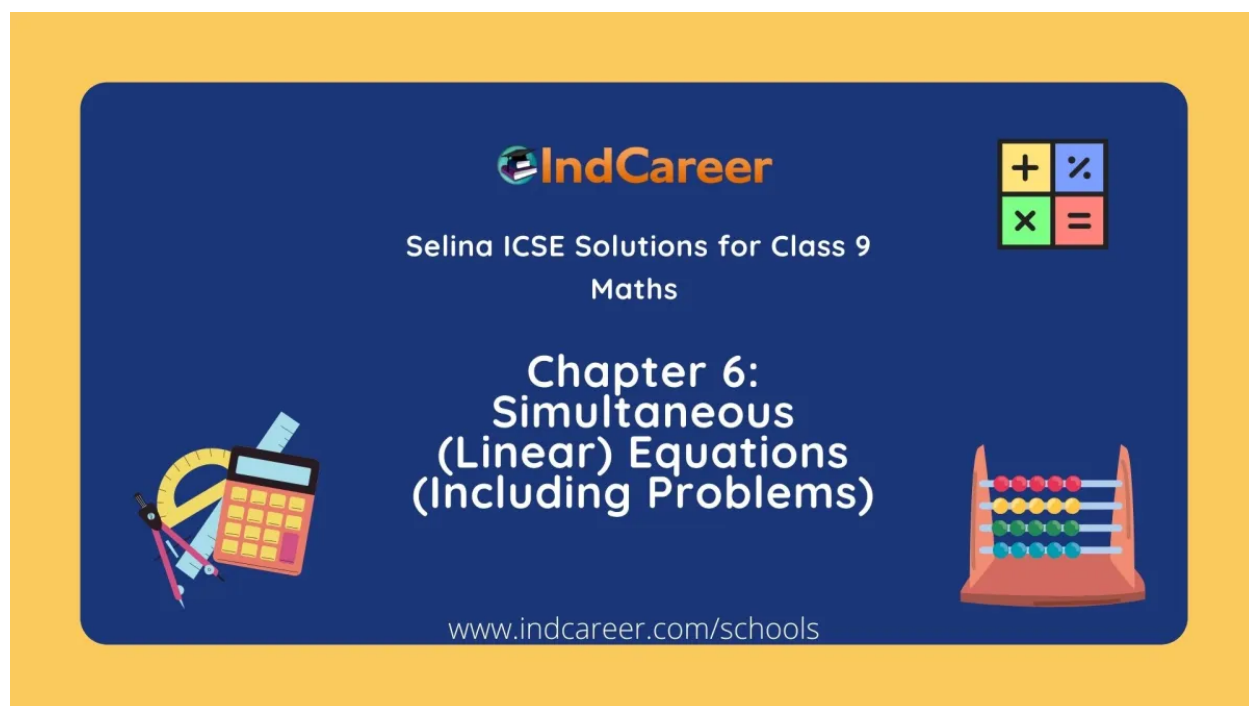


Selina Class 9 ICSE Solutions Mathematics :

Chapter 6 - Simultaneous (Linear) Equations

(Including Problems)



For any clarifications or questions you can write to info@indcareer.com

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Selina Class 9 ICSE Solutions Mathematics :

Chapter 6 - Simultaneous (Linear) Equations

(Including Problems)

Class 9: Maths Chapter 6 solutions. Complete Class 9 Maths Chapter 6 Notes.

Selina Class 9 ICSE Solutions Mathematics : Chapter 6 - Simultaneous (Linear) Equations (Including Problems)

Selina 9th Maths Chapter 6, Class 9 Maths Chapter 6 solutions

Exercise 6(A)

Solution 1:

$$8x + 5y = 9 \dots (1)$$

$$3x + 2y = 4 \dots (2)$$

$$(2) \Rightarrow y = \frac{9 - 8x}{5}$$

Putting this value of y in (2)

$$3x + 2 \left(\frac{9 - 8x}{5} \right) = 4$$

$$15x + 18 - 16x = 20$$

$$x = -2$$

$$\text{From (1) } y = \left(\frac{9 - 8x}{5} \right) = \frac{9 - 8(-2)}{5} = \frac{25}{5} = 5$$

$$y = 5$$

Solution 2:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

$$2x - 3y = 7 \dots (1)$$

$$5x + y = 9 \dots (2)$$

$$(2) \Rightarrow y = 9 - 5x$$

Putting this value of y in (1)

$$2x - 3(9 - 5x) = 7$$

$$2x - 27 + 15x = 7$$

$$17x = 34$$

$$x = 2$$

From (2)

$$y = 9 - 5(2)$$

$$y = -1$$

Solution 3:

$$2x + 3y = 8 \dots (1)$$

$$2x = 2 + 3y \dots (2)$$

$$(2) \Rightarrow 2x = 2 + 3y$$

Putting this value of 2x in (1)

$$2 + 3y + 3y = 8$$

$$6y = 6$$

$$y = 1$$

From (2) $2x = 2 + 3(1)$

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

$$x = 2.5$$

Solution 4:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

The given pair of linear equations are

$$0.2x + 0.1y = 25 \dots\dots\dots(i)$$

$$2(x - 2) - 1.6y = 116 \dots\dots\dots(ii)$$

Consider equation (i)

$$0.2x + 0.1y = 25$$

$$\Rightarrow 0.2x = 25 - 0.1y$$

$$\Rightarrow x = \frac{(25 - 0.1y)}{0.2} \dots\dots\dots(iii)$$

Substitute the value of x from equation (iii) in equation (ii).

$$2(x - 2) - 1.6y = 116$$

$$\Rightarrow 2\left(\frac{(25 - 0.1y)}{0.2} - 2\right) - 1.6y = 116$$

$$\Rightarrow 10(25 - 0.1y) - 4 - 1.6y = 116$$

$$\Rightarrow 250 - y - 4 - 1.6y = 116$$

$$\Rightarrow -2.6y = -130$$

$$\Rightarrow y = 50 \dots\dots\dots(iv)$$

Substitute the value of y from equation (iv) in equation (iii).

$$x = \frac{(25 - 0.1y)}{0.2}$$

$$\Rightarrow x = \frac{(25 - 0.1(50))}{0.2}$$

$$\Rightarrow x = \frac{(25 - 5)}{0.2}$$

$$\Rightarrow x = 100$$

$\therefore$ Solution is $x = 100$ and $y = 50$.

Solution 5:

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$$6x = 7y + 7 \dots (1)$$

$$7y - x = 8 \dots (2)$$

$$(2) \Rightarrow x = 7y - 8$$

Putting this value of x in (1)

$$6(7y - 8) = 7y + 7$$

$$42y - 48 = 7y + 7$$

$$35y = 55$$

$$y = \frac{11}{7}$$

$$\text{From (2) } x = 7\left(\frac{11}{7}\right) - 8$$

$$x = 3$$

Solution 6:

$$y = 4x - 7 \dots (1)$$

$$16x - 5y = 25 \dots (2)$$

$$(1) \Rightarrow y = 4x - 7$$

Putting this value of y in (2)

$$16x - 5(4x - 7) = 25$$

$$16x - 20x + 35 = 25$$

$$-4x = -10$$

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

From (1)

$$y = 4\left(\frac{5}{2}\right) - 7$$

$$\Rightarrow y = 10 - 7$$

$$\Rightarrow y = 3$$

$$y = 10 - 7 = 3$$

Solution is $x = \frac{5}{2}$ and $y = 3$.

Solution 7:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

$$2x + 7y = 39 \dots (1)$$

$$3x + 5y = 31 \dots (2)$$

$$(1) \Rightarrow x = \frac{39 - 7y}{2}$$

Putting this value of x in (2)

$$3\left(\frac{39 - 7y}{2}\right) + 5y = 31$$

$$117 - 21y + 10y = 62$$

$$-11y = -55$$

$$y = 5$$

$$\text{From (1) } x = \frac{39 - 7(5)}{2}$$

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

$$x = 2$$

Solution 8:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

The given pair of linear equations are

$$1.5x + 0.1y = 6.2 \dots\dots\dots(i)$$

$$3x - 0.4y = 11.2 \dots\dots\dots(ii)$$

Consider equation (i)

$$1.5x + 0.1y = 6.2$$

$$\Rightarrow 1.5x = 6.2 - 0.1y$$

$$\Rightarrow x = \frac{(6.2 - 0.1y)}{1.5} \dots\dots\dots(iii)$$

Substitute the value of x from equation (iii) in equation (ii).

$$3x - 0.4y = 11.2$$

$$\Rightarrow 3\left(\frac{(6.2 - 0.1y)}{1.5}\right) - 0.4y = 11.2$$

$$\Rightarrow 2(6.2 - 0.1y) - 0.4y = 11.2$$

$$\Rightarrow 12.4 - 0.2y - 0.4y = 11.2$$

$$\Rightarrow -0.6y = -1.2$$

$$\Rightarrow y = 2 \dots\dots\dots(iv)$$

Substitute the value of y from equation (iv) in equation (iii).

$$x = \frac{(6.2 - 0.1y)}{1.5}$$

$$\Rightarrow x = \frac{(6.2 - 0.1(2))}{1.5}$$

$$\Rightarrow x = \frac{(6.2 - 0.2)}{1.5}$$

$$\Rightarrow x = 4$$

$\therefore$ Solution is $x = 4$ and $y = 2$.

Solution 9:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

Given equations are

$$2(x - 3) + 3(y - 5) = 0 \quad \dots(1)$$

$$5(x - 1) + 4(y - 4) = 0 \quad \dots(2)$$

From (1), we get

$$2x - 6 + 3y - 15 = 0$$

$$\Rightarrow 2x - 21 + 3y = 0$$

$$\Rightarrow 2x = 21 - 3y$$

$$\Rightarrow x = \frac{21 - 3y}{2}$$

From (2), we get

$$5(x - 1) + 4(y - 4) = 0$$

$$\Rightarrow 5x - 5 + 4y - 16 = 0$$

$$\Rightarrow 5x + 4y - 21 = 0 \quad \dots(3)$$

Substituting $x = \frac{21 - 3y}{2}$ in (3), we get

$$5\left(\frac{21 - 3y}{2}\right) + 4y - 21 = 0$$

$$\Rightarrow \frac{105 - 15y}{2} + 4y - 21 = 0$$

$$\Rightarrow 105 - 15y + 8y - 42 = 0$$

$$\Rightarrow -7y + 63 = 0$$

$$\Rightarrow 7y = 63$$

$$\Rightarrow y = 9$$

Substituting $y = 9$ in $x = \frac{21 - 3y}{2}$, we get

$$x = \frac{21 - 3(9)}{2} = \frac{21 - 27}{2} = \frac{-6}{2} = -3$$

$\therefore$ Solution is $x = -3$ and $y = 9$

Solution 10:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

$$\frac{2x+1}{7} + \frac{5y-3}{3} = 12 \quad (\text{given})$$

$$\Rightarrow \frac{3(2x+1) + 7(5y-3)}{21} = 12$$

$$\Rightarrow 6x + 3 + 35y - 21 = 252$$

$$\Rightarrow 6x + 35y - 18 = 252$$

$$\Rightarrow 6x + 35y = 270$$

$$\Rightarrow 6x = 270 - 35y$$

$$\Rightarrow x = \frac{270 - 35y}{6}$$

$$\frac{3x+2}{2} - \frac{4y+3}{9} = 13 \quad (\text{given})$$

$$\Rightarrow \frac{9(3x+2) - 2(4y+3)}{18} = 13$$

$$\Rightarrow 27x + 18 - 8y - 6 = 234$$

$$\Rightarrow 27x - 8y + 12 = 234$$

$$\Rightarrow 27x - 8y = 222 \quad \dots(1)$$

Substituting $x = \frac{270 - 35y}{6}$ in (1), we get

$$27\left(\frac{270 - 35y}{6}\right) - 8y = 222$$

$$\Rightarrow 7290 - 945y - 48y = 1332$$

$$\Rightarrow -993y = -5958$$

$$\Rightarrow y = 6$$

Substituting $y = 6$ in $x = \frac{270 - 35y}{6}$, we get

$$x = \frac{270 - 35 \times 6}{6} = \frac{270 - 210}{6} = \frac{60}{6} = 10$$

$\therefore$ Solution is $x = 10$ and $y = 6$

Exercise 6(B)

Solution 1:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

$$13 + 2y = 9x \dots (1)$$

$$3y = 7x \dots (2)$$

Multiplying equation no. (1) by 3 and (2) by 2, we get,

$$39 + 6y = 27x \quad \dots (1)$$

$$6y = 14x \quad \dots (2)$$

$$\begin{array}{r} - \quad - \quad - \\ 39 = 13x \end{array}$$

$$x = 3$$

From (2)

$$3y = 7(3)$$

$$y = 7$$

Solution 2:

$$3x - y = 23 \dots (1)$$

$$\frac{x}{3} + \frac{y}{4} = 4$$

$$4x + 3y = 48 \dots (2)$$

Multiplying equation no. (1) by 3

$$9x - 3y = 69 \quad \dots (3)$$

$$4x + 3y = 48$$

$$\begin{array}{r} 13x = 117 \end{array}$$

$$x = 9$$

From (1)

$$3(9) - y = 23$$

$$y = 27 - 23$$

$$y = 4$$

Solution 3:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

The given pair of linear equations are

$$\frac{5y}{2} - \frac{x}{3} = 8$$

$$\Rightarrow -\frac{x}{3} + \frac{5y}{2} = 8 \dots\dots\dots(i) \quad [\text{On simplifying}]$$

$$\frac{y}{2} + \frac{5x}{3} = 12$$

$$\Rightarrow \frac{5x}{3} + \frac{y}{2} = 12 \dots\dots\dots(ii) \quad [\text{On simplifying}]$$

Multiply equation (i) by 5, we get:

$$-\frac{5x}{3} + \frac{25y}{2} = 40$$

$$\frac{5x}{3} + \frac{y}{2} = 12 \quad [\text{Equation (ii)}]$$

$$+ \quad + \quad + \quad [\text{Adding}]$$

$$\frac{26y}{2} = 52$$

$$\Rightarrow 13y = 52$$

$$\Rightarrow y = 4$$

Substituting $y = 4$ in equation (i), we get

$$-\frac{x}{3} + \frac{5(4)}{2} = 8$$

$$\Rightarrow -\frac{x}{3} = 8 - 10$$

$$\Rightarrow x = 6$$

$\therefore$ Solution is $x = 6$ and $y = 4$.

Solution 4:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

$$\frac{1}{5}(x-2) = \frac{1}{4}(1-y) \Rightarrow 4x + 5y = 13 \quad \dots(1)$$

$$26x + 3y = -4 \quad \dots(2)$$

Multiplying equation no. (1) by 3 and (2) by 5.

$$12x + 15y = 39 \quad \dots(3)$$

$$130x + 15y = -20$$

$$\begin{array}{r} - \quad - \quad + \\ \hline -115x = 59 \end{array}$$

$$x = -\frac{59}{118}$$

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

From (1)

$$4\left(-\frac{1}{2}\right) + 5y = 13$$

$$5y = 13 + 2$$

$$y = 3$$

Solution 5:

$$y = 2x - 6$$

$$y = 0$$

$$\Rightarrow 2x - y = 6 \quad \dots(1)$$

$$\underline{y = 2} \quad \dots(2)$$

$$2x = 6$$

$$x = 3, y = 0$$

Solution 6:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

The given pair of linear equations are

$$\frac{x-y}{6} = 2(4-x)$$

$$\Rightarrow 13x - y = 48 \dots\dots\dots(i) \text{ [On simplifying]}$$

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

$$\Rightarrow x - y = 12 \dots\dots\dots(ii) \text{ [On simplifying]}$$

Multiply equation (ii) by 13, we get:

$$13x - 13y = 156$$

$$13x - y = 48 \quad \text{[Equation (i)]}$$

$$\begin{array}{r} - \quad + \quad - \\ \hline \end{array} \quad \text{[Subtracting]}$$

$$-12y = 108$$

$$\Rightarrow y = -9$$

Substituting $y = -9$ in equation (i), we get

$$13x - (-9) = 48$$

$$\Rightarrow 13x = 39$$

$$\Rightarrow x = 3$$

$\therefore$ Solution is $x = 3$ and $y = -9$.

Solution 7:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

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

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

$$\Rightarrow -x - y = -6$$

$$\Rightarrow x + y = 6 \dots (1)$$

$$2x + 5y = 4 \dots (2)$$

Multiplying equation no. (1) by 2.

$$2x + 2y = 12$$

$$2x + 5y = 4$$

$$\begin{array}{r} - \quad - \quad - \\ \hline \end{array}$$

$$-3y = 8 \Rightarrow y = \frac{-8}{3}$$

From (1)

$$x - \frac{8}{3} = 6 \Rightarrow x = \frac{26}{3}$$

Solution 8:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>



$$2x - 3y - 3 = 0$$

$$\frac{2x}{3} + 4y + \frac{1}{2} = 0$$

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

$$\Rightarrow 4x + 24y = -3 \dots (2)$$

Multiplying equation no. (1) by 8.

$$16x - 24y = 24 \quad \dots (3)$$

$$4x + 24y = -3$$

$$\hline 20x = 21 \quad \Rightarrow x = \frac{21}{20}$$

From (1)

$$2\left(\frac{21}{20}\right) - 3y = 3$$

$$-3y = 3 - \frac{21}{10} \Rightarrow y = \frac{-3}{10}$$

Solution 9:

$$13x + 11y = 70 \dots (1)$$

$$11x + 13y = 74 \dots (2)$$

Adding (1) and (2)

$$24x + 24y = 144$$

$$x + y = 6 \dots (3)$$

subtracting (2) from (1)

$$2x - 2y = -4$$

$$x - y = -2 \dots (4)$$

$$x + y = 6 \dots (3)$$

$$\hline 2x = 4 \quad \Rightarrow x = 2$$

From (3)

$$2 + y = 6 \Rightarrow y = 4$$

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

Solution 10:

$$41x + 53y = 135 \dots (1)$$

$$53x + 41y = 147 \dots (2)$$

Adding (1) and (2)

$$94x + 94y = 282$$

$$x + y = 3 \dots (3)$$

Subtracting (2) from (1)

$$-12x + 12y = -12$$

$$-x + y = -1 \dots (4)$$

$$\begin{array}{r} x + y = 3 \\ \hline 2y = 2 \end{array} \Rightarrow y = 1$$

From (3)

$$x + 1 = 3 \Rightarrow x = 2$$

Solution 11:

$$2x + y = 23 \dots (1)$$

$$4x - y = 19 \dots (2)$$

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

$$2x + y = 23$$

$$4x - y = 19$$

$$\begin{array}{r} 2x + y = 23 \\ 4x - y = 19 \\ \hline 6x = 42 \end{array} \Rightarrow x = 7$$

From (1)

$$2(7) + y = 23$$

$$y = 23 - 14$$

$$\Rightarrow y = 9$$

$$\therefore x - 3y = 7 - 3(9) = -20$$

$$\text{And } 5y - 2x = 5(9) - 2(7) = 45 - 14 = 31$$

Solution 12:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

$$\begin{aligned}10y &= 7x - 4 \\ -7x + 10y &= -4 \dots (1) \\ 12x + 18y &= 1 \dots (2)\end{aligned}$$

Multiplying equation no. (1) by 12 and (2) by 7.

$$\begin{aligned}-84x + 120y &= -48 \quad \dots (3) \\ 84x + 126y &= 7 \\ \hline 246y &= -41 \quad \Rightarrow y = \frac{-1}{6}\end{aligned}$$

From (1)

$$-7x + 10\left(\frac{-1}{6}\right) = -4$$

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

$$\therefore 4\left(\frac{1}{3}\right) + 6\left(\frac{-1}{6}\right) = \frac{1}{3} \text{ and } 8y - x = 8\left(\frac{-1}{6}\right) - \frac{1}{3} = \frac{-5}{3}$$

Solution 13:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

(i)

The given pair of linear equations are

$$\frac{y+7}{5} = \frac{2y-x}{4} + 3x - 5$$

$$\Rightarrow 55x + 6y = 128 \dots\dots\dots(i) \text{ [On simplifying]}$$

$$\frac{7-5x}{2} + \frac{3-4y}{6} = 5y - 18$$

$$\Rightarrow 15x + 34y = 132 \dots\dots\dots(ii) \text{ [On simplifying]}$$

Multiply equation (i) by 3 and equation (ii) by 11, we get:

$$165x + 18y = 384$$

$$165x + 374y = 1452$$

$$\begin{array}{r} - \quad - \quad - \\ \hline - 356y = -1068 \end{array} \quad \text{[Subtracting]}$$

$$\Rightarrow y = 3$$

Substituting $y = 3$ in equation (i), we get

$$55x + 6(3) = 128$$

$$\Rightarrow 55x = 110$$

$$\Rightarrow x = 2$$

$\therefore$ Solution is $x = 2$ and $y = 3$.

(ii)

The given pair of linear equations are

$$4x = 17 - \frac{x - y}{8}$$

$$\Rightarrow 33x - y = 136 \dots\dots\dots(i) \text{ [On simplifying]}$$

$$2y + x = 2 + \frac{5y + 2}{3}$$

$$\Rightarrow 3x + y = 8 \dots\dots\dots(ii) \text{ [On simplifying]}$$

Multiply equation (ii) by 11, we get:

$$\begin{array}{rcl} 33x + 11y & = & 88 \\ 33x - y & = & 136 \quad \text{[Equation (i)]} \\ - & + & - \quad \text{[Subtracting]} \\ \hline 12y & = & -48 \\ \Rightarrow y & = & -4 \end{array}$$

Substituting $y = -4$ in equation (i), we get:

$$33x - (-4) = 136$$

$$\Rightarrow 33x = 132$$

$$\Rightarrow x = 4$$

$\therefore$ Solution is $x = 4$ and $y = -4$.

Solution 14:

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Solution 15:

$$10\% \text{ of } x + 20\% \text{ of } y = 24$$

$$\Rightarrow 0.1x + 0.2y = 24 \dots\dots\dots(i)$$

[On simplyfying]

$$3x - y = 20 \dots\dots\dots(ii)$$

Multiply equation (ii) by 0.2, we get:

$$0.6x - 0.2y = 4$$

$$0.1x + 0.2y = 24$$

[Equation (i)]

$$\begin{array}{r} + \quad + \quad + \\ \hline \end{array}$$

[Adding]

$$0.7x = 28$$

$$\Rightarrow x = 40$$

Substituting $x = 40$ in equation (i), we get

$$0.1(40) + 0.2y = 24$$

$$\Rightarrow 0.2y = 20$$

$$\Rightarrow y = 100$$

$\therefore$ Solution is $x = 40$ and $y = 100$.

Solution 16:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

The value of expression $mx - ny$ is 3 when $x = 5$ and $y = 6$.
 $\Rightarrow 5m - 6n = 3$(i)

The value of expression $mx - ny$ is 8 when $x = 6$ and $y = 5$.
 $\Rightarrow 6m - 5n = 8$(ii)

Multiply equation (i) by 6 and equation (ii) by 5, we get:

$$\begin{array}{rcl} 30m - 36n & = & 18 \quad \text{[Equation (i)]} \\ 30m - 25n & = & 40 \quad \text{[Equation (ii)]} \\ \hline - & + & - \quad \text{[Subtracting]} \\ & -11n & = -22 \\ \Rightarrow n & = & 2 \end{array}$$

Substituting $n = 2$ in equation (i), we get

$$5m - 6(2) = 3$$

$$\Rightarrow 5m = 15$$

$$\Rightarrow m = 3$$

$\therefore$ Solution is $m = 3$ and $n = 2$.

Solution 17:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

$$11(x - 5) + 10(y - 2) + 54 = 0 \quad (\text{given})$$

$$\Rightarrow 11x - 55 + 10y - 20 + 54 = 0$$

$$\Rightarrow 11x + 10y - 21 = 0$$

$$\Rightarrow 11x + 10y = 21 \quad \dots(1)$$

$$7(2x - 1) + 9(3y - 1) = 25 \quad (\text{given})$$

$$\Rightarrow 14x - 7 + 27y - 9 = 25$$

$$\Rightarrow 14x + 27y - 16 = 25$$

$$\Rightarrow 14x + 27y = 41 \quad \dots(2)$$

Multiplying equation (1) by 27 and equation (2) by 10, we get

$$297x + 270y = 567 \quad \dots(3)$$

$$140x + 270y = 410 \quad \dots(4)$$

Subtracting equation (4) from equation (3), we get

$$157x = 157$$

$$\Rightarrow x = 1$$

Substituting $x = 1$ in equation (1), we get

$$11 \times 1 + 10y = 21$$

$$\Rightarrow 10y = 10$$

$$\Rightarrow y = 1$$

$\therefore$ Solution set is $x = 1$ and $y = 1$.

Solution 18:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

$$\frac{7+x}{5} - \frac{2x-y}{4} = 3y-5 \quad (\text{given})$$

$$\Rightarrow 4(7+x) - 5(2x-y) = 20(3y-5)$$

$$\Rightarrow 28 + 4x - 10x + 5y = 60y - 100$$

$$\Rightarrow -6x - 55y = -128 \quad \dots(1)$$

$$\frac{5y-7}{2} + \frac{4x-3}{6} = 18-5x \quad (\text{given})$$

$$\Rightarrow 3(5y-7) + 4x-3 = 6(18-5x)$$

$$\Rightarrow 15y - 21 + 4x - 3 = 108 - 30x$$

$$\Rightarrow 34x + 15y = 132 \quad \dots(2)$$

Multiplying equation (1) by 34 and equation (2) by 6, we get

$$-204x - 1870y = -4352 \quad \dots(3)$$

$$204x + 90y = 792 \quad \dots(4)$$

Adding equations (3) and (4), we get

$$-1780y = -3560$$

$$\Rightarrow y = 2$$

Substituting $y = 2$ in equation (1), we get

$$-6x - 55 \times 2 = -128$$

$$\Rightarrow -6x - 110 = -128$$

$$\Rightarrow -6x = -18$$

$$\Rightarrow x = 3$$

$\therefore$ Solution is $x = 3$ and $y = 2$

Solution 19:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

$$4x + \frac{x-y}{8} = 17 \quad (\text{given})$$

$$\Rightarrow 32x + x - y = 136$$

$$\Rightarrow 33x - y = 136 \quad \dots(1)$$

$$2y + x - \frac{5y+2}{3} = 2 \quad (\text{given})$$

$$\Rightarrow 6y + 3x - 5y - 2 = 6$$

$$\Rightarrow 3x + y = 8 \quad \dots(2)$$

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

$$36x = 144$$

$$\Rightarrow x = 4$$

Substituting $x = 4$ in equation (2), we get

$$3 \times 4 + y = 8$$

$$\Rightarrow 12 + y = 8$$

$$\Rightarrow y = -4$$

$\therefore$ Solution is $x = 4$ and $y = -4$

Exercise 6(C)

Solution 1:

Given equations are $4x + 3y = 17$ and $3x - 4y + 6 = 0$

Comparing with $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, we have

$$a_1 = 4, b_1 = 3, c_1 = -17 \quad \text{and} \quad a_2 = 3, b_2 = -4, c_2 = 6$$

$$\text{Now, } x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1} \quad \text{and} \quad y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}$$

$$\Rightarrow x = \frac{3 \times 6 - (-4) \times (-17)}{4 \times (-4) - 3 \times 3} \quad \text{and} \quad y = \frac{-17 \times 3 - 6 \times 4}{4 \times (-4) - 3 \times 3}$$

$$\Rightarrow x = \frac{18 - 68}{-16 - 9} \quad \text{and} \quad y = \frac{-51 - 24}{-16 - 9}$$

$$\Rightarrow x = \frac{-50}{-25} \quad \text{and} \quad y = \frac{-75}{-25}$$

$$\Rightarrow x = 2 \quad \text{and} \quad y = 3$$

Solution 2:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>



Given equations are $3x + 4y = 11$ and $2x + 3y = 8$

Comparing with $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, we have

$a_1 = 3, b_1 = 4, c_1 = -11$ and $a_2 = 2, b_2 = 3, c_2 = -8$

Now, $x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1}$ and $y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}$

$$\Rightarrow x = \frac{4 \times (-8) - 3 \times (-11)}{3 \times 3 - 2 \times 4} \text{ and } y = \frac{-11 \times 2 - (-8) \times 3}{3 \times 3 - 2 \times 4}$$

$$\Rightarrow x = \frac{-32 + 33}{9 - 8} \text{ and } y = \frac{-22 + 24}{9 - 8}$$

$$\Rightarrow x = 1 \text{ and } y = 2$$

Solution 3:



Solution 4:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

Given equations are $5x + 4y + 14 = 0$ and $3x = -10 - 4y$

Comparing with $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, we have

$a_1 = 5, b_1 = 4, c_1 = 14$ and $a_2 = 3, b_2 = 4, c_2 = 10$

$$\text{Now, } x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1} \quad \text{and} \quad y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}$$

$$\Rightarrow x = \frac{4 \times 10 - 4 \times 14}{5 \times 4 - 3 \times 4} \quad \text{and} \quad y = \frac{14 \times 3 - 10 \times 5}{5 \times 4 - 3 \times 4}$$

$$\Rightarrow x = \frac{40 - 56}{20 - 12} \quad \text{and} \quad y = \frac{42 - 50}{20 - 12}$$

$$\Rightarrow x = \frac{-16}{8} \quad \text{and} \quad y = \frac{-8}{8}$$

$$\Rightarrow x = -2 \quad \text{and} \quad y = -1$$

Solution 5:

Given equations are $x - y + 2 = 0$ and $7x + 9y = 130$

Comparing with $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, we have

$a_1 = 1, b_1 = -1, c_1 = 2$ and $a_2 = 7, b_2 = 9, c_2 = -130$

$$\text{Now, } x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1} \quad \text{and} \quad y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}$$

$$\Rightarrow x = \frac{-1 \times (-130) - 9 \times 2}{1 \times 9 - 7 \times (-1)} \quad \text{and} \quad y = \frac{2 \times 7 - (-130) \times 1}{1 \times 9 - 7 \times (-1)}$$

$$\Rightarrow x = \frac{130 - 18}{9 + 7} \quad \text{and} \quad y = \frac{14 + 130}{9 + 7}$$

$$\Rightarrow x = \frac{112}{16} \quad \text{and} \quad y = \frac{144}{16}$$

$$\Rightarrow x = 7 \quad \text{and} \quad y = 9$$

Solution 6:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

Given equations are $4x - y = 5$ and $5y - 4x = 7$

Comparing with $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, we have

$$a_1 = 4, b_1 = -1, c_1 = -5 \text{ and } a_2 = -4, b_2 = 5, c_2 = -7$$

$$\text{Now, } x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1} \text{ and } y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}$$

$$\Rightarrow x = \frac{-1 \times (-7) - 5 \times (-5)}{4 \times 5 - (-4) \times (-1)} \text{ and } y = \frac{(-5) \times (-4) - (-7) \times 4}{4 \times 5 - (-4) \times (-1)}$$

$$\Rightarrow x = \frac{7 + 25}{20 - 4} \text{ and } y = \frac{20 + 28}{20 - 4}$$

$$\Rightarrow x = \frac{32}{16} \text{ and } y = \frac{48}{16}$$

$$\Rightarrow x = 2 \text{ and } y = 3$$

Solution 7:

Given equations are $4x - 3y = 0$ and $2x + 3y = 18$

Comparing with $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, we have

$$a_1 = 4, b_1 = -3, c_1 = 0 \text{ and } a_2 = 2, b_2 = 3, c_2 = -18$$

$$\text{Now, } x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1} \text{ and } y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}$$

$$\Rightarrow x = \frac{-3 \times (-18) - 3 \times 0}{4 \times 3 - 2 \times (-3)} \text{ and } y = \frac{0 \times 2 - (-18) \times 4}{4 \times 3 - 2 \times (-3)}$$

$$\Rightarrow x = \frac{54 - 0}{12 + 6} \text{ and } y = \frac{0 + 72}{12 + 6}$$

$$\Rightarrow x = \frac{54}{18} \text{ and } y = \frac{72}{18}$$

$$\Rightarrow x = 3 \text{ and } y = 4$$

Solution 8:

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Solution 9:



Solution 10:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

Given equations are $4x + 6y = 15$ and $3x - 4y = 7$

Comparing with $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, we have

$a_1 = 4$, $b_1 = 6$, $c_1 = -15$ and $a_2 = 3$, $b_2 = -4$, $c_2 = -7$

$$\text{Now, } x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1} \quad \text{and} \quad y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}$$

$$\Rightarrow x = \frac{6 \times (-7) - (-4) \times (-15)}{4 \times (-4) - 3 \times 6} \quad \text{and} \quad y = \frac{-15 \times 3 - (-7) \times 4}{4 \times (-4) - 3 \times 6}$$

$$\Rightarrow x = \frac{-42 - 60}{-16 - 18} \quad \text{and} \quad y = \frac{-45 + 28}{-16 - 18}$$

$$\Rightarrow x = \frac{-102}{-34} \quad \text{and} \quad y = \frac{-17}{-34}$$

$$\Rightarrow x = 3 \quad \text{and} \quad y = \frac{1}{2}$$

Exercise 6(D)

Solution 1:

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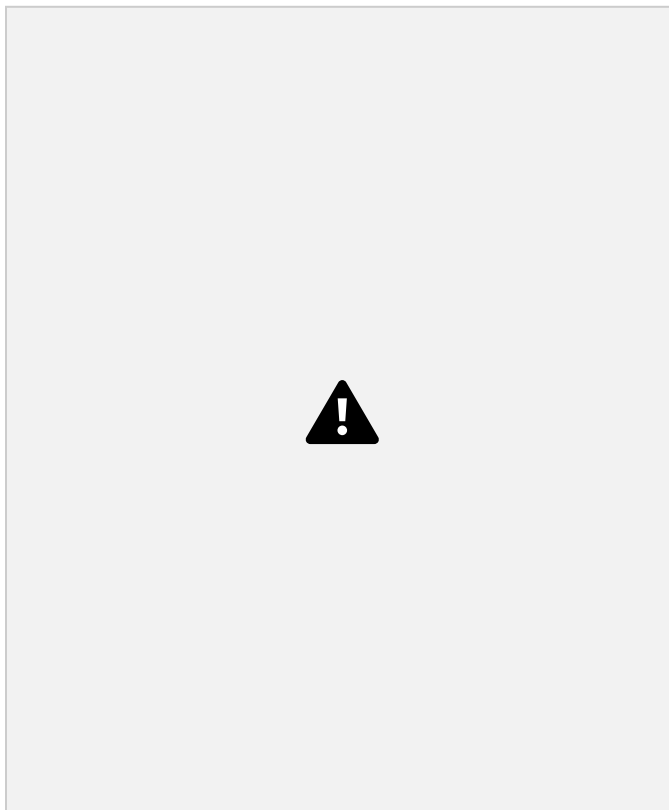
Solution 2:

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Solution 3:

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Solution 4:

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Solution 5:

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$$\frac{3}{x} - \frac{2}{y} = 0 \quad \dots(1)$$

$$\frac{2}{x} + \frac{5}{y} = 19 \quad \dots(2)$$

Multiplying equation no. (1) by 5 and (2) by 2.

$$\frac{15}{x} - \frac{10}{y} = 0 \quad \dots(3)$$

$$\frac{4}{x} + \frac{10}{y} = 38 \quad \dots(4)$$

$$\frac{19}{x} = 38 \quad \Rightarrow x = \frac{1}{2}$$

$$\text{From (1)} \quad 3\left(\frac{1}{2}\right) - \frac{2}{y} = 0 \quad \Rightarrow y = \frac{1}{3}$$

$$\therefore y = ax + 3$$

$$\frac{1}{3} = a\left(\frac{1}{2}\right) + 3$$

$$\frac{a}{2} = \frac{-8}{3} \Rightarrow a = \frac{-16}{3}$$

Solution 6:

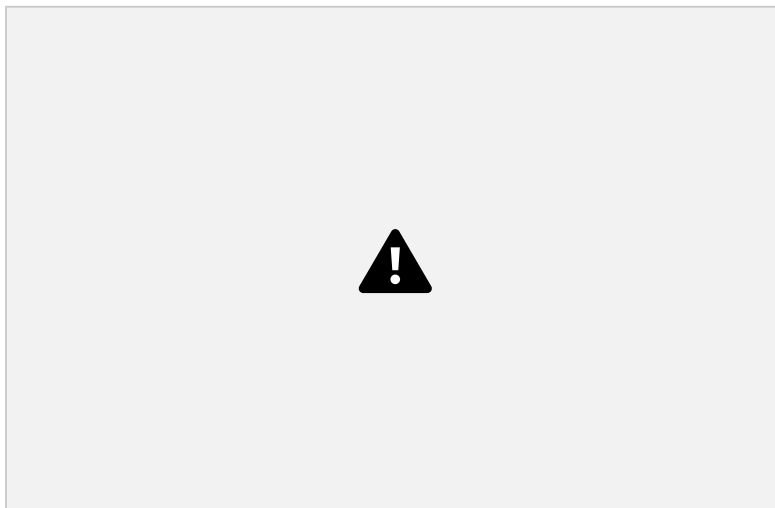
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Solution 7:

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Solution 8:

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Solution 9:

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Solution 10:

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Given equations are $\frac{3}{2x} + \frac{2}{3y} = -\frac{1}{3}$ and $\frac{3}{4x} + \frac{1}{2y} = -\frac{1}{8}$

Let $\frac{1}{x} = u$ and $\frac{1}{y} = v$

Then, the system of equations become

$$\frac{3}{2}u + \frac{2}{3}v = -\frac{1}{3} \text{ and } \frac{3}{4}u + \frac{1}{2}v = -\frac{1}{8}$$

$$\Rightarrow \frac{9u + 4v}{6} = -\frac{1}{3} \text{ and } \frac{3u + 2v}{4} = -\frac{1}{8}$$

$$\Rightarrow 27u + 12v = -6 \text{ and } 24u + 16v = -4$$

$$\Rightarrow 27u + 12v + 6 = 0 \text{ and } 24u + 16v + 4 = 0$$

$$\Rightarrow \frac{u}{12 \times 4 - 16 \times 6} = \frac{-v}{27 \times 4 - 24 \times 6} = \frac{1}{27 \times 16 - 24 \times 12}$$

$$\Rightarrow \frac{u}{48 - 96} = \frac{-v}{108 - 144} = \frac{1}{432 - 288}$$

$$\Rightarrow \frac{u}{-48} = \frac{-v}{-36} = \frac{1}{144}$$

$$\Rightarrow \frac{u}{-48} = \frac{v}{36} = \frac{1}{144}$$

$$\Rightarrow u = \frac{-48}{144} = -\frac{1}{3} \text{ and } v = \frac{36}{144} = \frac{1}{4}$$

$$\Rightarrow \frac{1}{x} = -\frac{1}{3} \text{ and } \frac{1}{y} = \frac{1}{4}$$

$$\Rightarrow x = -3 \text{ and } y = 4$$

Exercise 6(E)

Solution 1:

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Solution 2:

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Solution 3:

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Solution 4:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>



Solution 5:

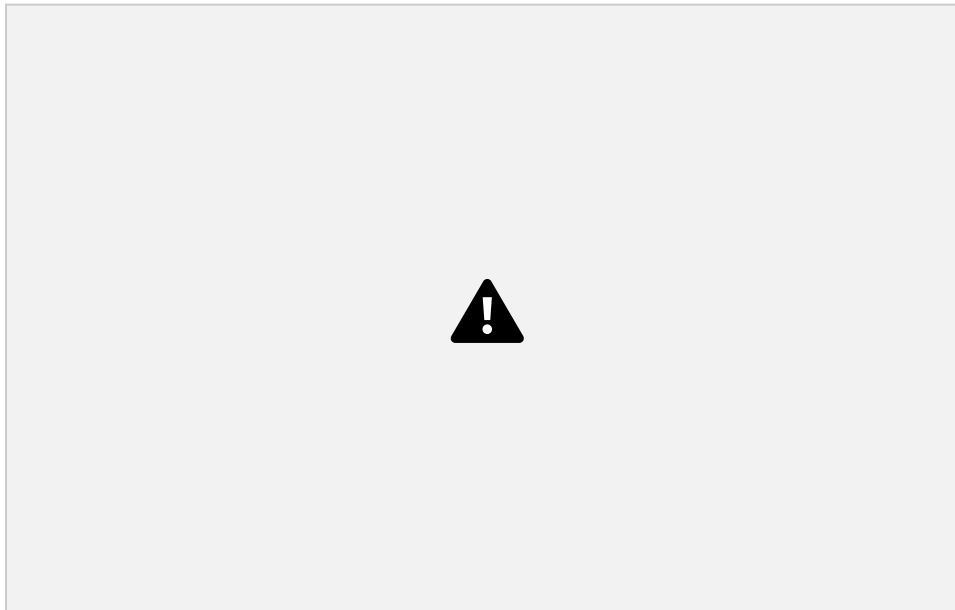


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Solution 6:



Solution 7:



Solution 8:

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Solution 9:

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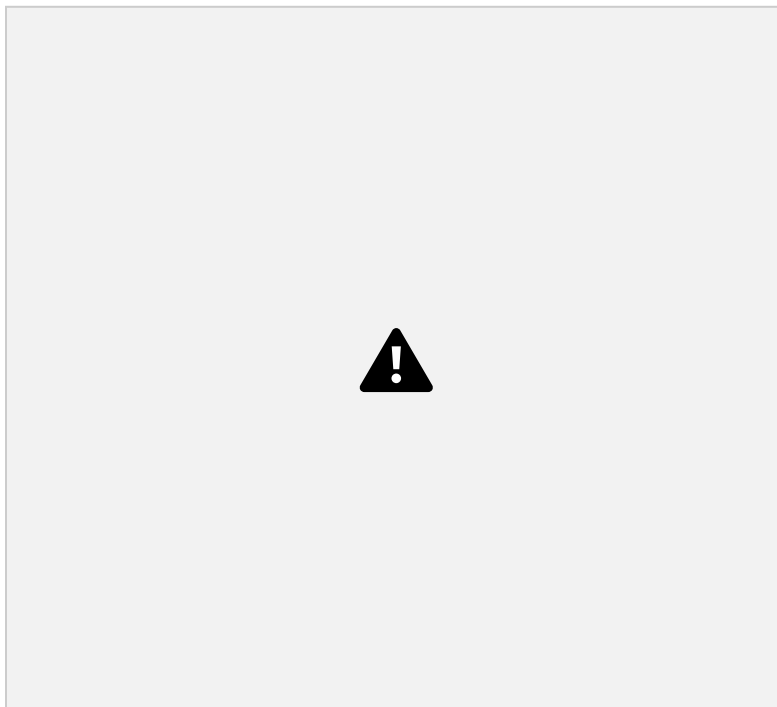
Solution 10:

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Solution 11:

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Solution 12:

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Solution 13:

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Let x be the number at the ten's place
and y be the number at the unit's place.
So, the number is $10x + y$.

Four times a certain two-digit number is seven times
the number obtained on interchanging its digits.

$$\Rightarrow 4(10x + y) = 7(10y + x)$$

$$\Rightarrow 40x + 4y = 70y + 7x$$

$$\Rightarrow 33x - 66y = 0$$

$$\Rightarrow x - 2y = 0 \dots\dots\dots(i)$$

If the difference between the digits is 4, then

$$\Rightarrow x - y = 4 \dots\dots\dots(ii)$$

Subtracting equation (i) from equation (ii), we get:

$x - y = 4$	
$x - 2y = 0$	[Equation (i)]
$- +$	[Subtracting]
$y = 4$	

Substituting $y = 4$ in equation (i), we get

$$x - 2(4) = 0$$

$$\Rightarrow x = 8$$

$\therefore$ The number is $10x + y = 10(8) + 4 = 84$.

Solution 14:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>



Solution 15:



Exercise 6(F)

Solution 1:

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Solution 2:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

**Solution 3:**

Let the present age of the mother be x years
and the present age of the daughter be y year.

According to the question,

$$x - 4 = 4(y - 4) \Rightarrow x - 4 = 4y - 16 \Rightarrow x - 4y = -12 \dots (i)$$

$$\text{and } x + 6 = 2\frac{1}{2}(y + 6) \Rightarrow x + 6 = \frac{5}{2}y + 15 \Rightarrow x - \frac{5}{2}y = 9 \dots (ii)$$

Solving (i) and (ii), we get

$$y = 14 \text{ and } x = 44$$

Hence, the present age of the mother is 44 years
and the present age of the daughter is 14 years.

Solution 4:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

Let the present age of the man be x years
and let the sum of the ages of his two children be y years.

According to the question,

$$x = 2y \dots (i)$$

and $x + 20 = y + 40 \dots (ii) \dots$ (Since he has two children)

Solving (i) and (ii), we get

$$2y + 20 = y + 40 \Rightarrow y = 20$$

$$\text{So, } x = 2y \Rightarrow x = 40$$

Hence, the present age of the man is 40 years.

Solution 5:



Solution 6:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

Let the no. of pass candidates be x
and the no. of fail candidates be y .

According to the question,

$$\frac{x}{y} = \frac{y}{1}$$

$$x - 4y = 0 \dots (1)$$

$$\text{and } \frac{x - 20}{y - 10} = \frac{5}{1}$$

$$x - 5y = -30 \dots (2)$$

$$x - 4y = 0 \quad \dots (1)$$

$$x - 5y = -30 \quad \dots (2)$$

$$\begin{array}{r} - \quad + \quad + \\ \hline y = 30 \end{array}$$

From (1)

$$-4(30) = 0$$

$$x = 120$$

$$\text{Total students appeared} = x + y$$

$$= 120 + 30$$

$$= 150$$

Solution 7:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

Let the number of pencils with A = x
and the number of pencils with B = y.

If A gives 10 pencils to B,

$$y + 10 = 2(x - 10)$$

$$2x - y = 30 \dots (1)$$

If B gives 10 pencils to A

$$y - 10 = x + 10$$

$$x - y = -20 \dots (2)$$

$$2x - y = 30 \dots (1)$$

$$\begin{array}{r} - \quad + \quad - \\ \hline -x = -50 \end{array}$$

$$x = 50$$

From (1)

$$2(50) - y = 30$$

$$y = 70$$

Thus, A has 50 pencils and B has 70 pencils.

Solution 8:

Let the number of adults = x

and the number of children = y

According to the question,

$$x + y = 1250 \dots (1)$$

$$\text{and } 75x + 25y = 61250$$

$$3x + y = 2450 \dots (2)$$

$$x + y = 1250 \dots (1)$$

$$\begin{array}{r} - \quad - \quad - \\ \hline 2x = 1200 \end{array}$$

$$x = 600$$

From (1)

$$600 + y = 1250$$

$$y = 650$$

Thus, number of adults = 600

and the number of children = 650.

Solution 9:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

Let the cost price of article A = Rs. x
and the cost price of articles B = Rs. y

According to the question,

$$(x + 5\% \text{ of } x) + (y + 7\% \text{ of } y) = 1167$$

$$\left(x + \frac{5}{100}x\right) + \left(y + \frac{7}{100}y\right) = 1167$$

$$\frac{21x}{20} + \frac{107y}{100} = 1167$$

$$105x + 107y = 116700 \dots (1)$$

$$\text{and } \frac{107x}{100} + \frac{105y}{100} = 1165$$

$$107x + 105y = 116500 \dots (2)$$

Adding (1) and (2)

$$212x + 212y = 233200$$

$$x + y = 1100 \dots (3)$$

subtracting (2) from (1)

$$-2x + 2y = 200$$

$$-x + y = 100 \quad \dots (4)$$

$$\frac{x + y = 1100 \quad \dots (3)}{2y = 1200}$$

$$y = 600$$

from (3)

$$x + 600 = 1100$$

$$x = 500$$

Thus, cost price of article A is Rs. 500.

and that of article B is Rs. 600.

Solution 10:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

Let Pooja's 1 day work = $\frac{1}{x}$

and Ritu's 1 day work = $\frac{1}{y}$

According to the question,

$$\frac{1}{x} + \frac{1}{y} = \frac{7}{120} \quad \dots (1)$$

$$\text{and, } \frac{1}{x} = \frac{3}{4} \cdot \frac{1}{y}$$

$$y = \frac{3}{4}x \quad \dots (2)$$

Using the value of y from (2) in (1)

$$\frac{1}{x} + \frac{4}{3x} = \frac{7}{120}$$

$$\frac{1}{x} \left(\frac{7}{3} \right) = \frac{7}{120}$$

$$x = 40$$

$$\text{From (2) } y = \frac{3}{4}(40) = 30$$

$$y = 30$$

Pooja will complete the work in 40 days and Ritu will complete the work in 30 days.

Exercise 6(G)

Solution 1:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

Let Rohit has Rs. x
and Ajay has Rs. y
When Ajay gives Rs. 100 to Rohit

$$x + 100 = 2(y - 100)$$

$$x - 2y = -300 \dots (1)$$

When Rohit gives Rs. 10 to Ajay

$$6(x - 10) = y + 10$$

$$6x - y = 70 \dots (2)$$

Multiplying equation no. (2) By 2.

$$12x - 2y = 140 \quad \dots (3)$$

$$x - 2y = -300$$

$$\begin{array}{r} - \quad + \quad + \\ \hline 11x = 440 \end{array}$$

$$x = 40$$

From (1)

$$40 - 2y = -300$$

$$\Rightarrow -2y = -340$$

$$\Rightarrow y = 170$$

Thus, Rohit has Rs. 40
and Ajay has Rs. 170

Solution 2:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

Let the digits in the tens place be x and the digit in the units place be y .

$$\therefore \text{Number} = 10x + y$$

$$\text{Number on reversing the digits} = 10y + x$$

$$\text{The difference between the digits} = x - y \text{ or } y - x$$

$$\text{Given : } (10x + y) + (10y + x) = 99$$

$$\Rightarrow 11x + 11y = 99$$

$$\Rightarrow x + y = 9 \dots\dots (i)$$

$$x - y = 3 \dots\dots (ii)$$

$$\text{or } y - x = 3 \dots\dots (iii)$$

On solving equations (i) and (ii), we get

$$2x = 12 \Rightarrow x = 6$$

$$\text{So, } y = 3$$

On solving equations (i) and (iii), we get

$$2y = 12 \Rightarrow y = 6$$

$$\text{So, } x = 3$$

$$\text{Number} = 10x + y = 10(6) + 3 = 63$$

$$\text{or Number} = 10x + y = 10(3) + 6 = 36$$

$$\therefore \text{Required number} = 63 \text{ or } 36.$$

Solution 3:

<https://www.indcareer.com/schools/selina-class-9-icse-solutions-mathematics-chapter-6-simultaneous-linear-equations-including-problems/>

3 Let the digit at ten's place be x
 And the digit at unit's place be y
 Required number = $10x + y$
 When the digits are interchanged,
 Reversed number = $10y + x$
 According to the question,
 $7(10x + y) = 4(10y + x)$
 $66x = 33y$
 $2x - y = 0 \dots (1)$
 Also,

$$\begin{array}{rcl} y - x = 3 & \dots (2) \\ -y + 2x = 0 & \dots (1) \\ \hline x = 3 \end{array}$$

From (1) $2(3) - y = 0$
 $y = 6$
 Thus, Required number = $10(3) + 6 = 36$

Solution 4:

Let, the fare of ticket for station A be Rs. x
 and the fare of ticket for station B be Rs. y
 According, to the question
 $2x + 3y = 77 \dots (1)$
 and $3x + 5y = 124 \dots (2)$
 Multiplying equation no. (1) by 3 and (2) by 2.

$$\begin{array}{rcl} 6x + 9y = 231 & \dots (1) \\ 6x + 10y = 248 & \dots (4) \\ \hline -y = -17 \end{array}$$

$y = 17$
 From (1) $2x + 3(17) = 77$
 $2x = 77 - 51$
 $2x = 26$
 $x = 13$
 Thus, fare for station A = Rs. 13
 and, fare for station B = Rs. 17.

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Solution 5:

Let x be the number at the ten's place
and y be the number at the unit's place.
So the number is $10x + y$.

The sum of digit of a two digit number is 11.
 $\Rightarrow x + y = 11 \dots\dots\dots(i)$

If the digit at ten's place is increased by 5
and the digit at unit place is decreased by 5,
the digits of the number are found to be reversed.

$$\begin{aligned}\Rightarrow 10(x + 5) + (y - 5) &= 10y + x \\ \Rightarrow 9x - 9y &= -45 \\ \Rightarrow x - y &= -5 \dots\dots\dots(ii)\end{aligned}$$

Subtracting equation (i) from equation (ii), we get:

$$\begin{array}{rcl}x - y &= & -5 \\ x + y &= & 11 \quad \text{[Equation (i)]} \\ \hline -2y &= & -16 \quad \text{[Subtracting]} \\ \Rightarrow y &= & 8\end{array}$$

Substituting $y = 8$ in equation (i), we get
 $x + 8 = 11$
 $\Rightarrow x = 3$

$\therefore$ The number is $10x + y = 10(3) + 8 = 38$.

Solution 6:

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Let the quantity of 90% acid solution be x litres and

The quantity of 97% acid solution be y litres

According to the question,

$$x + y = 21 \dots (1)$$

and 90% of x + 97% of y = 95% of 21

$$90x + 97y = 1995 \dots (2)$$

Multiplying equation no. (1) by 90, we get,

$$90x + 90y = 1890 \quad \dots (3)$$

$$90x + 97y = 1995 \quad \dots (2)$$

$$\begin{array}{r} - \quad - \quad + \\ \hline -7y = -105 \end{array}$$

$$y = 15$$

$$\text{From (1)} \quad x + 15 = 21$$

$$x = 6$$

Hence, 90% acid solution is 6 litres and 97% acid solution is 15 litres.

Solution 7:

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Assume x kg of the first kind costing Rs. 250 per kg and y kg of the second kind costing Rs. 350 per kg sweets were bought.

It is estimated that 40 kg of sweets were needed.

$$\Rightarrow x + y = 40 \dots\dots\dots(i)$$

The total budget for the sweets was Rs. 11,800.

$$\Rightarrow 250x + 350y = 11,800 \dots\dots\dots(ii)$$

Multiply equation (i) by 250, we get:

$$\begin{array}{rcl} 250x + 250y & = & 10000 \\ 250x + 350y & = & 11,800 \quad \text{[Equation (ii)]} \\ - & - & - \quad \text{[Subtracting]} \\ \hline & -100y & = -1800 \end{array}$$

$$\Rightarrow y = 18$$

Substituting $y = 18$ in equation (i), we get

$$x + 18 = 40$$

$$\Rightarrow x = 22$$

$\therefore$ 22 kgs of the first kind costing Rs. 250 per kg and 18 kgs of the second kind costing Rs. 350 per kg sweets were bought.

Solution 8:

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Weight of Mr. Ahuja = x kg
and weight of Mrs. Ahuja = y kg.

After the dieting,

$$x - 5 = y$$

$$x - y = 5 \dots (1)$$

$$\text{and, } y - 4 = \frac{7}{8}x$$

$$7x - 8y = -32 \dots (2)$$

Multiplying equation no. (1) by 7, we get

$$7x - 7y = 35 \dots (3)$$

Now subtracting (2) from (3)

$$7x - 7y = 35 \dots (3)$$

$$7x - 8y = -32 \dots (2)$$

$$\begin{array}{r} - \quad + \quad + \\ \hline y = 67 \end{array}$$

From (1)

$$x - 67 = 5 \Rightarrow x = 72$$

Thus, weight of Mr. Ahuja = 72 kg.

and that of Mr. Anuja = 67 kg.

Solution 9:

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Let x be the constant expense per month of the family,
and y be the expense per month for a single member of the family.

For a family of 4 people,
the total monthly expense is Rs. 10,400.
 $\Rightarrow x + 4y = 10,400$(i)

For a family of 7 people,
the total monthly expense is Rs. 15,800.
 $\Rightarrow x + 7y = 15,800$(ii)

Subtracting equation (i) from equation (ii), we get:

$$\begin{array}{rcl} x + 7y & = & 15800 \\ x + 4y & = & 10400 \quad \text{[Equation (i)]} \\ \hline - & - & - \\ 3y & = & 5400 \quad \text{[Subtracting]} \\ \Rightarrow y & = & 1800 \end{array}$$

Substituting $y = 1800$ in equation (i), we get
 $x + 4(1800) = 10,400$
 $\Rightarrow x = 3200$

$\therefore$ The constant expense is Rs. 3,200 per month and
the monthly expense of each member of a family is Rs. 1,800.

Solution 10:

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Let the fixed charge be Rs. x and the charge per kilometer be Rs. y .

The charges for 10 km = Rs. $10y$

The charges for 15 km = Rs. $15y$

According to the question,

$$x + 10y = 315 \dots (i)$$

$$x + 15y = 465 \dots (ii)$$

Solving the equations, we get

$$-5y = -150 \Rightarrow y = 30$$

$$\text{and } x = 315 - 10y = 315 - 10(30) = 15$$

So, the fixed charges is Rs. 15 and the charges per kilometer is Rs. 30.

To travel 32 km, a person has to pay

$$\text{Rs. } 15 + \text{Rs. } 30(32) = \text{Rs. } 15 + \text{Rs. } 960 = \text{Rs. } 975$$

Solution 11:

Let the fixed charges be Rs. x and the charge for each extra day be Rs. y .

According to the question,

$$x + 4y = 27 \dots (i)$$

$$\text{and } x + 2y = 21 \dots (ii)$$

Solving the equations, we get

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

$$\text{and } x = 21 - 2y = 21 - 2(3) = 15$$

Hence, the fixed charges is Rs. 15 and the charge for each extra day is Rs. 3.

Solution 12:

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Let the length of the rectangle be x units and the breadth of the rectangle be y units.

We know that, area of a rectangle = length $\times$ breadth = xy

According to the question,

$$xy - 9 = (x - 5)(y + 3)$$

$$\Rightarrow xy - 9 = xy + 3x - 5y - 15$$

$$\Rightarrow 3x - 5y = 6 \dots\dots (i)$$

$$xy + 67 = (x + 3)(y + 2)$$

$$\Rightarrow xy + 67 = xy + 2x + 3y + 6$$

$$\Rightarrow 2x + 3y = 61 \dots\dots (ii)$$

Multiply (i) by 2 and (ii) by 3, we get

$$6x - 10y = 12 \dots\dots (iii)$$

$$\text{and } 6x + 9y = 183 \dots\dots (iv)$$

Solving (iii) and (iv), we get

$$-19y = -171 \Rightarrow y = 9$$

$$\text{and } x = 17$$

Hence, the length of the rectangle is 17 units and the breadth of the rectangle is 9 units.

Solution 13:

Let the pipe with larger diameter and smaller diameter be pipes A and B respectively.

Also, let pipe A work at a rate of x hours / unit and pipe B work at a rate of y hours / unit.

According to the question,

$$x + y = \frac{1}{12} \Rightarrow 12x + 12y = 1 \dots\dots (i)$$

$$\text{and } 4x + 9y = \frac{1}{2} \Rightarrow 8x + 18y = 1 \dots\dots (ii)$$

Multiply (i) by 2 and (ii) by 3, we get

$$24x + 24y = 2 \text{ and } 24x + 54y = 3$$

$$\text{On solving we get, } 30y = 1 \Rightarrow y = \frac{1}{30}$$

$$\text{and } x = \frac{1}{20}$$

Hence, the pipe with larger diameter will take 20 hours to fill the swimming pool

and the pipe with smaller diameter will take 30 hours to fill the swimming pool.



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