} = \frac{1}{4}$ (b) $12.5\% = \frac{\overset{5}{\overset{1}{\cancel{125}}}}{\underset{1}{\cancel{10}} \times \underset{4}{\cancel{100}}} = \frac{1}{8}$

(c) $33\frac{1}{3}\% = \frac{100}{3}\% = \frac{\overset{1}{\cancel{100}}}{3 \times \underset{1}{\cancel{100}}} = \frac{1}{3}$ (d) $15\% = \frac{\overset{3}{\cancel{15}}}{\underset{20}{\cancel{100}}} = \frac{3}{20}$

(f) $\frac{18.5}{100} = \frac{\overset{37}{\cancel{185}}}{100 \times \underset{2}{\cancel{10}}} = \frac{37}{200}$

4. (a) $50\% = \frac{50}{100} = \frac{1}{2} = 0.5$ (b) $33\frac{1}{3}\% = \frac{100}{3 \times 100} = \frac{1}{3} = 0.38$

(c) $66\frac{2}{3}\% = \frac{200}{3}\% = \frac{\overset{2}{\cancel{200}}}{3 \times \cancel{100}} = \frac{2}{3} = 0.66$ (d) $15\% = \frac{15}{100} = 0.15$

(e) $12.5\% = \frac{12.5}{100} = \frac{125}{1000} = 0.125$ (f) $17.5\% = \frac{175}{100} = \frac{175}{1000} = 0.175$

5. (a) Required $\% = \frac{\overset{1}{\cancel{30}}}{\underset{2}{\cancel{60}}} \times 100 = 50\%$ (b) Required $\% = \frac{₹\,20}{₹\,20} \times 100\% = 100\%$

(c) Required $\% = \frac{60\,\text{kg}}{\cancel{80}\,\text{kg}} \times \overset{25}{\cancel{100}} = 75\%$

(d) Required $\% = \frac{\overset{1}{\cancel{15}}\,\text{m}}{\underset{5}{\cancel{75}}\,\text{m}} \times 100 = \frac{100}{5} = 20\%$

(e) Required $\% = \frac{\overset{1}{\cancel{112}\,l}}{\underset{2}{\cancel{224}\,l}} \times 100 = \frac{100}{2} = 50\%$

6. (a) 25% of $64 = \frac{\overset{1}{\cancel{25}}}{\underset{4}{\cancel{100}}} \times 64 = 16$

(b) $33\frac{1}{3}\%$ of $456 = \frac{100}{3}\%$ of $456 = \frac{100}{3 \times 100} \times 456 = 152$

(c) $66\frac{2}{3}\%$ of $567 = \frac{200}{3}\%$ of $567 = \frac{\overset{2}{\cancel{200}}}{\cancel{3} \times \cancel{100}} \times \overset{189}{\cancel{567}} = 2 \times 180 = 378$

(d) $12\frac{1}{2}\%$ of ₹ $24 = \frac{25}{2}\%$ ₹ $24 = \frac{25}{2 \times \underset{1}{\cancel{4}}} \times \overset{6}{\cancel{24}} = \frac{\overset{3}{\cancel{6}}}{2} = ₹\,3$

(e) 20% of $800\text{ kg} = \frac{20}{100} \times 800\text{ kg} = 20 \times 8\text{ kg} = 160\text{ kg}$

(f) 30% of $70\text{ kg} = \frac{30}{100} \times 70\text{ kg} = 21\text{ kg}$

(g) 45% of $73\text{ hours} = \frac{45}{100} \times 73\text{ hour} = \frac{3285}{100}\text{ hours} = 32.85\text{ hours}$

(h) 54% of $25\text{ m} = \frac{54}{\cancel{100}_{4}} \times \overset{1}{\cancel{25}}\text{ m} = \frac{54}{4} = 13.5\text{ m}$

(i) 27% of $90\ l = \frac{27}{100} \times 90\ l = \frac{243\ l}{10} = 24.3\ l$

(j) 12% of ₹ $65 = \frac{12}{100} \times 65 = \frac{780}{100} =$ ₹ 7.8

7. (a) Required Number $= \left(\frac{25}{10}\right) \times 100 = 250$

(b) Required Number $= \frac{2 \times 100}{\frac{25}{4}} = \frac{2 \times \overset{4}{\cancel{100}} \times 4}{\cancel{25}} = 32$

(c) Required Number $= \left(\frac{23\text{ kg}}{57\frac{1}{2}}\right) \times 100 = \left(\frac{23\text{ kg}}{\frac{115}{2}}\right) \times 100 = \frac{\overset{1}{\cancel{23}} \times \overset{20}{\cancel{100}} \times 2}{\underset{1}{\cancel{115}_{\cancel{5}}}} = 40$

8. (a) The Required Number $= 80\% + 10\%$ of $80 = \frac{10 \times 80}{100} = 80 + 8 = 88$

(b) The Required Number $= 150 - 5$ of $150 = \frac{5 \times 150}{100} = 150 - \frac{75}{10} = 150 - 7.5 = 142.5$

(c) The Required Number $= 240 - 25\%$ of $250 = \frac{240 - 240 \times 25}{100} = 2400 - \frac{600}{10}$

Exercise 7.3

$$\text{Increase \%} = \frac{\text{Increase}}{\text{Original Value}} \times 100\%$$

$$\text{Decrease \%} = \frac{\text{Decrease}}{\text{Original Value}} \times 100\%$$

1. Total Number of oranges in the basket = 300
Spoilt oranges in the basket = 35%
∴ Number of spoilt oranges = 35% of 300

$$= \frac{35}{100} \times 300 = 35 \times 3 = 105$$

∴ Required Number of oranges not spoilt $= 300 - 105 = 295$

2. Factory labourer earns wages per month = ₹ 5600
Money spends by him = ₹ 4800
∴ His savings = ₹ 5600 – 4800 = ₹ 800

Required % of Total earning $= \frac{₹\,800}{₹\,5600} \times 100\%$

$= \frac{100}{7}\% = 14.28\%$ or $14\frac{2}{7}\%$

3. Total Number of day in the Monthof June = 30 days
Number of days in which it rained = 28 days
so non-rainy days = $30 - 28 = 2$ days

$\therefore$ Required % of non-rainy days $= \frac{2}{30} \times 100\%$

$= \frac{20}{3}\% = 6\frac{2}{3}\%$

4. Total rail track = 1000 km
Distance of rail track has to be repaired = 125 km
Distance of rail track that has not to be repaired = $100 - 125 = 875$ km
(i.e., It is good track)

$\therefore$ % of good rail track $= \frac{875}{1000} \times 100\% = \frac{875}{10}\% = 87.5\%$

5. Total no. of students = 120
girls = 60%

$\therefore$ No. of girls = 60% of $120 = \frac{60}{100} \times 120 = 72$

$\therefore$ No. of boys $= 120 - 72 = 48$

6. Total expenses amount = ₹ 3750
broker charges commission $= 33\frac{1}{3}\%$ of total expenses

$= \frac{10}{3}\%$ of ₹ 3750

$\therefore$ Amount paid as comission $= \frac{10 \times 3750}{3 \times 100} =$ ₹ 125

7. Total Amount = ₹ 1236
Amount given as charity $= 33\frac{1}{3}\% = \frac{100}{3}\%$

$\therefore$ Required Amount given as charity $= \frac{100}{3}\%$ of ₹ 1236

$= \frac{100}{3 \times 100} \times 1236 =$ ₹ 412

8. The cake weight = 2.25 kg
Sugar in cake = 35%

$\therefore$ Required Weight of sugar in cake = 35% of 2.25 kg

$= \frac{35}{100} \times 2.25 \times 1000$ gm $\quad [\because 1\text{kg} = 1000\text{gm}]$

$= 35 \times 2.25 \times 10 = 787.5$ gm

9. Salary of employee for 1 month = ₹ 15,250
Salary of employee for 12 month (i.e., Annual Salary)

= ₹ $15250 \times 12 =$ ₹ 183000

bonus declared for the employee = 2%

$\therefore$ bonus amount = 2% of Annual salary

$$= \frac{2}{100} \times 183000$$

$$= 1830 \times 2 = ₹\ 3660$$

10. Total number of throws of a coin = 60

number of time recorded to get tail = 35%

$\therefore$ Number of Fails recorded (or, got) = 35% of 60

$$= \frac{35}{\cancel{100}_{5}} \times \overset{3}{\cancel{60}} = \frac{105}{5} = 21$$

and number of heads got (or, recorded) = 60 – 21 = 39

11. The population of a town in 1986 = 70,350

and population of a town in 1987 = 1,05,525

increase in population during 1 year = 1,05,525 – 70,350 = 37175

$\therefore$ Required increase % in population in 1987 $= \frac{35175}{70350} = 100 = 50\%$

12. Original cost of Article = ₹ 5

and the retailer sells it for = ₹ 7.50

increase in price = ₹ 7.50 – ₹ 5 = ₹ 2.5

$\therefore$ Required increase % $= \frac{\text{increase value}}{\text{original value}} \times 100\%$

$$= \frac{2.5}{5} \times 100 = \frac{\overset{50}{\cancel{250}}}{\cancel{5}_{1}} = 50\%$$

13. Cost of a garment = ₹ 700

discount on it = 5%

$\therefore$ Required discount amount = 5% of ₹ 700 $= \frac{5}{\cancel{100}} \times \overset{7}{\cancel{700}} =$ ₹ 35

14. Total population before the epidemic = 13568

because of an epidemic, decrease in the population $12\frac{1}{2}\% = \frac{25}{2}\%$

$\therefore$ Required decrease in population $= \frac{25}{2}\%$ of 13568

$$= \frac{\overset{1}{\cancel{25}} \times 13568}{2 \times \cancel{100}_{4}}$$

$$= \frac{13568}{8} = 1696$$

Hence 1696 people died due to the epidemic.

15. Let the number = x

then, 20% of x = 8

$$\Rightarrow \quad y = \frac{8 \times \overset{500}{\cancel{100}}}{\cancel{20}_{1}} = 40$$

$$\Rightarrow \quad x = 40$$

16. Let the number = y

Then, 30% of $y = 150$ $\Rightarrow$ $y = \dfrac{\overset{5}{\cancel{150}} \times 100}{\underset{1}{\cancel{30}}} = 500$

$\Rightarrow$ $y = 500$

17. Number of students out of 120 who got disctinction in Maths = 80

$\therefore$ Required % of students who got distinction in Maths $= \dfrac{\overset{4}{\cancel{80}}}{\underset{6}{\cancel{120}}} \times 100\%$

$= \dfrac{400}{6} = 66.66\%$

Number of students out of 100 who got distinction in English = 70

$\therefore$ Required % of students who got distinction in English $= \dfrac{70}{100} \times 100\% = 70\%$

Since 70% > 66.66%. Hence English is better.

18. Class VI : Sect-A, Total students = 50

No. of students passed the exam = 45

$\therefore$ Pass student % $= \dfrac{45}{\underset{1}{\cancel{50}}} \times \overset{2}{\cancel{100}}\% = 90\%$

Sect.-B Total students = 60

failed students = 5

$\therefore$ Passed students = 60 – 5 = 55

pass students % $= \dfrac{55}{60} \times 100\% = \dfrac{550}{6}\% = 91.66\%$

Since 91.66% > 90%. Hence Sec.-B had better results.

19. Let total number of students = x

girls % = 54%, boys % = 46%

and number of girls = 27

$\therefore$ 54% of $x = 27$

$\dfrac{54}{100} \times x = 27$ $\Rightarrow$ $x = \dfrac{\overset{1}{\cancel{27}}}{\underset{2}{\cancel{54}}} \times 100 = \dfrac{100}{2} = 50$

Hence total number of students = 50

20. Let total number of pages in the book = 100

Govind read the pages in a day = 75%

so, the remaining pages to be read = 100 – 75 = 25%

but it is given that 32 pages still has to read by Govind.

$\Rightarrow$ $25\% = 32$ pages

or, $1\% = \dfrac{32}{25}$ pages

or, $100\% = \dfrac{32}{\cancel{25}} \times \overset{4}{\cancel{100}}$

$= 32 \times 4 = 128$ pages

Hence, total number of pages in the book = 128 pages

21. Let total salary of Mr. Rao = ₹ 100

Mr. Rao spends = 80% of his salary = $\frac{80}{100} \times 100 = ₹\ 80$

$\therefore$ He saves = 100 – 80 = ₹ 20; i.e. 20%

but he saves every month = ₹ 650

$\therefore$ $20\% = ₹\ 650 \quad \Rightarrow \quad 1\% = ₹\ \frac{650}{20}$

$\Rightarrow \quad 100\% = \frac{650}{\cancel{20}_{1}} \times \cancel{100}^{5} = ₹\ 3250$

22. Let total students = 100

passed students = 90%

$\therefore$ failed students = 100 – 90 = 10%

but it is given that failed students are 12

$\therefore$ $10\% = 12$ and $100\% = \frac{12}{10} \times 100 = 120$

$1\% = \frac{12}{10}$ Hence 120 students appeared in the exam.

Exercise 7.4

Formulae :

1. Profit = S.P. – C.P. (when S.P. > C.P.)
   or, S.P. = CP + Profit
   or, C.P. = S.P. – Profit
2. Less = C.P. – S.P. (when S.P. < C.P.)
   or, S.P. = C.P. – Loss
   or, C.P. = S.P. + Loss
3. **Overhead charges :**
   C.P. = Price at which goods purchased + overhead expenses

1. C.P. of a dozen (or 12) eggs = ₹ 15

S.P. of 1 egg = ₹ 2.50

$\therefore$ S.P. of a dozen (or, 12) egs = ₹ 2.50 × 12 = ₹ 30

Since S.P. > C.P. therefore there is a profit (gain).

Profit = S.P. – C.P.

= 30 – 15 = ₹ 15

2. C.P. of chair 3 = ₹ 650

Profit on the chair = ₹ 200

S.P. = ?

by; S.P. = C.P. + Profit

$\therefore$ S.P. = 650 + 200

= ₹ 850

3. S.P. of an article = ₹ 1250

loss on it = ₹ 15

C.P. = ?

C.P. of the article = S.P. + Loss

= 1250 + 215

= ₹ 1465

4. C.P. of 1 kg sugar = ₹ 13.50

and cost of 500 gm packet = 25 P = ₹ $\frac{25}{100}$ = ₹ 0.25

∴ Cost of 1000 gm (i.e., 1 kg) packet = ₹ 0.25 × 2 = ₹ 0.50

Total cost of 1 kg sugar with packet = ₹ 13.50 + ₹ 0.50

= ₹ 14.00

∴ Total cost of 10 kg sugar = ₹ 14 × 10 = ₹ 140

S.P. of 10 kg sugar = ₹ 155

Since S.P. > C.P. Therefore, there is a profit.

by profit = S.P. – C.P.

= ₹ 155 – ₹ 140 = ₹ 15

5. S.P. of TV set = ₹ 21,50

S.P. of its cabinet = ₹ 1800

Total S.P. of 1 set with cabinet = ₹ 21500 + ₹ 1800 = ₹ 23300

∴ Total S.P. of 8 such sets with cabinets = ₹ 23330 × 8 = ₹ 1,86,400

C.P. of the TV set = ₹ 13,500

C.P. of the cagbinet = ₹ 1250

Total C.P. of 1 set with cabinet = ₹ 13500 + ₹ 1250 = ₹ 14750

∴ Total C.P. of 8 such sets with cabinets = ₹ 14750 × 8 = ₹ **1,18,000**

Since S.P. of 8 sets > C.P. of sets

Therefore, there is a profit

by profit = S.P. – C.P.

= ₹ 1,86,400 – ₹ 1,18,000 = ₹ **68400**

6. Cost price of defective Titan watch = ₹ 1550

Selling price of defective Titan watch = ₹ 1325

Since C.P. > S.P. Therefore, there is a loss.

Loss = C.P. – S.P.

= ₹ 1550 – ₹ 1325 = ₹ 225

7. Cost of box = ₹ 670

Cost of painting it = ₹ 45

and cost of transport it = ₹ 25

∴ Total cost of box = ₹ 670 + ₹ 45 + ₹ 25 = ₹ 743

Selling price of this box = ₹ 1120

Since S.P. > C.P. Therefore, there is a gain (Profit)

∴ Gain = S.P. – C.P.

= ₹ 45900 – ₹ 2100 = ₹ 43800

If the S.P_2 of the car be = ₹ 53670, then P_2 = ?

∴ Profit (P_2) = S.P_2 – C.P.

= ₹ 53670 – ₹ 43800 = ₹ 9870

difference on both the profits = $P_2 - P_1$ = ₹ 9870 – ₹ 2100 = ₹ 7770

∴ He would have got ₹ 7,770 more profit.

9. Less on 1000 copies of a book = ₹ 520

C.P. of 1 book = ₹ 10.50

Then, C.P. of 1000 copies of this book = ₹ 10.50 × 1000 = ₹ 10500

S.P. of 1000 books = ?

S.P. of 1000 books = C.P. of 1000 books – loss on 1000 copies of the book.

= ₹ 10500 – ₹ 520 = ₹ 9980

10. Cost of each (one) sweater = ₹ 430
S.P. of 25 sweaters = ₹ 14750
C.P. of 25 sweaters = ₹ 430 × 25 = ₹ 10750
∴ Total profit on 25 sweaters = S.P. of sweaters – C.P. of 25 sweaters
= ₹ 14750 – ₹ 10750 = ₹ 4000
∴ Profit on Per (i.e. 1) sweater = ₹ $\frac{4000}{25}$ = ₹ 160

Exercise 7.5

Formula :

$$\text{Profit \%} = \frac{\text{Profit}}{\text{C.P.}} \times 100\%$$

$$\text{Loss \%} = \frac{\text{Loss}}{\text{C.P.}} \times 100\%$$

1. (a) C.P. = ₹ 72 per dozen S.P. = ₹ 7.50 per piece
S.P. = ₹ 7.50 × 12 = ₹ 90 per dozen
P = S.P. – C.P. = ₹ 90 – ₹ 72 = ₹ 18

$$P\% = \frac{P}{C.P.} \times 100\% = \frac{\cancel{18}^{1}}{\cancel{72}_{4}} \times 100 = \frac{100}{4} = 25\%$$

(b) C.P > ₹ 4500, S.P. = ₹ 4250
Since S.P. < C.P. There is a less.
Loss (L) = C.P. – S.P.
= ₹ 4500 – ₹ 4250 = ₹ 250

$$\text{Loss (L\%)} = \frac{L}{C.P.} \times 100\% = \frac{250}{4500} \times 100 = 5.55\%$$

(c) C.P. for 100 m = ₹ 2000 C.P. for 1 m = ₹ $\frac{2000}{100}$ = ₹ 20
S.P. for per (i.e., one) m = ₹ 38
Since S.P. > C.P., there is a profit
P = S.P. – C.P. = ₹ 38 – ₹ 20 = ₹ 18

$$P\% = \frac{P}{C.P.} \times 100\% = \frac{18}{20} \times 100\% = 90\%$$

(d) C.P. = ₹ 2400, Loss % = 6%
by formula : $\text{Loss \%} = \frac{\text{Loss}}{\text{C.P.}} \times 100 = \frac{\text{Loss}}{2400} \times 100$
Loss = 24 × 6 = ₹ 144 S.P. = ?
by, S.P. = C.P. – Loss = ₹ 2400 – ₹ 144 = ₹ 2256

2. C.P. of cow = ₹ 8500 Loss = 3%, S.P. = ?
If C.P. is ₹ 100 than S.P. is ₹ 97 (∵ S.P. = C.P. – Loss)
If C.P. is ₹ 1 then S.P. is ₹ $\frac{97}{100}$.
If C.P. is ₹ 8500 then S.P. ₹ $\frac{97}{100} \times 8500$ = ₹ 97 × 85 = ₹ 8245

$$\text{Loss} = 3\% \text{ of C.P.} = \frac{3}{100} \times 8500$$
$$= 3 \times 85 = ₹ 255$$

3. C.P. of An article = ₹ 55 Profit = 5%
If C.P. is ₹ 100 then S.P. is ₹ 100 + 5 = 105.
If C.P. is ₹ 55 then S.P. ₹ $\frac{105}{100}$
If C.P. is ₹ 55 then S.P. = $\frac{105}{100} \times 55 =$ ₹ $\frac{5775}{100} =$ ₹ 57.75

4. C.P. of dozen (= 12) Eggs = ₹ 24 C.P. of 1 egg = ₹ $\frac{24}{12} =$ ₹ 2
C.P. of 100 eggs = ₹ 2 × 100 = ₹ 200 gain = 12%
S.P. of 100 eggs = ?
by formula, $P\% = \frac{P}{C.P.} \times 100$ [∵ gain = profit]

$$12 = \frac{P}{200} \times 100 = \frac{P}{2}$$

or, $P = 12 \times 2 =$ ₹ 24
by formula, S.P. = C.P. + P
S.P. of 100 eggs = C.P. of 100 Egg + Profit (gain)
= 200 + 24 = ₹ 224

5. C.P. of 11 Bananas = ₹ 10 C.P. of 1 Bananas = ₹ $\frac{10}{11}$ $\left[\frac{10}{11} = 0.90, \frac{11}{10} = 1.1\right]$
S.P. of 10 Banans = ₹ 11 S.P. of 1 Bananas = ₹ $\frac{11}{10}$
Since S.P. of 1 Banana > C.P. of 1 Banana
Therefore, there is a profit (gain).
[**Note :** gain = profit, same thing]
Hence, Profit = S.P. – C.P.

$$= \frac{11}{10} - \frac{10}{11} = \frac{11 \times 11 - 10 \times 10}{110} = \frac{121 - 100}{110} = \frac{21}{110}$$

$$\text{Profit \%} = \frac{\text{Profit}}{C.P.} \times 100 = \frac{\left(\frac{21}{110}\right)}{\left(\frac{10}{11}\right)} \times 100 = \frac{21 \times 11}{110 \times 10} \times 100 = \frac{21 \times 11}{11} = 21\%$$

6. S.P. of the article = ₹ 460 loss = 18%
C.P. of the article = ?
Let us assume that the C.P. is ₹ 100
∴ S.P. = ₹ 92 (∵ loss is ₹ 8 for ₹ 100)
If S.P. is ₹ 92 Then C.P. is ₹ 100
If S.P. is ₹ 1 Then C.P. is ₹ $\frac{100}{92}$
If S.P. is ₹ 460 then C.P. = $\frac{100}{\cancel{92}_{1}} \times \cancel{460}^{5} =$ ₹ 500 (Applying Unitary Method)

7. S.P. of Machine = ₹ 2040 loss = 15%
Let us assume taht the C.P. is ₹ 100
∴ S.P. = ₹ (100 – 15) = ₹ 85 (∴ loss is ₹ 15 for ₹ 100)

If S.P. is ₹ 85 then C.P. is ₹ 100 If S.P. is ₹ 1 then C.P. is ₹ $\frac{100}{85}$

If S.P. is ₹ 2040 then C.P. = $\frac{100}{85} \times \overset{24}{2040} = ₹\ 2400$

$\because$ To get a gain of 10%, Then we have
If C.P. is ₹ 100 then S.P. is ₹ $(100 + 10 = 110)$
If C.P. is ₹ 1 then S.P. is ₹ $\frac{110}{100}$.
If C.P. is ₹ 2400.
Then S.P. = $\frac{110}{100} \times 2400 = 110 \times 24 = ₹\ 2640$

8. S.P. of few books = ₹ 6525, loss = 10%
C.P. of few books = ?
Let us assume that C.P. is ₹ 100
$\therefore$ S.P. = ₹ $(100 - 10) = ₹\ 90$ ($\because$ loss is ₹ 10 for ₹ 100)
If S.P. is ₹ 90 Then C.P. is ₹ 100.
If S.P. is ₹ 1 then C.P. is ₹ $\frac{100}{90}$
If S.P. is ₹ 6525, then C.P. = $\frac{100}{\cancel{90}} \times \overset{725}{\cancel{6525}} = ₹\ 7250$
Now to get a profit of 10%, we have as follow
If C.P. is ₹ 100 then S.P. is ₹ 110 [$\because$ S.P. = C.P. + P = 100 + 10 = ₹ 110]
If C.P. is ₹ 1 then S.P. is ₹ $\frac{110}{100}$
If C.P. is ₹ 7250 then S.P. = $\frac{110}{100} \times 7250 = ₹\ 7975$

9. S.P of 1 metre silk cloth = ₹ 155,
S.P. of 200 metre silk cloth = $155 \times 200 = ₹\ 31000$
gain = 25%
$\therefore$ S.P. = ₹ $(100 + 25) = ₹\ 125$ [$\because$ gain is ₹ 25 for ₹ 100]
Now, S.P> is ₹ 125, then C.P. is ₹ 100
If S.P. is ₹ 1, then C.P. is ₹ $\frac{100}{125}$.
If S.P. is ₹ 31000 (of 200 m cloth), then C.P. = $\frac{\overset{4}{\cancel{100}}}{\underset{1}{\cancel{125}}} \times \overset{6200}{\cancel{31000}}$

$\therefore$ C.P. $= 4 \times 6200 = ₹\ 24800$
$\therefore$ Profit = S.P. – C.P.
= S.P. of 200 m cloth – C.P. of 200 m cloth
= ₹ $(31000 - 24800) = ₹\ 6200$

10. S.P. of Article = ₹ 368, loss = 8%
Let us assume that the C.P. is ₹ 100
$\therefore$ S.P. = ₹ $(100 - 8) = ₹\ 92$ ($\because$ loss is ₹ 8 for ₹ 100)
If S.P. is ₹ 92 then C.P. is ₹ 100 If S.P. is ₹ 1. Then C.P. is ₹ $\frac{100}{92}$

If S.P. is ₹ 368. Then $\text{C.P.} = \frac{100}{\cancel{92}} \times \overset{4}{\cancel{368}} = ₹\ 400$

Now we have to get a gain of 10%, then we follow as
If C.P. is ₹ 100 then S.P. is ₹ (100 + 10 = 110).
If C.P. is ₹ 1 then S.P. is ₹ $\frac{110}{100}$.

If C.P. is ₹ 400. Then $\text{S.P.} = \frac{110}{\underset{1}{\cancel{100}}} \times \overset{4}{\cancel{400}} = ₹\ 440$

11. Total C.P. of Air cooler = ₹ 1500 + ₹ 575 = ₹ 2075
Profit = 4%
∴ S.P. = ₹ (100 – 4) = ₹ 104 [∵ Profit is ₹ 4 for ₹ 100]
Now, If C.P. is ₹ 100, then S.P. is ₹ 104
If C.P. is ₹ 1, than S.P. is ₹ $\left(\frac{104}{100}\right)$

If .P. is ₹ 2075, Then $\text{S.P.} = \frac{104}{100} \times 2075 = \frac{215800}{100} = ₹\ 100$

12. C.P of per (i.e., 1) sack of rice = ₹ 1500
and C.P. per 3 sacks of rice = 1500 × 3 = ₹ 4500
Cost of transporting them = ₹ 125
∴ Total C.P. of sacks of rice = ₹ 4500 + ₹ 125 = ₹ 4625
S.P. of all three saks = ₹ 5087.50
P = ? P% = ?
by P = S.P. – C.P.

$$\text{P\%} = \frac{\text{P}}{\text{C.P.}} \times 100$$

= ₹ 5087.50 – ₹ 3625 $= \frac{462.5}{4625} \times 100 = 10\%$

= ₹ 462.5

13. C.P. of Sofa set = ₹ 22000
Profit % = 8%
∴ S.P. = ₹ (100 + 8) = ₹ 108 [∵ P is ₹ 8 for ₹ 100]
Now, C.P. is ₹ 100, Then S.P. is ₹ 108
If C.P. is ₹ 1 Then S.P. is ₹ $\left(\frac{108}{100}\right)$

If C.P. is ₹ 22000, Then $\text{S.P.} = \frac{108}{100} \times 22000 = 108 \times 220 = ₹\ 23{,}760$

14. S.P. of Almirah= ₹ 4000
loss = 20% C.P. = ?
Let us assume that the C.P. is ₹ 100
∴ S.P. = ₹ (100 – 20) = ₹ 80 (∵ loss is ₹ 20 for ₹ 100)
Now, if S.P. is ₹ 80, then C.P. is ₹ 100
If S.P. is ₹ 1, then C.P. is ₹ $\left(\frac{100}{80}\right)$

If S.P. is ₹ 4000, then $\text{C.P.} = \frac{100}{\cancel{80}} \times \overset{500}{\cancel{4000}} = ₹\ 5000$

15. ∵ Each (i.e., one) crates having eggs = 10
∴ 40 crates having eggs = $40 \times 10 = 400$
Now C.P. of 40 crates of eggs (i.e., 400 eggs) is = ₹ 400
but on the way, number of eggs were broken = 25
∴ Remaining eggs = $400 - 25 = 375$
given, S.P. of one (i.e., each) egg = ₹ 1.20
S.P. of 375 eggs = ₹ 1.20×375 = ₹ 450
Since S.P. > C.P. therefore, there is a profit.

$$\text{P} = \text{S.P.} - \text{C.P.} = ₹\,450 - ₹\,400 = ₹\,50$$

$$\text{P}\% = \frac{P}{\text{C.P.}} \times 100 = \frac{50}{400} \times 100 = \frac{50}{4} = 12\frac{1}{2}\%$$

Exercise 7.6

Formulae :

1. $\text{S.I.} = \dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$ or $I = \dfrac{PRT}{100}$
2. Amount = Principal + Interest
   or, $A = P + I$

1. Here, we have to given Principal $(P) = ₹\,876$, Rate $(R) = 4\%$

Time $(T) = 8$ months $= \dfrac{8}{12}$ years

[∵ 1 year = 12 months, so i month $= \dfrac{1}{12}$ year]

∵ $\text{S.I.} = \dfrac{PRT}{100} = \dfrac{\overset{73}{\cancel{876}} \times 4 \times 8}{100 \times \cancel{12}} = \dfrac{73 \times 4 \times 8}{100} = \dfrac{2336}{100} = ₹\,23.36$

2. Here, we have to given

$P = ₹\,1200$, $R = 4\frac{1}{2}\% = \frac{9}{2}\%$,

$T = 1$ year 5 months $= \left(1 + \dfrac{5}{12}\right)$ year $= \dfrac{17}{12}$ year

$$\text{S.I.} = \frac{PRT}{100} = \frac{1200 \times 9 \times 17}{100 \times 2 \times 12} = \frac{9 \times 17}{2} = \frac{153}{2} = ₹\,76.5$$

Total Amount = $P + I$ = ₹ 1200 + ₹ 76.5 = ₹ 1276.5

3. $P = ₹\,800$, $R = 5\%$, $T = 146$ days $= \dfrac{146}{365}$ years $= \dfrac{2}{5}$ years

I (or, S.I.) $= \dfrac{PRT}{100} = \dfrac{\overset{8}{\cancel{800}} \times 5 \times 2}{\cancel{100} \times 5} = ₹\,16$

4. (a) $P = ₹\,3000$, $T = 3\frac{1}{2}$ years $= \frac{7}{2}$ years, $R = 14\%$, $I = ?$, $A = ?$

$$I = \frac{PRT}{100} = \frac{3000 \times \overset{7}{\cancel{14}} \times 7}{100 \times \underset{1}{\cancel{2}}}$$

$$= 30 \times 7 \times 7 = ₹\,1470$$

$A = P + I$ = ₹ 3000 + ₹ 1470 = ₹ 4470

(b) $T = 3$ year, $R = 6\%$, $I = ₹\ 72$, $P = ?$, $A = ?$

by $$I = \frac{PRT}{100}$$

$$72 = \frac{P \times 6 \times 3}{100}$$

$$P = \frac{72 \times 100}{6 \times 3} = ₹\ 400$$

by $$A = P + I = ₹\ 400 + ₹\ 72 = ₹\ 472$$

(c) $P = ?$, $T = 2\frac{1}{2}$ year $= \frac{5}{2}$ year, $R = ?$, $I = ₹\ 120$, $A = ₹\ 520$

by $$I = \frac{PRT}{100}$$

$$120 = \frac{P \times R \times 5}{100 \times 2}$$

$$P \times R = \frac{120 \times \overset{40}{\cancel{200}}}{\underset{1}{\cancel{5}}}$$

$$P \times R = 4800$$

by $$A = P + I \ 520 = P + 120$$

$\therefore$ $$P = 520 - 120 = ₹\ 400$$

Put $P = 400$ in equation (1), we get

$$400 \times R = 4800$$

$$R = \frac{\overset{12}{\cancel{48000}}}{\underset{1}{\cancel{400}}}$$

$$R = 12\%$$

(d) $P = ₹\ 1000$, $T = 4$ year$R = 5\%$, , $I = ?$, $A = ?$

$$I = \frac{PRT}{100} = \frac{1000 \times 5 \times 4}{100} = ₹\ 200$$

$$A = P + I = 1000 + 200 = ₹\ 1200$$

(e) $P = ₹\ 1250$, $R = 14\%$, $I = ₹\ 7000$, $T = ?$, $A = ?$

$$I = \frac{PRT}{100} = \frac{1250 \times 14 \times T}{100}$$

$$T = 7000 \times \frac{1250 \times 14 \times T}{100}$$

$$T = \frac{\overset{4}{\cancel{56}}}{\cancel{7000} \times 10} = 40 \text{ years}$$

$$A = P + I = 1250 + 7000 = ₹\ 8250$$

5. (a) Here, $I = ₹\ 3500$, $T = 5$ years, $R = 14\%$

by $$P = \frac{I \times 100}{R \times T} = \frac{\overset{700}{\cancel{3500}} \times 100}{14 \times \underset{1}{\cancel{5}}} = \frac{\overset{50}{\cancel{700}} \times 100}{\underset{1}{\cancel{14}}}$$

$\therefore$ $$P = ₹\ 5000$$

(b) $I = ₹\,2304$, $T = 4$ years, $R = 12\%$

by $$P = \frac{I \times 100}{RT} = \frac{\overset{192}{\cancel{2304}} \times 100}{\underset{1}{\cancel{12}} \times 4} = \frac{\overset{48}{\cancel{192}} \times 100}{\underset{1}{\cancel{4}}}$$

$\therefore$ $$P = 48 \times 100 = ₹\,4800$$

(c) $I = ₹\,1650$, $T = 3$ years, $R = 10\%$

by $$P = \frac{I \times 100}{RT} = \frac{1650 \times 100}{10 \times 3} = 5500$$

$\therefore$ $$P = ₹\,5500$$

6. (a) $P = ₹\,1500$, $R = 5.5\%$, $I = 16.50$, $T =$ (in days)?

by $$I = \frac{P \times R \times T}{100},$$

We have $$T = \frac{I \times 100}{P \times R} = \frac{16.50 \times 100}{1500 \times 5.5}$$

$$= \frac{1}{5} \text{ years} \qquad [\because 1 \text{year} = 365 \text{days}]$$

$$= \frac{1}{5} \times 365 \text{ days}$$

$\therefore$ $$T = 73 \text{ days}$$

(b) $P = ₹\,3800$, $R = 4\%$, $I = 60.80$, $T =$ (in days)?

by $$I = \frac{PRT}{100}$$

We have $$T = \frac{I \times 100}{PR} \text{ year}$$

$$= \frac{60.80 \times 100}{3800 \times 4} = \frac{\overset{15.2}{\cancel{60.80}}}{38 \times \underset{1}{\cancel{4}}}$$

$$= \frac{15.2}{38} = 0.4 \text{ years}$$

$$= 0.4 \times 364 \text{ days} \qquad [\because 1 \text{year} = 365 \text{days}]$$

$\therefore$ $$T = 146 \text{ days}$$

7. (a) $P = ₹\,6000$, $I = ₹\,360$, $R = 15\%$, $T = ?$

by $$I = \frac{PRT}{100},$$

We have $$T = \frac{I \times 100}{PR} = \frac{360 \times 100}{6000 \times 15}$$

$$= \frac{\overset{2}{6}}{\underset{5}{15}} = \frac{2}{5} \text{ year}$$

$$= \frac{2}{5} \times 365 \text{ days} \qquad [\because 1 \text{year} = 365 \text{days}]$$

$\therefore$ $$T = 2 \times 73$$

$$= 14 \text{ days}$$

8. $P = ₹\,4500,\ I = ₹\,540,\ T = 1\,\text{year},\ R = ?$

by $$I = \frac{PRT}{100},$$

We have $$R = \frac{I \times 100}{P \times T} = \frac{540 \times 100}{4500 \times 1} = 12\%$$

9. $I = ₹\,17{,}355,\ R = 15\%\ \text{p.a.},\ T = 1\,\text{year},\ P = ?$

by $$I = \frac{PRT}{100},$$

We have $$P = \frac{I \times 100}{R \times T} = \frac{17355 \times 100}{15 \times 1}$$

$\therefore$ $$P = ₹\,1{,}157{,}00$$

10. $P = ₹\,50{,}000,\ A = ₹\,1{,}02{,}500,\ R = 21\%,\ I = ?,\ T = ?$

By $$A = P + I,$$

We have $$I = A - P = ₹\,1{,}02{,}500 - ₹\,50{,}000 = ₹\,52{,}500$$

By $$I = \frac{P \times R \times T}{100},$$

We have $$52{,}500 = \frac{50{,}000 \times 21 \times T}{100}$$

$$T = \frac{52500}{500 \times 21} = \frac{525}{105} = 5\,\text{year}$$

11. $P = ₹\,5600,\ T_1 = 8\,\text{year},\ R_1 = 6\%,\ I_1 = ?$

$$I_1 = \frac{P_1 R_1 T_1}{100} = \frac{5600 \times 6 \times 8}{100} = ₹\,2688$$

$P_2 = ₹\,5000,\ T_2 = 10\,\text{year},\ R_2 = 5\%,\ I_2 = ?$

$$I_2 = \frac{P_2 R_2 T_2}{100} = \frac{5000 \times 5 \times 10}{100}$$

$$= 50 \times 50 = ₹\,2500$$

clearly, $$₹\,2688 > ₹\,2500.$$

Hence first investment is better

12. **For first Person :** $P = ₹\,20{,}000,\ R = 8\%,\ T = 5\,\text{years}$

$\therefore$ Interest for First Person $(I_1) = \frac{PRT}{100} = \frac{20{,}000 \times 8 \times 5}{100}$

$$= 200 \times 40 = ₹\,8000$$

For client : $P = ₹\,20{,}000,\ T = 5\,\text{years},\ R = 14\,\%$

$\therefore$ Interest for client $(I_2) = \frac{PRT}{100} = \frac{20{,}000 \times 14 \times 5}{100}$

$$= 200 \times 700 = ₹\,14000$$

$\therefore$ Money gained by the person in the transaction after 5 years

$$= ₹\,14000 - ₹\,8000 = ₹\,6000$$

13. $P = ₹\,1000,\ R = 10\%,\ T = ?, A = ?$

Time = days from January Ist to August 7th

= January + February + March + April + May + June + July + August

$$= 30 + 28 + 31 + 30 + 31 + 30 + 31 + 7 = 219\,\text{days} = \frac{219}{365}\,\text{year}$$

$$I = \frac{P \times R \times T}{100} = \frac{1000 \times 10 \times 219}{100 \times 365} \qquad [\because 1\text{year} = 365\text{days}]$$

$$= \frac{21900}{365}^{60} = ₹\,60$$

$\therefore$ Amount $(A) = P + I = ₹\,1000 + ₹\,60 = ₹\,1060$

Hence, Total amount that 9 pay after 219 days is ₹ 1060.

MCQ's

1. (c) **2.** (c) **3.** (b) **4.** (a) **5.** (b) **6.** (c) **7.** (a) **8.** (b) **9.** (b) **10.** (b)

8. Linear Equation

Exercise 8.1

1. (a) The equation is $n + 10 = 25$

(b) Difference of d and 11 is $d - 11$ $\quad\therefore$ The equation is $d - 11 = 40$

(c) Seven times m is 7 m. $\quad\therefore$ The equation is $7m = 74$

(d) Half of y is $\frac{4}{2}$ $\quad\therefore$ The equation is $\frac{y}{2} = 33$

(e) 5 times b is $5b$ $\quad\therefore$ The equation is $5b - 3 = 12$

(f) 5 times x is $5x$ $\quad\therefore$ The equation is $5x + 3 = 18$

(g) one-sixth of C is more than 8

The equation is $\frac{C}{6} = 8 + 2$

or, $\frac{C}{6}$ is greater than 8 by 2 $\quad\therefore$ The equation is $\frac{C}{6} - 8 = 2$

(h) one-fourth of P is $\frac{P}{4}$ $\quad\therefore$ The equation is $\frac{P}{4} + 4 = 40$

(i) 8 times e is $8e$ $\quad\therefore$ The equation is $8e - 8 = 80$

(j) The equation of t and 7 is $\frac{t}{7}$

13 is added in it, so it will be $\frac{t}{7} + 13$ $\quad\therefore$ The equation is $\frac{t}{7} + 13 = 20$

(k) Total of a number x and 2 is $x + 2$

9 less from the total is $(x + 2) - 9$ $\quad\therefore$ The equation is $(x + 2) - 9 = 53$

2. (a) Sum of x and 3 is 14

(b) Difference between 5 and y is -3

(c) 16 times m is 96

(d) Quotient of q and 9 is 9

(e) Three-fourth of a number P is 15

(f) 11 is added to 6 times x given 35

(g) 3 less than quotient of b and 7 is 8

(h) 14 less than 3 times x results in 4

(i) 7 subtracted from one-fifth of y is 8

(j) 5 subtract from y gives -12

(k) Negative quotient of P and 7 is 7

3. (a) Let Two consecutive numbers be x and $(x+1)$. Their sum is $x+(x+1)$.

$\therefore$ The equation is $x+(x+1)=51$. or, $2x+51$

(b) Let Isha is x ears old. Then, Saurabhs' age $= x+6$

Sum of their ages is $x+(x+6)$.

$\therefore$ The equation is $x+(x+6)=24$

or, $2x+6=24$.

(c) Let the number be x and its half is $\frac{x}{2}$.

$\therefore$ The equation is $x+\frac{x}{2}=33$.

(d) Let the breadth of a rectangle is (x) m.

Then, the length of the rectangle is $(2x-6)$ m.

The perimeter of rectangle = 240 m

$\therefore$ The equation is $x+(2x-6)+x+(2x-6)=240$

or, $2x+2(2x-6)=240$

or, $2x+4x-12=240$

or, $6x-12=240$

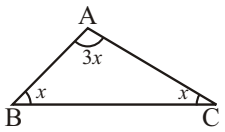
(e) Let $\angle B=\angle C=x$.

Then $\angle A=3\angle B=3x$

or, $\angle A=3\angle C=3x$

The equation is $\angle A+\angle B+\angle C=180$

i.e., $\angle A+\frac{\angle A}{3}+\frac{\angle A}{3}=180$ $[\because \angle A=\angle B=3\angle C]$



(f) Let variables Age is x years.

Then, Vaibhav's father's age is $(3x+4)$ years but Vaibhav's father is 43 years.

$\therefore$ The equation is $(3x+4)=43$, where x is Vaibhav's age.

(g) Let Gautam scored the runs $= x$

Then Rahul scored the runs $= 2x$

The sum of their runs $= (2x+x-5)$

[$\because$ century = 100 runs, *d*ouble century = 100 + 100 = 200 runs]

(h) Let the number of boys in the class $= x$

Then, then number of girls are $=\frac{2}{5}$ of $x=\frac{2x}{5}$

Total students in the class = 35

$\therefore$ The equation is $x+\frac{2x}{5}=35$, (where x is number of boys)

Exercise 8.2

1. $2b+5=17$, $b=6$ Substituting $b=6$ in the equation

L.H.S. $=2\times 6+5=12+5=17=$ R.H.S.

$\therefore$ $b=6$ is a solution of the given equation.

2. $8-7x=-20$, $n=2$ Substituting $n=2$ in the equation

L.H.S. $=8-7n=7-7\times 2=8-14=-6$

R.H.S. $=-20$

$\because$ L.H.S. $\neq$ R.H.S.

$\therefore$ $n=2$ is not a solution of the given equation.

3. $9q - 3 = 15,\ q = 2$

Substituting $q = 2$ in the equation

L.H.S. $= 9 \times 2 - 3 = 18 - 3 = 15 =$ R.H.S.

$\therefore$ $q = 2$ is a solution of the given equation.

4. $\frac{a}{20} = 4,\ a = 60$

Substituting $a = 60$ in the equation

L.H.S. $= \frac{60}{20} = 3$

and, R.H.S. $= 4$

Since L.H.S. $\neq$ R.H.S.

$\therefore$ $a = 60$ is not a solution of the given equation.

5. $\frac{y}{2} - 4 = 0,\ y = 8$

Substituting $y = 8$ in the equation

L.H.S. $= \frac{8}{2} - 4 = 4 - 4$

$= 0 =$ R.H.S.

$\therefore$ $y = 8$ is a solution of the given equation.

6. $4S = 80,\ s = 76$

Substituting $S = 76$ in the equation

L.H.S. $= 4 \times 76 = 304 \neq$ R.H.S.

$\therefore$ $S = 76$ is not a solution of the given equation.

7. $13b = 169,\ b = 13$

Substituting $b = 13$ in the equation

L.H.S. $= 13 \times 13 = 69 =$ R.H.S.

$\therefore$ $b = 13$ is a solution of the given equation.

8. $11 + 23x = 11,\ x = 1$

Substituting $x = 1$ in the equation

L.H.S. $= 11 + 23 \times 1 = 11 + 23 = 34 \neq$ R.H.S.

$\therefore$ $x = 1$ is not a solution of the given equation.

9. $2x + 1 = x + 3,\ x = 1$

Substituting $x = 1$ in the equation

L.H.S. $= 2 \times 1 + 1 = 2 + 1 = 3$

R.H.S. $= 1 + 3 = 4$

Since L.H.S. $\neq$ R.H.S.

$\therefore$ $x = 1$ is not a solution of the given equation.

Exercise 8.3

1. $x - 5 = 0$

Add 5 to both sides of the equation i.e.

$x - 5 + 5 = 0 + 5$

or, $x + 0 = 5,$

or $x = 5$

Hence, $x = 5$ is solution of the given equation.

Check : L.H.S. $= x - 5 = 5 - 5 = 0 =$ R.H.S.

2. $x + 4 = 0$ on subtract 4 from both sides of the equation, i.e.,

$$x + 4 - 4 = 0 - 4 \; x = -4$$

Hence, $x = -4$ is a solution of the given equation.

Check : L.H.S. $= x + 4 = -4 + 4 = 0 =$ R.H.S.

3. $b - 7 = 9$

Add '7' to both sides of the equation, i.e.

$$b - 7 + 7 = 9 + 7 \; b = 16$$

Hence, $b = 16$ is a solution of the given equation.

Check : L.H.S. $= b - 7 = 16 - 7 = 9 =$ R.H.S.

4. $y + 8 = 20$ on subtract 8 from both sides of the equation, i.e.

$$y + 8 - 8 = 20 - 8 \; y = 12$$

Hence, $y = 12$ is a solution of the given equation.

Check : L.H.S. $= y + 8 = 12 + 8 = 20 =$ R.H.S.

5. $P + 6 = -6$ on subtract 6 from both sides of the equation,

i.e., $P + 6 - 6 - 6 - 6 \; P = -12$

Hence, $P = -12$ is a solution of the given equation.

Check : L.H.S. $= P + 6 = -12 + 6 = -6 =$ R.H.S.

6. $q + 9 = 9$ on subtract 9 from both sides of the equation.

$$q + 9 - 9 = 9 - 9 \; q = 0$$

Hence, $q = 0$ is a solution of the given equation.

Check : L.H.S. $= q + 9 = 0 + 9 = 9 =$ R.H.S.

7. $5d = 45$ divide both the sides of the equation by 5.

Thus, $$\frac{5d}{5} = \frac{\overset{9}{\cancel{45}}}{\underset{1}{\cancel{5}}} \; d = 9$$

Hence, $d = 9$ is a solution of the given equation.

Check : L.H.S. $= 5d = 5 \times 9 = 45 =$ R.H.S.

8. $30t = -60$ divide both the sides of the equation by 30.

Thus, $$\frac{30t}{30} = \frac{\overset{2}{\cancel{-60}}}{\underset{1}{\cancel{30}}} \qquad \Rightarrow \qquad t = -2$$

Hence, $t = -2$ is a solution of the given equation.

Check : L.H.S. $= 30t = 30 \times (-2) = -60 =$ R.H.S.

9. $\frac{-r}{8} = 6$ multiplying by (-8) on both the sides, we get

$$= \frac{-r}{8} \times (-8) = 6 \times (-8) \; r = -48 \qquad [\because (-1) \times (-1) = t]$$

Hence, $r = -48$ is a solution of the given equation.

Check : L.H.S. $$= \frac{-r}{8} = \frac{(-48)}{8} = \frac{\overset{6}{\cancel{48}}}{\underset{1}{\cancel{8}}}$$

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

10. $\frac{-a}{11} = \frac{18}{55}$ multiplying by (-11) on both the sides, we get

$$\frac{-a}{11} \times (-11) = \frac{18 \times (-\cancel{11}^{1})}{\cancel{55}_{5}}$$

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

Hence, $a = \frac{-18}{5}$ is a solution of the given equation.

Check : $\text{L.H.S.} = \frac{-a}{11} = \frac{-\left(-\frac{18}{5}\right)}{11}$

$$= \frac{18}{11 \times 5} = \frac{18}{35} = \text{R.H.S.}$$

11. $\frac{y}{16} = \frac{7}{48}$ multiplying by 16 on both the sides we get

$$\frac{y}{16} \times 16 = \frac{7}{\cancel{48}_{3}} \times \cancel{16}^{1}$$

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

Hence, $y = \frac{7}{3}$ is a solution of the given equation.

Check : $\text{L.H.S.} = \frac{y}{16} = \frac{\left(\frac{7}{3}\right)}{16} = \frac{7}{3 \times 16} = \frac{7}{48} = \text{R.H.S.}$

12. $3x - 2 = 22$ Add 2 on both the sides of the equation.

$$3x - 2 + 2 = 22 + 2\ 3x = 24$$

Now, divide both the sides by 3.

$$\frac{3x}{3} = \frac{\cancel{24}^{8}}{\cancel{3}_{1}}\ x = 8$$

Hence, $n = 8$ is a solution of the given equation.

Check : $\text{L.H.S.} = 3x - 2 = 3 \times 8 - 2 = 24 - 2 = 22 = \text{R.H.S.}$

13. $4x + 9 = 45$ on subtract 9 from both the sides of the equation, we get

$$4x + 9 - 9 = 45 - 9$$

$$4x = 36$$

Now, divide both the sides of 4.

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

$$x = 9$$

Hence, $x = 9$ is a solution of the given equation.

Check : $\text{L.H.S.} = 4x + 9 = 4 \times 9 + 9 = 45 = \text{R.H.S.}$

14. $14l = 56$ divide both the sides by 14,

We get $$\frac{14l}{14} = \frac{\overset{4}{\cancel{56}}}{\underset{1}{\cancel{14}}} l = 4$$

Hence, $l = 4$ is a solution of the given equation.

Check : L.H.S. $= 14l = 14 \times 4 = 56 =$ R.H.S.

15. $15P + 15 = 90$ on subtract 15 from both the sides of the equation,

We get $$15P + 15 - 15 = 90 - 15$$
$$15P = 75$$

Now, divide both the sides by 15.

$$\frac{15P}{15} = \frac{\overset{5}{\cancel{75}}}{\underset{1}{\cancel{15}}} P = 5$$

Hence, $P = 15$ is a solution of the given equation.

Check : L.H.S. $= 15P + 15 = 15 \times 5 + 15 = 95 + 15 = 90 =$ R.H.S.

16. $-5x - 8 = 107$

Add '+ 8' on both the sides, we get

$$-5x - 8 + 8 = 107 + 8$$
$$-5x = 115$$

Now, divide both the sides by (-5).

$$\frac{-5x}{-5} = \frac{\overset{23}{\cancel{115}}}{\underset{1}{\cancel{-5}}}$$
$$x = \frac{23}{-1} = -23$$

Hence, $x = -23$ is a solution of the given equation.

Check : L.H.S. $= -5x - 8 = -5 \times (-23) - 8$
$= 115 - 8 = 107 =$ R.H.S.

17. $4y + 3y = 84$

$$7y = 84$$

Now, divide both the sides by 7.

$$\frac{7y}{7} = \frac{\overset{12}{\cancel{84}}}{\underset{1}{\cancel{7}}} \quad \Rightarrow \quad y = 12$$

Hence, $y = 12$ is a solution of the given equation.

Check : L.H.S. $= 4y + 3y = 7y = 7 \times 12 = 84 =$ R.H.S.

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

Add `x' on both the sides, we get

$$5 + 9x - 7 + x = 9x - 2 - x + x$$
$$5 + 10x - 7 = 9x - 2$$

subtract `$9x$' from both the sides, we get

$$5 + 10x - 7 - 9x = 9x - 2 - 9x$$
$$5 + x - 7 = -2$$

Add `7' on both the sides,

we get $5 + x - 7 + 7 = -2 + 7$

$5 + x = 5$

subtract '5' from both the sides, we get

$5 + x - 5 = 5 - 5$

$x = 0$

Hence, $x = 0$ is a solution of the given equation.

Check : L.H.S. $= 5 + 9x - 7 = 5 + 9 \times 0 - 7$

$= 5 + 0 - 8 = 5 - 7 = -2$

R.H.S. $= 9x - 2x = 9 \times 0 - 2 - 0 = 0 - 2 - 0 = -2$

$\therefore$ L.H.S. = R.H.S. $= -2$

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

Subtract $\left(\frac{1}{2}\right)$ from both the sides

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

$$x = \frac{19}{1} - \frac{1}{2} = \frac{19 \times 2 - 1}{2} = \frac{38 - 1}{2} = \frac{37}{2}$$

Hence, $x = \frac{37}{2}$ is a solution of the given equation.

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

Add '$\frac{1}{2}$' on both the sides

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

$$2S = \frac{1}{2} - \frac{1}{3} = \frac{3 - 2}{6}$$

$$2S = \frac{1}{6} \qquad \text{[LCM of } (2, 3 = 6)\text{]}$$

Now, divide both the sides by 2.

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

$$S = \frac{1}{6 \times 2} = \frac{1}{12}$$

Hence, $S = \frac{1}{12}$ is a solution of the given equation.

Check: R.H.S. $= 2S - \frac{1}{2} = \cancel{2}^{1} \times \frac{1}{\cancel{12}_{6}} - \frac{1}{2} = \frac{1}{6} - \frac{1}{2}$

$$= \frac{1 - 3}{6} = \frac{-\cancel{2}^{1}}{\cancel{6}_{3}} = \frac{-1}{3} = \text{R.H.S.}$$

Exercise 8.4

1. $12t + 1 = 37$

We have, $12t + 1 = 37$

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

$\Rightarrow$ $12t = 36$

$\Rightarrow$ $t = \frac{\overset{3}{\cancel{36}}}{\underset{1}{\cancel{12}}}$ (By transposition)

$\Rightarrow$ $t = 3$

Hence, $t = 3$ is a solution of the given equation.

Check : L.H.S. $= 12t + 1 = 12 \times 3 + 1 = 36 + 1 = 37 =$ R.H.S.

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

We have $\frac{x}{4} + 9 = 7$

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

$\Rightarrow$ $\frac{x}{4} = -2$

$\Rightarrow$ $x = -2 \times 4$ (By transposition)

$\Rightarrow$ $x = -8$

Hence, $x = -8$ is a solution of the given equation.

Check : L.H.S. $= \frac{x}{4} + 9 = \frac{-8}{4} + 9 = -2 + 9 = 7$

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

We have, $\frac{5y}{2} = 60$

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

$\Rightarrow$ $y = \overset{12}{\cancel{60}} \times \frac{2}{\underset{1}{\cancel{5}}}$

$\Rightarrow$ $y = 24$

Hence, $y = 24$ is a solution of the given equation.

Check : L.H.S. $= \frac{5}{2} y = \frac{5}{\cancel{2}} \times \overset{12}{\cancel{24}} = 5 \times 12 = 60 =$ R.H.S.

4. $2m + \frac{5}{2} = \frac{37}{2}$

We have, $2m = \frac{37}{2} - \frac{5}{2}$ (by transposition)

$\Rightarrow$ $2m = \frac{37 - 5}{2} = \frac{32}{2} = 16$

$\Rightarrow$ $m = \frac{16}{2}$ (By transposition)

$\Rightarrow \quad m = 8$

Hence, $m = 8$ is a solution of the given equation.

Check : $\text{L.H.S.} = 2m + \frac{5}{2} = 2 \times 8 + \frac{5}{2}$

$= 16 + \frac{5}{2} = \frac{32 + 5}{2} = \frac{37}{2} = \text{R.H.S.}$

5. $8z + 20 = 52$

We have, $8z + 20 = 52$

$\Rightarrow \quad 8z = 52 - 20$ (by transposition)

$\Rightarrow \quad 8z = 32$

$\Rightarrow \quad z = \frac{32}{8}$ (by transposition)

$\Rightarrow \quad z = 4$

Hence, $z = 4$ is a solution.

Check : $\text{L.H.S.} = 8z + 20 = 8 \times 4 + 20 = 52 = \text{R.H.S.}$

6. $\frac{a}{13} + 6 = 5$

We have, $\frac{a}{13} + 6 = 5$

$\Rightarrow \quad \frac{a}{13} = 5 - 6$ (by transposition)

$\Rightarrow \quad \frac{a}{13} = -1$

$\Rightarrow \quad a = -1 \times 13$ (by transposition)

$\Rightarrow \quad a = -13$

Check : $\text{L.H.S.} = \frac{a}{13} + 6 = \frac{-13}{13} + 6$

$= -1 + 6 = 6 - 1 = 5 = \text{R.H.S.}$

7. $-2(y + 3) = 7$

We have, $-2(y + 3) = 7$

$\Rightarrow \quad -2y - 6 = 7$

$\Rightarrow \quad -2y = 7 + 6$ (by transposition)

$\Rightarrow \quad -2y = 13$

$\Rightarrow \quad y = \frac{13}{-12}$ (by transposition)

$\Rightarrow \quad y = \frac{-13}{2}$

Hence, $y = \frac{-13}{2}$ is a solution of the given equation.

Check : $\text{L.H.S.} = -2(y + 3) = -2y - 6$

$= -2 \times \left(\frac{-13}{2}\right) - 6 = 13 - 6$

$= 7 = \text{R.H.S.}$

8. $-3(4-x)=2x+5$

We have, $-3(4-x)=2x+5$

$\Rightarrow \quad -12+3x=2x+5$

$\Rightarrow \quad 3x=2x+5+12$ (by transposition)

$\Rightarrow \quad 3x=2x+17$

$\Rightarrow \quad 3x-2x=17$ (by transposition)

$\Rightarrow \quad x=17$

Hence, $x=17$ is a solution of the given equation.

Check : L.H.S. $=-3(4-x)=-12+3x=-12+3\times17=-12+51=39$

R.H.S. $=2x+5=2\times17+5=34+5=39$

$\therefore$ L.H.S. = R.H.S.

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

We have, $4x-\frac{1}{3}=\frac{1}{5}+3x$

$\Rightarrow \quad 4x-\frac{1}{3}-3x=\frac{1}{5}$ (by transposition)

$\Rightarrow \quad x-\frac{1}{3}=\frac{1}{5}$

$\Rightarrow \quad x=\frac{1}{5}+\frac{1}{3}$ (by transposition)

$\Rightarrow \quad x=\frac{3+5}{15}=\frac{8}{15}$

Hence, $x=\frac{8}{15}$ is a solution of the given equation.

Check : L.H.S. $=4x-\frac{1}{3}=4\times\left(\frac{8}{15}\right)-\frac{1}{3}=\frac{32}{15}-\frac{1}{3}=\frac{32-5}{15}=\frac{\overset{9}{27}}{\underset{5}{15}}=\frac{9}{5}$

R.H.S. $=\frac{1}{5}+3x=\frac{1}{5}+\overset{1}{3}\times\frac{8}{\underset{5}{15}}=\frac{1}{5}+\frac{8}{5}=\frac{1+8}{5}=\frac{9}{5}$

$\therefore$ L.H.S. = R.H.S

10. $4(5x-4)+3(2x-0)=7$

$\Rightarrow \quad 20x-16+6x-3=7$

$\Rightarrow \quad 26x-19=7$

$\Rightarrow \quad 26x=7+19$ (by transposition)

$\Rightarrow \quad 26x=26$

$\Rightarrow \quad x=\frac{26}{26}$ (by transposition)

$\Rightarrow \quad x=1$

Hence, $x=1$ is a solution of the given equation.

Check : L.H.S. $=4(5x-4)+3(2x-1)$

$=4(5\times1-4)+3(2\times1-1)$

$=4(5-4)+3(2\times1-1)$

$=4\times1+3\times1$

$=4+3=7=$ R.H.S.

11. $7x + 2(x + 2) = 20 - (2x - 5)$

$\Rightarrow \quad 7x + 2x + 4 = 20 - 2x + 5$

$\Rightarrow \quad 9x + 4 = 25 - 2x$

$\Rightarrow \quad 9x + 2x + 4 = 25$ (by transposition)

$\Rightarrow \quad 11x = 25 - 4$ (by transposition)

$\Rightarrow \quad 11x = 21$

$\Rightarrow \quad x = \frac{21}{11}$ (by transposition)

Hence, $x = \frac{21}{11}$ is a solution of the given equation.

Check : L.H.S. $= 7x + 2(x + 2)$

$$= 7 \times \frac{21}{11} + 2\left(\frac{21}{11} + 2\right) = \frac{147}{11} + \frac{42}{11} + 4$$

$$= \frac{147 + 42 + 44}{11} = \frac{233}{11}$$

$$\text{R.H.S.} = 20 - (2x - 5) = 20 - \left(2 \times \frac{21}{11} - 5\right) = 20 - \frac{42}{11} + 5$$

$$= 25 - \frac{42}{11} = \frac{275 - 42}{11} = \frac{233}{11}$$

$\therefore$ L.H.S. = R.H.S.

12. $\frac{y}{5} - \frac{y}{6} = \frac{1}{30}$

$\Rightarrow \quad \frac{6y - 5y}{30} = \frac{1}{30}$ [LCM of $(5, 6) = 30$]

$\Rightarrow \quad \frac{y}{30} = \frac{1}{30}$

$\Rightarrow \quad y = 30$

$\Rightarrow \quad y = \frac{1}{30} \times 30$ (by transposition)

$\Rightarrow \quad y = 1$

13. $23 - 4x = -25 + 4x$

or, $23 = -25 + 4x + 4x$ (by transposition)

or, $23 = -25 + 8x$

or, $23 + 25 = 8x$ (by transposition)

or, $48 = 8x$

or, $8x = 48$

or, $x = \frac{\overset{6}{\cancel{48}}}{\underset{1}{\cancel{8}}}$ (by transposition)

or, $x = 6$

Hence, $x = 6$ is a solution.

Check : L.H.S. $= 23 - 4x = 23 - 4 \times 6 = 23 - 24 = 1$

R.H.S. $= -25 + 4x = -25 + 4 \times 6 = -24 + 24 = -1$

$\therefore$ L.H.S. = R.H.S.

14. $\frac{2x}{3} - \frac{x}{2} = 30$

$\Rightarrow \quad \frac{4x - 3x}{6} = 30$ [LCM of (3, 2) = 6]

$\Rightarrow \quad \frac{x}{6} = 30$

$\Rightarrow \quad x = 30 \times 6$ (by transposition)

$\Rightarrow \quad x = 180$

Hence, $x = 180$ is a solution.

Check : L.H.S. $= \frac{2x}{3} - \frac{x}{2} = \frac{2 \times \overset{60}{\cancel{180}}}{\underset{1}{\cancel{3}}} - \frac{\overset{90}{\cancel{180}}}{2}$

$= 120 - 90 = 30$

$=$ R.H.S.

15. $0 = 18 + 9(m - 2)$

We have, $0 = 18 + 9(m - 2)$

$\Rightarrow \quad 0 = 18 + 9m - 18$

$\Rightarrow \quad 0 = 9m$

$\Rightarrow \quad \frac{0}{9} = m$ (by transposition)

$\Rightarrow \quad 0 = m$

or, $m = 0$

Hence, $m = 0$ is a solution of this equation.

Check : R.H.S. $= 18 + 9(m - 2) = 18 + 9(0 - 2)$

$= 18 + 9 \times 0 - 9 \times 2 = 18 - 18 = 0 =$ L.H.S.

16. $5(x - 3) = -45$

We have, $5(x - 3) = -45$

$\Rightarrow \quad 5x - 15 = -45$

$\Rightarrow \quad 5x = 15 - 45$ (by transposition)

$\Rightarrow \quad 5x = -30$

$\Rightarrow \quad x = \frac{-30}{5}$ (by transposition)

$\Rightarrow \quad x = -5$

Hence, $x = -6$ is a solution.

Check : L.H.S. $= 5(x - 3) = 5(-6 - 3) = 5 \times (-9) = -45 =$ R.H.S.

17. $\frac{7b}{8} - 15 = 1$

We have, $\frac{7b}{8} - 15 = -1$

$\Rightarrow \quad \frac{7b}{8} = 15 - 1$ (by transposition)

$\Rightarrow \quad \frac{7b}{8} = 14$

$\Rightarrow \quad 7b = 14 \times 8$ (by transposition)