Chapter

# 11 SIMULTANEOUS LINEAR EQUATIONS

## KEY FACTS

**1.** A linear equation in two variables is represented algebraically as $ax + by + c = 0$, where $a \neq 0, b \neq 0$. Graphically it represents a straight line.

**2.** A pair of linear equations in two variables $x$ and $y$ (simultaneous linear equations) can be represented algebraically as follows:

$$a_1x + b_1y + c_1 = 0$$
$$a_2x + b_2y + c_2 = 0$$

where $a_1, a_2, b_1, b_2, c_1, c_2$ are real numbers such that $a_1^2 + b_1^2 \neq 0$ and $a_2^2 + b_2^2 \neq 0$.

**3.** Simultaneous linear equations in two variables can be solved by :
(i) Algebraic method (ii) Graphical method

**4.** To solve the simultaneous linear equations algebraically. We use the following methods :
(i) Substitution method (ii) Elimination method
Both the methods have been explained with the help of solved examples.

**5.** If $a_1x + b_1y + c_1 = 0$
$a_2x + b_2y + c_2 = 0$
is a pair of linear equations in two variables $x$ and $y$ such that :

(i) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, then the pair of linear equations is consistent with a unique solution, *i.e.,* they intersect at a point.

(ii) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$, then the pair of linear equations inconsistent with no solution, *i.e.,* they represent a pair of parallel lines.

(iii) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$, then the pair of linear equations are consistent with infinitely many solutions, *i.e.,* they represent coincident lines.

## Solved Examples

**Ex. 1.** ***If $3x + 7y = 75$ and $5x - 5y = 25$, then what is the value of $x + y$ ?***

**Sol.** $3x + 7y = 75$ …(1)

$5x - 5y = 25$ …(2)

In this example, we have to transform each equation to obtain the same numerical coefficient of one of the variables. To do this we multiply the first equation by 5 and the second equation by 7. Then, the variable $y$ has the same coefficient.

$$\begin{array}{ll} 15x+35y=375 & \text{Multiply (1) by 5} \\ 35x-35y=175 & \text{Multiply (2) by 7} \\ \hline 50x \quad\quad =550 & \text{Add} \end{array}$$

$$x=\frac{550}{50}=11$$

Putting $x = 11$ in (1), we get

$3 \times 11 + 7y = 75 \quad \Rightarrow \quad 33 + 7y = 75 \quad \Rightarrow \quad 7y = 75 - 33 = 42 \quad \Rightarrow \quad y = 6$

$\therefore$ $x + y = 11 + 6 =$ **17**.

**Ex. 2.** ***Find the solution set of the system of equations:*** $\frac{4}{x}+5y=7$ ***and*** $\frac{3}{x}+4y=5.$

**Sol.** Let $\frac{1}{x}=a.$ Then the system of equations become

$4a + 5y = 7$ …(1)

$3a + 4y = 5$ …(2)

Multiplying equation (1) by 3 and equation (2) by 4 and subtracting equation (2) from equation (1), we get

$$\begin{array}{ll} 12a+15y=21 & \text{Multiply (1) by 3} \\ 12a+16y=20 & \text{Multiply (2) by 4} \\ - \quad - \quad\quad - & \\ \hline -y=+1 & \text{Subtract} \end{array}$$

$\Rightarrow$ $y=-1$

Putting $y = -1$ in (1), we get

$4a - 5 = 7 \Rightarrow 4a = 12 \Rightarrow a = 3 \Rightarrow x = \frac{1}{3}$

$\therefore$ The solution set is $\left(\frac{1}{3},-1\right)$.

**Ex. 3.** ***Which one of the following is the solution of the system of linear equations*** $\left(\frac{5}{x}\right)-\left(\frac{4}{y}\right)=3$ ***and*** $\left(\frac{9}{x}\right)-\left(\frac{8}{y}\right)=7$ ***?***

***(a) x is +ve and y is –ve (b) y is +ve and x is –ve (c) Both x and y are +ve (d) Both x and y are –ve***

**Sol.** Let $\frac{1}{x}=a$ and $\frac{1}{y}=b$. Then, the system of linear equations is

$5a - 4b = 3$ …(1)

$9a - 8b = 7$ …(2)

$$\begin{array}{ll} 45a-36b=27 & \text{Multiply (1) by 9} \\ 45a-40b=35 & \text{Multiply (2) by 5} \\ - \quad + \quad\quad - & \\ \hline 4b=-8 & \text{Subtract} \\ b=-2 & \end{array}$$

$\Rightarrow$ $y=-\frac{1}{2}$

Putting $b = -2$ in (1), we get

$5a - 4 \times -2 = 3 \Rightarrow 5a + 8 = 3 \Rightarrow 5a = -5 \Rightarrow a = -1 \Rightarrow x = -1$

$\therefore$ (*d*) is the correct option. Both $x$ and $y$ are negative.

**Ex. 4.** ***If $2^a + 3^b = 17$ and $2^{a+2} - 3^{b+1} = 5$, then find the value of a and b.***

**Sol.** $2^a + 3^b = 17$ …(1)

$2^{a+2} - 3^{b+1} = 5 \Rightarrow 2^2 \cdot 2^a - 3 \cdot 3^b = 5$

$\Rightarrow$ $4.2^a - 3.3^b = 5$ ...(2)

Let $2^a = x$ and $3^b = y$. Then the system of equations is

$x + y = 17$ …(3)

$4x - 3y = 5$ …(4)

Multiplying equations (3) by 3 and adding to equation (4), we get

$$3x + 3y = 51$$
$$4x - 3y = 5$$
$$7x = 56 \quad \text{Add}$$

$$x = \frac{56}{7} = 8$$

Putting $x = 8$ in (3), we get

$8 + y = 17 \Rightarrow y = 17 - 8 = 9$

$\Rightarrow$ $2^a = 8$ and $3^b = 9 \Rightarrow 2^a = 2^3$ and $3^b = 3^2$

$\Rightarrow$ $a = \mathbf{3}$ and $b = \mathbf{2}$.

**Ex. 5.** ***For what value of k does the system of equations 2x + ky = 11 and 5x – 7y = 5 has no solution ?***

**Sol.** The given equations are : $2x + ky - 11 = 0$ and $5x - 7y - 5 = 0$

Here, $a_1 = 2, b_1 = k, c_1 = -11$ and $a_2 = 5, b_2 = -7, c_2 = -5$

The two equations will have no solution if,

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}, \text{ i.e., } \frac{2}{5} = \frac{k}{-7} \neq \frac{-11}{-5}$$

$$\Rightarrow \frac{2}{5} = \frac{k}{-7} \Rightarrow k = \mathbf{\frac{-14}{5}}.$$

**Ex. 6.** ***If the equations 4x + 7y = 10 and 10x + ky = 25 represent coincident lines, then find the value of k ?***

**Sol.** The given equations are : $4x + 7y - 10 = 0$ and $10x + ky - 25 = 0$

Here, $a_1 = 4, b_1 = 7, c_1 = -10$

$a_2 = 10, b_2 = k, c_2 = -25$

For the given equation to represent coincident lines,

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}, \text{ i.e., } \frac{4}{10} = \frac{7}{k} = \frac{-10}{-25}$$

$$\Rightarrow \frac{4}{10} = \frac{7}{k} \Rightarrow k = \frac{70}{4} = \mathbf{\frac{35}{2}}.$$

**Ex. 7.** ***Find the condition that the system of equations ax + by = c and lx + my = n has a unique solution ?***

**Sol.** The given equations are : $ax + by - c = 0$ and $lx + my - n = 0$

Here, $a_1 = a, b_1 = b, c_1 = -c$, and $a_2 = l, b_2 = m, c_2 = -n$

For unique solution,

$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}, \text{ i.e., } \frac{a}{l} \neq \frac{b}{m} \Rightarrow am \neq bl.$$

**Ex. 8.** ***Find the values of p and q for which the following system of linear equations has infinite number of solutions : 2x + 3y = 1, (p + q)x + (2p – q)y = 21***

**Sol.** The given equations are :

$2x + 3y - 1 = 0$ and $(p + q)x + (2p - q)y - 21 = 0$

Here, $a_1 = 2, b_1 = 3, c_1 = -1$ and $a_2 = p + q, b_2 = 2p - q, c_2 = -21$

For infinite solutions,

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \Rightarrow \frac{2}{p+q} = \frac{3}{2p-q} = \frac{-1}{-21} \Rightarrow \frac{2}{p+q} = \frac{1}{21} \text{ and } \frac{3}{2p-q} = \frac{1}{21}$$

$\Rightarrow p + q = 42$ …(1) and $2p - q = 63$ …(2)

Adding (1) and (2), we get

$3p = 105 \Rightarrow p = 35$

Putting $p = 35$ in (1), we get

$35 + q = 42 \Rightarrow q = 42 - 35 = 7$

$\therefore p = 35, q = 7.$

**Ex. 9.** ***3 chairs and 2 tables cost Rs 700 while 5 chairs and 3 tables cost Rs 1100. What is the cost of 2 chairs and 2 tables ?***

**Sol.** Let the cost of one chair be Rs $x$ and that of a table be Rs $y$.

Then, $3x + 2y = 700$ …(1)

$5x + 3y = 1100$ …(2)

$9x + 6y = 2100$ Multiply (1) by 3

$10x + 6y = 2200$ Multiply (2) by 2

$\underline{-\quad -\quad -}$

$-x = -100$ Subtract

$x = 100$

$\therefore$ Putting $x = 100$ in (1), we get

$300 + 2y = 700 \Rightarrow 2y = 400 \Rightarrow y = 200$

$\therefore$ Cost of one chair = Rs 100, Cost of one table = Rs 200.

$\Rightarrow$ Cost of 2 chairs and 2 tables = 2 × Rs 100 + 2 × Rs 200

= Rs 200 + Rs 400 = Rs **600**.

**Ex. 10.** ***The average of two numbers is 6 and four times the difference between them is 16. Find the numbers.***

**Sol.** Let the numbers be $x$ and $y$. Given,

$\frac{x+y}{2} = 6 \Rightarrow x + y = 12$ …(1)

$4(x - y) = 16 \Rightarrow 4x - 4y = 16$ …(2)

Multiplying equation (1) by 4 and adding to equation (2), we get

$4x + 4y = 48$ Multiplying (1) by 4

$4x - 4y = 16$

$8x \quad = 64$ Add

$\Rightarrow \quad x = \frac{64}{8} = 8$

Putting $x = 8$ in (1), we get

$8 + y = 12 \Rightarrow y = 12 - 8 = 4$

$\therefore$ The numbers are 8 and 4.

**Ex. 11.** ***A part of monthly expenses of a family is constant and the remaining part varies with the price of wheat. When the rate of wheat is Rs 250 a quintal, the total monthly expenses of the family are Rs 1000 and when it is Rs 240 a quintal, the total monthly expenses are Rs 980. Find the total monthly expenses of the family, when the cost of wheat is Rs 350 a quintal.***

**Sol.** Let the constant part be Rs $c$ and quantity of wheat consumed per month be $q$ quintals. Then,

$$c + 250q = 1000 \quad ....(1)$$
$$c + 240q = 980 \quad ....(2)$$
$$10q = 20 \quad \text{Subtract}$$

$$q = 2$$

Putting $q = 2$ in equation (1), we get

$c + 250 \times 2 = 1000 \Rightarrow c + 500 = 1000 \Rightarrow c = 500$

∴ Total monthly by expenses of the family when the rate of wheat is Rs 350 a quintal

$= 500 + 350 \times 2 = 500 + 700 =$ **Rs 1200**.

**Ex. 12.** ***If the numerator of a certain fraction is increased by 2 and the denominator increased by 1, then the resulting fraction equals $\frac{1}{2}$. If however the numerator is increased by 1 and the denominator decreased by 2, then the resulting fraction equal $\frac{3}{5}$. Find the fraction.***

**Sol.** Let the given fraction be $\frac{x}{y}$. Then,

$$\frac{x+2}{y+1} = \frac{1}{2} \Rightarrow 2x + 4 = y + 1 \Rightarrow 2x - y = -3 \quad ...(1)$$

$$\frac{x+1}{y-2} = \frac{3}{5} \Rightarrow 5x + 5 = 3y - 6 \Rightarrow 5x - 3y = -11 \quad ...(2)$$

Now,

$$6x - 3y = -9 \quad \text{Multiply (1) by (3)}$$
$$5x - 3y = -11$$
$$- \quad + \quad +$$
$$x = 2 \quad \text{Subtract}$$

Putting $x = 2$ in equation (1), we get

$4 - y = -3 \Rightarrow -y = -3 - 4 \Rightarrow y = 7$

∴ The given fraction is $\mathbf{\frac{2}{7}}$.

**Ex. 13.** ***Ram buys 4 horses and 9 cows for Rs 13400. If he sells the horses at 10% profit and cows at 20% profit, then he earns a total profit of Rs 1880. What is the cost of a horse ?***

**Sol.** Let $H$ be the cost of a horse and $C$ the cost of a cow.

Then, $4H + 9C = 13400$ ...(1)

Also, $\frac{10}{100} \times 4H + \frac{20}{100} \times 9C = 1880$

$\Rightarrow 4H + 18C = 18800$ ...(2)

Subtracting equation (1) from equation (2), we get

$$9C = 5400 \Rightarrow C = \frac{5400}{9} = 600$$

Putting $C = 600$ in (1), we get

$$4H + 9 \times 600 = 13400 \Rightarrow 4H = 8000 \Rightarrow H = \frac{8000}{4} = 2000.$$

∴ The cost of a horse is **Rs 2000**.

**Ex. 14.** ***Students of a class are made to stand in rows. If 4 students are extra in each row, then there would be 2 rows less. If four students are less in each row, then there would be 4 more rows. What is the number of students in the class ?***

**Sol.** Let the number of students in each row be $x$ and the number of rows be $y$. Then total number of students = $xy$

$\therefore$ By the given conditions,

$(x + 4)(y - 2) = xy \Rightarrow xy + 4y - 2x - 8 = xy$

$\Rightarrow -2x + 4y = 8$ …(1)

and $(x - 4)(y + 4) = xy$

$\Rightarrow xy - 4y + 4x - 16 = xy$

$\Rightarrow 4x - 4y = 16$ …(2)

Adding equations (1) and (2), we get

$2x = 24 \quad \Rightarrow \quad x = 12$

Putting $x = 12$ in equation (1), we get

$-2 \times 12 + 4y = 8 \Rightarrow 4y = 8 + 24 = 32 \Rightarrow y = 8$

$\therefore$ Total number of students in the class = $x \times y = 12 \times 8 =$ **96**.

## Question Bank–11

**1.** The solution of the two simultaneous equations $2x + y = 8$ and $3y = 4 + 4x$ is :

(a) $x = 4, y = 1$ (b) $x = 1, y = 4$
(c) $x = 2, y = 4$ (d) $x = 3, y = -4$

**2.** The solution of the simultaneous equation $\frac{x}{2} + \frac{y}{3} = 4$ and $x + y = 10$ is given by

(a) (6, 4) (b) (4, 6)
(c) (–6, 4) (d) (6, –4)

**3.** The course of an enemy submarine as plotted on a set of rectangular axes is $2x + 3y = 5$. On the same axes the course of the destroyer is indicated by $x - y = 10$. The point $(x, y)$ at which the submarine can be destroyed is :

(a) (–7, 3) (b) (–3, 7)
(c) (3, –7) (d) (7, –3)

**4.** The values of $x$ and $y$ satisfying $(x + 3)(y - 5) = xy + 39$ and $(x - 2)(y + 3) = xy - 40$ respectively are :

(a) 6 and 8 (b) 6 and –8
(c) –6 and 8 (d) –6 and –8

**5.** If the sum and the difference of two expressions is $5x^2 - x - 4$ and $x^2 + 9x - 10$ respectively, then the expressions are :

(a) $(4x^2 + 8x - 6)$ and $(4x^2 - 10x + 2)$
(b) $(2x^2 + 4x - 3)$ and $(3x^2 - 10x - 6)$
(c) $(3x^2 + 4x - 7)$ and $(2x^2 - 5x + 3)$
(d) $(3x^2 + 4x + 7)$ and $(2x^2 - 5x - 3)$

**6.** If $\frac{5x+6}{(2+x)(1-x)} = \frac{a}{2+x} + \frac{b}{1-x}$, then the values of $a$ and $b$ respectively are :

(a) $-\frac{5}{3}, \frac{6}{5}$ (b) $\frac{5}{3}, -\frac{6}{5}$
(c) $-\frac{4}{3}, \frac{11}{3}$ (d) $\frac{4}{3}, -\frac{11}{3}$

**7.** If $(4)^{x+y} = 1$ and $(4)^{x-y} = 4$, then the value of $x$ and $y$ will be respectively :

(a) $\frac{1}{2}$ and $-\frac{1}{2}$ (b) $\frac{1}{2}$ and $\frac{1}{2}$
(c) $-\frac{1}{2}$ and $-\frac{1}{2}$ (d) $-\frac{1}{2}$ and $\frac{1}{2}$

**8.** If $\frac{2}{x} + \frac{3}{y} = \frac{9}{xy}$ and $\frac{4}{x} + \frac{9}{y} = \frac{21}{xy}$, where $x \neq 0$, $y \neq 0$, then the value of $x$ and $y$ are respectively :

(a) 0 and 1 (b) 1 and 2
(c) 2 and 3 (d) 1 and 3

**9.** If $\frac{2}{x} + \frac{3}{y} = 2$ and $\frac{6}{x} + \frac{18}{y} = 9$, then the values of $x$ and $y$ respectively are :

(a) 3 and 2 (b) 2 and 3
(c) 4 and 3 (d) 3 and 4

**10.** The solution of the equations

$\frac{p}{x} + \frac{q}{y} = m, \frac{q}{x} + \frac{p}{y} = n$ is

(a) $x = \frac{q^2 - p^2}{mp - nq}, y = \frac{p^2 - q^2}{np - mq}$

(b) $x = \frac{p^2 - q^2}{mp - nq}, y = \frac{q^2 - p^2}{np - mq}$

(c) $x = \dfrac{p^2 - q^2}{mp - nq}, y = \dfrac{p^2 - q^2}{np - mq}$

(d) $x = \dfrac{q^2 - p^2}{mp - nq}, y = \dfrac{q^2 - p^2}{np - mq}$

**11.** For what value of $k$, the following system of equations has a unique solution : $2x + 3y - 5 = 0$, $kx - 6y - 8 = 0$ ?
(a) $k = -4$ (b) $k \neq -4$
(c) $k \neq 4$ (d) $k = 4$

**12.** The value of $k$ for which the equations $9x + 4y = 9$ and $7x + ky = 5$, have no solution is :
(a) $\dfrac{9}{5}$ (b) $\dfrac{9}{7}$
(c) $\dfrac{9}{28}$ (d) $\dfrac{28}{9}$

**13.** For what value of $k$ will the given equations in two variables represent coincident lines : $2x + 32y + 3 = 0$ and $3x + 48y + k = 0$ ?
(a) $\dfrac{2}{3}$ (b) $\dfrac{3}{2}$
(c) $\dfrac{9}{2}$ (d) 1

**14.** The simultaneous equatoins $2x + 3y = 5$, $4x + 6y = 10$ have :
(a) no solution (b) only one solution
(c) only two solutions (d) several solutions

**15.** If $2a = b$, the pair of equations $ax + by = 2a^2 - 3b^2$, $x + 2y = 2a - 6b$ possess :
(a) no solution
(b) only one solution
(c) only two solutions
(d) an infinite number of solutions

**16.** A bill for Rs 40 is paid by means of Rs 5 notes and Rs 10 notes. Seven notes are used in all. If $x$ is the number of Rs 5 notes and $y$ is the number of Rs 10 notes, then
(a) $x + y = 7$ and $x + 2y = 40$
(b) $x + y = 7$ and $x + 2y = 8$
(c) $x + y = 7$ and $2x + y = 8$
(d) $x + y = 7$ and $2x + y = 40$

**17.** The total cost of 8 apples and 5 oranges is Rs 92 and the total cost of 5 apples and 8 oranges is Rs 77, Find the cost of 2 oranges and 3 apples.
(a) Rs 30 (b) Rs 35
(c) Rs 38 (d) Rs 70

**18.** In a group of buffaloes and ducks, the number of legs are 24 more than twice the number of heads. What is the number of buffaloes in the group ?
(a) 6 (b) 12
(c) 8 (d) 10

**19.** $X$ has pens and pencils which together are 40 in number. If he had 5 more pencils and 5 less pens, the number of pencils would have become 4 times the number of pens. Find the original number of pens.
(a) 10 (b) 11
(c) 12 (d) 13

**20.** If 1 is added to the age of the elder sister, then the ratio of the ages of the two sisters becomes 0.5 : 1, but if 2 is subtracted from the age of the younger one, the ratio becomes 1 : 3. The age of the younger sister will be
(a) 9 years (b) 5 years
(c) 18 years (d) 15 years

**21.** Ram and Mohan are friends. Each has some money. If Ram gives Rs 30 to Mohan, then Mohan will have twice the money left with Ram. But if Mohan gives Rs 10 to Ram, then Ram will have thrice as much as is left with Mohan. How much money does each have ?
(a) Rs 62, Rs 34 (b) Rs 6, Rs 2
(c) Rs 170, Rs 124 (d) Rs 43, Rs 26

**22.** A fraction becomes 2 when 1 is added to both the numerator and the denominator, and it beocmes 3 when 1 is subtracted from both the numerator and the denominator. The numerator of the given fraction is
(a) 7 (b) 4
(c) 3 (d) 2

**23.** On selling a pen at 5% loss and a book at 15% gain, Karim gains Rs 7. If he sell the pen at 5% gain and the book at 10% gain, then he gains Rs 13. The actual price of the book is
(a) Rs 100 (b) Rs 80
(c) Rs 10 (d) Rs 400

**24.** If three times the larger of the two numbers is divided by the smaller one, we get 4 as quotient and 3 as the remainder. Also if seven times the smaller number is divided by the larger one, we get 5 as quotient and 1 as remainder. Find the sum of the numbers.
(a) 34 (b) 43
(c) 47 (d) 74

**25.** If the two digits of the ages of Mr. Manoj are reversed, then the new age so obtained is the age of his wife. $\dfrac{1}{11}$ of the sum of their ages is equal to the difference between their ages. If Mr. Manoj is elder than his wife, then find the difference between their ages.
(a) 10 years (b) 8 years
(c) 7 years (d) 9 years

**26.** I had Rs 14.40 in one-rupee coins and 20 paise coins when I went out shopping. When I returned, I had as many one rupee coins as I originally had 20 paise coins and as many 20 paise coins as I originally had one rupee coins. Briefly, I came back with about one-third of what I had started out with. How many one-rupee coins did I have initially ?

(a) 10 (b) 12
(c) 14 (d) 16

**27.** Five times $A$'s money added to $B$'s money is more than Rs 51.00. Three times $A$'s money minus $B$'s money is Rs 21.00. If a represents $A$'s money in Rs and $b$ represents $B$'s money in Rs, then :

(a) $a > 9, b > 6$
(b) $a > 9, b < 6$
(c) $a > 9, b = 6$
(d) $a > 9$, but we can put no bounds on $b$

**28.** In a triangle $ABC$, $\angle A = x°$, $\angle B = y°$ and $\angle C = (y + 20)°$. If $4x - y = 10$, then the triangle is

(a) Right angled (b) Obtuse angled
(c) Equilateral (d) None of these

**29.** A two digit number is obtained by either multiplying sum of the digits by 8 and adding 1 or by multiplying the difference of the digits by 13 and adding 2. The number is

(a) 14 (b) 42
(c) 24 (d) 41

**30.** The population of a town is 53,000. If in a year the number of males was to increase by 6% and that of the females by 4%, the population will grow to 55,630. Find the difference between the number of males and females in the town at present.

(a) 3000 (b) 4000
(c) 2000 (d) 5000

**31.** Places $A$ and $B$ are 100 km apart from each other on a highway. A car starts from $A$ another from $B$ at the same time. If they move in the same direction, they meet in 10 hours and if they move in opposite direction, they meet in 1 hour 40 minutes. Find the speed of the cost from places $A$ and $B$ respectively are :

(a) 45 km/hr, 25 km/hr
(b) 65 km/hr, 75 km/hr
(c) 35 km/hr, 25 km/hr
(d) 60 km/hr, 45 km/hr

**32.** A person invested some amount at the rate of 10% simple interest and some amount at the rate of 12% simple interest. He received an yearly interest of Rs 130. But if he had interchanged the amounts invested, he would have received Rs 4 more as interest. How much amounts did he invest at 12% and 10% respectively ?

(a) Rs 600, Rs 550 (b) Rs 800, Rs 450
(c) Rs 700, Rs 500 (d) Rs 500, Rs 700

**33.** Solve the following system of equations for $x$ and $y$, $x, y \neq 0$.

$$\frac{a}{x} - \frac{b}{y} = 0, \frac{ab^2}{x} + \frac{a^2b}{y} = a^2 + b^2$$

(a) $x = b, y = a$ (b) $x = a, y = b$
(c) $x = -a, y = -b$ (d) $x = -b, y = -a$

**34.** A man had a certain number of oranges. He divides them into two lots $A$ and $B$. He sells the first lot at the rate of Rs 2 for 3 oranges and the second lot at the rate Re 1 per orange and gets a total of Rs 400. If he had sold the first lot at the rate of Re 1 per orange and the second lot at the rate of Rs 4 for 5 oranges, his total collection would have been Rs 460. Find the total number of oranges he had ?

(a) 50 (b) 100
(c) 500 (d) 400

**35.** Two men and 7 children complete a certain piece of work in 4 days while 4 men and 4 children complete the same work in only 3 days. The number of days required by 1 man to complete the work is

(a) 60 days (b) 15 days
(c) 6 days (d) 51 days

## Answers

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1.** (c) | **2.** (b) | **3.** (d) | **4.** (c) | **5.** (c) | **6.** (c) | **7.** (a) | **8.** (d) | **9.** (b) | **10.** (c) |
| **11.** (b) | **12.** (d) | **13.** (c) | **14.** (d) | **15.** (d) | **16.** (b) | **17.** (b) | **18.** (b) | **19.** (d) | **20.** (b) |
| **21.** (a) | **22.** (a) | **23.** (b) | **24.** (b) | **25.** (d) | **26.** (c) | **27.** (a) | **28.** (a) | **29.** (d) | **30.** (c) |
| **31.** (c) | **32.** (d) | **33.** (a) | **34.** (c) | **35.** (b) | | | | | |

## Hints and Solutions

**1.** (c) $2x + y = 8$ ...(*i*)

$-4x + 3y = 4$ ...(*ii*)

Multiplying eqn (*i*) by 2 and adding to eqn (*ii*), we get

$4x + 2y - 4x + 3y = 16 + 4$

$\Rightarrow 5y = 20 \quad \Rightarrow \quad y = 4$

Putting $y = 4$ in (*i*), we get $2x + 4 = 8$

$\Rightarrow 2x = 4 \quad \Rightarrow \quad x = \mathbf{2}$.

**2.** (b) $\frac{x}{2}+\frac{y}{3}=4 \Rightarrow 6\times\frac{x}{2}+6\times\frac{y}{3} = 6 \times 4$

$\Rightarrow 3x + 2y = 24$ ...(*i*)

Given, $x + y = 10 \quad \Rightarrow \quad y = 10 - x$ ...(*ii*)

Substituting the value of $y$ in (*i*), we get

$3x + 2\,(10 - x) = 24$

$\Rightarrow 3x + 20 - 2x = 24 \quad \Rightarrow \quad x = 24 - 20 = 4$

$\therefore$ From eqn (*ii*), $y = 10 - 4 = \mathbf{6}$.

**3.** (d) $x - y = 10 \quad \Rightarrow \quad x = y + 10$

Substitute this value of $x$ in eqn $2x + 3y = 5$.

Then solve yourself.

**4.** (c) $(x + 3)(y - 5) = xy + 39$

$\Rightarrow xy + 3y - 5x - 15 = xy + 39$

$\Rightarrow -5x + 3y = 54 \Rightarrow 5x - 3y = -54$ ...(*i*)

$(x - 2)(y + 3) = xy - 40$

$\Rightarrow xy - 2y + 3x - 6 = xy - 40$

$\Rightarrow -2y + 3x = -34 \Rightarrow 3x - 2y = -34$ ...(*ii*)

Multiply (*i*) by 3 and (*ii*) by 5 and then subtract eqn (*ii*) from eqn (*i*).

Solve yourself now.

**5.** (c) Let the two expressions be $A$ and $B$.

Then, $A + B = 5x^2 - x - 4$ ...(*i*)

$A - B = x^2 + 9x - 10$ ...(*ii*)

Adding eqn (*i*) and (*ii*), we get

$2A = (5x^2 + x^2) + (-x + 9x) + (-4 - 10)$

$= 6x^2 + 8x - 14$

$\Rightarrow A = 3x^2 + 4x - 7$

$\therefore$ From (*i*), $B = (5x^2 - x - 4) - A$

$= (5x^2 - x - 4) - (3x^2 + 4x - 7)$

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

**6.** (c) $\frac{5x+6}{(2+x)(1-x)} = \frac{a}{(2+x)} + \frac{b}{(1-x)}$

$\Rightarrow \frac{a(1-x)+b(2+x)}{(2+x)(1-x)} = \frac{5x+6}{(2+x)(1-x)}$

$\Rightarrow \frac{a-ax+2b+bx}{(2+x)(1-x)} = \frac{5x+6}{(2+x)(1-x)}$

$\Rightarrow \frac{(a+2b)-x(a-b)}{(2+x)(1-x)} = \frac{5x+6}{(2+x)(1-x)}$

Equating the coefficient of $x$ and constant term on both the sides of the equation, we get

$a + 2b = 6$ ...(*i*)

$a - b = -5$ ...(*ii*)

Subtracting eqn (*ii*) from eqn (*i*), we get

$3b = 11 \quad \Rightarrow \quad b = \frac{11}{3}$

Putting the value of $b$ in (*ii*), we get

$a - \frac{11}{3} = -5$

$\Rightarrow a = -5 + \frac{11}{3} = \frac{-15+11}{3} = \mathbf{\frac{-4}{3}}$.

**7.** (a) $(4)^{x+y} = 1 \Rightarrow (4)^{x+y} = 4^0 \Rightarrow x + y = 0$ ...(*i*)

$(4)^{(x-y)} = 4 \Rightarrow (4)^{x-y} = 4^1 \Rightarrow x - y = 1$ ...(*ii*)

Adding eqn (*i*) and (*ii*), $2x = 1 \Rightarrow x = \mathbf{\frac{1}{2}}$

$\therefore$ From eqn (*i*), $\frac{1}{2} + y = 0 \Rightarrow y = -\mathbf{\frac{1}{2}}$.

**8.** (d) $\frac{2}{x}+\frac{3}{y}=\frac{9}{xy} \Rightarrow \frac{2y+3x}{xy} = \frac{9}{xy}$

$\Rightarrow 3x + 2y = 9$ ...(*i*)

$\frac{4}{x}+\frac{9}{y}=\frac{21}{xy} \Rightarrow \frac{4y+9x}{xy}=\frac{21}{xy}$

$\Rightarrow 9x + 4y = 21$ ...(*ii*)

Multiplying eqn (*i*) by 3 and subtracting from eqn (*ii*), we get

$(9x - 9x) + (4y - 6y) = 21 - 27$

$\Rightarrow -2y = -6 \quad \Rightarrow \quad y = 3$

Now substitute the value of $y$ in eqn (*i*) and find $x$.

**9.** (b) Let $\frac{1}{x} = a$, $\frac{1}{y} = b$, Then, the given equations reduce to:

$2a + 3b = 2$ ...(*i*)

$6a + 18b = 9$ ...(*ii*)

Now solve eqn (*i*) and (*ii*) to find the values of $a$ and $b$, and then $x$ and $y$.

**10.** (c) Let $\frac{1}{x} = a$ and $\frac{1}{y} = b$. Then, the given equations reduce to

$pa + qb = m$ ...(i)

$qa + pb = n$ ...(ii)

Multiplying eqn (i) by $q$ and eqn (ii) by $p$, we get

$pqa + q^2b = mq$ ...(iii)

$qpa + p^2b = np$ ...(iv)

Now, subtracting eqn (iii) from eqn (iv),

$(p^2 - q^2)b = np - mq$

$$\Rightarrow b = \frac{np - mq}{p^2 - q^2} \Rightarrow y = \frac{1}{b} = \frac{p^2 - q^2}{np - mq}$$

Substituting this value of $b$ in (i), we have

$$pa + \frac{q(np - mq)}{p^2 - q^2} = m$$

$$\Rightarrow pa = m - \frac{(pqn - mq^2)}{p^2 - q^2}$$

$$\Rightarrow pa = \frac{mp^2 - \cancel{mq^2} - pqn + \cancel{mq^2}}{p^2 - q^2}$$

$$\Rightarrow pa = \frac{p(mp - qn)}{p^2 - q^2}$$

$$\Rightarrow a = \frac{mp - qn}{p^2 - q^2} \Rightarrow x = \frac{1}{a} = \frac{p^2 - q^2}{mp - qn}.$$

**11.** (b) In the given system of equations,

$a_1 = 2, b_1 = 3, c_1 = -5$

$a_2 = k, b_2 = -6, c_2 = -8$

For a unique solution.

$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \Rightarrow \frac{2}{k} \neq \frac{3}{-6} \Rightarrow 3k \neq -12 \Rightarrow k \neq \mathbf{-4}.$$

**12.** (d) Here, $a_1 = 9, b_1 = 4, c_1 = -9$

$a_2 = 7, b_2 = k, c_2 = -5$

For no solution $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$$\Rightarrow \frac{9}{7} = \frac{4}{k} \Rightarrow 9k = 28 \Rightarrow k = \mathbf{\frac{28}{9}}.$$

**13.** (c) Here, $a_1 = 2, b_1 = 32, c_1 = 3$

$a_2 = 3, b_2 = 48, c_2 = k$

For coincident lines,

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

$$\Rightarrow \frac{2}{3} = \frac{32}{48} = \frac{3}{k} \Rightarrow \frac{3}{k} = \frac{2}{3} \Rightarrow 2k = 9$$

$$\Rightarrow k = \mathbf{\frac{9}{2}}.$$

**14.** (d) Check for $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}, \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

and $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

Here $a_1 = 2, b_1 = 3, c_1 = -5$

$a_2 = 4, b_2 = 6, c_2 = -10.$

**15.** (d) Here $a_1 = a, b_1 = b, c_1 = -(2a^2 - 3b^2) = 3b^2 - 2a^2$

$a_2 = 1, b_2 = 2, c_2 = -(2a - 6b) = 6b - 2a$

$$\frac{a_1}{a_2} = \frac{a}{1}, \frac{b_1}{b_2} = \frac{b}{2}, \frac{c_1}{c_2} = \frac{3b^2 - 2a^2}{6b - 2a}$$

$$2a = b \Rightarrow a = \frac{b}{2}$$

$$\therefore \frac{a_1}{a_2} = \frac{b}{2}, \quad \frac{b_1}{b_2} = \frac{b}{2} \text{ and}$$

$$\frac{c_1}{c_2} = \frac{3b^2 - 2 \times \frac{b^2}{4}}{6b - 2 \times \frac{b}{2}} = \frac{3b^2 - \frac{b^2}{2}}{6b - b} = \frac{\frac{5b^2}{2}}{5b} = \frac{b}{2}$$

$$\therefore \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

**16.** (b) Total number of notes = 7 $\Rightarrow x + y = 7$

Total value of notes = Rs 40

$\Rightarrow 5x + 10y = 40$

$\Rightarrow x + 2y = 8$

**17.** (b) Let the cost of one apple and one orange be Rs $x$ and Rs $y$ respectively.

Then, according to the given question,

$8x + 5y = 92$ ...(i)

$5x + 8y = 77$ ...(ii)

Multiplying eqn (i) by 5 and eqn (ii) by 8, we get

$40x + 25y = 460$ ...(iii)

$40x + 64y = 616$ ...(iv)

Subtracting eqn (iii) from eqn (iv),

$$39y = 156 \Rightarrow y = \frac{156}{39} = 4$$

From (i) putting the value of $y$, we get

$8x + 20 = 92 \Rightarrow 8x = 72 \Rightarrow x = 9$

$\therefore$ Cost of 2 oranges and 3 apples

= 2 × Rs 4 + 3 × Rs 9 = Rs 8 + Rs 27 = **Rs 35**.

**18.** (b) Let the number of buffaloes be $b$ and the number of ducks be $d$. Then,

Number of legs of buffaloes = $4 \times b = 4b$

Number of legs of ducks = $2 \times d = 2d$

Total number of heads = $2(b + d)$

According to the question,

$4b + 2d = 2(b + d) + 24$

$\Rightarrow 4b + 2d = 2b + 2d + 24 \Rightarrow 2b = 24 \Rightarrow b = \mathbf{12}$.

**19.** (d) Let the number of pencils and pen with $X$ be $x$ and $y$ respectively.

Given, $x + y = 40$ …($i$)

Also $(x + 5) = 4(y - 5)$

$\Rightarrow x + 5 = 4y - 20 \Rightarrow x - 4y = -25$ …($ii$)

Subtracting eqn ($ii$) from eqn ($i$), we get

$5y = 65 \Rightarrow y = \mathbf{13}$.

**20.** (b) Let the ages of the younger sister and elder sister be $x$ yrs and $y$ yrs respectively. Then,

$\frac{x}{y+1} = \frac{0.5}{1} \Rightarrow \frac{x}{y+1} = \frac{1}{2}$

$\Rightarrow 2x = y + 1 \Rightarrow 2x - y = 1$ …($i$)

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

$\Rightarrow 3x - y = 6$ …($ii$)

Now solve for $x$ and $y$.

**21.** (a) Let Ram have Rs $x$ and Mohan have Rs $y$.

If Ram gives Rs 30 to Mohan, then

Ram has = Rs $(x - 30)$

Mohan has = Rs $(y + 30)$

According to the question, $y + 30 = 2(x - 30)$

$\Rightarrow y + 30 = 2x - 60 \Rightarrow 2x - y = 90$ …($i$)

If Mohan gives Rs 10 to Ram, then

Ram has Rs $(x + 10)$

Mohan has Rs $(y - 10)$

According to the question, $(x + 10) = 3(y - 10)$

$\Rightarrow x + 10 = 3y - 30 \Rightarrow x - 3y = -40$ …($ii$)

Now solve yourself for $x$ and $y$.

**22.** (a) Let the fraction be $\frac{x}{y}$.

Given, $\frac{x+1}{y+1} = 2$

$\Rightarrow x + 1 = 2y + 2 \Rightarrow x - 2y = 1$ …($i$)

and $\frac{x-1}{y-1} = 3$

$\Rightarrow x - 1 = 3y - 3 \Rightarrow x - 3y = -2$ …($ii$)

Now solve eqn ($i$) and ($ii$) for $x$ and $y$.

**23.** (b) Let the cost price of the pen and the book be Rs $x$ and Rs $y$ respectively.

**Case I:** When the pen is sold at 5% loss and book at 15% gain,

Loss on pen = Rs $\frac{5x}{100}$ = Rs $\frac{x}{20}$

Gain on book = Rs $\frac{15y}{100}$ = Rs $\frac{3y}{20}$

$\therefore$ Net gain = Rs$\frac{3y}{20}$ – Rs$\frac{x}{20}$

Given, $\frac{3y}{20} - \frac{x}{20} = 7 \Rightarrow 3y - x = 140$ …($i$)

**Case II:** When the pen is sold at 5% gain and book at 10% gain

Gain on pen = Rs $\frac{5x}{100}$ = Rs $\frac{x}{20}$

Gain on book = Rs $\frac{10y}{100}$ = Rs $\frac{y}{10}$

$\therefore$ Net gain = $\frac{x}{20} + \frac{y}{10}$

Given, $\frac{x}{20} + \frac{y}{10} = 13 \Rightarrow x + 2y = 260$ …($ii$)

Now, solve equation ($i$) and ($ii$) for the value of $x$ and $y$.

**24.** (b) Let the larger number be $x$ and the smaller one be $y$. We know that,

Dividend = (Divisor × Quotient) + Remainder

By the first condition,

$3x = 4y + 3 \Rightarrow 3x - 4y = 3$ …($i$)

By the second condition,

$7y = 5x + 1 \Rightarrow 5x - 7y = -1$ …($ii$)

Now solve for $x$ and $y$.

**25.** (d) Mr. Manoj's age be $(10x + y)$ yrs.

Then, his wife's age = $(10y + x)$ years

Given,

$$\frac{1}{11}(10x + y + 10y + x) = (10x + y) - (10y + x)$$

$$\Rightarrow \frac{1}{11}(11x + 11y) = 9x - 9y$$

$$\Rightarrow x + y = 9x - 9y \Rightarrow 8x = 10y \Rightarrow \frac{x}{y} = \frac{5}{4}$$

$\therefore$ $x = 5, y = 4$ (because any other multiple of 5 will make $x$ two digits)

$\therefore$ Difference = $9x - 9y = 9(x - y) = 9(5 - 4) = 9$ yrs.

**26.** (c) Suppose I have $x$, one-rupee coins and $y$, 20 – paise coins.

$x \times 1 + y \times 0.2 = 14.40 \Rightarrow x + 0.2y = 14.4$ ...($i$)

After shopping, I had $y$ one-rupee coins and $x$ 20-paise coins.

Also, $x \times 0.2 + y \times 1 = \frac{1}{3} \times 14.4$

$\Rightarrow 0.2x + y = 4.8$ ...($ii$)

[**Note:** To solve the equations of the form $ax + by = c$ and $bx + ay = d$, where $a \neq b$, we can use the following method also.]

Adding eqn ($i$) and ($ii$), we get

$1.2x + 1.2y = 19.2 \Rightarrow x + y = \frac{19.2}{1.2} = 16$ ...($iii$)

and subtracting eqn ($ii$) from eqn ($i$), we get

$-0.8x + 0.8y = -9.6 \Rightarrow x - y = 12$ ...($iv$)

Now adding ($iii$) and ($iv$), we get

$2x = 28 \Rightarrow x = \mathbf{14}$.

**27.** (a) $5a + b > 51$ ...($i$)

$3a - b = 21$ ...($ii$) $\Rightarrow$ $b = 3a - 21$

Putting the value of $b$ in ($i$), we get

$5a + 3a - 21 > 51 \Rightarrow 8a > 72 \Rightarrow a > 9$

Now, $b = 3a - 21$

$$\left.\begin{array}{l}\text{If } a = 9, b = 6;\\ a = 10, b = 9;\\ a = 11, b = 12;\end{array}\right\} \Rightarrow \text{If } a > 9, b > 6$$

**28.** (a) By the angle sum property of a triangle,

$\angle A + \angle B + \angle C = 180°$

$\Rightarrow x + y + y + 20° = 180° \Rightarrow x + 2y = 160$ ...($i$)

Given, $4x - y = 10$ ...($ii$)

Multiplying ($ii$) by 2, we get

$8x - 2y = 20$ ...($iii$)

Adding eqn ($i$) and ($iii$),

$9x = 180 \Rightarrow x = 20$

$\therefore$ From ($i$), $2y = 160 - 20 = 140 \Rightarrow y = 70$

$\Rightarrow \angle A = 20°, \angle B = 70°, \angle C = 90°$.

$\therefore$ The triangle is right angled.

**29.** (d) Let the two digit number be $10x + y$.

According to the question,

$10x + y = 8(x + y) + 1 \Rightarrow 2x - 7y = 1$ ...($i$)

and $10x + y = 13(x - y) + 2 \Rightarrow 3x - 14y = -2$ ...($ii$)

Now solve yourself for $x$ and $y$.

**30.** (c) Let the number of females be $x$ and males be $y$.

Then, $x + y = 53000$

$1.04x + 1.06y = 55630$

[No. of females after increase $= x + \frac{4}{100}x = \frac{104}{100}x = 1.04x$

Similarly, no. of males $= 1.06\,y$]

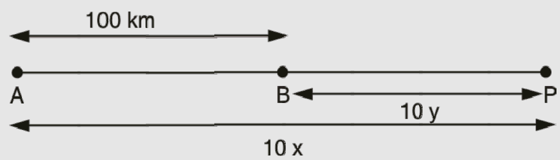
Now solve for $x$ and $y$ and find the difference.

**31.** (c) Let $X$ and $Y$ be two cars starting from points $A$ and $B$ respectively.

Let the speed of the car $X$ be $x$ km/hr and that of car $Y$ be $y$ km/hr.

**Case I :** *When the two cars move in the same direction.*

Suppose the two cars meet at point $P$ after 10 hours.



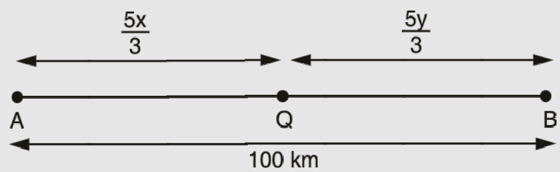

Then, Dist. travelled by car $X = AP = 10x$ km

and Dist. travelled by car $Y = BP = 10y$ km

Given, $AP - BP = AB$

$\Rightarrow 10x - 10y = 100 \Rightarrow x - y = 10$ ...($i$)

**Case II:** *When the two cars move in the opposite direction :*




Suppose the two cars meet at point $Q$ of 1 hrs 40 min $= 1\frac{40}{60}$ hrs $= 1\frac{2}{3}$ hrs $= \frac{5}{3}$ hrs.

Then, dist. travelled by car $X = AQ = \frac{5x}{3}$ km

and dist. travelled by car $Y = BQ = \frac{5y}{3}$ km.

Given, $AQ + BQ = 100$

$\Rightarrow \frac{5x}{3} + \frac{5y}{3} = 100 \Rightarrow (x + y) = \frac{300}{5} = 60$ ...($ii$)

Adding ($i$) and ($ii$)

$2x = 70 \Rightarrow x = \mathbf{35}$

$\therefore$ From ($i$), $35 - y = 10 \Rightarrow y = \mathbf{25\ km/hr}$.

**32.** (d) Suppose the person invested Rs $a$ at 12% simple interest and Rs $b$ at 10% simple interest. Then,

$$\frac{12a}{100}+\frac{10b}{100}=130 \Rightarrow 6a+5b=6500 \quad ...(i)$$

If the amounts invested are interchanged, then the yearly interest = Rs 134

$$\therefore \frac{10a}{100}+\frac{12b}{100}=134 \Rightarrow 5a+6b=6700 \quad ...(ii)$$

Now solve the equations yourself for $a$ and $b$.

**33.** (a) Let $\frac{1}{x}=p, \frac{1}{y}=q$. Then,

$$ap-bq=0 \quad ...(i)$$

$$ab^2p+a^2bq=a^2+b^2 \Rightarrow ab(bp+aq)=a^2+b^2$$

$$\Rightarrow bp+aq=\frac{a^2+b^2}{ab} \quad ...(ii)$$

Multiplying eqn ($i$) by $b$ and eqn ($ii$) by $a$, we get

$$abp-b^2q=0 \quad ...(iii)$$

$$abp+a^2q=\frac{a^2+b^2}{b} \quad ...(iv)$$

Now subtracting eqn ($iii$) from eqn ($iv$), we get

$$(a^2+b^2)q=\frac{a^2+b^2}{b} \Rightarrow q=\frac{1}{b} \Rightarrow \frac{1}{x}=\frac{1}{b} \Rightarrow x=b$$

Putting in ($i$), $ap-1=0 \Rightarrow ab=1$

$$\Rightarrow p=\frac{1}{a} \Rightarrow \frac{1}{y}=\frac{1}{a} \Rightarrow y=a$$

$\therefore$ $x=\boldsymbol{b}$, $y=\boldsymbol{a}$.

**34.** (c) Let the number of oranges in the lots $A$ and $B$ be $a$ and $b$ respectively.

According to the question,

$$\frac{2}{3}a+b=400 \quad ...(i)$$

$$a+\frac{4}{5}b=460 \quad ...(ii)$$

Now solve for $a$ and $b$.

**35.** (b) (2 Men + 7 Children)'s 1 days' work = $\frac{1}{4}$

(4 Men + 4 children)'s 1 days' work = $\frac{1}{3}$

$$\Rightarrow 2M+7C=\frac{1}{4} \quad ...(i)$$

$$4M+4C=\frac{1}{3} \quad ...(ii)$$

Now solve for the value of man.

## Self Assessment Sheet–11

**1.** If the equations $4x+7y=10$ and $10x+ky=25$ represent coincident lines, then the value of $k$ is :

(a) 5 (b) $\frac{17}{2}$

(c) $\frac{27}{2}$ (d) $\frac{35}{2}$

**2.** The solution of the equations $\frac{m}{3}+\frac{n}{4}=12$ and $\frac{m}{2}-\frac{n}{3}=1$ is

(a) $m=8, n=6$ (b) $m=18, n=24$

(c) $m=24, n=18$ (d) $m=6, n=8$

**3.** Given that : $5=\frac{5W+2\omega}{5+2}$ and $5.1=\frac{7W+3\omega}{7+3}$, find $W$ and $\omega$.

(a) $W=3, \omega=10$ (b) $W=10, \omega=3$

(c) $W=-10, \omega=3$ (d) $W=3, \omega=-10$

**4.** Solve for $a$ and $b$ : $2(a+b)-(a-b)=6$, $4(a-b)=2(a+b)-9$

(a) $a=\frac{3}{4}, b=1\frac{3}{4}$ (b) $a=\frac{1}{2}, b=1\frac{1}{2}$

(c) $a=1\frac{3}{4}, b=\frac{3}{4}$ (d) $a=\frac{3}{2}, b=\frac{3}{4}$

**5.** Solve : $\frac{x+2}{y+2}+2=0, \frac{x-4}{y-2}=\frac{x-1}{y+7}$

(a) $x=2, y=4$ (b) $x=-2, y=4$

(c) $x=2, y=-4$ (d) $x=-2, y=-4$

**6.** The solution of the pair of equations: $0.25x+0.6y=0.7$ and $0.3x-3.5y=2.95$ is

(a) $x=4, y=0.5$ (b) $x=-4, y=-0.5$

(c) $x=4, y=0.5$ (d) $x=4, y=-0.5$

**7.** Three times Diana's age is 17 years more than twice Jim's age. The sum of their ages is 13 years less than their father's age which is three times Jim's age. What are the children's ages ?

(a) Diana 21 years, Jim 16 years

(b) Diana 15 years, Jim 14 years

(c) Diana 15 years, Jim 16 years
(d) Diana 20 years, Jim 14 years

**8.** A number of two digits is equal to six times the sum of its digits. If the digits are reversed the number so formed is equal to :
(a) six times the sum of its digits.
(b) five times the sum of its digits.
(c) ten times the sum of its digits.
(d) nine times the sum of digits.

**9.** A sports club has 130 members. An increase of 10% in the number of men and 20% in the number of ladies brought up the membership to 148. How many men and ladies were there originally ?
(a) 90 men, 40 women (b) 80 men, 50 women
(c) 60 men, 70 women (d) 50 men, 80 women

**10.** The difference between two angles of a triangle whose magnitude is in the ratio 10 : 7 is 20° less than the third angle. The third angle is:
(a) 80° (b) 56°
(c) 44° (d) 70°

## Answers

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