6 Algebraic Expressions

Exercise 6.1

1. (a) $y \quad x$ (b) $\frac{x \quad y}{2}$ (c) $z \quad z \quad z^2$

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

2. (a) $x^2 \quad y^2 \quad z^2$ trinomial (b) $14xyz$ monomials

(c) 10 binomials (d) $y \quad 2z$ binomials

(e) $3x \quad 4 \quad 9y$ trinomials [∵ It has 3 terms]

(f) $15z^2 \quad 2$ binomials [∵ It has 2 terms]

(g) $a^2 \quad b^2 \quad 9c^2$ Trinomial [∵ It has 3 terms]

(h) $pq \quad rq \quad 4$ trinomials [∵ It has 3 terms]

3. (a) like terms $(9a^2, \quad 4a^2)$ and $(3b^2, 2b^2)$

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

(c) like terms $(a^2b^2c, \quad 9a^2cb^2)$ (d) like terms $(pqr, \quad 32pqr)$

(e) like terms $(x^2y, yx^2, 4x^2y)$ (f) like terms $(\quad xy^2, 2xy^2)$

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

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

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

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

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

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

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

(d) $\frac{5}{6}y^2x^2z \quad y^2 \quad \frac{5}{6}x^2z$ Co-efficient of $y^2 \quad \frac{5}{6}x^2z$

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

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

6. (a) $5y \quad y(\quad 5)$ Coefficient of $y \quad 5$

(b) $2ab \quad a(2b)$ Coefficient of $a \quad 2b$

(c) $7xy \quad y(\quad 7x)$ Coefficient of $y \quad 7x$

(d) $3pq \quad p(\quad 3q)$ Coefficient of $p \quad 3q$

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

(f) $x^3 \quad 1 \quad x^3(1 \quad 1)$ Coefficient of $x^3 \quad 1$

(g) $x^2 \quad x^2(\quad 1)$ Coefficient of $x^2 \quad 1$

(h) $\frac{5}{7}x^2y \quad x^2 \quad \frac{5}{7}y$ Coefficient of $xc^2 \quad \frac{5}{7}y$

7. (a) $16xyz \quad 4yz$

$-16xyz \qquad 4yz$

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

$32yz \qquad 8xy \qquad 4$

(c) $a^2b^2c \quad ab \quad 9$

$a \quad a \quad b \quad b \quad c \qquad a \quad b \quad 9$

(d) $x^2y \quad y^2z$

$xxy \qquad yyz$

8. (a) $16xyz \quad 4yz$

Degree of $16xyz \quad 3$ $\quad$ ($\because$ $x \,.\, y \,.\, z \quad 1 \quad 1 \quad 1 \quad 3$)

Degree of $4yz \quad 2$

Degree of $16xyz \quad 4yz \quad 3$

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

Degree of $32y^2z \quad 2 \quad 1 \quad 3$

Degree of $8xy \quad 1 \quad 1 \quad 2$

Degree of $4 \quad 0$

Degree of $32y^2z \quad 8xy \quad 4 \quad 3$

(c) $a^2b^2c \quad ab \quad 9$

Degree of $a^2b^2c \quad 2 \quad 2 \quad 1 \quad 5$

Degree of $ab \quad 1 \quad 1 \quad 2$

Degree of $9 \quad 0$

Degree of $a^2b^2c \quad ab \quad 9 \quad 5$

(d) $x^2y \quad y^2z$

Degree of $x^2y \quad 2 \quad 1 \quad 3$

Degree of $y^2z \quad 2 \quad 1 \quad 3$ $\qquad$ Degree of $x^2y \quad y^2z \quad 3$

9. (a) Degree of $4 \quad 0$

Degree of $(4 \quad y)^2 \quad 2$

Degree of $4 = 0$

(b) Degree of $4 = 0$

Degree of $y^3 \quad 3$

Degree of $(4 \quad y^3) \quad 3$

(c) Degree of $1 = 0$

Degree of $2t \quad 1$

Degree of $t^3 \quad 3$

Degree of $(1 \quad 2t \quad t^2 \quad 3t^3) \quad 3$

(d) Degree of $x^2 \quad 2$

Degree of $xy \quad 1 \quad 1 \quad 2$

Degree of $(x^2 \quad xy) \quad 2$

(e) Degree of $4x^3 \quad 3$

Degree of $3x^2 \quad 2$

Degree of $5x \quad 1$

Degree of $6 \quad 0$

Degree of $(4x^2 \quad 3x^2 \quad 5x \quad 6) \quad 3$

(f) Degree of $x^2y \quad 2 \quad 1 \quad 3$

Degree of $xy^2 \quad 1 \quad 2 \quad 3$

Degree of $7xy \quad 1 \quad 1 \quad 2$

Degree of $3 \quad 0$

Degree of $(x^2y \quad xy^2 \quad 7xy \quad 3) \quad 3$

(g) Same as (f)

(h) Degree of $4x^3 \quad 3$

Degree of $7x^2y \quad 2 \quad 1 \quad 3$

Degree of $5xy^2 \quad 1 \quad 2 \quad 3$

Degree of $2 \quad 0$

Degree of $(x^3 \quad 7x^2y \quad 5xy^2 \quad 2) \quad 3$

(i) Degree of $xy^2 \quad 1 \quad 2 \quad 3$

Degree of $4x^2y \quad 2 \quad 1 \quad 3$

Degree of $7x^2y \quad 2 \quad 1 \quad 3$

Degree of $3xy^2 \quad 1 \quad 2 \quad 3$

Degree of $3 = 3$

Degree of $(xy^2 \quad 4x^2y \quad 7x^2y \quad 3xy^2 \quad 3) \quad 3$

Exercise 6.2

1. (a) $24xy \quad 19xy \quad (\quad 4xy) \quad 43xy \quad 4xy \quad 39xy$

(c) $5y^3 \quad 26y^3 \quad 10y^3 \quad (\quad 3y^3) \quad 41y^3 \quad 3y^3 \quad 38y^3$

(e) $10ab^2c \quad (\quad ab^2c) \quad 15ab^2c \quad ab^2c \quad 10ab^2c \quad ab^2c \quad 15ab^2c \quad ab^2c$

$5ab^2c$

(b) $3x^2 \quad (\quad 10x^2) \quad 4x^2 \quad 3x^2 \quad 10x^2 \quad 4x^2 \quad 7x^2 \quad 10x^2 \quad 3x^2$

(f) $8x^2y \quad (\quad 11x^2y) \quad (\quad 8x^2y) \quad 8x^2y \quad 11x^2y \quad 8x^2y \quad 11x^2y$

(g) $4x^2y \quad (\quad 3xy^2) \quad (\quad 5xy^2) \quad 5x^2y \quad 4x^2y \quad 3xy^2 \quad 5xy^2 \quad 5x^2y \quad 9x^2y \quad 8xy^2$

2. By column method :

(a)
$$\begin{array}{rrr} x^2 & y^2 & 2xy \\ 3x^2 & y^2 & 4xy \\ +\ x^2 & y^2 & 0xy \\ \hline 5x^2 & 3y^2 & 2xy \\ \hline \end{array}$$

(b)
$$\begin{array}{rr} x^2y & xy^2 \\ 11x^2y & 10xy^2 \\ 10x^2y & 11xy^2 \\ \hline 20x^2y & 0 \\ \hline \end{array}$$

(c)
$$\begin{array}{rrr} 4abc & 6a^2 & 7b \\ 0abc & 10a^2 & 14b \\ 2abc & 3a^2 & 06 \\ \hline 2abc & 13a^2 & 216 \\ \hline \end{array}$$

(d)
$$\begin{array}{rrr} 2x^2 & 4y^2 & 5 \\ x^2 & 3y^2 & 10 \\ 2x^2 & 4y^2 & 10 \\ \hline x^2 & 3y^2 & 5 \\ \hline \end{array}$$

3. By column method :

(a)
$$\begin{array}{r} 6ab \\ 18ab \\ \hline 24ab \\ \hline \end{array}$$

(b)
$$\begin{array}{r} 9a^2b \\ a^2b \\ \hline 10a^2b \\ \hline \end{array}$$

(c)
$$\begin{array}{r} 6pq \\ 19pq \\ \hline 13pq \\ \hline \end{array}$$

(d)
$$\begin{array}{r} 14xy \\ 10xy \\ \hline 2xy \\ \hline \end{array}$$

(e)
$$\begin{array}{r} 3x^2 \\ 14x^2 \\ \hline 11x^2 \\ \hline \end{array}$$

(f)
$$\begin{array}{r} 10x^3y \\ 5x^3y \\ \hline 5x^3y \\ \hline \end{array}$$

4. (a)
$$\begin{array}{rrr} 6a & 8b & 10 \\ 5a & 3b & 15 \\ - & + & - \\ \hline a & 5b & 25 \\ \hline \end{array}$$

(b)
$$\begin{array}{rrr} 3x^2 & 4x & 2 \\ x^2 & 2x & 7 \\ + & + & - \\ \hline 4x^2 & 2x & 5 \\ \hline \end{array}$$

(c)
$$\begin{array}{rrr} & 10y & 14 \\ 3x^2 & 5y & 7 \\ - & + & - \\ \hline 3x^2 & 15y & 7 \\ \hline \end{array}$$

(d)
$$\begin{array}{rrr} x^2 & 2xy & y^2 \\ x^2 & xy & y^2 \\ - & + & - \\ \hline 2x^2 & xy & \\ \hline \end{array}$$

(e)
$$\begin{array}{rrr} 2ab^2 & 3b^2 & \\ ab^2 & b^2 & a^2b \\ & - & + \\ \hline 3ab^2 & 2b^2 & a^2b \\ \hline \end{array}$$

(f)
$$\begin{array}{rrr} 6p^3 & & 4p \\ 4p^3 & 3p^2 & 2p \\ - & - & + \\ \hline 2p^3 & 3p^2 & 2p \\ \hline \end{array}$$

(g) $2x^2$

$6x^2 \quad 8y \quad 9$

$+ \quad - \quad -$

$8x^2 \quad 8y \quad 9$

(h) $2a^2 \quad 3ab \quad 2b^2$

$5a^2 \quad 7ab \quad 5b^2$

$- \quad + \quad -$

$7a^2 \quad 10ab \quad 7b^2$

5. Here, we have to subtract $2x^3 \quad 4x^2 \quad 3x \quad 1$ from $9x^2 \quad 7x \quad 2$

$9x^2 \quad 7x \quad 2$

$4x^2 \quad 3x \quad 1 \quad 2x^3$

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

$5x^2 \quad 4x \quad 3 \quad 2x^3$

6. $10x^3 \quad 4x^2 \quad 6$

$5x^3 \quad 11x^2 \quad 4$

$- \quad + \quad +$

$5x^3 \quad 7x^2 \quad 10$

7. $14xyz \quad 6xy$

$xyz \quad 7xy$

$+ \quad -$

$15xyz \quad xy$

8. **Step 1 :**

$-7a^2b \quad 9$

$3ab^2 \quad 2$

$+ \quad -$

$7a^2b \quad 3ab^2 \quad 11$

Step 2 :

$7a^2b \quad 3ab^2 \quad 11$

$10a^2b \quad 4ab^2$

$- \quad -$

$17a^2b \quad 7ab^2 \quad 11$

9. **Step 1 :**

$p^2 - q^2 \quad pq$

$2p^2 \quad 4q^2$

$+ \quad -$

$3p^2 \quad 3q^2 \quad pq$

Step 2 :

$3p^2 \quad 3q^2 \quad pq$

$p^2 \quad 2pq$

$+ \quad -$

$4p^2 \quad 3q^2 \quad pq$

10. **Step 1 :**

$11xy \quad x^2 \quad 4$

$14xy \quad 5x^2$

$3xy \quad 4x^2 \quad 4$

Step 2 :

$3xy \quad 4x^2 \quad 4$

$15xy \quad x^2 \quad 2$

$12xy \quad 5x^2 \quad 2$

11. $P \quad 2x^2 \quad 3xy \quad 5y^2, \; Q \quad 5x^2 \quad 2xy \quad 3y^2 \; R \quad 3x^2 \quad 5xy \quad 2y^2$

$P \quad Q \quad R \quad (2x^2 \quad 3xy \quad 5y^2) \quad (5x^2 \quad 2xy \quad 3y^2) \quad (3x^2 \quad 5xy \quad 2y^2)$

$2x^2 \quad 3xy \quad 5y^2 \quad 5x^2 \quad 2xy \quad 3y^2 \quad 3x^2 \quad 5xy \quad 2y^2$

$(2x^2 \quad 3x^2 \quad 5x^2) \quad (3xy \quad 2xy \quad 5xy) \quad (3y^2 \quad 2y^2 \quad 5y^2)$

$(5x^2 \quad 5x^2) \quad (5xy \quad 5xy) \quad (5y^2 \quad 5y^2)$

$0 \quad 0 \quad 0 \quad 0$

= 0 Henced proved.

12. Required other expression $x^2 \quad y^2 \quad 3y \quad 5$ (on subtraction)

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

Exercise 6.3

1. Given $x \quad 2, y \quad 1$

(a) $2x \quad 3 \quad 2 \quad 2 \quad 3 \quad 7$

(b) $4y \quad 6 \quad 4 \quad 1 \quad 6 \quad 4 \quad 6 \quad 2$

(c) $4x^2 \quad 5 \quad 4 \quad (2)^2 \quad 5 \quad 4 \quad 4 \quad 5 = 16 - 5 = 11$

(d) $y^2 \quad 2y \quad (1)^2 \quad 2 \quad 1 \quad 1 \quad 2 \quad 1$

(e) $x^2 \quad y^2 \quad xy \quad (2)^2 \quad 1^2 \quad 2 \quad 1 \quad 4 \quad 1 \quad 2 = 3$

(f) $x^2 \quad y^2 \quad (2)^2 \quad (1)^2 \quad 4 \quad 1 \quad 3$

2. Given $a \quad 2, b \quad 2, c \quad 1$

(a) $2abc \quad 1 \quad 2 \quad 2 \quad (\quad 2) \quad 1 \quad 1 \quad 8 \quad 1 \quad 7$

(b) $a^3 \quad b^3 \quad c^3 \quad (2)^3 \quad (\quad 2)^3 \quad (1)^3 \quad 8 \quad 8 \quad 1 \quad 1$

(c) $a^2b \quad ab^2 \quad (2)^2 \quad (\quad 2) \quad 2 \quad (\quad 2)^2 \quad 4 \quad (\quad 2) \quad 2 \quad 4 \quad 8 \quad 8 \quad 0$

(d) $ab \quad bc \quad ac \quad 2 \quad (\quad 2) \quad (\quad 2) \quad 1 \quad 2 \quad 1 \quad 4 \quad 2 \quad 2 \quad 4$

(e) $a^2b \quad b^2c \quad c^2a \quad (2)^2 \quad (\quad 2) \quad (\quad 2)^2 \quad 1 \quad (1)^2 \quad 2 \quad 8 \quad 4 \quad 2 \quad 8 \quad 6 \quad 2$

(f) $a^2b \quad a^2c \quad 2a^2 \quad (2)^2 \quad (\quad 2) \quad (2)^2 \quad 1 \quad 2(2)^2$

$4 \quad (\quad 2) \quad 4 \quad 1 \quad 2 \quad 4$

$8 \quad 4 \quad 8 \quad 4$

(g) $ab^2c \quad a^2bc \quad abc^2 \quad (2) \quad (\quad 2)^2 \quad 1 \quad (2)^2 \quad (\quad 2) \quad 1 \quad 2 \quad (\quad 2) \quad (1)^2$

$2 \quad 4 \quad 1 \quad 4 \quad 2 \quad 1 \quad 4$

$8 \quad 8 \quad 4 \quad 12$

(h) $a^2 \quad b^2 \quad c^2 \quad 2ab \quad 2bc \quad 2ac \quad (2)^2 \quad (\quad 2)^2 \quad (1)^2 \quad 2 \quad (\quad 2)$

$1 \quad 2(\quad 2) \quad 1 \quad 2 \quad 2 \quad 1$

$4 \quad 4 \quad 1 \quad 8 \quad 4 \quad 4 \quad 1 \quad 8 \quad 7$

(i) $a^3 \quad b^3 \quad c^3 \quad 3abc \quad (2)^3 \quad (\quad 2)^3 \quad (1)^3 \quad 3 \quad 2 \quad (\quad 2) \quad 1$

$8 \quad 8 \quad 1 \quad 12 \quad 13$

3. (a) $4p \quad q \quad 6p \quad q \quad (4p \quad 6p) \quad (q \quad q) \quad 2p \quad 2q$

$2 \quad (\quad 1) \quad 2 \quad 1$ [Put $p \quad 1, 1 \quad 1$]

$2 \quad 2 \quad 4$

(b) $7p^2 \quad q^2 \quad 8p^2 \quad q^2 \quad (7p^2 \quad 8p^2) \quad (q^2 \quad q^2)$ [Put $p \quad 1$]

$p^2 \quad (1)^2 \quad (\quad 1) \quad 1$

(c) $10pq \quad 2qr \quad 6pr \quad 4pq \quad (10pq \quad 4pq) \quad 2qr \quad 6pr$

$14pq \quad 2qr \quad 6pr$ (Put $p \quad 1, q \quad 1, r \quad 2$)

$14 \quad (\quad 1) \quad 1 \quad 2 \quad 1 \quad 2 \quad 6 \quad (\quad 1) \quad 2$

$14 \quad 4 \quad 12 \quad 18 \quad 12 \quad 6$

(d) $pqr \quad 6pqr \quad 7q^2 \quad 4p^2$

$(pqr \quad 6pqr) \quad 7q^2 \quad 4p^2$

$(\quad 5pqr) \quad 7q^2 \quad 4p^2$

$[\ 5 \quad (\ 1) \quad 1 \quad 2] \quad 7(1)^2 \quad 4(\ 1)^2$ [Put $p \quad 1, q \quad 1, r \quad 2$]

$10 \quad 7 \quad 4 \quad 17 \quad 4 \quad 13$

(e) $5p^2 \quad 6q \quad 7r^2 \quad 6p^2 \quad 5q^2 \quad 2r^2$

$(5p^2 \quad 6p^2) \quad (\ 6q^2 \quad 5q^2) \quad (\ 7r^2 \quad 2r^2)$

$11p^2 \quad (\ 11q^2) \quad (\ 5r)^2$

$11.(\ 1)^2 \quad 11.(1)^2 \quad 5.(2)^2$ [Put $p \quad 1, q \quad 1, r \quad 2$]

$11 \quad 11 \quad 20 \quad 20$

(f) $5(p \quad q) \quad 3p \quad 2q \quad 5p \quad 5q \quad 3p \quad 2q \quad (5p \quad 3p) \quad (5q \quad 2q)$

$2p \quad 3q$ [Put $p \quad 1, q \quad 1$]

$2 \quad (\ 1) \quad 3 \quad 1$

$2 \quad 3 \quad 1$

4. (a) $x \quad 7 \quad 4(x \quad 5) \quad x \quad 7 \quad 4x \quad 20 \quad 5x \quad 7 \quad 20 \quad 5x \quad 13$

Put $x \quad 2$ in $(5x \quad 13)$, we have

$5x \quad 13 \quad 5 \quad 2 \quad 13 \quad 10 \quad 13 \quad 3$

(b) $3(x \quad 2) \quad 5x \quad 7 \quad 3x \quad 6 \quad 5x \quad 7$

$(3x \quad 5x) \quad (6 \quad 7) \quad 8x \quad 1$

Put $x \quad 2$ in $(8x \quad 1)$, we have

$8x \quad 1 \quad 8 \quad 2 \quad 1 \quad 16 \quad 1 \quad 15$

(c) $6x \quad 5(x \quad 2) \quad 6x \quad 5x \quad 10 \quad 11x \quad 10$

Put $x \quad 2$ in $(11x \quad 10)$, we have

$11x \quad 10 \quad 11 \quad 2 \quad 10 \quad 22 \quad 10 \quad 12$

(d) $4(2x \quad 1) \quad 3x \quad 11 \quad 8x \quad 4 \quad 3x \quad 11 \quad (8x \quad 3x) \quad (11 \quad 4) \quad 11x \quad 7$

Put $x \quad 2$ in $(11x \quad 7)$, we have

$11x \quad 7 \quad 11 \quad 2 \quad 7 \quad 22 \quad 7 \quad 29$

5. (i) Put $z \quad 10$ in $z^{3.} \quad 3(z \quad 10)$, we have

$z^3 \quad 3(z \quad 10) \quad 10^3 \quad 3(10 \quad 10) \quad 1000 \quad 3 \quad 0 \quad 1000$

(ii) Put $p \quad 10$ in $(p^2 \quad 2p \quad 100)$, we have

$p^2 \quad 2p \quad 100 \quad (\ 10)^2 \quad 2 \quad (\ 10) \quad 100$

$100 \quad 20 \quad 100 \quad 20$

MCQ's

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

7 Commercial Mathematics

Exercise 7.1

1. (a) 60 minutes to 3 hours

1 hours to 3 hours Ratio $1:3$

(b) 32 cm to 4 m

32 cm to 400 cm Ratio $2:25$

(c) 800 ml to 4.8 litres

800 ml to 480 ml Ratio $1:6$

2. Total number of $\quad 90$

Social Science $\quad 10$; Hindi $\quad 18$

English $\quad 27$

Science $\quad 90 \quad (10 \quad 18 \quad 27) \quad 35$

(a) Ratio of number of social science books to science books $10:35 \quad 2:7$

(b) Ratio of number of Hindi to English book $18:27 \quad 2:3$

(c) Ratio of Number of Social Science to total number of book $10:90 \quad 1:9$

3. (a) $\frac{15}{75} \quad \frac{x}{300}$

$300 \quad 15 \quad 75 \quad x_1$

$x_1 \quad \frac{300 \quad 15}{75} \quad 60$

And, $\frac{60}{300} \quad \frac{75}{x_2}$

$60 \quad x_2 \quad 75 \quad 300$

$x_2 \quad \frac{75 \quad 300}{60} \quad 375$

And $\frac{75}{375} \quad \frac{x_3}{5}$

$75 \quad 5 \quad x_3 \quad 375$

$x_3 \quad \frac{75 \quad 5}{375} \quad 1$

(b) $\frac{32}{x_1} \quad \frac{4}{6}$

$32 \quad 6 \quad 4 \quad x_1$

$x_1 \quad \frac{32 \quad 6}{4} \quad 48$

$\frac{4}{6} \quad \frac{x_2}{3}$

$4 \quad 3 \quad 6x_2$

$x_2 \quad \frac{12}{6} \quad 2$

$\frac{2}{3} \quad \frac{48}{x_3}$

$2x_3 \quad 48 \quad 3$

4. Given Ratio in between A and B $5:4$

A's share ₹ 900 $\frac{5}{9}$ ₹ 500

B's share ₹ 900 $\frac{4}{9}$ ₹ 400

5. Given Ratio in between A, B and C $3:4:5$

A's share ₹ 324 $\frac{3}{12}$ ₹ 81

B's share ₹ 324 $\frac{4}{12}$ ₹ 108

C's share ₹ 324 $\frac{5}{12}$ ₹ 135

6. Total number of animals 95

Number of houses 5,

Number of rabbits 20,

Number of hens 95 (5 20) 70

(a) Ratio in number of horses to the total number of the animals $5:95 \quad 1:19$

(b) Ratio in number of rabbits to number of horses $20:5 \quad 4:1$

(c) Ratio in number of hens to number of horses $70:5 \quad 14:1$

(d) Ratio in number of hens to number of rabbits $70:20 \quad 7:2$

7. $A:B \quad 2:3$ …(1)

$B:C \quad 4:5$ …(2)

Multiply (1) by (4) and (2) by (3), we get

$A:BC \quad 8:12:15$

(b) $A:C \quad 8:15$

8. $a : b \quad 4 : 5$ $\qquad \frac{a}{b} \quad \frac{4}{5}$ $\qquad a \quad \frac{4b}{5}$

$$\frac{5a \quad b}{5a \quad b} \qquad \frac{5 \quad \frac{4b}{5} \quad b}{5 \quad \frac{4b}{5} \quad b} \qquad \frac{4b \quad b}{4b \quad b} \quad \frac{5b}{3b} \quad \frac{5}{3}$$

9. $x : y \quad 1 : 2$

$$\frac{x}{y} \quad \frac{1}{2} \qquad x \quad \frac{y}{2}$$

$$\frac{2x \quad y}{y \quad x} \qquad \frac{2 \quad \frac{y}{z} \quad y}{y \quad \frac{y}{z}} \qquad \frac{y \quad y}{\frac{2y \quad y}{z}}$$

$$\frac{2(y \quad y)}{2y \quad y}$$

$$\frac{2 \quad 2y}{y} \quad \frac{4y}{y} \quad \frac{4}{1} \quad 4 : 1$$

10. $\frac{2x \quad 3y}{x \quad 8y} \quad \frac{1}{z}$

$2(2x \quad 3y) \quad 1(x \quad 8y)$ [cross multiplication]

$4x \quad 6y \quad x \quad 8y$

$4x \quad x \quad 8y \quad 6y$

$3x \quad 14y$

$\frac{x}{y} \quad \frac{14}{3}$

11. $\frac{5m \quad n}{n \quad m} \quad \frac{9}{7}$

$8(5m \quad n) \quad 9(n \quad m)$ [cross multiplication]

$35m \quad 7n \quad 9n \quad 9m$

$35m \quad 9m \quad 9n \quad 7n$

$44m \quad 2n$

$\frac{m}{n} \quad \frac{2}{44} \quad \frac{1}{29}$

12. Let one number $4x$

second number $7x$

According to

Question ; $\frac{4x \quad 3}{7x \quad 3} \quad \frac{5}{8}$

$(4x \quad 3)8 \quad 5(7x \quad 3)$

$22x \quad 24 \quad 35x \quad 15$

$9 \quad 3x$

$x \quad 9 \quad 3 \quad 3$

The numbers are

one number $4 \quad 3 \quad 12$

Second number $7 \quad 3 \quad 28$

13. Given Ratio $3:4:2:3$

$3:4 \quad \frac{3}{4} \quad \frac{3}{4} \quad \frac{3}{3} \quad \frac{9}{12}$

$2:3 \quad \frac{2}{3} \quad \frac{2}{3} \quad \frac{4}{4} \quad \frac{8}{12}$

$\frac{9}{12} \quad \frac{8}{12}$

3 : 4 is greater ratio of 2 : 3.

14. Perimeter of the triangle 54 cm

Ratio fo triangle sides $2:3:4$

one side of triangle $54 \quad \frac{2}{9} \quad 12\,\text{cm}$

two side of triangle $54 \quad \frac{3}{9} \quad 18\ \text{cm}$

Three side of triangle $54 \quad \frac{4}{9} \quad 24\,\text{cm}$

Exercise 7.2

1. (a) 30, 35, 40, 45

The production of extremes product means

30 45 35 40

1350 1400

It is not proportion.

(b) 2, 4, 3, 6

The production of extremes product of means.

2 6 4 3

12 12

It is proportion.;

(c) 14, 18, 21, 27

The production of extremes Product of means

14 27 18 21

378 378

It is production.

2. (a) 4, 6, 6, 9

The production of extremes Product of means.

4 9 6 6

36 36

It is proportion.

(b) 2, 4, 6 2, 4, 4, 6

The product of extremes Product of means

2 6 4 4

12 16

It is not proportion.

(c) 4, 12, 36 11, 12, 12, 36

The product of extremes Product of means.

4 36 12 12

144 144

It is proportion.

(d) 3, 9, 27 3, 9, 9, 27

The product of extremes Product of means

$3 \quad 27 \quad 9 \quad 29$

$81 \quad 81$

It is proportion

3. (a) $21 : 38 \quad x : 52$

$21 \quad 52 \quad 28x$ [Product of extremes Product of means]

$x \quad \frac{21 \quad 52}{28} \quad 39$

(b) $11 : x \quad 12 : 72$

$11 \quad 72 \quad 12x$ [Product of extremes Product of means]

$x \quad \frac{11 \quad 72}{12} \quad 66$

(c) $x : 45 \quad 24 : 60$

$x \quad 60 \quad 45 \quad 24$ [Product of extremes Product of means]

$x \quad \frac{45 \quad 24}{60} \quad 18$

4. (a) Let the fourth proportion to 8, 12 and 16 be x :

$8 : 12 \quad 16 : x$

$8x \quad 12 \quad 16$ [Product of extremes Product of means]

$x \quad \frac{12 \quad 16}{8} \quad 24$

(b) Let the fourth proportion to 4, 7 and 8 be x

$4 : 7 \quad 8 : x$

$4x \quad 7 \quad 8$ [Product of extremes Product of means]

$x \quad \frac{7 \quad 8}{4} \quad 14$

(c) Let the fourth proportion to 1, 6 and 10 be x

$1 : 6 \quad 10 : x$

$1 \quad x \quad 6 \quad 10$ [Product of extremes Product of means]

$x \quad 60$

(d) Let the fourth proportion to 30, 40 and 45 be x

$30 : 40 \quad 45 : x$ [Product of extremes Product of means]

$30x \quad 40 \quad 45$

$x \quad \frac{40 \quad 45}{30} \quad 60$

5. (a) Let third proportion to 9 and 4 be x

$9 : x :: x : 4$

$9 \quad 4 \quad x^2$

$36 \quad x$

$x \quad \sqrt{36} \quad 6$

(b) Let third proportion to 2 and 8 be x

$2 : x :: x : 4$

$2 \quad 8 \quad x^2$

$16 \quad x^2$

$x \quad \sqrt{16} \quad 4$

(c) Let third proportion to 25 and 4 be x

$25 : x :: x : 4$

$25 \quad 4 \quad x^2$

$100 \quad x^2$

$x \quad \sqrt{100} \quad 10$

(d) Let third proportion to 9 and 16 be x

$9 : x :: x : 16$

$9 \quad 16 \quad x^2$

$144 \quad x^2$

$x \quad \sqrt{144} \quad 12$

6. Let x number be added

Than ; number is $(1 \quad x)$;

$(3 \quad x)$;

$$(1 \quad x):(3 \quad x)::(10 \quad x):(18 \quad x)$$

$$(1 \quad x)(18 \quad x) \quad (10 \quad x)(3 \quad x)$$

$$18 \quad x \quad 18x \quad x^2 \quad 30 \quad 10x \quad 3x \quad x^2$$

$$18 \quad 19x \quad x^2 \quad 30 \quad 13x \quad x^2$$

$$19x \quad 13x \quad 30 \quad 18$$

$$6x \quad 12$$

$$x \quad 2$$

7. Bulbs in working conation   12

Defective bulbs   3

Ratio of working and defective bulbs $12:3 \quad 4:1$

Defective bulbs $100 \quad \frac{1}{5} \quad 20$

8. Scale of the map 1 cm   5000000

Actual distance between two towns   2 cm

scale of the map 2 cm $2 \quad 5000000$

10,00,00,000 cm   100 km

9. Ratio of present ages of two girls $3:5$

Let age of one girl $3x$

Let age of one second line $5x$

Five years ago,

age of one girl $3x \quad 5$

second girl $5x \quad 5$

Ratio $3x \quad 5 : 5x \quad 5$

According to question

Ration of her age in 5 year ago $1:2$

$$3x \quad 5 : 5x \quad 5 \quad 1:2$$

$$\frac{3x \quad 5}{5x \quad 5} \quad \frac{1}{2}$$

$$2(3x \quad 5) \quad (5x \quad 5) \qquad \text{(cross multiplication)}$$

$$6x \quad 10 \quad 5x \quad 5$$

$$6x \quad 5x \quad 10 \quad 5$$

$$x \quad 5$$

Present age of one girl $3 \quad 5 \quad 15$ year

Present age of second girl $5 \quad 5 \quad 25$ year

10. Distance covered by train   180 km

time taken   3 hours

speed of train   3 hours

speed of train $\frac{180}{3} \quad 60$ km/hour $\because \text{Speed} = \frac{\text{Distance}}{\text{Time}}$

Distance covered by train   240 km

Speed of train   60 km/hour

time taken by train $\frac{240}{60} \quad 6$ hour $\because \text{Time} = \frac{\text{Distance}}{\text{Speed}}$

Exercise 7.3

1. Cost of 12 books ₹ 606

Cost of 1 book ₹ $\frac{606}{12}$ ₹ 50.5

we can bought for ₹ 1010 $\frac{1010 \quad 12}{606}$ 20

2. Cost of 30 metre of cloth ₹ 1800

Cost of 1 metre o cloth ₹ $\frac{1800}{30}$

Cost of 35 metre of cloth ₹ $\frac{1800}{30}$ 35 ₹ 2100

3. Selling price of doll ₹ 625 than tax on it ₹ 62.50

Selling price of doll ₹ 300 than tax on it ₹ $\frac{62.50}{625}$ 300 ₹ 30

4. Cost of 5 litre milk ₹ 112.50

Cost of 1 litre milk ₹ $\frac{112.50}{5}$

Cost of 2 litre milk $\frac{112.50}{5}$ 2 ₹ 45

5. 900 chocolates are packed in 15 boxes

1 chocolate are packed in $\frac{15}{900}$

1500 chocolate are packed in $\frac{15}{900}$ 1500 25 box

6. Capacity of water tank 1.2 kilolitre or 1200 liter

1200 litere store in 1 water tank

1 litre store in $\frac{1}{1200}$ water tank

180000 litre store in $\frac{1}{1200}$ 180000 150 water tank

7. 4 months income of a labourer ₹ 24000

1 months income of a labourer ₹ $\frac{24000}{4}$

12 month income of a labourer ₹ $\frac{24000}{4}$ 12 ₹ 72000

8. Distance covered by plane 4800 km

time taken 8 hours

Speed $\frac{4800}{8}$ 600 km/hour Speed $\frac{\text{Distance}}{\text{Time taken}}$

Time taken $\frac{1800}{600}$ 3 hour Time take $\frac{\text{Distance}}{\text{Speed}}$

MCQ's

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

8 Linear Equation

Exercise 8.1

1. (a) Half of y is $\frac{y}{2}$ — The equation is $\frac{y}{2}$ 33

(b) Seven times m is 7 m. — The equation is $7m$ 84

(c) The equation is n 10 25

(d) Difference of d and 11 is d 11 — The equation is d 11 40

(e) 5 times b is $5b$ — The equation is $5b$ 3 12

(f) 5 times x is $5x$ — 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 — The equation is $\frac{C}{6}$ 8 2

(h) one-fourth of P is $\frac{P}{4}$ — The equation is $\frac{P}{4}$ 4 40

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

13 is added in it, so it will be $\frac{t}{7}$ 13 — The equation is $\frac{t}{7}$ 13 20

(j) 8 times e is $8e$ — The equation is $8e$ 8 80

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

9 less from the total is $(x$ 2) 9 — The equation is $(x$ 2) 9 53

2. (a) 5 subtract from y gives 12

(b) Quotient of q and 9 is 9

(c) Sum of x and 3 is 14

(d) Difference between 5 and y is 3

(e) Negative quotient of P and 7 is 7

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

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

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

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

(j) 16 times m is 96

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

3. (a) 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

The equation is x $\frac{2x}{5}$ 35, (where x is number of boys)

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

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

(c) Let Two consecutive numbers be x and $(x$ 1). Their sum is x $(x$ 1).

The equation is x $(x$ 1) 51. or $2x$ 51

(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

The equation is $x \quad (2x \quad 6) \quad x \quad (2x \quad 6) \quad 240$

or, $2x \quad 2(2x \quad 6) \quad 240$

or, $2x \quad 4x \quad 12 \quad 240$

or, $6x \quad 12 \quad 240$

(e) Let $B \quad C \quad x.$

Then $A \quad 3 \quad B \quad 3x$

or, $A \quad 3 \quad C \quad 3x$

The equation is $A \quad B \quad C \quad 180$

i.e., $A \quad \frac{A}{3} \quad \frac{A}{3} \quad 180$ $[\because \quad A \quad B \quad 3 \quad C]$

(f) Let Viabhav's Age is x years.

Then, Vaibhav's father's age is $(3x \quad 4)$ years but Vaibhav's father is 43 years.

The equation is $(3x \quad 4) \quad 43$, where x is Vaibhav's age.

(g) Let Gautam scored the runs x

Then Rahul scored the runs $2x$

The sum of their runs $(2x \quad x \quad 5)$

[$\because$ century 100 runs, *d*ouble century 100 100 200 runs]

(h) Let Isha is x ears old. Then, Saurabhs' age $x \quad 6$

Sum of their ages is $x \quad (x \quad 6)$.

The equation is $x \quad (x \quad 6) \quad 24$

or, $2x \quad 6 \quad 24.$

Exercise 8.2

1. $2b \quad 5 \quad 17, b \quad 6$

Substituting $b \quad 6$ in the equation

L.H.S. $2 \quad 6 \quad 5 \quad 12 \quad 5 \quad 17$ R.H.S.

$b \quad 6$ is a solution of the given equation.

2. $8 \quad 7x \quad 20, \ n \quad 2$

Substituting $n \quad 2$ in the equation

L.H.S. $8 \quad 7n \quad 7 \quad 7 \quad 2 \quad 8 \quad 14 \quad 6$

R.H.S. 20

$\because$ L.H.S. R.H.S.

$n \quad 2$ is not a solution of the given equation.

3. $9q \quad 3 \quad 15, q \quad 2$

Substituting $q \quad 2$ in the equation

L.H.S. $9 \quad 2 \quad 3 \quad 18 \quad 3 \quad 15$ R.H.S.

$q \quad 2$ is a solution of the given equation.

4. $\frac{a}{20} \quad 4, a \quad 60$

Substituting $a \quad 60$ in the equation

L.H.S. $\frac{60}{20} \quad 3$

and, R.H.S. 4

Since L.H.S. R.H.S.

$a \quad 60$ is not a solution of the given equation.

5. $\frac{y}{2} \quad 4 \quad 0, y \quad 8$

Substituting $y \quad 8$ in the equation

L.H.S. $\frac{8}{2}$ 4 4 4

0 R.H.S.

y 8 is a solution of the given equation.

6. $4S$ 80, s 76

Substituting s 76 in the equation

L.H.S. 4 76 304 R.H.S.

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 13 169 = R.H.S.

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 1 11 23 34 R.H.S.

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 1 1 2 1 3

R.H.S. 1 3 4

Since L.H.S. R.H.S.

x 1 is not a solution of the given equation.

Exercise 8.3

1. $8z$ 20 52

We have, $8z$ 20 52

$8z$ 52 20 (by transposition)

$8z$ 32

z $\frac{32}{8}$ (by transposition)

$\boldsymbol{z}$ **4**

Hence, z 4 is a solution.

Check : L.H.S. $8z$ 20 8 4 20 52 = R.H.S.

2. $\frac{a}{13}$ 6 5

We have, $\frac{a}{13}$ 6 5

$\frac{a}{13}$ 5 6 (by transposition)

$\frac{a}{13}$ 1

a 1 13 (by transposition)

$\boldsymbol{a}$ **13**

Check : L.H.S. $\frac{a}{13}$ 6 $\frac{13}{13}$ 6

1 6 6 1 5 = R.H.S.

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

We have, $\quad \frac{5y}{2} \quad 60$

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

$y \quad \overset{12}{60} \quad \frac{2}{\underset{1}{5}}$

$\boldsymbol{y \quad 24}$

Hence, $y \quad 24$ is a solution of the given equation.

Check : L.H.S. $\frac{5}{2}y \quad \frac{5}{2} \quad \overset{12}{24} \quad 5 \quad 12 \quad 60 =$ R.H.S.

4. $2(y \quad 3) \quad 7$

We have, $\quad 2(y \quad 3) \quad 7$

$2y \quad 6 \quad 7$

$2y \quad 7 \quad 6$ (by transposition)

$2y \quad 13$

$y \quad \frac{13}{12}$ (by transposition)

$\boldsymbol{y \quad \frac{13}{2}}$

Hence, $y \quad \frac{13}{2}$ is a solution of the given equation.

Check : L.H.S. $\quad 2(y \quad 3) \quad 2y \quad 6$

$2 \quad \frac{13}{2} \quad 6 \quad 13 \quad 6$

$7 =$ R.H.S.

5. $12t \quad 1 \quad 37$

We have, $\quad 12t \quad 1 \quad 37$

$12t \quad 37 \quad 1$ (By transposition)

$12t \quad 36$

$t \quad \frac{\overset{3}{36}}{\underset{1}{12}}$ (By transposition)

$\boldsymbol{t \quad 3}$

Hence, $t \quad 3$ is a solution of the given equation.

Check : L.H.S. $\quad 12t \quad 1 \quad 12 \quad 3 \quad 1 \quad 36 \quad 1 \quad 37 \quad$ R.H.S.

6. $\frac{x}{4} \quad 9 \quad 7$

We have $\quad \frac{x}{4} \quad 9 \quad 7$

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

$$\frac{x}{4} = 2$$

$$x = 2 \times 4 \quad \text{(By transposition)}$$

$$\boldsymbol{x = 8}$$

Hence, $x = 8$ is a solution of the given equation.

Check : L.H.S. $= \frac{x}{4} - 9 = \frac{8}{4} - 9 = 2 - 9 = -7 =$ R.H.S.

7. $2m + \frac{5}{2} = \frac{37}{2}$

We have, $2m = \frac{37}{2} - \frac{5}{2}$ (by transposition)

$$2m = \frac{37 - 5}{2} = \frac{32}{2} = 16$$

$$m = \frac{16}{2} \quad \text{(By transposition)}$$

$$\boldsymbol{m = 8}$$

Hence, $m = 8$ is a solution of the given equation.

Check : L.H.S. $= 2m + \frac{5}{2} = 2 \times 8 + \frac{5}{2}$

$$= 16 + \frac{5}{2} = \frac{32 + 5}{2} = \frac{37}{2} = \text{R.H.S.}$$

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

We have, $3(4 - x) = -2x - 5$

$$12 - 3x = -2x - 5$$

$$-3x + 2x = -5 - 12 \quad \text{(by transposition)}$$

$$-3x + 2x = -17$$

$$3x - 2x = 17 \quad \text{(by transposition)}$$

$$\boldsymbol{x = 17}$$

Hence, $x = 17$ is a solution of the given equation.

Check : L.H.S. $= 3(4 - x) = 12 - 3x = 12 - 3 \times 17 = 12 - 51 = -39$

R.H.S. $= -2x - 5 = -2 \times 17 - 5 = -34 - 5 = -39$

L.H.S. = R.H.S.

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

We have, $4x - \frac{1}{3} = \frac{1}{5} + 3x$

$$4x - \frac{1}{3} - 3x = \frac{1}{5} \quad \text{(by transposition)}$$

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

$$x = \frac{1}{5} + \frac{1}{3} \quad \text{(by transposition)}$$

$$x = \frac{3 + 5}{15} = \frac{8}{15} \qquad \boldsymbol{x = \frac{8}{15}}$$

Hence, $x = \frac{8}{15}$ is a solution of the given equation.

Check : L.H.S. $4x \quad \frac{1}{3} \quad 4 \quad \frac{8}{15} \quad \frac{1}{3} \quad \frac{32}{15} \quad \frac{1}{3} \quad \frac{32 \quad 5}{15} \quad \frac{\overset{9}{27}}{\underset{5}{15}} \quad \frac{9}{5}$

R.H.S. $\frac{1}{5} \quad 3x \quad \frac{1}{5} \quad \overset{1}{3} \quad \frac{8}{\underset{5}{15}} \quad \frac{1}{5} \quad \frac{}{5} \quad \frac{1 \quad 8}{5} \quad \frac{9}{5}$

L.H.S. = R.H.S

10. $4(5x \quad 4) \quad 3(2x \quad 1) \quad 7$

We have, $20x \quad 16 \quad 6x \quad 3 \quad 7$

$26x \quad 19 \quad 7$

$26x \quad 7 \quad 19$ (by transposition)

$26x \quad 26$

$x \quad \frac{26}{26}$ (by transposition)

$\boldsymbol{x \quad 1}$

Hence, $x \quad 1$ is a solution of the given equation.

Check : L.H.S. $4(5x \quad 4) \quad 3(2x \quad 1)$

$4(5 \quad 1 \quad 4) \quad 3(2 \quad 1 \quad 1)$

$4(5 \quad 4) \quad 3(2 \quad 1 \quad 1)$

$4 \quad 1 \quad 3 \quad 1$

$4 \quad 3 \quad 7 =$ R.H.S.

11. $7x \quad 2(x \quad 2) \quad 20 \quad (2x \quad 5)$

$7x \quad 2x \quad 4 \quad 20 \quad 2x \quad 5$

$9x \quad 4 \quad 25 \quad 2x$

$9x \quad 2x \quad 4 \quad 25$ (by transposition)

$11x \quad 25 \quad 4$ (by transposition)

$11x \quad 21$

$\boldsymbol{x \quad \frac{21}{11}}$ (by transposition)

Hence, $x \quad \frac{21}{11}$ is a solution of the given equation.

Check : L.H.S. $7x \quad 2(x \quad 2)$

$7 \quad \frac{21}{11} \quad 2 \quad \frac{21}{11} \quad 2 \quad \frac{147}{11} \quad \frac{42}{11} \quad 4$

$\frac{147 \quad 42 \quad 44}{11} \quad \frac{233}{11}$

R.H.S. $20 \quad (2x \quad 5) \quad 20 \quad 2 \quad \frac{21}{11} \quad 5 \quad 20 \quad \frac{42}{11} \quad 5$

$25 \quad \frac{42}{11} \quad \frac{275 \quad 42}{11} \quad \frac{233}{11}$

L.H.S. = R.H.S.

12. $\frac{y}{5} \quad \frac{y}{6} \quad \frac{1}{30}$

$\frac{6y \quad 5y}{30} \quad \frac{1}{30}$ [LCM of $(5, 6) \quad 30$]

$$\frac{y}{30} \quad \frac{1}{30}$$

$$y \quad \frac{1}{30} \quad 30 \qquad \text{(by transposition)}$$

$$\boldsymbol{y} \quad \mathbf{1}$$

13. $23 \quad 4x \qquad 25 \quad 4x$

or, $23 \qquad 25 \quad 4x \quad 4x$ (by transposition)

or, $23 \qquad 25 \quad 8x$

or, $23 \quad 25 \quad 8x$ (by transposition)

or, $48 \quad 8x$

or, $8x \quad 48$

or, $x \quad \frac{\overset{6}{48}}{\underset{1}{8}}$ (by transposition)

or, $\boldsymbol{x} \quad \mathbf{6}$

Hence, $x \quad 6$ is a solution.

Check : L.H.S. $23 \quad 4x \quad 23 \quad 4 \quad 6 \quad 23 \quad 24 \quad 1$

R.H.S. $25 \quad 4x \qquad 25 \quad 4 \quad 6 \qquad 24 \quad 24 \qquad 1$

L.H.S. = R.H.S.

14. $\frac{2x}{3} \quad \frac{x}{2} \quad 30$

$$\frac{4x \quad 3x}{6} \quad 30 \qquad \text{[LCM of (3, 2) = 6]}$$

$$\frac{x}{6} \quad 30$$

$$x \quad 30 \quad 6 \qquad \text{(by transposition)}$$

$$\boldsymbol{x} \quad \mathbf{180}$$

Hence, $x \quad 180$ is a solution.

Check : L.H.S. $\frac{2x}{3} \quad \frac{x}{2} \quad \frac{2 \quad \overset{60}{\cancel{180}}}{\underset{1}{\cancel{3}}} \quad \frac{\overset{90}{\cancel{180}}}{\cancel{2}}$

$120 \quad 90 \quad 30$

= R.H.S.

15. $0 \quad 18 \quad 9(m \quad 2)$

We have, $0 \quad 18 \quad 9(m \quad 2)$

$0 \quad 18 \quad 9m \quad 18$

$0 \quad 9m$

$\frac{0}{9} \quad m$ (by transposition)

$0 \quad m$

or, $\boldsymbol{m} \quad \mathbf{0}$

Hence, $m \quad 0$ is a solution of this equation.

Check : R.H.S. $18 \quad 9(m \quad 2) \quad 18 \quad 9(0 \quad 2)$

$18 \quad 9 \quad 0 \quad 9 \quad 2 \quad 18 \quad 18 \quad 0$ L.H.S.

16. $34 \quad 5(n \quad 1) \quad 4$

We have, $34 \quad 5(n \quad 1) \quad 4$

$34 \quad 5n \quad 5 \quad 4$

$39 \quad 5n \quad 4$

$5n \quad 4 \quad 39$ (by transposition)

$5n \quad 35$

$n \quad \frac{35}{(\quad 5)}$ (by transposition)

$\boldsymbol{n \quad 7}$s

Hence, $n \quad 7$ is a solution.

Check : L.H.S. $34 \quad 5(n \quad 1) \quad 34 \quad 5(7 \quad 1) \quad 34 \quad 5 \quad 6$

$34 \quad 3 \quad 4 =$ R.H.S.

17. $\frac{x}{4} \quad \frac{x}{5} \quad 1$

We have, $\frac{x}{4} \quad \frac{x}{5} \quad 1$

$\frac{x}{4} \quad \frac{x}{5} \quad 1$ (by transposition)

$\frac{5x \quad 4x}{20} \quad 1$

$\frac{x}{20} \quad 1$

$x \quad 1 \quad 20$ (by transposition)

$\boldsymbol{x \quad 20}$

Hence, $x \quad 20$ is a solution.

Check : L.H.S. $\frac{x}{4} \quad \frac{20}{4} \quad 5$

R.H.S. $\frac{x}{5} \quad 1$

$\frac{\overset{4}{\cancel{20}}}{\underset{1}{\cancel{5}}} \quad 1 \quad 4 \quad 1 \quad 5$

L.H.S. R.H.S.

18. $\frac{7b}{8} \quad 15 \quad 1$

We have, $\frac{7b}{8} \quad 15 \quad 1$

$\frac{7b}{8} \quad 15 \quad 1$ (by transposition)

$\frac{7b}{8} \quad 14$

$7b \quad 14 \quad 8$ (by transposition)

$b \quad \frac{\overset{2}{\cancel{14}} \quad 18}{\underset{1}{\cancel{7}}}$ (by transposition)

$\boldsymbol{b \quad 16}$

Hence, $b \quad 16$ is a solution.

Check : L.H.S. $\frac{7b}{8}$ 15 $\frac{7 \quad \overset{2}{\cancel{16}}}{\underset{1}{\cancel{8}}}$ 15 7 2 15 14 15 1 = R.H.S.

19. $5(x \quad 3) \quad 45$

We have, $5(x \quad 3) \quad 45$

$5x \quad 15 \quad 45$

$5x \quad 15 \quad 45$ (by transposition)

$5x \quad 30$

$x \quad \frac{30}{5}$ (by transposition)

$\boldsymbol{x \quad 6}$

Hence, $x \quad 6$ is a solution.

Check : L.H.S. $5(x \quad 3) \quad 5(\quad 6 \quad 3) \quad 5 \quad (\quad 9) \quad 45$ = R.H.S.

20. $3P \quad 2(2P \quad 5) \quad 2(P \quad 3) \quad 8$

We have, $3P \quad 2(2P \quad 5) \quad 2(P \quad 3) \quad 8$

$3P \quad 4P \quad 10 \quad 2P \quad 6 \quad 8$

$P \quad 10 \quad 2P \quad 2$

$10 \quad 2p \quad 2 \quad P$ (by transposition)

$10 \quad 3p \quad 2$

$10 \quad 2 \quad 3P$ (by transposition)

$12 \quad 3P$

$\frac{12}{3} \quad P$ (by transposition)

$4 \quad P$ or $\boldsymbol{P \quad 4}$

Hence, $P \quad 4$ is a solution.

Check : L.H.S. $3P \quad 2(2P \quad 5) \quad 3 \quad 4 \quad 2(2 \quad 4 \quad 5)$

$12 \quad 2(8 \quad 5) \quad 12 \quad 2 \quad 3 \quad 12 \quad 6 \quad 6$

R.H.S. $2(P \quad 3) \quad 8 \quad 2(4 \quad 3) \quad 8 \quad 2 \quad 7 \quad 8 \quad 14 \quad 8 \quad 6$

L.H.S. R.H.S.

Exercise 8.4

1. Let one of the numbers be x. Then, the second number will be $(x \quad 1)$.

Then, $x \quad (x \quad 1) \quad 203$ $\qquad$ $2x \quad 1 \quad 203$

$2x \quad 203 \quad 1$ $\qquad$ $2x \quad 202$

$x \quad \frac{202}{2}$ $\qquad$ $\boldsymbol{x \quad 101}$

one number = 101 and the second number 101 1 102

2. Let one of the odd numbers be x

Then, the next consecutive odd number $x \quad 2$

Sum of 2 consecutive odd number = 136

$x \quad (x \quad 2) \quad 136$

or, $2x \quad 2 \quad 136$

or, $2x \quad (136 \quad 2) \quad 134$

or, $x \quad \frac{134}{2} \quad 67$

$\boldsymbol{x \quad 67}$

Hence, one odd number = 67

and the second odd number $67 \quad 2 \quad 69$

3. Let one the even number be x.

Then, the next consecutive even number $x \quad 2$.

Sum of 2 consecutive even number 502

$$x \quad (x \quad 2) \quad 502$$

$$2x \quad 2 \quad 502$$

$$2x \quad 502 \quad 2 \quad 500$$

$$x \quad 250$$

Hence, one even number = 250 and the second even number $250 \quad 2 \quad 252$

4. Let the 3 consecutive integers be $x, x \quad 1, x \quad 2$

Sum of all the inegers is $x \quad (x \quad 1) \quad (x \quad 2)$.

$$x \quad (x \quad 1) \quad (x \quad 2) \quad 24$$

or, $3x \quad 3 \quad 24$

or, $3x \quad 24 \quad 3 \quad 21$

or, $x \quad \frac{\overset{7}{\cancel{21}}}{\underset{1}{\cancel{3}}} \quad 7$ $\qquad$ $\boldsymbol{x \quad 7}$

First integer = 7 Second $7 \quad 1 \quad 8$ and the third integer $7 \quad 2 \quad 9$

5. Let the number be x. 35 added to x gives $x \quad 35$.

So, the following equation is obtained.

$$x \quad 35 \quad 217$$

or, $x \quad 217 \quad 35 \quad 182$

Hence, the number is 182.

Check : $182 \quad 35 \quad 217$

6. Let the number be x. twice the number is $2x$.

7 added to $2x$ gives 59, so we obtain the following equation.

$$2x \quad 7 \quad 59$$

$$2x \quad 59 \quad 7$$

$$2x \quad 52$$

$$x \quad \frac{52}{2}$$

$$\boldsymbol{x \quad 26}$$

Hence, the required number is 26.

Check : $2 \quad 26 \quad 7 \quad 52 \quad 7 \quad 59$

7. Let the number be x. 5 times the number $5x$,

Subtracting 3 from it, we get $5x \quad 3$. so, the following equation is obtained

$$5x \quad 3 \quad 42$$

$$5x \quad 42 \quad 3 \quad 45$$

$$\frac{5x}{5} \quad \frac{\overset{9}{45}}{\underset{1}{5}}$$

$$x \quad 9$$

Hence, the required number is 9.

Check : Do yourself as above.

8. Let the number be x. Multiplication by $\frac{5}{6}$ is $\frac{5x}{6}$,

So we obtain the following equation.

$$\frac{5}{6}x \quad 60$$

$$5x \quad 60 \quad 6$$

$$x \quad \frac{\overset{12}{\cancel{60}} \quad 6}{\underset{1}{\cancel{5}}} \quad 12 \quad 6$$

$$\boldsymbol{x} \quad \mathbf{72}$$

Hence, the required number is 72.

9. Let the number be x. Two-third of the number is $\frac{2}{3}x$.

one-third of the number is $\frac{x}{3}$. So, the equation is

$$\frac{2}{3}x \quad \frac{x}{3} \quad 3 \qquad\qquad \frac{2x}{3} \quad \frac{x}{3} \quad 3$$

$$\frac{2x \quad x}{3} \quad 3 \qquad\qquad \frac{x}{3} \quad 3$$

$$x \quad 3 \quad 3 \quad 9 \qquad\qquad \boldsymbol{x} \quad \mathbf{9}$$

Hence, the required number is 9.

10. Let the number be x. Its three-fourth is $\frac{3}{4}x$.

So, the equation is $x \quad \frac{3x}{4} \quad 91$

$$\frac{4x \quad 3x}{4} \quad 91 \qquad\qquad \frac{7x}{4} \quad 91$$

$$7x \quad 91 \quad 4 \qquad\qquad x \quad \frac{\overset{13}{91} \quad 4}{\underset{1}{7}} \quad 13 \quad 4$$

$$\boldsymbol{x} \quad \mathbf{52}$$

Hence, the required number is 52.

11. Let the number of boys in the class be x.

Then, the number of girls $\frac{5}{6}$ of the number of boys $\frac{5}{6} \quad x \quad \frac{5x}{6}$

Total number of students 44

Now, the number of girls + The number of boys = Total number of students

$$\frac{5x}{6} \quad x \quad 44 \qquad\qquad \frac{5x \quad 6x}{6} \quad 44$$

$$\frac{11x}{6} \quad 44 \qquad\qquad x \quad \frac{\overset{4}{44} \quad 6}{\underset{1}{11}}$$

$$\boldsymbol{x} \quad \mathbf{24}$$

Hence, the number of girls in the class $\frac{5}{6} \quad \overset{4}{24} \quad 20$

12. Let the number be x. half of the number is $\frac{x}{2}$.

$$x \quad \frac{x}{2} \quad 45$$

$$\frac{2x \quad x}{2} \quad 45$$

$$\frac{3x}{2} \quad 45$$

$$3x \quad 45 \quad 2$$

$$x \quad \frac{\overset{15}{45} \quad 2}{\underset{1}{3}} \quad 15 \quad 2 \quad 30 \qquad\qquad \boldsymbol{x \quad 30}$$

The number = 30

13. Let Sahil's age be x years. Then his mother's age is $5x$.

Sum of their ages is $(x \quad 5x)$ years.

$$x \quad 5x \quad 48$$

$$6x \quad 48$$

$$x \quad \frac{\overset{8}{\cancel{48}}}{\underset{1}{\cancel{6}}} \quad 8$$

$$x \quad 8$$

Hence, Sahil age = 8 years and is mother's age $5 \quad 8 \quad 40$ years

14. Let Mayank's present age x years

Then, after 15 years, Mayank's age $(x \quad 15)$ years

$$x \quad 15 \quad 4 \quad \text{(Present age)} \quad 4x$$

$$x \quad 15 \quad 4x$$

$$15 \quad 4x \quad x \quad 3x$$

$$\frac{\overset{5}{\cancel{15}}}{\underset{1}{\cancel{3}}} \quad x \qquad\qquad s \qquad\qquad 5 \quad x$$

$$\boldsymbol{x \quad 5}$$

Manayk's present age = 5 years

15. Let Isha's brother age be x years.

Then, Ishas's age $(x \quad 5)$ years.

After 4 years, Isha's brother age will be $(x \quad 4)$ years

Ratio of both age $2 : 3$

and Isha's age will be $(x \quad 5) \quad 4 \quad (x \quad 1)$ years

$$\frac{(x \quad 5) \quad 4}{x \quad 4} \quad \frac{2}{3} \qquad\qquad \frac{x \quad 1}{x \quad 4} \quad \frac{2}{3}$$

$$3(x \quad 1) \quad 2(x \quad 4)$$

$$3x \quad 3 \quad 2x \quad 8$$

$$3x \quad 2x \quad 8 \quad 3$$

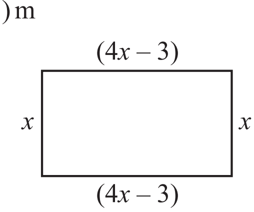
$$\boldsymbol{x \quad 11}$$

Hence,Isha's brother age $x \quad 11$ years and Isha's age $(x \quad 5) \quad (11 \quad 5) \quad 6$ years

16. Let breadth of rectangle x m. Then length of rectangle $(4x \quad 3)$ m

Perimeter of rectangle 94 m.

Perimeter of rectangle $2(l \quad b)$



$$94 \quad 2(4x \quad 3 \quad x)$$

$$\frac{\overset{47}{94}}{2} \quad 5x \quad 3$$

$47 \quad 5x \quad 3$

$47 \quad 3 \quad 5x$

$50 \quad 5x$

$\frac{50}{5} \quad x$ $\qquad\qquad$ $\boldsymbol{x \quad 10}$

Breadth $\quad x \quad 10$ m

Length $\quad (4x \quad 3) \quad 4 \quad 10 \quad 3 \quad 40 \quad 3 \quad 37$ m

17. Let Yuvraj scored x runs and Gautam scored $2x$

Together, their run fell five short of a double century $(100 \quad 100 \quad 5) \quad 195$

$x \quad 2x \quad 195$

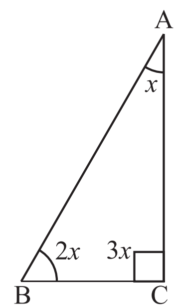
$3x \quad 195$

$x \quad \frac{\overset{65}{195}}{\underset{1}{3}}$ $\qquad\qquad$ $\boldsymbol{x \quad 65}$

Yuvraj scored $\quad x \quad 65$ runs

Gautam scored $\quad 2x \quad 2 \quad 65 \quad 130$ runs

18. Let angle are $\quad A \quad x, \quad B \quad 2x, \quad C \quad 3x$



We know that the sum of 3 angles of a triangle is 180°.

The equation is. $\quad A \quad B \quad C \quad 180$

i.e., $\quad x \quad 2x \quad 3x \quad 180$

$6x \quad 180$

$x \quad \frac{\overset{30}{\cancel{180}}}{\underset{1}{\cancel{6}}}$

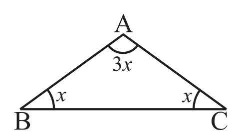
$\boldsymbol{x \quad 30}$

$A \quad x \quad 30$

$B \quad 2x \quad 2 \quad 30 \quad 60$

$C \quad 3x \quad 3 \quad 30 \quad 90$

19. Let base angel be $\quad B \quad x$ and $\quad C \quad x$



Then, vertex angle $\quad A \quad 3x$

The sum of 3 angles of a triangle is 180°.

i.e., $\quad A \quad B \quad C \quad 180$

$3x \quad x \quad x \quad 180$

$5x \quad 180$

$x \quad \frac{180}{5} \quad 36$

measure of $\quad B \quad x \quad 36$

measure of $\quad C \quad x \quad 36$

measure of $\quad A \quad 3x \quad 3 \quad 36 \quad 108$

20. Let Garima's age be x years

Then her mother's age $\quad 3x$

Hence, the equation is, $x \quad 3x \quad 72$

$4x \quad 72$

$x \quad \frac{\overset{18}{72}}{\underset{1}{4}} \quad 18$ $\qquad\qquad$ $\boldsymbol{x \quad 18}$

Hence, Garima's age = 18 years and mother age $\quad 3 \quad 18 \quad 54$ years

21. Let the number of 2-rupee coins be x

the number of 1-rupee coins $3x$

value of one-rupee coin = ₹ 2

value of x 2-rupee coin = ₹ $2x$

value of one 1-rupee coin = ₹ 1

value of $3x$ 1-rupee coin = ₹ $3x$

Total value of (2-rupee + 1-rupee) coins = ₹ $(2x \quad 3x)$

Hence, the equation is $2x \quad 3x$ ₹ 50

$5x \quad 50$

$x \quad \frac{\overset{10}{50}}{\underset{1}{5}} \quad 10$

$x \quad 10$

Number of 2 rupee coins $x \quad 10$

Number of 1-rupee coins $3x \quad 3 \quad 10 \quad 30$

22. Total number of notes = 30

Let the number of ₹ 100 notes be x

The number of ₹ 500 notes be $(30 \quad x)$

Total rupees in the purse is ₹ 5000.

The equation is $x\,100 \quad (30 \quad x)\,500 \quad 5000$

$100x \quad 15000 \quad 500x \quad 5000$

$15000 \quad 400x \quad 5000 \qquad 10000 \quad 400x$

$\frac{\overset{25}{10000}}{400} \quad x \qquad$ $\boldsymbol{x \quad 25}$

Hence, the number of ₹ 100 = 25

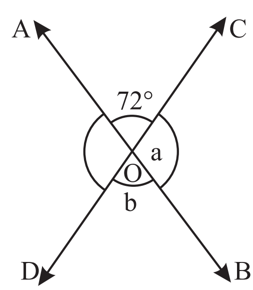
And the number of ₹ 500 $(30 \quad 25) \quad 5$

MCQ's

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

9 Understanding Shapes

Exercise 9.1



1. (a) Since AOB is a straight line

$AOB \quad 180$

$72 \quad a \quad 180$

$a \quad 180 \quad 72 \quad 108$

(b) Adjacent angles are

BOC, COA, AOD, DOB

(c) Vertically opposite angles are

(AOC and DOB)

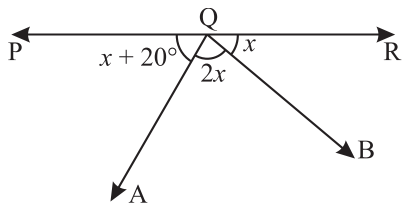
(AOD and BOC).

(d) $DOB \quad AOC \quad 72$ (vertically opposite angles

$BOC \quad AOD$ (vertically opposite angles)

$a \quad AOD \quad 108 \quad AOD$

2. Since *PQR* is a straight line.



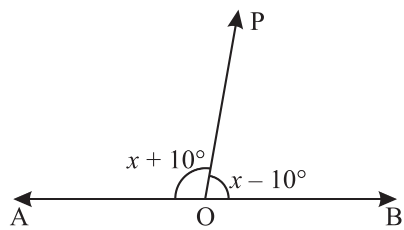
$$PQR \quad 180$$
$$x \quad 20 \quad 2x \quad x \quad 180$$
$$4x \quad 20 \quad 180$$
$$4x \quad 180 \quad 20 \quad 160$$
$$x \quad \frac{160}{4} \quad 40$$

(a) $AQB \quad 2x \quad 2 \quad 40 \quad 80$

(b) $BQP \quad 2x \quad x \quad 20 \quad 3x \quad 20 \quad 3 \quad 40 \quad 20 \quad 140$

(c) $AQR \quad 2x \quad x \quad 3x \quad 3 \quad 40 \quad 120$

3. Since *AOB* is a straight line.



$$AOB \quad 180$$
$$x \quad 10 \quad x \quad 10 \quad 180$$
$$2x \quad 180$$
$$x \quad \frac{180}{2} \quad 90$$

(a) $AOP \quad x \quad 10 \quad 90 \quad 10 \quad 100$

(b) $BOP \quad x \quad 10 \quad 90 \quad 10 \quad 80$

(c) Since 80 90

BOP is acute angle.

(d) Since 100 90 .

AOP is obtuse angle.

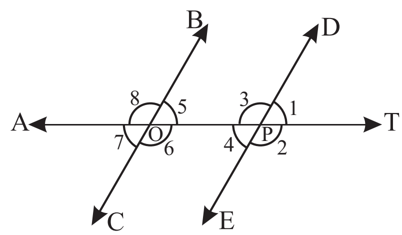
4. (a) Linear pairs will be :

(5, 8) and (1, 3)

(8, 7) and (3, 4)

(7, 6) and (4, 2)

(6, 5) and (2, 1)



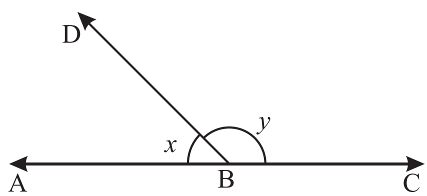
(b) Vertically opposite angles are :

(1, 4), and (5, 7)

(2, 3) and (8, 6)

5. If x 45 , y ?

Since *ABC* is a straight line



$$ABC \quad 180$$
$$x \quad y \quad 180$$
$$45 \quad y \quad 180$$
$$y \quad 180 \quad 45 \quad 135$$
$$y \quad 135$$

6. y ?, If $x \quad \frac{y}{2}$ Since *ABC* is a straight line (from the figure)

$$ABC \quad 180$$
$$x \quad y \quad 180°$$
$$\frac{y}{2} \quad y \quad 180 \qquad \because \quad x \quad \frac{y}{2} \text{ (given)}$$
$$\frac{3y}{2} \quad 180$$
$$y \quad \frac{\overset{60}{\cancel{180}} \quad 2}{\cancel{3}} \quad 120 \qquad y \quad 120$$

7. If y $2x$, x ?, y ?

Since ABC is a straight line

ABC 180

x y 180

x $2x$ 180   [∵ y $2x$ given]

$3x$ 180

x $\frac{180}{3}$ 60 x 60

y 2 x 2   60   120 y 120

8. If y $1\frac{1}{2}$ right angle, x ?

y $\frac{3}{2}$ right angle

$\frac{3}{2}$ 90   3   45   135   [∵   1Right angle   90]

Since ABC is a straight line (from the fig.)

ABC 180 x y 180

x 135   180 x 180   135   45

x 45

9. (a) POR POQ QOR x y

(b) POR QOR x y y x

(c) QOS SOR

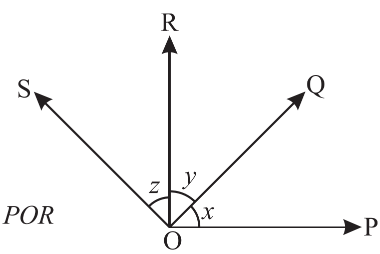
QOR ROS SOR

y z z y

(d) POS QOR POQ

POQ QOR ROS QOR POR

ROS z



10. (a) x y POQ QOR POR

(b) x y z POQ QOR ROS POS

(c) y z QOR ROS QOS

(d) x y z z x y POQ QOR POR

11. If x $\frac{1}{3}$ right angle $\frac{1}{3}$ 90   30

y $\frac{2}{3}$ right angle $\frac{2}{3}$ 90   2   30   60

z $\frac{1}{2}$ right angle $\frac{1}{2}$ 90   45

POS x y z

30   60   45   135

12. If x 25 , y 60 , POR ?

POR x y (by figure)

25   60   85

13. If SOQ 100 , QOR 55 , SOR ?

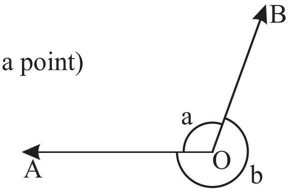
SOR QOR SOQ

SOR 55   100

SOR 100   55

45

14. (a) If a 110 , b ?



AOB BOA 360 (sum of all the small angles at a point)

a b 360

110 b 360

b 360 110 250

b 250

(b) If b 200, a ?

AOB BOA 360 (sum of all the angles at a point is 360°)

a b 360

a 200 360

a 360 200 160

a 160

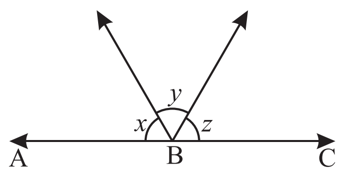
(c) If a $\frac{5}{3}$ right angle $\frac{5}{3}$ 90 5 30 150 , b ?

∵ a b 360 (sum of all the angles at a point is 360°)

150 b 360

b 360 150 210

15. (a) Given, x y 80, z 30



ABC x y z

80 80 30 190

Since ABC 190 180 .

Hence, ABC is not a straight line.

(b) Given, x y z $\frac{2}{3}$ right angle

$\frac{2}{3}$ $\overset{30}{90}$ 60 (cancelled: 1)

ABC x y z

60 60 60 180

Since ABC 180 .

Hence, ABC is a straight line.

(c) Given, x $\frac{2}{3}$ right angle

$\frac{2}{3}$ 90 60 (x 60)

y 1 right angle (given)

90 (y 90)

z $\frac{1}{2}$ right angle

$\frac{1}{2}$ 90 45 (z 195)

ABC x y z

60 90 45 195

Since ABC 195 180 .

Hence, ABC is not a straight line.

(d) z $1\frac{1}{2}$ right angle (given)

$\frac{3}{2}$ right angle

$\frac{3}{2}$ $\overset{45}{90}$ 135 $\qquad\qquad$ $(z \quad 195\ )$

$\overset{1}{}$

$ABC \quad x \quad y \quad z$

$30 \quad 30 \quad 135 \quad 195$

Since $ABC \quad 195 \quad 180$.

Hence, ABC is not a straight line.

16. (a) $\frac{1}{3}$ of $90°$ $\frac{1}{3}$ $90 \quad 30$

$a \quad b \quad 90$ $\qquad$ $a \quad 30 \quad 90$ $\qquad$ (Sum of two angles is 90°)

$a \quad 90 \quad 30$ $\qquad$ $a \quad 60$

(b) $\frac{1}{4}$ of $80°$ $\frac{1}{4}$ $80 \quad 20$

$a \quad b \quad 90$ $\qquad$ $a \quad 20 \quad 90$ $\qquad$ (Sum of two angles is 90°)

$a \quad 90 \quad 20$ $\qquad$ $a \quad 70$

(c) $\frac{1}{2}$ of $60°$ $\frac{1}{2}$ $60 \quad 30$ $\qquad$ (Sum of two angles is 90°)

$a \quad b \quad 90$

$a \quad 30 \quad 90$

$a \quad 90 \quad 30 \quad 60$ $\qquad$ $a \quad 60$

(d) $\frac{2}{5}$ of 70 $\frac{2}{5}$ $\overset{14}{70}$ 28

$\because$ $a \quad b \quad 90$

$a \quad 28 \quad 90$ $\qquad$ (Sum of two angles 90°)

$a \quad 90 \quad 28$ $\qquad$ $a \quad 62$

17. (a) $30°$

$a \quad b \quad 90$ $\qquad$ (Sum of two angles is 90°)

$a \quad 30 \quad 90$ $\qquad$ $a \quad 90 \quad 30 \quad 60$

$a \quad 60$

(b) 80

$a \quad b \quad 90$ $\qquad$ (Sum of two angles is 90°)

$a \quad 90 \quad 80$ $\qquad$ $a \quad 10$

(c) 15

$a \quad b \quad 90$ $\qquad$ (Sum of two angles is 90°)

$a \quad 15 \quad 90$ $\qquad$ $a \quad 90 \quad 15 \quad 75$

(d) 75

$a \quad b \quad 90$ $\qquad$ (Sum of two angles is 90°)

$a \quad 75 \quad 90$ $\qquad$ $a \quad 90 \quad 75 \quad 45$

$a \quad 15$

(e) $45°$

$a \quad b \quad 90$ $\qquad$ (Sum of two angles is 90°)

$a \quad 45 \quad 90$ $\qquad$ $a \quad 90 \quad 45 \quad 45$

$a \quad 45$

(f) x

$a \quad b \quad 90$ $\qquad$ (Sum of two angles is 90°)

$a \quad x \quad 90$ $\qquad$ $a \quad 90 \quad x$

(g) 35°

a b 90 (Sum of two angles is 90°)

a 35 90 a 90 35 15

a 55

(h) 10 y

a b 90 (Sum of two angles is 90°)

a (10 y) 90 a 90 10 y a 80y

18. (a) 70°

∵ a b 180 (∵ Sum of two supplement angles is 180°)

a 70 180 a 180 70 110

(b) 80°

∵ a b 180 (∵ Sum of two supplement angles is 180°)

a 80 180 a 180 80 100

(c) 195°

∵ a b 180 (∵ Sum of two supplement angles is 180°)

a 195 180 a 180 195 15

(d) 135

∵ a b 180 (∵ Sum of two supplement angles is 180°)

a 135 180 a 180 135 45

(e) 40

∵ a b 180 (∵ Sum of two supplement angles is 180°)

a 40 180 a 180 40 140

(f) 121

∵ a b 180 (∵ Sum of two supplement angles is 180°)

a 121 180 a 180 121 59

(g) x

∵ a b 180 (∵ Sum of two supplement angles is 180°)

a x 180 a 180 x

(h) 20 y

∵ a b 180 (∵ Sum of two supplement angles is 180°)

a (20 y) 180 a 180 20 y 160 y

19. (a) $\frac{3}{4}$ of 160° $\frac{3}{4}$ 160 120

∵ a b 180 (∵ Sum of two angles is 180°)

a 120 180 a 180 120 60

(b) $\frac{1}{2}$ of 120 $\frac{1}{2}$ 120 60

∵ a b 180 (∵ Sum of two supplement angles is 180°)

a 60 180 a 180 60 120

(c) $\frac{1}{3}$ of 150 $\frac{1}{3}$ 150 50

∵ a b 180 (∵ Sum of two supplement angles is 180°)

a 50 180 a 180 50 130

(d) $\frac{3}{5}$ of 100° $\frac{3}{5}$ 100 3 20 60

∵ a b 180 (∵ Sum of two supplement angles is 180°)

a 60 180 a 180 60 120

20. Let angles be $7x$, $8x$

∵ Angles are complementary

$7x \quad 8x \quad 90$ (∵ Sum of two complementary angles is 90°)

$15x \quad 90$

$x \quad \frac{90}{15} \quad 6$

Thus, the angles are $7x \quad 7 \quad 6 \quad 42$ and $8x \quad 8 \quad 6 \quad 48$

21. Let angles be $7x$, $11x$ (∵ Angles are supplementary)

$7x \quad 11x \quad 180$ (∵ Sum of two supplementary angles is 180°)

$18x \quad 180$

$x \quad \frac{180}{18} \quad 10$

Thus, the angles are $7x \quad 7 \quad 10 \quad 70$ and $11x \quad 11 \quad 10 \quad 110$

22. Let $a \quad 3x \quad 15$, $b \quad (2x \quad 5)$, x ?

$a \quad b \quad 180$ (∵ Sum of two supplementary angles is 180°)

$3x \quad 15 \quad 2x \quad 5 \quad 180$

$5x \quad 20 \quad 180$

$5x \quad 180 \quad 20 \quad 160$

$x \quad \frac{160}{5} \quad 32$

23. Let $A \quad (2x \quad 7)$, $B \quad (x \quad 4)$

∵ $A \quad B \quad 90$ (∵ Sum of two complementary angles is 90°)

$(2x \quad 7) \quad (x \quad 4) \quad 90$ $(2x \quad x) \quad (4 \quad 7) \quad 90$

$(3x \quad 3) \quad 90$ $3x \quad 90 \quad 3$

$x \quad \frac{\overset{31}{\cancel{93}}}{\underset{1}{\cancel{3}}}$ $x \quad 31$

24. (a) Let both the angles be x . (∵ Angles are complement)

$x \quad x \quad 90$ $2x \quad 90$

$x \quad \frac{90}{2} \quad 45$ $x \quad 45$

(b) Let both the angles be x (∵ Angles are supplementary)

$x \quad x \quad 180$ $2x \quad 180$

$x \quad \frac{180}{2} \quad 90$ $x \quad 90$

25. (a) No, (b) No,

(c) $a \quad b \quad 180$ (Sum of linear pair is 180°)

$a \quad 90 \quad 180$ $a \quad 180 \quad 90 \quad 90$

other angle is 90°

(d) $a \quad b \quad 180$

obtuse angle $b \quad 180$

$b \quad 180$ obtuse angle = acute angle

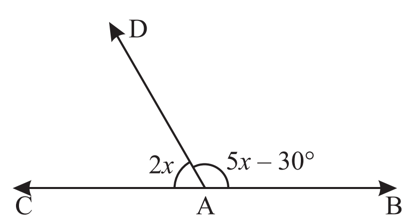
26. Given $BAD \quad (5x \quad 30)$, $CAD \quad 2x$

∵ CAB is a straight angle

$CAD \quad BAD \quad 180$

$2x \quad (5x \quad 30) \quad 180$

$7x \quad 30 \quad 180$



$7x \quad 180 \quad 130 \quad 210$

$x \quad \frac{210}{7} \quad 30$

$x \quad 30$

Exercise 9.2

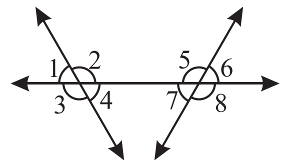
1. (a) 1 and 5 = Corresponding angles

(b) 4 and 7 = None

(c) 2 and 7 = Alternate interior angles

(d) 4 and 8 = Corresponding angles

(e) 1 and 8 = Alternate exterior angles

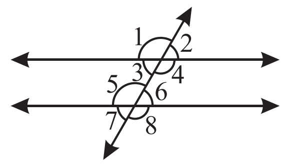


2. (a) (3, 5) = None

(b) (4, 5) = Alternate interior angles

(c) (1, 8) = Alternate exterior angles

(d) (2, 4) = None



3. (a) (1, 10) Corresponding angles

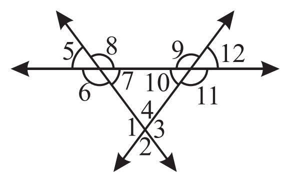
(b) (2, 8) = Alternate interior

(c) (5, 7) = None

(d) (6, 2) = Alternate exterior

(e) (4, 11) = Alternate interior

(f) (8, 10) = Alternate interior



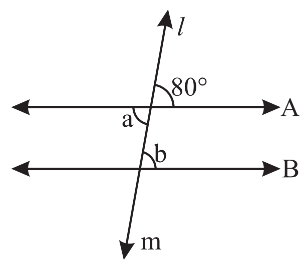
4. (a) ∵ $b \quad 80$

(Corresponding angles)

$a \quad b$

(Alternative interior angles)

$a \quad 80$



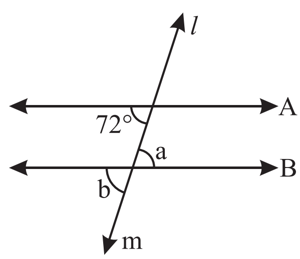
(b) ∵ $a \quad 72$

(Alternate interior angles)

$b \quad a$

(Vertically opposite angles)

$b \quad 72$



(c) ∵ $a \quad 60$

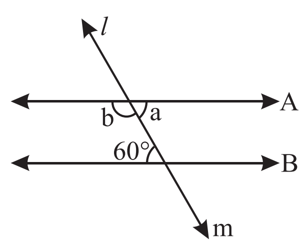
(Alternate interior angles)

$b \quad 60 \quad 180$

(Allied or conjoined angled)

$b \quad 180 \quad 60$

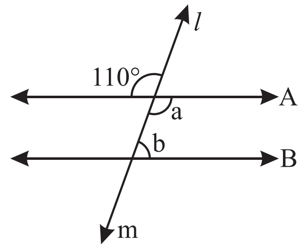
$b \quad 120$



(d) $\because$ a 110 (Vertically opposite angle)

a 110 180

(Allied or conjoined angled)



a b 180

110 b 180

b 180 110

b 70

(e) $\because$ *AOB* is a straight line

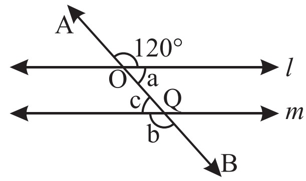
AOB 180

120 a 180

a 180 120

a 60

c a (Interior alternate angle)



c 60

Now, *AQB* is a straight line

AQB 180

c b 180

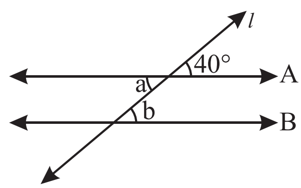
60 b 180

b 180 60 120

b 120

(f) $\because$ b 40

(Corresponding angles)



b 40

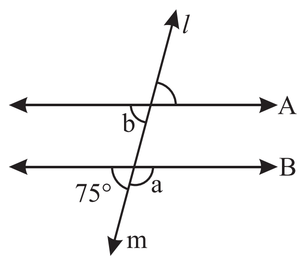
$\because$ a b

(Alternate angles)

a 40

(g) $\because$ b 75

(Corresponding angles)



a 75 180

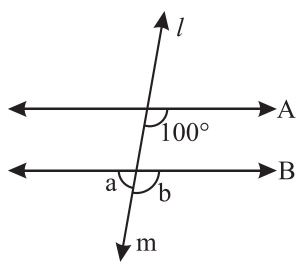
(straight angles)

a 180 75

a 105

(h) $\because$ b 100

(Corresponding angles)



a b 180

(straight line)

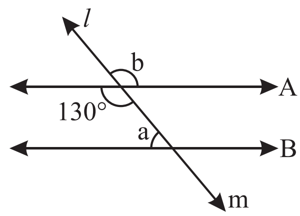
a 100 180

a 180 100 80

a 80

(i) $\because$ b 130

(Vertically opposite angle)



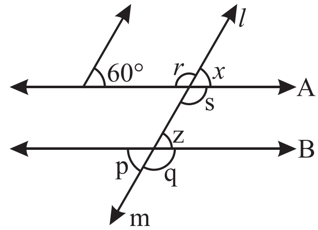
a 130 180

(Allied or conjoined angles)

a 180 130

a 50

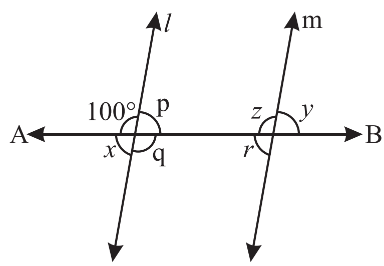
5. x 60 (corresponding angle)



z x (corresponding angle)
z 60
p z (vertically opposite angle)
p 60
r 60 180 (straight line)
r 60 180
r 180 60 120
r 120
s r (vertically opposite angle)
s 120
q s (corresponding angle)
120
x 60 z 60

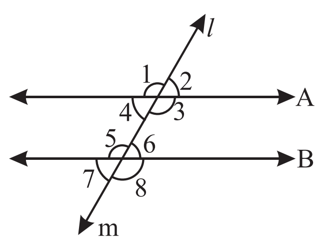
Hence, p 60 , q 120 , r 120 , s 120 .

6. ∵ AB is a straight line



100 P 180
[straight line]
P 180 100 80
P 80
∵ q 100
[vertically opp. angle]
q 100
x P [vertically opp. angle]
x 80
∵ z 100 [corresponding angle]
z 100
∵ r z [vertically opp. angle]
r 100
∵ z y 180 [straight line]
100 y 180
y 180 100 80
y 80

7. Given 1 120 , 8 60



3 1 (vertically opposite angle)
3 120 [∵ 1 120]
∵ 1 2 180 [straight line]
120 2 180
2 180 120 60
2 60
Similarly, 5 6 180
(straight line)
5 6 180
6 180 120 60
6 60
4 2 (vertically opposite angle)
4 60
∵ 5 6 180 (straight line)

5 60 180

5 180 60 120

5 120

Now, since given,

8 60 (Note)

7 8 180 (straight line)

7 60 180

7 180 60 120

7 120

8. *a* 130

(vertically opp. angles)

d *a*

(corresponding angles)

d 130

c 150 (Alternative angles)

b *c* (coresponding angles)

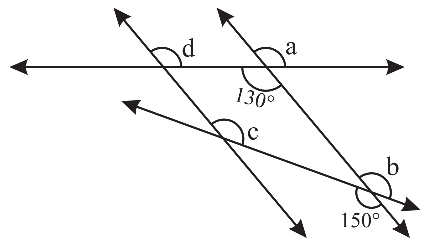
b 150 .

Hence *a* 130 ,

b 150 ,

c 150 ,

d 130 .



9. *AB* || *CD*

z 125 (corresponding angles)

In Trapezium *ABCD*,

x *z* 180 (sum of opposite *s* 180)

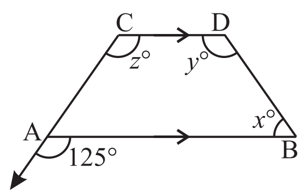
x 125 180

x 180 125 55

x *y* 180 (sum of co-interior *s*)

55 *y* 180

y 180 55 125



10. *y* 70 (Vertically opp. angles)

∵ *z* *y* (corresponding angles)

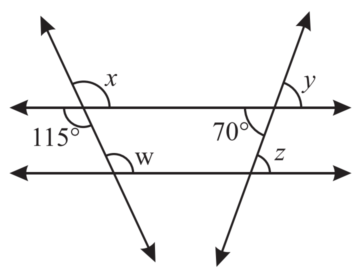
z 70

∵ *x* 115 (vertically opp. angles)

w *x* (corresponding angles)

w 115

Hence, *x* 115 , *y* 70 , *w* 115



11. Given, *AB* || *CD* || *EF* *CD* || *EF* and *CE* is a transversal

x 25 180 (co-interior angles)

x 180 25 155

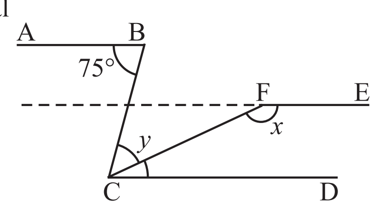
∵ *AB* || *CD* and *BC* is a transversal

ABC *BCD* [∵ *BCD* *y* 25]

75 *y* 25

75 25 *y*

y 50

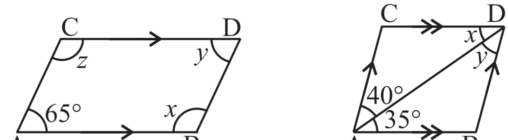


12. Given *AB* || *CD*, *AC* || *BD*

(i) *z* 65 180 (sum of co-interior angles)

z 180 65 z 115

$AC || BD$



(i) (ii)

x 180 65

x 115

again, $CD || AB$

y x 180 (sum of co-interior angles)

y 180 x

y 180 115 65

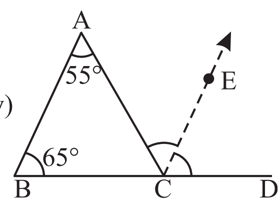
Hence, x 115 , y 65 , z 115

(ii) $CD || AB$ and AD is a transversal

x 35 (Alternate s)

and y 40 (Alternate s)

13. Given $CE || BA$, ABC 65 , BAC 55



ACE BAC (Alternate angles)

55

ACD A B (exterior angle property)

55 65 120

Now, ACD ACE ECD

120 55 ECD

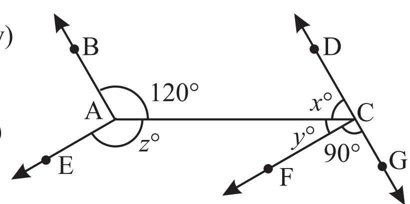
ECD 120 55 65

14. Given $AB || CD$, $AE || CF$ and FCG 90

∵ $AB || CD$ and AC is a transversal

x 120 180

(co-interior angles are supplementry)



x 180 120 60

Now, x y 90 180

(Angles at a point on a straight line)

60 y 90 180

y 180 150 30

Similarly, $AE || CF$ and AC is a transversal

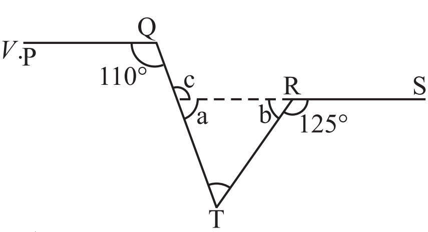
z y 180 (co-interior angles are supplementary)

z 30 180

z 180 30 150

15. Given, $PQ || RS$

produce RS towards QT which meet QT at point V.



Now, $PQ || VR$ and QT is a transversal

C 110 (alternate angles)

VS is a straight line

b 125 180 (linear pair)

b 180 125 55

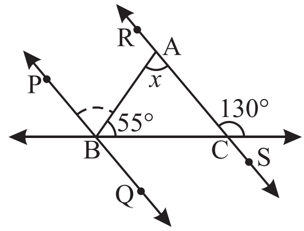
Now, c x b (exterior angle property)

110 x 55

$x \quad 110 \quad 55 \quad 55$

Hence, $x \quad 55$

16. Given $PQ \,||\, RS$



In ABC, we know that

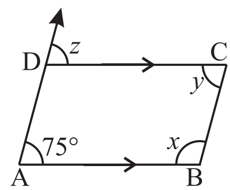
$x \quad 55 \quad 130$

(exterior angle property)

$x \quad 130 \quad 55$

$x \quad 75$

17. $DC \,||\, AB$



$z \quad 75$ (corresponding s)

$y \quad z$ (Alternative s)

$y \quad 75$

Again $DC \,||\, AB$ & BC is a transversal

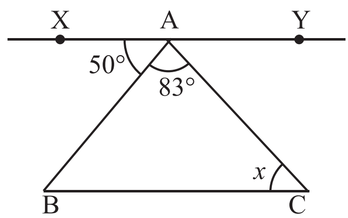
$x \quad y \quad 180$ (sum of co-interiors s)

$x \quad 75 \quad 180$

$x \quad 180 \quad 75 \quad 105$

Hence, $x \quad 105$, $y \quad 75$, $z \quad 75$

18. Given $XY \,||\, BC$



$B \quad 50$ (alternate angle)

Now In ABC,

$A \quad B \quad C \quad 180$

$83 \quad B \quad x \quad 180$

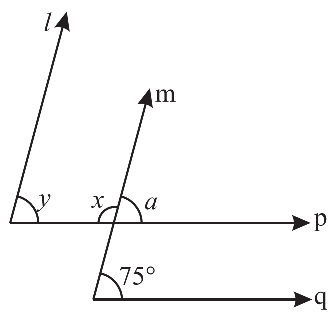
$83 \quad 50 \quad x \quad 180$

$133 \quad x \quad 180$

$x \quad 180 \quad 133$

$x \quad 47$

19. Given $l \,||\, m$ and $p \,||\, q$



∵ $p \,||\, q$

$a \quad 75$ (corresponding angles)

now, $x \quad a \quad 180$ (linear pair)

$x \quad 75 \quad 180$

$x \quad 180 \quad 75 \quad 105$

again, $l \,||\, m$ and P is a transversal

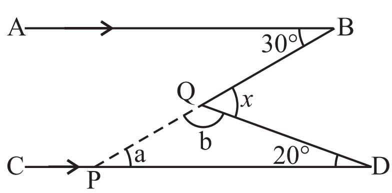
$x \quad y \quad 180$

(sum of the interior angles on the same side of the transversal is 180°)

$105 \quad y \quad 180$

$y \quad 180 \quad 105 \quad 75$

20. Produce BQ which meet CD at point P.



Now $AB \,||\, CD$ and BP is a transversal

$a \quad 30$

(alternate angles)

Now, In PQD,

$b \quad a \quad 20 \quad 180$

(sum of all the angles of a triangle)

$b \quad 30 \quad 20 \quad 180$

$b \quad 180 \quad 50 \quad 130$

$x \quad b \quad 180$ (straight line)

$x \quad 130 \quad 180$

$x \quad 180 \quad 30$

$x \quad 50$

MCQ's

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

10 Triangles and Its Properties

Exericise 10.1

1. (a) In ABC

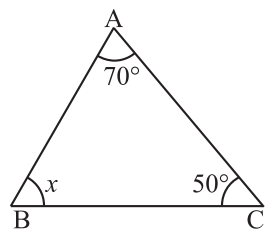
$A \quad B \quad C \quad 180$

(sum of the angles of a triangle is 180°)

$70 \quad 50 \quad x \quad 180$

$x \quad 180 \quad 120$

$x \quad 60$



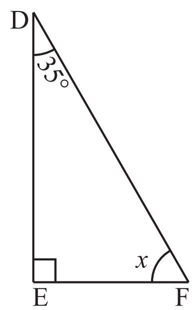
(b) In DEF,

$D \quad E \quad F \quad 180$

$35 \quad 90 \quad x \quad 180$

$x \quad 180 \quad 125$

$x \quad 55$



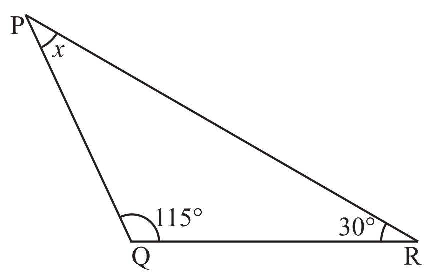
(c) In PQR,

$P \quad Q \quad R \quad 180$

$x \quad 115 \quad 30 \quad 180$

$x \quad 180 \quad 145$

$x \quad 35$



(d) $x \quad 74$ (vertically opposite angle)

Now, In ABC

$A \quad B \quad C \quad 180$

$x \quad 49 \quad y \quad 180$

$74 \quad 49 \quad y \quad 180$

$y \quad 180 \quad 23 \quad 57$

$x \quad 74 \; , y \quad 57$