

## Exercise 9.2

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Solve each of the following equations and also check your result in each case.

Q.1  $\frac{2x+5}{3} = \frac{3x-10}{1}$

Solve By Cross Multiplying

$$\Rightarrow 2x+5 = 3(3x-10)$$

$$\Rightarrow 2x+5 = 9x-30$$

$$\Rightarrow 2x-9x = -30-5$$

$$\Rightarrow -7x = -35$$

$$\Rightarrow x = \frac{-35}{-7}$$

$$\Rightarrow x = 5$$

Q.2  $\frac{a-8}{3} = \frac{a-3}{2}$

Sol By Cross Multiplying

$$2(a-8) = 3(a-3)$$

$$\Rightarrow 2a-16 = 3a-9$$

$$\Rightarrow 2a-3a = -9+16$$

$$\Rightarrow -a = 7$$

$$\Rightarrow a = -7$$

Q.3  $\frac{7y+2}{5} = \frac{6y-5}{11}$

Solution: we have  $\frac{7y+2}{5} = \frac{6y-5}{11}$

$$\Rightarrow 11(7y+2) = 5(6y-5) \quad \text{By Cross Multiplying}$$

$$\Rightarrow 77y + 22 = 30y - 25$$

$$\Rightarrow 77y - 30y = -25 - 22$$

$$\Rightarrow 47y = -47$$

$$\Rightarrow y = \frac{-47}{47}$$

$$\Rightarrow y = -1$$

Q.4  $x - 2x + 2 - \frac{16}{3}x + 5 = 3 - \frac{7}{2}x$

Solution: we have

$$x - 2x + 2 - \frac{16}{3}x + 5 = 3 - \frac{7}{2}x$$

$$\Rightarrow x - 2x - \frac{16}{3}x + \frac{7}{2}x = 3 - 2 - 5$$

$$\Rightarrow \frac{6x - 12x - 32x + 21x}{6} = 3 - 7$$

$$= \frac{-7x}{6} = -4$$

$$\Rightarrow -7x = -24$$

$$\Rightarrow x = \frac{24}{7}$$

Q.5  $\frac{1}{2}x + 7x - 6 = 7x + \frac{1}{4}$

Sol:

Transposing  $7x$  to LHS,  $-6$  to RHS.

$$\frac{1}{2}x + 7x - 7x = 6 + \frac{1}{4}$$

$$\Rightarrow \frac{1}{2}x = \frac{24+1}{4}$$

$$\Rightarrow \frac{x}{2} = \frac{25}{4} \Rightarrow 4x = 50$$

$$x = \frac{50}{4} = \frac{25}{2}$$

Q.6  $\frac{3}{4}x + 4x = \frac{7}{8} + 6x - 6$

Transposing  $6x$  to LHS

Sol:  $\frac{3}{4}x + 4x - 6x = \frac{7}{8} - 6$

$$\Rightarrow \frac{3}{4}x - 2x = \frac{7-48}{8}$$

$$\Rightarrow \frac{3x - 8x}{4} = -\frac{41}{8}$$

$$\Rightarrow -\frac{5x}{4} = -\frac{41}{8}$$

$$\Rightarrow -40x = -164$$

$$x = \frac{-164}{-40}$$

$$x = \frac{41}{10}$$

Q.7  $\frac{7}{2}x - \frac{5}{2}x = \frac{20}{3}x + 10$

Solution

Transposing  $\frac{20}{3}x$  to LHS

$$\Rightarrow \frac{7}{2}x - \frac{5}{2}x + \frac{20}{3}x = 10$$

$$\Rightarrow \frac{21x - 15x + 40x}{6} = \frac{10}{1}$$

$$= \frac{46x}{6} = \frac{10}{1}$$

$$\Rightarrow 46x = 60$$

$$x = \frac{60}{46} = \frac{30}{23}$$

Q.8  $\frac{6x+1}{2} + 1 = \frac{7x-3}{3}$

Sol: Transposing  $\frac{7x-3}{3}$  to LHS and 1 to RHS

$$\Rightarrow \frac{6x+1}{2} - \frac{7x-3}{3} = -1$$

$$\Rightarrow \frac{3(6x+1) - 2(7x-3)}{6} = -1$$

$$\Rightarrow \frac{18x+3-14x+6}{6} = -1$$

$$\Rightarrow \frac{4x+9}{6} = -1$$

$$\Rightarrow 4x+9 = -6$$

$$\Rightarrow 4x = -9-6$$

$$\Rightarrow x = \frac{-15}{4}$$

Q.9  $\frac{3a-2}{3} + \frac{2a+3}{2} = a + \frac{7}{6}$

Sol: we have

$$\frac{3a-2}{3} + \frac{2a+3}{2} = a + \frac{7}{6}$$

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

$$\Rightarrow \frac{6a-4+6a+9}{6} = \frac{6a+7}{6}$$

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

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

$$\Rightarrow 6a = 2$$

$$\Rightarrow a = \frac{2}{6}$$

$$\Rightarrow a = \frac{1}{3}$$

Q.10  $x - \frac{(x-1)}{2} = 1 - \frac{(x-2)}{3}$

Solution:

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

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

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

$$\Rightarrow 3(x+1) = 2(5-x) \quad (\text{By cross multiplication})$$

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

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

$$\Rightarrow 5x = 7$$

$$\Rightarrow x = \frac{7}{5}$$

Q.11  $\frac{3x}{4} - \frac{(x-1)}{2} = \frac{(x-2)}{3}$

Solution:

We are given  $\frac{3x}{4} - \frac{(x-1)}{2} = \frac{x-2}{3}$

$$= \frac{3x - 2(x-1)}{4} = \frac{x-2}{3}$$

$$\Rightarrow \frac{3x-2x+2}{4} = \frac{x-2}{3}$$

$$\Rightarrow \frac{x+2}{4} = \frac{x-2}{3}$$

(By cross Multiplication)

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

$$\Rightarrow 3x+6 = 4x-8$$

$$\Rightarrow 3x-4x = -8-6$$

$$\Rightarrow -x = -14$$

$$\Rightarrow x = 14$$

Q.12  $\frac{5x}{3} - \frac{x-1}{4} = \frac{x-3}{5}$

Solve: we have

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

$$\Rightarrow \frac{4(5x) - 3(x-1)}{12} = \frac{x-3}{5}$$

$$\Rightarrow \frac{20x - 3x + 3}{12} = \frac{x-3}{5}$$

$$\Rightarrow \frac{17x+3}{12} = \frac{x-3}{5}$$

$$\Rightarrow 5(17x+3) = 12(x-3) \text{ By cross multiplication.}$$

$$\Rightarrow 85x+15 = 12x-36$$

$$\Rightarrow 85x-12x = -36-15$$

$$\Rightarrow 73x = -41 \Rightarrow x = -\frac{41}{73}$$

Q.13  $\frac{(3x+1)}{16} + \frac{2x-3}{7} = \frac{x+3}{8} + \frac{3x-1}{14}$

Solution Transposing  $\frac{x+3}{8}$  to LHS,  $\frac{2x-3}{7}$  to RHS

$$\Rightarrow \frac{3x+1}{16} - \frac{x+3}{8} = \frac{3x-1}{14} - \frac{2x-3}{7}$$

$$\Rightarrow \frac{(3x+1) - 2(x+3)}{16} = \frac{(3x-1) - 2(2x-3)}{14}$$

$$\Rightarrow \frac{3x+1-2x-6}{16} = \frac{3x-1-4x+6}{14}$$

$$\Rightarrow \frac{x-5}{16} = \frac{-x+5}{14}$$

By cross multiplication.

$$\Rightarrow 14(x-5) = 16(-x+5)$$

$$\Rightarrow 14x - 70 = -16x + 80$$

$$\Rightarrow 14x + 16x = 80 + 70$$

$$\Rightarrow 30x = 150$$

$$\Rightarrow x = \frac{150}{30}$$

$$x = 5$$

Q.14  $\frac{1-2x}{7} - \frac{2-3x}{8} = \frac{3}{2} + \frac{x}{4}$

Sol: we have

$$\frac{1-2x}{7} - \frac{2-3x}{8} = \frac{3}{2} + \frac{x}{4}$$

$$\frac{8(1-2x) - 7(2-3x)}{56} = \frac{6+x}{4}$$

$$\Rightarrow \frac{8 - 16x - 14 + 21x}{56} = \frac{x+6}{4}$$

$$\Rightarrow \frac{5x-6}{56} = \frac{x+6}{4}$$

By cross multiplying

$$\Rightarrow -4(5x-6) = 56(x+6)$$

$$\Rightarrow 5x-6 = 14x+84$$

$$\Rightarrow 5x-14x = 84+6$$

$$-9x = 90$$

$$\Rightarrow x = -\frac{90}{9}$$

$$x = -10$$

Q.15  $\frac{9x+7}{2} - \left(x - \frac{x-2}{7}\right) = 36$

Sol:  $\frac{9x+7}{2} - x + \frac{x-2}{7} = 36$

$$= \frac{7(9x+7) - 14x + 2(x-2)}{14} = 36$$

$$\Rightarrow \frac{63x+49-14x+2x-4}{14} = 36$$

$$\Rightarrow 51x+45 = 504$$

$$\Rightarrow 51x = 504-45$$

$$51x = 459 \Rightarrow x = 9$$

Q.16  $0.18(5x-4) = 0.5x + 0.8$

Sol:  $0.18(5x-4) = 0.5x + 0.8$

$$\Rightarrow 0.9x - 7.2 = 0.5x + 0.8$$

$$\Rightarrow 0.9x - 0.5x = 0.8 + 7.2$$

$$\Rightarrow 0.4x = 8.0$$

$$\Rightarrow x = \frac{8.0}{0.4} = 20$$

Q.17  $\frac{2}{3x} - \frac{3}{2x} = \frac{1}{12}$

Sol:  $\therefore \frac{2}{3x} - \frac{3}{2x} = \frac{1}{12}$

$$\Rightarrow \frac{2 \times 2 - 3 \times 3}{6x} = \frac{1}{12}$$

$$\Rightarrow \frac{4-9}{6x} = \frac{1}{12}$$

$$\Rightarrow \frac{-5}{6x} = \frac{1}{12} \Rightarrow 6x = -60$$

$$\Rightarrow x = \frac{-60}{6} = -10$$

Q.18  $\frac{4x}{9} + \frac{1}{3} + \frac{13}{108}x = \frac{8x+19}{18}$

Solution: we have

$$\frac{4x}{9} + \frac{1}{3} + \frac{13}{108}x = \frac{8x+19}{18}$$

$$\Rightarrow \frac{4x}{9} + \frac{13x}{108} - \frac{(8x+19)}{18} = -\frac{1}{3}$$

$$\Rightarrow \frac{48x + 13x - 6(8x+19)}{108} = -\frac{1}{3}$$

$$\Rightarrow \frac{48x + 13x - 48x - 114}{108} = -\frac{1}{3}$$

$$\Rightarrow \frac{13x - 114}{108} = -\frac{1}{3}$$

$$\Rightarrow 39x - 342 = -108$$

$$\Rightarrow 39x = -108 + 342$$

$$39x = 234$$

$$\Rightarrow x = 234/39$$

$$= 6$$

$$\textcircled{19} \quad \frac{(45-2x)}{15} - \frac{(4x+10)}{5} = \frac{15-14x}{9}$$

Sol:

$$\Rightarrow \frac{45-2x}{15} - \frac{4x+10}{5} = \frac{15-14x}{9}$$

$$\Rightarrow \frac{(45-2x)}{15} - \frac{(4x+10)}{5} - \frac{(15-14x)}{9} = 0$$

$$\Rightarrow \frac{3(45-2x) - 9(4x+10) - 5(15-14x)}{45} = 0$$

$$\Rightarrow \frac{135 - 6x - 36x - 90 - 75 + 70x}{45} = 0$$

$$\Rightarrow \frac{28x-30}{45} = 0$$

$$\Rightarrow 28x - 30 = 0$$

$$\Rightarrow 28x = 30$$

$$\Rightarrow x = \frac{30}{28} = \frac{15}{14}$$

$$\therefore x = \frac{15}{14}$$

Q.20  $5\left(\frac{7x+5}{3}\right) - \frac{23}{3} = 13 - \frac{4x-2}{3}$

Sol. By rearranging

$$\Rightarrow 5\left(\frac{7x+5}{3}\right) + \frac{4x-2}{3} = 13 + \frac{23}{3}$$

$$\Rightarrow \frac{35x+25+4x-2}{3} = \frac{39+23}{3}$$

$$\Rightarrow \frac{39x+23}{3} = \frac{62}{3}$$

$$\Rightarrow 39x+23 = 62$$

$$\Rightarrow 39x = 62-23$$

$$39x = 39$$

$$x = \frac{39}{39}$$

$$x = 1$$

$$\text{Q21} \quad \frac{7x-1}{4} - \frac{1}{3} \left( 2x - \frac{1-x}{2} \right) = \frac{10}{3}$$

$$\text{Sol:} \quad \frac{7x-1}{4} - \frac{1}{3} \left( 2x - \frac{1-x}{2} \right) = \frac{10}{3}$$

$$= \frac{7x-1}{4} - \frac{1}{3} \left( \frac{4x-1+x}{2} \right) = \frac{10}{3}$$

$$= \frac{7x-1}{4} - \frac{5x-1}{6} = \frac{10}{3}$$

$$= \frac{3(7x-1) - 2(5x-1)}{12} = \frac{10}{3}$$

$$= \frac{21x-3-10x+2}{12} = \frac{10}{3}$$

$$= \frac{11x-1}{12} = \frac{10}{3}$$

By cross multiplying

$$\Rightarrow 33x-3=120$$

$$\Rightarrow 33x=120+3$$

$$\Rightarrow 33x=123$$

$$\Rightarrow x = \frac{123}{33}$$

$$\Rightarrow x = \frac{41}{11} \text{ Ans}$$

Q.22  $\frac{0.5(x-0.4)}{0.35} - \frac{0.6(x-2.71)}{0.42} = x+6.1$

Sol:  $\frac{x-0.4 - x+2.71}{0.7} = x+6.1$

$= -0.4 + 2.71 = 0.7(x+6.1)$

$\Rightarrow 0.7x = 2.71 - 0.4 - 4.27$

$= -1.96$

$x = \frac{-1.96}{0.7} = -2.8$

Q.23  $6.5x + \frac{19.5x-32.5}{2} = 6.5x + 13 + \left(\frac{13x-26}{2}\right)$

Sol: we have

$6.5x + \frac{19.5x-32.5}{2} = 6.5x + 13 + \frac{(13x-26)}{2}$

$\Rightarrow 6.5x + \frac{19.5x-32.5}{2} - 6.5x - \frac{13x-26}{2} = 13$

$\Rightarrow \frac{19.5x-32.5}{2} - \frac{13x-26}{2} = 13$

$\Rightarrow \frac{19.5x-32.5-13x+26}{2} = 13$

$\Rightarrow \frac{6.5x-6.5}{2} = 13 \Rightarrow 6.5x - 6.5 = 26$

$\Rightarrow 6.5x = 26 + 6.5$   
 $6.5x = 32.5 \Rightarrow x = \frac{32.5}{6.5} = 5$

$$(24) \quad (3x-8)(3x+2) - (4x-11)(2x+1) = (x-3)(x+7) \quad (19)$$

Sol:  $(3x-8)(3x+2) - (4x-11)(2x+1) - (x-3)(x+7) = 0$

$$\Rightarrow (9x^2 + 6x - 24x - 16) - (8x^2 + 4x - 22x - 11) - (x^2 + 7x - 3x - 21) = 0$$

$$\Rightarrow (9x^2 - 8x^2 - x^2) + (6x - 24x - 4x + 22x - 7x + 3x) + (-16 + 11 + 21) = 0$$

$$= -4x + 16 = 0$$

$$\Rightarrow -4x = -16$$

$$x = 4$$

$$(25) \quad [(2x+3) + (x+5)]^2 + [(2x+3) - (x+5)]^2 = 10x^2 + 92$$

Sol:  $(3x+8)^2 + (x-2)^2 = 10x^2 + 92$

$$\Rightarrow 9x^2 + 64 + 48x + x^2 - 4x + 4 = 10x^2 + 92$$

$$\Rightarrow 10x^2 + 44x + 68 = 10x^2 + 92$$

$$\Rightarrow 44x = 92 - 68$$

$$44x = 24$$

$$x = \frac{24}{44} = \frac{6}{11}$$

$$x = \frac{6}{11}$$