

## Solve the following equations (1 to 12):

Question 1.

$$(i) 5x - 3 = 3x - 5$$

$$(ii) 3x - 7 = 3(5 - x)$$

Solution:

$$(i) 5x - 3 = 3x - 5$$

$$\Rightarrow 5x - 3x = -5 + 3$$

$$\Rightarrow 2x = -2$$

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

$$(ii) 3x - 7 = 3(5 - x)$$

$$\Rightarrow 3x - 7 = 15 - 3x$$

$$\Rightarrow 3x + 3x = 15 + 7$$

$$\Rightarrow 6x = 22$$

$$\Rightarrow x = \frac{22}{6} = \frac{11}{3}$$

Question 2.

$$(i) 4(2x + 1) = 3(x - 1) + 7$$

$$(ii) 3(2p - 1) = 5 - (3p - 2)$$

Solution:

$$(i) 4(2x + 1) = 3(x - 1) + 7$$

$$\Rightarrow 8x + 4 = 3x - 3 + 7$$

$$\Rightarrow 8x + 4 = 3x + 4$$

$$\Rightarrow 8x - 3x = 0$$

$$\Rightarrow x = 0$$

$$(ii) 3(2p - 1) = 5 - (3p - 2)$$

$$\Rightarrow 6p - 3 = 5 - 3p + 2$$

$$\Rightarrow 6p + 3p = 5 + 3 + 2$$

$$\Rightarrow 9p = 10$$

$$\Rightarrow p = \frac{10}{9} = 1\frac{1}{9}$$

Question 3.

$$(i) 5y - 2[y - 3(y - 5)] = 6$$

$$(ii) 0.3(6 - x) = 0.4(x + 8)$$

Solution:

$$(i) 5y - 2[y - 3(y - 5)] = 6$$

$$\Rightarrow 5y - 2[y - 3y + 15] = 6$$

$$\Rightarrow 5y - 2[-2y + 15] = 6$$

$$\Rightarrow 5y + 4y - 30 = 6$$

$$\Rightarrow 9y = 6 + 30$$

$$\Rightarrow 9y = 36$$

$$\Rightarrow y = \frac{36}{9}$$

$$\Rightarrow y = 4$$

$$(ii) 0.3(6 - x) = 0.4(x + 8)$$

$$\Rightarrow 1.8 - 0.3x = 0.4x + 3.2$$

$$\Rightarrow 0.3x - 0.4x = 3.2 - 1.8$$

$$\Rightarrow -0.7x = 1.4$$

$$\Rightarrow x = \frac{-1.4}{0.7}$$

$$\Rightarrow x = \frac{-14}{7}$$

$$\Rightarrow x = -2$$

Question 4.

$$(i) \frac{x-1}{3} = \frac{x+2}{6} + 3$$

$$(ii) \frac{x+7}{3} = 1 + \frac{3x-2}{5}$$

Solution:

$$(i) \frac{x-1}{3} = \frac{x+2}{6} + 3$$

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

$$\Rightarrow \frac{2(x-1) - 1(x+2)}{6} = 3$$

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

$$\Rightarrow \frac{x-4}{6} = 3$$

$$\Rightarrow x - 4 = 6 \times 3$$

$$\Rightarrow x - 4 = 18$$

$$\Rightarrow x = 18 + 4$$

$$\Rightarrow x = 22$$

$$(ii) \frac{x+7}{3} = 1 + \frac{3x-2}{5}$$

$$\Rightarrow \frac{x+7}{3} - \frac{3x-2}{5} = 1$$

$$\Rightarrow \frac{5 \times (x+7) - 3(3x-2)}{15} = 1$$

$$\Rightarrow \frac{(5x+35)-(9x-6)}{15} = 1$$

$$\Rightarrow \frac{-4x+41}{15} = 1$$

$$\Rightarrow -4x + 41 = 15$$

$$\Rightarrow -4x = 15 - 41$$

$$\Rightarrow -4x = -26$$

$$\Rightarrow x = \frac{-26}{-4}$$

$$\Rightarrow x = \frac{13}{2}$$

$$\Rightarrow x = 6\frac{1}{2}$$

Question 5.

$$(i) \frac{y+1}{3} - \frac{y-1}{2} = \frac{1+2y}{3}$$

$$(ii) \frac{p}{3} + \frac{p}{4} = 55 - \frac{p+40}{5}$$

Solution:

$$(i) \frac{y+1}{3} - \frac{y-1}{2} = \frac{1+2y}{3}$$

$$\Rightarrow \frac{2 \times (y+1) - 3 \times (y-1)}{6} = \frac{1+2y}{3}$$

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

$$\Rightarrow \frac{-y+5}{6} = \frac{1+2y}{3}$$

$$\Rightarrow 3(-y+5) = 6(1+2y)$$

$$\Rightarrow -3y + 15 = 6 + 12y$$

$$\Rightarrow -3y - 12y = 6 - 15$$

$$\Rightarrow -15y = -9$$

$$\Rightarrow y = \frac{-9}{-15}$$

$$\Rightarrow y = \frac{3}{5}$$

$$(ii) \frac{p}{3} + \frac{p}{4} = 55 - \frac{p+40}{5}$$

$$\Rightarrow \frac{p}{3} + \frac{p}{4} + \frac{p+40}{5} = 55$$

$$\Rightarrow \frac{20p + 15p + 12(p+40)}{60} = 55$$

$$\Rightarrow \frac{20p + 15p + 12p + 480}{60} = 55$$

$$\Rightarrow \frac{47p + 480}{60} = 55$$

$$\Rightarrow 47p + 480 = 55 \times 60$$

$$\Rightarrow 47p + 480 = 3300$$

$$\Rightarrow 47p = 3300 - 480$$

$$\Rightarrow 47p = 2820$$

$$\Rightarrow p = \frac{2820}{47}$$

$$\Rightarrow p = 60$$

Question 6.

$$(i) n - \frac{n-1}{2} = 1 - \frac{n-2}{3}$$

$$(ii) \frac{3t-2}{3} + \frac{2t+3}{2} = t + \frac{7}{6}$$

Solution:

$$(i) n - \frac{n-1}{2} = 1 - \frac{n-2}{3}$$

$$\Rightarrow \frac{2n-n+1}{2} = \frac{3-n+2}{3}$$

$$\Rightarrow 3(n+1) = 2(5-n)$$

$$\Rightarrow 3n + 3 = 10 - 2n$$

$$\Rightarrow 3n + 2n = 10 - 3$$

$$\Rightarrow 5n = 7 \Rightarrow n = \frac{7}{5} = 1\frac{2}{5}$$

$$(ii) \frac{3t-2}{3} + \frac{2t+3}{2} = t + \frac{7}{6}$$

$$\Rightarrow \frac{2(3t-2) + 3(2t+3)}{6} = \frac{6t+7}{6}$$

$$\Rightarrow (6t-4) + (6t+9) = 6t+7$$

$$\Rightarrow 12t + 5 = 6t + 7$$

$$\Rightarrow 12t - 6t = 7 - 5$$

$$\Rightarrow 6t = 2 \Rightarrow t = \frac{2}{6} = \frac{1}{3}$$

Question 7.

$$(i) 4(3x+2) - 5(6x-1) = 2(x-8) - 6(7x-4)$$

$$(ii) 3(5x+7) + 5(2x-11) = 3(8x-5) - 15$$

Solution:

$$\begin{aligned}(i) \quad & 4(3x + 2) - 5(6x - 1) = 2(x - 8) - 6(7x - 4) \\ \Rightarrow & 12x + 8 - 30x + 5 = 2x - 16 - 42x + 24 \\ \Rightarrow & -18x + 13 = -40x + 8 \\ \Rightarrow & -18x + 40x = 8 - 13 \\ \Rightarrow & 22x = -5 \Rightarrow x = \frac{-5}{22}\end{aligned}$$

$$\begin{aligned}(ii) \quad & 3(5x + 7) + 5(2x - 11) = 3(8x - 5) - 15 \\ \Rightarrow & 15x + 21 + 10x - 55 = 24x - 15 - 15 \\ \Rightarrow & 25x - 34 = 24x - 30 \\ \Rightarrow & 25x - 24x = -30 + 34 \\ \Rightarrow & x = 4\end{aligned}$$

Question 8.

$$(i) \frac{3-2x}{2x+5} = -\frac{3}{11}$$

$$(ii) \frac{5p+2}{8-2p} = \frac{7}{6}$$

Solution:

$$\begin{aligned}(i) \quad & \frac{3-2x}{2x+5} = -\frac{3}{11} \\ \Rightarrow & 11(3 - 2x) = -3(2x + 5) \\ \Rightarrow & 33 - 22x = -6x - 15 \\ \Rightarrow & -22x + 6x = -15 - 33 \\ \Rightarrow & -16x = -48 \\ \Rightarrow & x = \frac{48}{16} = 3\end{aligned}$$

$$(ii) \frac{5p+2}{8-2p} = \frac{7}{6}$$

$$\Rightarrow 6(5p + 2) = 7(8 - 2)p$$

$$\Rightarrow 30p + 12 = 56 - 14p$$

$$\Rightarrow 30p + 14p = 56 - 12$$

$$\Rightarrow 44p = 44$$

$$\Rightarrow p = \frac{44}{44} = 1$$

Question 9.

$$(i) \frac{5}{x} = \frac{7}{x-4}$$

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

Solution:

$$(i) \frac{5}{x} = \frac{7}{x-4}$$

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

$$\Rightarrow 5x - 20 = 7x$$

$$\Rightarrow 5x - 7x = 20$$

$$\Rightarrow -2x = 20$$

$$\Rightarrow x = \frac{20}{-2}$$

$$\Rightarrow x = \frac{-20}{2}$$

$$\Rightarrow x = -10$$

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

$$\Rightarrow 4(x+4) = 5(2x+3)$$

$$\Rightarrow 4x + 16 = 10x + 15$$

$$\Rightarrow -6x = -1$$

$$\Rightarrow x = \frac{-1}{-6} = \frac{1}{6}$$

Question 10.

$$(i) \frac{2x+5}{2} - \frac{5x}{x-1} = x$$

$$(ii) \frac{1}{5} \left( \frac{1}{3x} - 5 \right) = \frac{1}{3} \left( 3 - \frac{1}{x} \right)$$

Solution:

$$(i) \frac{2x+5}{2} - \frac{5x}{x-1} = x$$

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

$$\Rightarrow \frac{2x(x-1) + 5(x-1) - 10x}{2x-2} = x$$

$$\Rightarrow \frac{2x^2 - 2x + 5x - 5 - 10x}{2x-2} = x$$

$$\Rightarrow \frac{2x^2 - 7x - 5}{2x-2} = x$$

$$\Rightarrow 2x^2 - 7x - 5 = x(2x-2)$$

$$\Rightarrow 2x^2 - 7x - 5 = 2x^2 - 2x$$

$$\Rightarrow -7x - 5 = -2x$$

$$\Rightarrow -7x + 2x = 5$$

$$\Rightarrow -5x = 5$$

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

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

$$\Rightarrow x = -1$$

$$(ii) \frac{1}{5} \left( \frac{1}{3x} - 5 \right) = \frac{1}{3} \left( 3 - \frac{1}{x} \right)$$

$$\Rightarrow \frac{1}{5} \left( \frac{1 - 5(3x)}{3x} \right) = \frac{1}{3} \left( \frac{3x - 1}{x} \right)$$

$$\Rightarrow \frac{1 - 15x}{15x} = \frac{3x - 1}{3x}$$

$$\Rightarrow 3x(1 - 15x) = 15x(3x - 1)$$

$$\Rightarrow 3(1 - 15x) = 15(3x - 1)$$

$$\Rightarrow 3 - 45x = 45x - 15$$

$$\Rightarrow -45x - 45x = -15 - 3$$

$$\Rightarrow -90x = -18$$

$$\Rightarrow x = \frac{-18}{-90} \Rightarrow x = \frac{1}{5}$$

Question 11.

$$(i) \frac{2x-3}{2x-1} = \frac{3x-1}{3x+1}$$

$$(ii) \frac{2y+3}{3y+2} = \frac{4y+5}{6y+7}$$

Solution:

$$(i) \frac{2x-3}{2x-1} = \frac{3x-1}{3x+1}$$

$$\begin{aligned}
 &\Rightarrow (2x - 3)(3x + 1) = (3x - 1)(2x - 1) \\
 &\Rightarrow 6x^2 + 2x - 9x - 3 = 6x^2 - 3x - 2x + 1 \\
 &\Rightarrow 6x^2 - 7x - 3 = 6x^2 - 5x + 1 \\
 &\Rightarrow 6x^2 - 7x - 6x^2 + 5x = 1 + 3 \\
 &\Rightarrow -2x = 4 \Rightarrow x = \frac{4}{-2} = -2
 \end{aligned}$$

$$\begin{aligned}
 &(\text{ii}) \frac{2y+3}{3y+2} = \frac{4y+5}{6y+7} \\
 &\Rightarrow (2y + 3)(6y + 7) = (4y + 5)(3y + 2) \\
 &\Rightarrow 12y^2 + 14y + 18y + 21 = 12y^2 + 8y + 15y + 10 \\
 &\Rightarrow 32y + 21 = 23y + 10 \\
 &\Rightarrow 32y - 23y = 10 - 21 \\
 &\Rightarrow 9y = -11 \Rightarrow y = \frac{-11}{9}
 \end{aligned}$$

Question 12.

If  $x = p + 1$ , find the value of  $p$  from the equation  $\frac{1}{2}(5x - 30) - \frac{1}{3}(1 + 7p) = \frac{1}{4}$

Solution:

Given  $x = p + 1 \dots (\text{i})$

Also  $\frac{1}{2}(5x - 30) - \frac{1}{3}(1 + 7p) = \frac{1}{4} \dots (\text{ii})$

Putting the value of  $x$  from (i) in (ii), we get,

$$\frac{1}{2}[5(p + 1) - 30] - \frac{1}{3}[1 + 7p] = \frac{1}{4}$$

$$\Rightarrow \frac{1}{2}[5p + 5 - 30] - \frac{1}{3}[1 + 7p] = \frac{1}{4}$$

$$\Rightarrow \frac{1}{2}[5p - 25] - \frac{1}{3}[1 + 7p] = \frac{1}{4}$$

$$\Rightarrow \frac{5p - 25}{2} - \frac{1 + 7p}{3} = \frac{1}{4}$$

$$\Rightarrow \frac{3(5p - 25) - 2(1 + 7p)}{6} = \frac{1}{4}$$

$$\Rightarrow \frac{15p - 75 - 2 - 14p}{6} = \frac{1}{4}$$

$$\Rightarrow \frac{p - 77}{6} = \frac{1}{4}$$

$$\Rightarrow 4 \times (p - 77) = 1 \times 6$$

$$\Rightarrow 4p - 308 = 6$$

$$\Rightarrow 4p = 6 + 308$$

$$\Rightarrow 4p = 314$$

$$\Rightarrow p = \frac{314}{4}$$

$$\Rightarrow p = \frac{157}{2}$$

$$\Rightarrow p = 78\frac{1}{2}$$

Question 13.

Solve  $\frac{x+3}{3} - \frac{x-2}{2} = 1$ , Hence find p if  $\frac{1}{x} + p = 1$ .

Solution:

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

$$\Rightarrow \frac{2(x+3) - 3(x-2)}{6} = 1$$

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

$$\Rightarrow \frac{-x+12}{6} = 1$$

$$\Rightarrow -x+12 = 1 \times 6$$

$$\Rightarrow -x+12 = 6$$

$$\Rightarrow -x = 6 - 12$$

$$\Rightarrow -x = -6$$

$$\Rightarrow x = 6$$

Also  $\frac{1}{x} + p = 1$