9. Linear Equation in One Variable

Exercise 9.1

1. Question

Solve each of the following equations and also verify your solution:

$9\frac{1}{4} = y - 1\frac{1}{3}$

Answer

$$9\frac{1}{4} = y - 1\frac{1}{3} \quad y - \frac{4}{3} = \frac{37}{4}$$

On transposing $-\frac{4}{3}$ to right hand side (RHS)

$$y = \frac{37}{4} + \frac{4}{3}$$

$$y = \frac{111 + 16}{12}$$

$$y = \frac{127}{12}$$

2. Question

Solve each of the following equations and also verify your solution:

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

Answer

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

On transposing $\frac{2}{5}$ to right hand side (RHS)

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

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

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

On cross-multiplication, we get,

$$25x = 9$$

$$x = \frac{9}{25}$$

Check:

Take LHS:

$\Rightarrow \frac{5x}{3} + \frac{2}{5}$

$= \frac{5 \times 9}{25 \times 3} + \frac{2}{5}$

$\frac{3}{5}+\frac{2}{5}=1$

We got LHS=RHS

3. Question

Solve each of the following equations and also verify your solution:

$\frac{x}{2}+\frac{x}{3}+\frac{x}{4}=13$

Answer

$$\frac{x}{2}+\frac{x}{3}+\frac{x}{4}=13$$

LCM of 2, 3, and 4 = 12

$$\frac{6x+4x+3x}{12}=13$$

$$\frac{13x}{12}=13$$

On cross-multiplication, we get,

$$13x=156$$

$$x=\frac{156}{13}=12$$

Check:

Take LHS:

$$\frac{12}{2}+\frac{12}{3}+\frac{12}{4}=6+4+3=13$$

We got LHS=RHS

4. Question

Solve each of the following equations and also verify your solution:

$\frac{x}{2}+\frac{x}{8}=\frac{1}{8}$

Answer

$$\frac{x}{2}+\frac{x}{8}=\frac{1}{8}$$

LCM of 2 and 8 is 8

$$\frac{4x+x}{8}=\frac{1}{8}$$

$$\frac{5x}{8}=\frac{1}{8}$$

On cross-multiplication, we get,

$$5x=\frac{8}{8}$$

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

Check:

Take LHS:

$$\frac{1}{2\times5}+\frac{1}{8\times5}$$

$$\frac{1}{10}+\frac{1}{40}$$

$$\frac{5}{40}=\frac{1}{8}$$

We got LHS=RHS

5. Question

Solve each of the following equations and also verify your solution:

$\frac{2x}{3}-\frac{3x}{8}=\frac{7}{12}$

Answer

$$\frac{2x}{3}-\frac{3x}{8}=\frac{7}{12}$$

LCM of 3 and 8 is 24

$$\frac{16x-9x}{24}=\frac{7}{12}$$

$$\frac{7x}{24}=\frac{7}{12}$$

On cross-multiplication, we get,

$$7x\times12=24\times7$$

$$x=\frac{24\times7}{12\times7}$$

$$x=2$$

Check:

Take LHS:

$$\frac{2x}{3}-\frac{3x}{8}$$

$$\frac{2\times2}{3}-\frac{3\times2}{8}$$

$$\frac{4}{3}-\frac{6}{8}$$

$$\frac{32-18}{24}$$

$$\frac{7}{12}$$

We got LHS=RHS

6. Question

Solve each of the following equations and also verify your solution:

$$(x+2)(x+3)+(x-3)(x-2)-2x(x+1)=0$$

Answer

$(x+2)(x+3)+(x-3)(x-2)-2x(x+1)=0$

On opening the brackets we get,

$x^2 + 5x + 6 + x^2 - 5x + 6 - 2x^2 - 2x = 0$

$-2x+12=0$

On dividing by -2 we get,

x - 6 = 0x = 6

Check:

Take LHS:

$(x+2)(x+3)+(x-3)(x-2)-2x(x+1)$

On substituting x = 6

$(6+2)(6+3)+(6-3)(6-2)-2\times6(6+1)$

$72+12-84=0$

We got LHS=RHS

7. Question

Solve each of the following equations and also verify your solution:

$\frac{x}{2}-\frac{4}{5}+\frac{x}{5}+\frac{3x}{10}=\frac{1}{5}$

Answer

$\frac{x}{2}-\frac{4}{5}+\frac{x}{5}+\frac{3x}{10}=\frac{1}{5}$

On Transposing $-\frac{4}{5}$ to RHS

$\frac{x}{2}+\frac{x}{5}+\frac{3x}{10}=\frac{1}{5}+\frac{4}{5}$

LCM of 2 and 5 is 10

$\frac{5x+2x+3x}{10}=\frac{5}{5}$

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

$x=1$

Check:

Take LHS:

$\frac{x}{2}-\frac{4}{5}+\frac{x}{5}+\frac{3x}{10}$

$\frac{1}{2}-\frac{4}{5}+\frac{1}{5}+\frac{3}{10}$

$\frac{5-8+2+3}{10}=\frac{1}{5}$

We got LHS=RHS

8. Question

Solve each of the following equations and also verify your solution:

$\frac{7}{x} + 35 = \frac{1}{10}$

Answer

$$\frac{7}{x} + 35 = \frac{1}{10}$$

On Transposing 35 to RHS

$$\frac{7}{x} = \frac{1}{10} - 35$$

$$\frac{7}{x} = \frac{1 - 350}{10}$$

$$\frac{7}{x} = -\frac{349}{10}$$

$$x = -\frac{70}{349}$$

Check:

Take LHS:

$$\frac{7}{x} + 35$$

$$\frac{7 \times 349}{-70} + 35$$

$$\frac{-349}{10} + 35$$

$$\frac{-349 + 350}{10} = \frac{1}{10}$$

We got LHS=RHS

9. Question

Solve each of the following equations and also verify your solution:

$\frac{2x-1}{3} - \frac{6x-2}{5} = \frac{1}{3}$

Answer

$$\frac{2x-1}{3} - \frac{6x-2}{5} = \frac{1}{3}$$

$$\frac{\{5(2x-1) - 3(6x-2)\}}{15} = \frac{1}{3}$$

$$\frac{10x - 5 - 18x + 6}{15} = \frac{1}{3}$$

$$\frac{-8x + 1}{15} = \frac{1}{3}$$

On cross multiplication, we get

$$-24x + 3 = 15$$

$$-24x + 3 = 15 - 3$$

$$x = -\frac{12}{24}$$

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

Check:

$$\frac{2\times\frac{-1}{2} - 1}{3} - \frac{6\times\frac{-1}{2} - 2}{5}$$

$$\frac{-1-1}{3} - \frac{-3-2}{5}$$

$$\frac{-2}{3} - \frac{-5}{5}$$

$$\frac{-10+15}{15} = \frac{1}{3}$$

We got LHS=RHS

10. Question

Solve each of the following equations and also verify your solution:

$13(y-4) - 3(y-9) - 5(y+4) = 0$

Answer

13(y - 4) - 3(y - 9) - 5(y + 4) = 013y - 52 - 3y + 27 - 5y - 20 = 05y = 45y = 9

Check:

13(y - 4) - 3(y - 9) - 5(y + 4) = 013(9 - 4) - 3(9 - 9) - 5(9 + 4)13(5) - 0 - 5(13) = 0

We got LHS = RHSHence, verified.

11. Question

Solve each of the following equations and also verify your solution:

$\frac{2}{3}(x-5) - \frac{1}{4}(x-2) = \frac{9}{2}$

Answer

$$\frac{2}{3}(x-5) - \frac{1}{4}(x-2) = \frac{9}{2}$$

$$\frac{2x}{3} - \frac{10}{3} - \frac{x}{4} + \frac{1}{2} = \frac{9}{2}$$

On transposing constant terms to RHS

$$\frac{2x}{3} - \frac{x}{4} = \frac{9}{2} + \frac{10}{3} - \frac{1}{2}$$

$$\frac{8x-3x}{12} = \frac{27+20-3}{6}$$

$$\frac{5x}{12} = \frac{44}{6}$$

$$\frac{5x}{12} = \frac{22}{3}$$

On cross multiplication

$$15x = 264$$

$$x = \frac{264}{15} = \frac{88}{5}$$

Check:

Taking LHS

$$\frac{2}{3}\left(\frac{88}{5} - 5\right) - \frac{1}{4}\left(\frac{88}{5} - 2\right)$$

$$\frac{2}{3}\left(\frac{88 - 25}{5}\right) - \frac{1}{4}\left(\frac{88 - 10}{5}\right)$$

$$\frac{2}{3}\left(\frac{63}{5}\right) - \frac{1}{4}\left(\frac{78}{5}\right)$$

$$\frac{126}{15} - \frac{78}{20}$$

$$\frac{504 - 234}{60}$$

$$\frac{270}{60} = \frac{9}{2}$$

We got LHS=RHS

Exercise 9.2

1. Question

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

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

Answer

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

On transposing 3x to RHS

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

$$\frac{2x + 5 - 9x}{3} = -10$$

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

On cross multiplication

$$-7x + 5 = -30$$

$$-7x = -30 - 5$$

$$x = 5$$

Check:

Taking LHS

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

$\frac{2\times5+5}{3}=5$

Taking RHS

$3x-10$

$3\times5-10=5$

We got LHS=RHS

2. Question

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

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

Answer

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

On cross multiplication

2(a - 8) = 3(a - 3)2a - 16 = 3a - 3

On transposing constant terms to RHS and variables to LHS, we get

2a - 3a = 16 - 9-a = 7a = -7

Check:

Taking LHS

$\frac{a-8}{3}$

On substituting a = -7, we get

$\frac{-7-8}{3}=-\frac{15}{3}=-5$

Taking RHS

$\frac{a-3}{2}$

On substituting a = -7, we get

$\frac{-7-3}{2}=-\frac{10}{2}=-5$

We got LHS = RHS

3. Question

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

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

Answer

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

On cross multiplication

$$11(7y+2) = 5(6y-5)$$

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

On transposing constant terms to RHS and variables to LHS, we get

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

$$47y = -47$$

$$y = -1$$

Check:

Taking LHS

$$\frac{7y+2}{5}$$

On substituting a = -1, we get

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

Taking RHS

$$\frac{6y-5}{11}$$

On substituting a = -1, we get

$$\frac{-6-5}{11} = -\frac{11}{11} = -1$$

We got LHS=RHS

4. Question

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

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

Answer

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

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

On transposing constant terms to RHS and variables to LHS, we get

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

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

On taking LCM of 2 and 3, we get 6

$$\frac{-6x - 32x + 21x}{6} = -4$$

$$\frac{-17x}{6} = -4$$

$x = \frac{24}{17}$

Check:

Taking LHS

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

On substituting $x = \frac{24}{17}$, we get

$\frac{24}{17} - 2\times\frac{24}{17} + 2 - \frac{16\times\frac{24}{17}}{3} + 5$

$\frac{24}{17} - \frac{48}{17} + 2 - \frac{384}{51} + 5$

$\frac{72 - 144 + 102 - 384 + 255}{51}$

$\frac{72 - 144 + 102 - 384 + 255}{51} = -\frac{99}{51} = -\frac{33}{17}$

Taking RHS

$3 - \frac{7x}{2}$

On substituting $x = \frac{24}{17}$, we get

$3 - \frac{7\times\frac{24}{17}}{2}$

$3 - \frac{168}{34}$

$\frac{102 - 168}{17}$

$\frac{-66}{34} = -\frac{33}{17}$

We got LHS=RHS

5. Question

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

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

Answer

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

On transposing constant terms to RHS and variables to LHS, we get

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

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

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

Check:

Taking LHS

$$\frac{x}{2} + 7x - 6$$

On substituting $x = \frac{25}{2}$, we get

$$\frac{25}{4} + 7\times\frac{25}{2} - 6$$

$$\frac{25}{4} + \frac{175}{2} - 6$$

$$\frac{25 + 350 - 24}{4} = \frac{351}{4}$$

Taking RHS

$$7x + \frac{1}{4}$$

On substituting $x = \frac{25}{2}$, we get

$$7\times\frac{25}{2} + \frac{1}{4}$$

$$\frac{175}{2} + \frac{1}{4} = \frac{351}{4}$$

We got LHS=RHS

6. Question

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

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

Answer

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

On transposing constant terms to RHS and variables to LHS, we get

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

$$\frac{3x + 16x - 24x}{4} = \frac{7 - 48}{8}$$

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

$$10x = 41$$

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

Check:

Taking LHS

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

$$\frac{3\times\frac{41}{10}}{4}+4\times\frac{41}{10}$$

On substituting $x=\frac{41}{10}$, we get

$$\frac{3\times\frac{41}{10}}{4}+4\times\frac{41}{10}$$

$$\frac{123}{40}+\frac{164}{10}$$

$$\frac{123+656}{40}=\frac{779}{40}$$

Taking RHS

$$\frac{7}{8}+6x-6$$

On substituting $x=\frac{41}{10}$, we get

$$\frac{7}{8}+6\times\frac{41}{10}-6$$

$$\frac{7}{8}+\frac{246}{10}-6$$

$$\frac{70+1968-480}{80}$$

$$\frac{1558}{80}=\frac{779}{40}$$

We got LHS=RHS

7. Question

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

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

Answer

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

On transposing $\frac{20x}{2}$ to LHS, we get

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

LCM of 2 and 3 is 6,

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

$$\frac{-34x}{6}=10$$

$$x = -\frac{60}{34} = -\frac{30}{17}$$

Check:

Taking LHS

$$\frac{7x}{2} - \frac{5x}{2}$$

On substituting $x = -\frac{30}{17}$ we get

$$\frac{7\times-\frac{30}{17}}{2} - \frac{5\times-\frac{30}{17}}{2}$$

$$\frac{-210}{34} - \frac{-150}{34}$$

$$\frac{-210+150}{34} = -\frac{60}{34} = -\frac{30}{17}$$

Taking RHS

$$\frac{20x}{3} + 10$$

On substituting $x = -\frac{30}{17}$, we get

$$\frac{20\times-\frac{30}{17}}{3} + 10$$

$$-\frac{600}{51} + 10$$

$$\frac{-600+510}{51} = -\frac{90}{51} = -\frac{30}{17}$$

We got LHS=RHS

8. Question

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

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

Answer

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

On transposing $\frac{7x-3}{3}$ to LHS and 1 to RHS, we get

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

LCM of 2 and 3 is 6,

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

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

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

$$4x+9=-6$$

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

Check:

Taking LHS

$$\frac{6x+1}{2}+1$$

On substituting $x=-\frac{15}{4}$ we get

$$\frac{6\times-\frac{15}{4}+1}{2}+1$$

$$\frac{-\frac{45}{2}+1}{2}+1$$

$$\frac{\frac{-45+2}{2}}{2}+1$$

$$-\frac{43}{4}+1$$

$$\frac{-43+4}{4}=-\frac{39}{4}$$

Taking RHS

$$\frac{7x-3}{3}$$

On substituting $x=-\frac{15}{4}$, we get

$$\frac{7\times-\frac{15}{4}-3}{3}$$

$$\frac{-\frac{105}{4}-3}{3}$$

$$\frac{\frac{-105-12}{4}}{3}$$

$$-\frac{117}{12}=-\frac{39}{4}$$

We got LHS=RHS

9. Question

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

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

Answer

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

On transposing a to LHS, we get

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

LCM of 2 and 3 is 6,

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

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

$$\frac{6a+5}{6}=\frac{7}{6}$$

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

Check:

Taking LHS

$$\frac{3a-2}{3}+\frac{2a+3}{2}$$

On substituting $a=\frac{1}{3}$ we get

$$\frac{3\times\frac{1}{3}-2}{3}+\frac{2\times\frac{1}{3}+3}{2}$$

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

$$\frac{-1}{3}+\frac{\frac{11}{3}}{2}$$

$$\frac{-1}{3}+\frac{11}{6}$$

$$\frac{-2+11}{6}=\frac{9}{6}=\frac{3}{2}$$

Taking RHS

$$a+\frac{7}{6}$$

On substituting $a=\frac{1}{3}$, we get

$$\frac{1}{3}+\frac{7}{6}$$

$$\frac{2+7}{6}=\frac{9}{6}=\frac{3}{2}$$

We got LHS=RHS

10. Question

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

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

Answer

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

On transposing $-\frac{x-2}{3}$ to LHS, we get

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

LCM of 2 and 3 is 6,

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

$$\frac{5x-1}{6}=1$$

$$5x=7$$

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

Check:

Taking LHS

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

On substituting $x=\frac{7}{5}$ we get

$$\frac{7}{5}-\frac{\frac{7}{5}-1}{2}$$

$$\frac{7}{5}-\frac{\frac{2}{5}}{2}$$

$$\frac{7}{5}-\frac{1}{5}=\frac{6}{5}$$

Taking RHS

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

On substituting $x=\frac{7}{5}$, we get

$$1-\frac{\frac{7}{5}-2}{3}$$

$$1+\frac{1}{5}=\frac{6}{5}$$

We got LHS=RHS

11. Question

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

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

Answer

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

On transposing $\frac{x-2}{3}$ to LHS, we get

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

LCM of 2, 3 and 4 is 12,

$$\frac{9x - 6x + 6 - 4x + 8}{12} = 0$$

$$\frac{-x + 14}{12} = 0$$

$$x = 14$$

Check:

Taking LHS

$$\frac{3x}{4} - \frac{x-1}{2}$$

On substituting $x = 14$, we get

$$\frac{3\times14}{4} - \frac{14-1}{2}$$

$$\frac{21}{2} - \frac{13}{2} = \frac{8}{2} = 4$$

Taking RHS

$$\frac{x-2}{3}$$

On substituting $x = 14$, we get

$$\frac{14-2}{3} = \frac{12}{3} = 4$$

We got LHS=RHS

12. Question

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

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

Answer

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

On transposing $\frac{x-3}{5}$ to LHS, we get

$$\frac{5x}{3} - \frac{x-1}{4} - \frac{x-3}{5} = 0$$

LCM of 3, 4 and 5 is 60,

$$\frac{100x-15x+15-12x+36}{60}=0$$

$$\frac{73x+51}{60}=0$$

$$x=\frac{-51}{73}$$

Check:

Taking LHS

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

On taking LCM of 3 and 4; substituting $x=-\frac{51}{73}$, we get

$$\frac{(4\times5x)-3(x-1)}{12}=\frac{20x-3x+3}{12}$$

$$\frac{17x+3}{12}=\frac{17\times-\frac{51}{73}+3}{12}=\frac{\frac{-867}{73}+3}{12}$$

$$\frac{\frac{-867+219}{73}}{12}=-\frac{648}{73\times12}=-\frac{54}{73}$$

Taking RHS

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

On substituting $x=-\frac{51}{73}$, we get

$$\frac{-\frac{51}{73}-3}{5}=\frac{-\frac{51-219}{73}}{5}=-\frac{270}{73\times5}=-\frac{54}{73}$$

$$\frac{-51-219}{225}=-\frac{270}{225}$$

We got LHS=RHS

13. Question

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

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

Answer

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

On transposing $\frac{x+3}{8}+\frac{3x-1}{14}$ to LHS, we get

$$\frac{3x+1}{16}+\frac{2x-3}{7}-\frac{x+3}{8}-\frac{3x-1}{14}=0$$

LCM of 7, 8, 14 and 16 is 112

$$\frac{7(3x+1)+16(2x-3)-14(x+3)-8(3x-1)}{112}=0$$

$$21x+7+32x-48-14x-42-24x+8=0$$

$$15x=75$$

$$x=5$$

Check:

Taking LHS

$$\frac{3x+1}{16}+\frac{2x-3}{7}$$

On substituting $x=5$, we get

$$\frac{3\times5+1}{16}+\frac{2\times5-3}{7}$$

$$\frac{16}{16}+\frac{7}{7}=2$$

Taking RHS

$$\frac{x+3}{8}+\frac{3x-1}{14}$$

On substituting $x=5$, we get

$$\frac{5+3}{8}+\frac{3\times5-1}{14}$$

$$\frac{8}{8}+\frac{14}{14}=2$$

We got LHS=RHS

14. Question

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

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

Answer

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

On transposing $\frac{x}{4}$ to LHS, we get

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

LCM of 7 and 8 is 56

$$\frac{8(1-2x)-7(2-3x)-14x}{56}=\frac{3}{2}$$

$$8(1-2x)-7(2-3x)-14x=\frac{3\times56}{2}$$

$$8-16x-14+21x-14x=84$$

$-9x-6=84$

$x=-10$

Check:

Taking LHS

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

On substituting $x=-10$, we get

$\frac{1-2\times(-10)}{7}-\frac{2-3\times(-10)}{8}$

$\frac{1+20}{7}-\frac{2+30}{8}$

$\frac{21}{7}-\frac{32}{8}$

$3-4=-1$

Taking RHS

$\frac{3}{2}+\frac{-10}{4}$

On substituting $x=-10$, we get

$\frac{3}{2}-\frac{10}{4}$

$\frac{6-10}{4}=-\frac{4}{4}=-1$

We got LHS=RHS

15. Question

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

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

Answer

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

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

$\frac{9x+7}{2}-\frac{6x+2}{7}=36$

$\frac{7(9x+7)-2(6x+2)}{14}=36$

$\frac{63x+49-12x-4}{14}=36$

$\frac{51x+45}{14}=36$

$51x+45=36\times14$

$51x = 459$

$x = 9$

Check:

Taking LHS

$\frac{9x+7}{2} - \left(x - \frac{x-2}{7}\right)$

On substituting $x = 9$, we get

$\frac{9\times9+7}{2} - \left(9 - \frac{9-2}{7}\right)$

$44 - 8 = 36$

We got LHS=RHS

16. Question

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

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

Answer

$0.18(5x - 4) = 0.50x + 0.8$

$0.90x - 0.72 = 0.50x + 0.8$

On transposing $0.50x$ to LHS and 0.80 to RHS, we get

$0.90x - 0.50x = 0.72 + 0.8$

$0.40x = 1.52$

$x = 3.8$

Check:

Taking LHS

$0.18(5x - 4)$

On substituting $x = 3.8$, we get

$0.18(5\times3.8 - 4) = 2.7$

Taking RHS

$0.50x + 0.8$

On substituting $x = 3.8$, we get

$0.50\times3.8 + 0.8 = 2.7$

We got LHS=RHS

17. Question

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

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

Answer

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

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

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

On cross multiplication, we get

$$6x=-60$$

$$x=-10$$

Check:

Taking LHS

$$\frac{2}{3x}-\frac{3}{2x}$$

On substituting $x=-10$, we get

$$\frac{2}{3\times-10}-\frac{3}{2\times-10}$$

$$\frac{2}{-30}-\frac{3}{-20}$$

$$\frac{-4-(-9)}{60}$$

$$\frac{5}{60}=\frac{1}{12}$$

We got LHS=RHS

18. Question

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

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

Answer

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

On transposing $\frac{8x+19}{18}$ to LHS and $\frac{1}{3}$ to RHS, we get

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

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

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

On cross multiplication, we get

$$3(13x-114)=-108$$

$$13x-114=-36$$

$13x = -36 + 114$

$13x = 78$

$x = 6$

Check:

Taking LHS

$\frac{4x}{9} + \frac{1}{3} + \frac{13x}{108}$

On substituting $x = 6$, we get

$\frac{4\times6}{9} + \frac{1}{3} + \frac{13\times6}{108}$

$\frac{8}{3} + \frac{1}{3} + \frac{13}{18}$

$\frac{48 + 6 + 13}{18}$

$\frac{67}{18}$

Taking RHS

$\frac{8x + 19}{18}$

On substituting $x = 6$, we get

$\frac{8\times6 + 19}{18} = \frac{67}{18}$

We got LHS=RHS

19. Question

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

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

Answer

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

On transposing $\frac{15-14x}{9}$ to LHS, we get

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

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

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

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

$28x = 30$

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

Check:

Taking LHS

$\frac{45-2x}{15} - \frac{4x+10}{5}$

On substituting $x = \frac{15}{14}$, we get

$\frac{45-2\times\frac{15}{14}}{15} - \frac{4\times\frac{15}{14}+10}{5}$

$\frac{45-\frac{15}{7}}{15} - \frac{\frac{30}{7}+10}{5}$

$\frac{300}{105} - \frac{100}{35} = \frac{300-300}{105} = 0$

Taking RHS

$\frac{15-14\times\frac{15}{14}}{9}$

On substituting $x = \frac{15}{14}$, we get

$\frac{15-14\times\frac{15}{14}}{9}$

$\frac{15-15}{9} = 0$

We got LHS=RHS

20. Question

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

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

Answer

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

On transposing $\frac{4x-2}{3}$ to LHS and $-\frac{23}{3}$, to RHS we get

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

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

$\frac{35x+25+4x-2}{3} = \frac{62}{3}$

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

$39x + 23 = 62$

$x = 1$

Check:

Taking LHS

$$\frac{5(7x+5)}{3} - \frac{23}{3}$$

On substituting $x = 1$ we get

$$\frac{5(7\times1+5)}{3} - \frac{23}{3}$$

$$20 - \frac{23}{3}$$

$$\frac{60-23}{3} = \frac{37}{3}$$

Taking RHS

$$13 - \frac{4x-2}{3}$$

On substituting $x = 1$, we get

$$13 - \frac{4\times1-2}{3}$$

$$13 - \frac{2}{3} = \frac{39-2}{3} = \frac{37}{3}$$

We got LHS=RHS

21. Question

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

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

Answer

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

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

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

Taking LCM of 4 and 6

$$\frac{6(7x-1)-4(5x-1)}{24} = \frac{10}{3}$$

$$\frac{42x-6-20x+4}{24} = \frac{10}{3}$$

$$\frac{22x-2}{24} = \frac{10}{3}$$

On cross ultiplication, we get

$$22x - 2 = 80$$

$$x = \frac{41}{11}$$

Check:

Taking LHS

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

On substituting $x = \frac{41}{11}$ we get

$$\frac{7\times\frac{41}{11}-1}{4} - \frac{1}{3}\left(2\times\frac{41}{11} - \frac{1-\frac{41}{11}}{2}\right)$$

$$\frac{\frac{287}{11}-1}{4} - \frac{1}{3}\left(2\times\frac{41}{11} - \frac{1-\frac{41}{11}}{2}\right)$$

$$\frac{276}{44} - \frac{1}{3}\left(\frac{82}{11} + \frac{15}{11}\right)$$

$$\frac{69}{11} - \frac{97}{33} = \frac{207-97}{33} = \frac{110}{33} = \frac{10}{3}$$

We got LHS=RHS

22. Question

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

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

Answer

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

$$\frac{0.5x-0.2}{0.35} - \frac{0.6x-1.626}{0.42} = x + 6.1$$

$$\frac{0.5x-0.2}{0.35} - \frac{0.6x-1.626}{0.42} - x = 6.1$$

LCM of 0.35 and 0.42 is 2.10

$$\frac{0.6(0.5x-0.2) - 5(0.6x-1.626) - 2.1x}{2.1} = 6.1$$

$$\frac{0.3x-0.12-3x+8.13-2.1x}{2.1} = 6.1$$

$$\frac{-4.8x+8.01}{2.1} = 6.1$$

$$x = -2.8$$

Check:

Taking LHS

$$\frac{0.5(x-0.4)}{0.35} - \frac{0.6(x-0.27)}{0.42}$$

On substituting $x = -2.8$ we get

$$\frac{0.5(-2.8-0.4)}{0.35} - \frac{0.6(-2.8-0.27)}{0.42}$$

$$\frac{0.5(-3.2)}{0.35} - \frac{0.6(-3.07)}{0.42} = 3.3$$

Taking RHS

$$x + 6.1$$

On substituting $x = -2.8$ we get

$$-2.8 + 6.1 = 3.3$$

We got LHS=RHS

23. Question

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

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

Answer

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

On transposing $6.5x$ and $\frac{13x-26}{2}$ to LHS

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

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

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

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

On cross multiplication, we get

$$6.5x - 6.5 = 26$$

$$6.5x = 32.5$$

$$x = 5$$

Check:

Taking LHS

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

On substituting $x = 5$ we get

$$6.5\times5 + \frac{19.5\times5 - 32.5}{2}$$

$$32.5 + \frac{97.5 - 32.5}{2}$$

$$\frac{65+97.5-32.5}{2}=\frac{130}{2}=65$$

Taking RHS

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

On substituting $x=5$ we get

$$6.5\times5+13+\frac{13\times5-26}{2}$$

$$32.5+13+\frac{65-26}{2}$$

$$45.5+\frac{39}{2}$$

$$\frac{91+39}{2}=\frac{130}{2}=65$$

We got LHS=RHS

24. Question

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

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

Answer

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

On transposing $6.5x$ and $\frac{13x-26}{2}$ to LHS

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

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

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

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

On cross multiplication, we get

$$6.5x-6.5=26$$

$$6.5x=32.5$$

$$x=5$$

Check:

Taking LHS

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

On substituting $x=5$ we get

$$6.5\times5+\frac{19.5\times5-32.5}{2}$$

$$32.5+\frac{97.5-32.5}{2}$$

$$\frac{65+97.5-32.5}{2}=\frac{130}{2}=65$$

Taking RHS

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

On substituting $x=5$ we get

$$6.5\times5+13+\frac{13\times5-26}{2}$$

$$32.5+13+\frac{65-26}{2}$$

$$45.5+\frac{39}{2}$$

$$\frac{91+39}{2}=\frac{130}{2}=65$$

We got LHS=RHS

25. Question

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

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

Answer

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

On opening brackets

$$[3x+8]^2+[x-2]^2=10x^2+92$$

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

On transposing $10x^2$to LHS and 68 to RHS

$$10x^2+48x-4x-10x^2=92-68$$

$$48x-4x=24$$

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

Check:

Taking LHS

$$[(2x+3)+(x+5)]^2+[(2x+3)-(x+5)]^2$$

On substituting $x=\frac{6}{11}$ we get

$$\left[\left(2\times\frac{6}{11}+3\right)+\left(\frac{6}{11}+5\right)\right]^2+\left[\left(2\times\frac{6}{11}+3\right)-\left(\frac{6}{11}+5\right)\right]^2$$

$$\left[\left(\frac{12}{11}+3\right)+\left(\frac{6}{11}+5\right)\right]^2+\left[\left(\frac{12}{11}+3\right)-\left(\frac{6}{11}+5\right)\right]^2$$

$$\left[\frac{12+33}{11}+\frac{6+55}{11}\right]^2+\left[\frac{12+33}{11}-\frac{6+55}{11}\right]^2$$

$$\left[\frac{45}{11}+\frac{61}{11}\right]^2+\left[\frac{45}{11}-\frac{61}{11}\right]^2$$

$$\left[\frac{45+61}{11}\right]^2+\left[\frac{45-61}{11}\right]^2$$

$$\left[\frac{106}{11}\right]^2+\left[\frac{-16}{11}\right]^2$$

$$\frac{11236}{121}+\frac{256}{121}=\frac{11492}{121}$$

Taking RHS

$10x^2+92$

On substituting $x=\frac{6}{11}$, we get

$$10\times\frac{6}{11}\times\frac{6}{11}+92$$

$$10\times\frac{6}{11}\times\frac{6}{11}+92$$

$$\frac{360}{121}+92$$

$$\frac{360+11132}{121}=\frac{11492}{121}$$

We got LHS=RHS

Exercise 9.3

1. Question

Slove the following equations and verify your answer:

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

Answer

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

On cross multiplication, we get

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

$6x-9=-6x-4$

On transposing $-6x$ to LHS and -9 to RHS

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

$12x=5$

$x = \frac{5}{12}$

Check:

Taking LHS

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

On substituting $x = \frac{5}{12}$ we get

$\frac{2\times\frac{5}{12}-3}{3\times\frac{5}{12}+2}$

$\frac{\frac{10}{12}-3}{\frac{15}{12}+2}$

$\frac{\frac{10-36}{12}}{\frac{15+24}{12}}$

$\frac{-26\times12}{12\times39} = -\frac{2}{3}$

We got LHS=RHS

2. Question

Slove the following equations and verify your answer:

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

Answer

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

On cross multiplication, we get

$5(2-y) = 3(y+7)$

$-5y + 10 = 3y + 21$

On transposing $3y$ to LHS and 10 to RHS

$-5y - 3y = 21 - 10$

$-8y = 11$

$y = \frac{-11}{8}$

Check:

Taking LHS

$\frac{2-y}{y+7}$

On substituting $x = \frac{-11}{8}$ we get

$$\frac{2-(-\frac{11}{8})}{-\frac{11}{8}+7}$$

$$\frac{2+\frac{11}{8}}{-\frac{11}{8}+7}=\frac{27\times8}{8\times(45)}$$

$$\frac{27}{45}=\frac{3}{5}$$

We got LHS=RHS

3. Question

Slove the following equations and verify your answer:

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

Answer

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

On cross multiplication, we get

$$5x-7=6x$$

On transposing $6x$ to LHS and -7 to RHS

$$5x-6x=7$$

$$-x=7$$

$$x=-7$$

Check:

Taking LHS

$$\frac{5x-7}{3x}$$

On substituting $x=-7$ we get

$$\frac{5\times(-7)-7}{3\times(-7)}$$

$$\frac{-42}{-21}=2$$

We got LHS=RHS

4. Question

Slove the following equations and verify your answer:

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

Answer

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

On cross multiplication, we get

$3x + 5 = 8x + 28$

On transposing $8x$ to LHS and 5 to RHS

$3x - 8x = 28 - 5$

$-5x = 23$

$x = -\frac{23}{5}$

Check:

Taking LHS

$\frac{3x + 5}{2x + 7}$

$\frac{3\times(-\frac{23}{5}) + 5}{2\times\left(-\frac{23}{5}\right) + 7}$

On substituting $x = -\frac{23}{7}$ we get

$\frac{3\times(-\frac{23}{5}) + 5}{2\times\left(-\frac{23}{5}\right) + 7}$

$\frac{-\frac{69}{5} + 5}{-\frac{46}{5} + 7}$

$\frac{\frac{-69+25}{5}}{\frac{-46+35}{5}}$

$-\frac{44}{-11} = 4$

We got LHS=RHS

5. Question

Slove the following equations and verify your answer:

$\frac{2y + 5}{y + 4} = 1$

Answer

$\frac{2y + 5}{y + 4} = 1$

On cross multiplication, we get

$2y + 5 = y + 4$

On transposing y to LHS and 5 to RHS

$2y - y = 4 - 5$

$y = -1$

Check:

Taking LHS

$$\frac{2y+5}{y+4}=$$

On substituting $y=-1$ we get

$$\frac{2\times(-1)+5}{-1+4}$$

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

We got LHS=RHS

6. Question

Slove the following equations and verify your answer:

$\frac{2x+1}{3x-2}=\frac{5}{9}$

Answer

$$\frac{2x+1}{3x-2}=\frac{5}{9}$$

On cross multiplication, we get

$$9(2x+1)=5(3x-2)$$

$$18x+9=15x-10$$

On transposing $15x$ to LHS and 9 to RHS

$$18x-15x=-9-10$$

$$3x=-19$$

$$x=-\frac{19}{3}$$

Check:

Taking LHS

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

On substituting $y=-\frac{19}{3}$ we get

$$\frac{2\times\left(-\frac{19}{3}\right)+1}{3\times\left(-\frac{19}{3}\right)-2}$$

$$\frac{-\frac{38}{3}+1}{-19-2}$$

$$\frac{\frac{-38+3}{3}}{-21}$$

$$\frac{-35}{-63}=\frac{5}{9}$$

We got LHS=RHS

7. Question

Solve the following equations and verify your answer:

$\frac{1-9y}{19-3y}=\frac{5}{8}$

Answer

$$\frac{1-9y}{19-3y}=\frac{5}{8}$$

On cross multiplication, we get

8(1 - 9y) = 5(19 - 3y)-72y + 8 = 95 - 15y

On transposing - 15y to LHS and 8 to RHS

-72y + 15y = 95 - 8-57y = 87

$$y=-\frac{29}{19}$$

Check:

Taking LHS

$$\frac{1-9y}{19-3y}$$

On substituting $y=-\frac{29}{19}$ we get

$$\frac{1-9\times-\frac{29}{19}}{19-3\times-\frac{29}{19}}$$

$$\frac{\frac{19+261}{19}}{\frac{361+87}{19}}$$

$$\frac{280\times19}{448\times19}$$

$$\frac{280}{448}=\frac{70}{112}=\frac{5}{8}$$

We got LHS = RHS

8. Question

Slove the following equations and verify your answer:

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

Answer

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

On cross multiplication, we get

$$3x+1=2x$$

On transposing $2x$ to LHS and 1 to RHS

$$3x-2x=-1$$

$$x=-1$$

Check:

Taking LHS

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

On substituting $x = -1$ we get

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

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

We got LHS=RHS

9. Question

Slove the following equations and verify your answer:

$$\frac{y-(7-8y)}{9y-(3+4y)} = \frac{2}{3}$$

Answer

$$\frac{y-(7-8y)}{9y-(3+4y)} = \frac{2}{3}$$

$$\frac{y-7+8y}{9y-3-4y} = \frac{2}{3}$$

$$\frac{-7+9y}{5y-3} = \frac{2}{3}$$

On cross multiplication, we get

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

$$27y-21 = 10y-6$$

On transposing $10y$ to LHS and -21 to RHS

$$27y-10y = 21-6$$

$$17y = 15$$

$$y = \frac{15}{17}$$

Check:

Taking LHS

$$\frac{y-(7-8y)}{9y-(3+4y)}$$

On substituting $x = \frac{15}{17}$ we get

$$\frac{\frac{15}{17}-(7-8\times\frac{15}{17})}{9\times\frac{15}{17}-(3+4\times\frac{15}{17})}$$

$$\frac{\frac{15}{17}-(7-\frac{120}{17})}{\frac{135}{17}-(3+\frac{60}{17})}$$

$$\frac{\frac{15}{17}-(\frac{119-120}{17})}{\frac{135}{17}-(\frac{51+60}{17})}$$

$$\frac{\frac{15}{17}-\frac{-1}{17}}{\frac{135}{17}-\frac{111}{17}}$$

$$\frac{\frac{15+1}{17}}{\frac{135-111}{17}}$$

$$\frac{\frac{16}{17}}{\frac{24}{17}}=\frac{16}{24}=\frac{2}{3}$$

We got LHS=RHS

10. Question

Slove the following equations and verify your answer:

$$\frac{6}{2x-(3-4x)}=\frac{2}{3}$$

Answer

$$\frac{6}{2x-(3-4x)}=\frac{2}{3}$$

$$\frac{6}{2x-3+4x}=\frac{2}{3}$$

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

On cross multiplication, we get

$$-6+12x=18$$

$$12x=18+6$$

$$x=2$$

Check:

Taking LHS

$$\frac{6}{2x-(3-4x)}$$

On substituting $x=2$ we get

$$\frac{6}{2\times2-(3-4\times2)}$$

$$\frac{6}{4-(3-8)}$$

$$\frac{6}{4+5}=\frac{6}{9}=\frac{2}{3}$$

We got LHS=RHS

11. Question

Slove the following equations and verify your answer:

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

Answer

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

LCM of 2 and 3 is 6

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

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

On cross multiplication, we get

$$6x = -60$$

$$x = -10$$

Check:

Taking LHS

$$\frac{2}{3x} - \frac{3}{2x}$$

On substituting $x = -10$ we get

$$\frac{2}{3\times(-10)} - \frac{3}{2\times(-10)}$$

$$\frac{2}{-30} - \frac{3}{-20}$$

$$\frac{2}{-30} + \frac{3}{20}$$

$$\frac{-4+9}{60}$$

$$\frac{5}{60} = \frac{1}{12}$$

We got LHS=RHS

12. Question

Slove the following equations and verify your answer:

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

Answer

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

On transposing $\frac{3x+4}{4x+7}$ to LHS

$$\frac{3x+5}{4x+2}-\frac{3x+4}{4x+7}=0$$

On taking LCM of the denominators, we get

$$\frac{(3x+5)(4x+7)-(3x+4)(4x+2)}{(4x+2)(4x+7)}=0$$

On cross multiplication, we get

$$(3x+5)(4x+7)-(3x+4)(4x+2)=0$$

On opening the brackets:

$$3x(4x+7)+5(4x+7)-\{3x(4x+2)+4(4x+2)\}=0$$

$$12x^2+21x+20x+35-12x^2-6x-16x-8=0$$

$$19x+35-8=0$$

$$x=-\frac{27}{19}$$

Check:

Taking LHS

$$\frac{3x+5}{4x+2}$$

On substituting $x=-\frac{27}{19}$ we get

$$\frac{3\times(-\frac{27}{19})+5}{4\times(-\frac{27}{19})+2}$$

$$\frac{-\frac{81}{19}+5}{-\frac{108}{19}+2}$$

$$\frac{\frac{-81+95}{19}}{\frac{-108+38}{19}}$$

$$\frac{\frac{14}{19}}{\frac{-70}{19}}=-\frac{14}{70}=-\frac{1}{5}$$

Taking RHS

$$\frac{3x+4}{4x+7}$$

On substituting $x=-\frac{27}{19}$ we get

$$\frac{3\times(-\frac{27}{19})+4}{4\times(-\frac{27}{19})+7}$$

$$\frac{-\frac{81}{19}+4}{-\frac{108}{19}+7}$$

$$\frac{\frac{-81+76}{19}}{\frac{-108+133}{19}}$$

$$\frac{\frac{-5}{19}}{\frac{25}{19}} = -\frac{1}{25} = -\frac{1}{5}$$

We got LHS=RHS

13. Question

Slove the following equations and verify your answer:

$$\frac{7x-2}{5x-1} = \frac{7x+3}{5x+4}$$

Answer

$$\frac{7x-2}{5x-1} = \frac{7x+3}{5x+4}$$

On transposing $\frac{7x+3}{5x+4}$ to LHS

$$\frac{7x-2}{5x-1} - \frac{7x+3}{5x+4} = 0$$

On taking LCM of the denominators, we get

$$\frac{(7x-2)(5x+4)-(7x+3)(5x-1)}{(5x-1)(5x+4)} = 0$$

On cross multiplication, we get

$$(7x-2)(5x+4)-(7x+3)(5x-1) = 0$$

On opening the brackets:

$$7x(5x+4)-2(5x+4)-\{7x(5x-1)+3(5x-1)\} = 0$$

$$35x^2+28x-10x-8-35x^2+7x-15x+3 = 0$$

$$10x-5 = 0$$

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

Check:

Taking LHS

$$\frac{7x-2}{5x-1}$$

On substituting $x = \frac{1}{2}$ we get

$$\frac{7\times\frac{1}{2}-2}{5\times\frac{1}{2}-1}$$

$$\frac{\frac{7}{2}-2}{\frac{5}{2}-1}$$

$$\frac{\frac{7-4}{2}}{\frac{5-2}{2}}$$

$$\frac{\frac{3}{2}}{\frac{3}{2}} = 1$$

Taking RHS

$$\frac{7x+3}{5x+4}$$

On substituting $x = \frac{1}{2}$ we get

$$\frac{7\times\frac{1}{2}+3}{5\times\frac{1}{2}+4}$$

$$\frac{\frac{7}{2}+3}{\frac{5}{2}+4}$$

$$\frac{\frac{7+6}{2}}{\frac{5+8}{2}}$$

$$\frac{\frac{13}{2}}{\frac{13}{2}} = 1$$

We got LHS=RHS

14. Question

Solve the following equations and verify your answer:

$$\left(\frac{x+1}{x+2}\right)^2 = \frac{x+2}{x+4}$$

Answer

$$\frac{(x+1)^2}{(x+2)^2} = \frac{x+2}{x+4}$$

On transposing $\frac{x+2}{x+4}$ to LHS

$$\frac{(x+1)^2}{(x+2)^2} - \frac{x+2}{x+4} = 0$$

On taking LCM of the denominators, we get

$$\frac{(x+1)^2(x+4) - (x+2)(x+2)^2}{(x+2)^2(x+4)} = 0$$

On cross multiplication, we get

$$(x+1)^2(x+4) - (x+2)(x+2)^2$$

On opening the brackets:

$$(x^2+2x+1)(x+4) - \{(x+2)(x^2+4x+4\} = 0$$

$$x^3+2x^2+x+4x^2+8x+4 - \{x^3+4x^2+4x+2x^2+8x+8\} = 0$$

$$x^3+2x^2+x+4x^2+8x+4-x^3-4x^2-4x-2x^2-8x-8=0$$

$$-3x-4=0$$

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

On opening the brackets:

Check:

Taking LHS

$$\frac{(x+1)^2}{(x+2)^2}$$

On substituting $x=-\frac{4}{3}$ we get

$$\frac{(-\frac{4}{3}+1)^2}{(-\frac{4}{3}+2)^2}$$

$$\frac{(\frac{-4+3}{3})^2}{(\frac{-4+6}{3})^2}=\frac{1}{4}$$

Taking RHS

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

On substituting $x=-\frac{4}{3}$ we get

$$\frac{-\frac{4}{3}+2}{-\frac{4}{3}+4}$$

$$\frac{\frac{-4+6}{3}}{\frac{-4+12}{3}}=\frac{\frac{2}{3}}{\frac{8}{3}}=\frac{1}{4}$$

We got LHS=RHS

15. Question

Slove the following equations and verify your answer:

$$\left(\frac{x+1}{x-4}\right)^2=\frac{x+8}{x-2}$$

Answer

$$\frac{(x+1)^2}{(x-4)^2}=\frac{x+8}{x-2}$$

On transposing $\frac{x+8}{x-2}$ to LHS

$$\frac{(x+1)^2}{(x-4)^2}-\frac{x+8}{x-2}=0$$

On taking LCM of the denominators, we get

$$\frac{(x+1)^2(x-2)-(x+8)(x-4)^2}{(x-4)^2(x-2)}=0$$

On cross multiplication, we get

$$(x+1)^2(x-2)-(x+8)(x-4)^2$$

On opening the brackets:

$$(x^2+2x+1)(x-2)-\{(x+8)(x^2-8x+16\}=0$$

$$x^3+2x^2+x-2x^2-4x-2-\{x^3-8x^2+16x+8x^2-64x+128\}=0$$

$$x^3+2x^2+x-2x^2-4x-2-x^3+8x^2-16x-8x^2+64x-128=0$$

$$45x-130=0$$

$$x=\frac{130}{45}=\frac{26}{9}$$

Check:

Taking LHS

$$\frac{(x+1)^2}{(x-4)^2}$$

On substituting $x=\frac{26}{9}$ we get

$$\frac{(\frac{26}{9}+1)^2}{(\frac{26}{9}-4)^2}$$

$$\frac{(\frac{26+9}{9})^2}{(\frac{26-36}{9})^2}=\frac{1}{4}$$

$$\frac{(\frac{35}{9})^2}{(\frac{-10}{9})^2}=\frac{35\times35}{10\times10}=\frac{49}{4}$$

Taking RHS

$$\frac{x+8}{x-2}$$

On substituting $x=\frac{26}{9}$ we get

$$\frac{\frac{26}{9}+8}{\frac{26}{9}-2}$$

$$\frac{\frac{26+72}{9}}{\frac{26-18}{9}}=\frac{\frac{98}{9}}{\frac{8}{9}}=\frac{98}{8}=\frac{49}{4}$$

We got LHS=RHS

16. Question

Slove the following equations and verify your answer:

$$\frac{9x-7}{3x+5}=\frac{3x-4}{x+6}$$

Answer

$$\frac{9x-7}{3x+5}=\frac{3x-4}{x+6}$$

On transposing $\frac{3x-4}{x+6}$ to LHS

$$\frac{9x-7}{3x+5}=\frac{3x-4}{x+6}$$

On taking LCM of the denominators, we get

$$\frac{(9x-7)(x+6)-(3x-4)(3x+5)}{(3x+5)(x+6)}=0$$

On cross multiplication, we get

$$(9x-7)(x+6)-(3x-4)(3x+5)$$

On opening the brackets:

$$9x^2+54x-7x-42-\{9x^2+15x-12x-20\}=0$$

$$44x-22=0$$

$$x=\frac{22}{44}=\frac{1}{2}$$

Check:

Taking LHS

$$\frac{9x-7}{3x+5}$$

On substituting $x=\frac{1}{2}$ we get

$$\frac{9\times\frac{1}{2}-7}{3\times\frac{1}{2}+5}$$

$$\frac{\frac{9-14}{2}}{\frac{3+10}{2}}=\frac{\frac{-5}{2}}{\frac{13}{2}}=-\frac{5}{13}$$

Taking RHS

$$\frac{3x-4}{x+6}$$

On substituting $x=\frac{1}{2}$ we get

$$\frac{3\times\frac{1}{2}-4}{\frac{1}{2}+6}=\frac{\frac{3-8}{2}}{\frac{1+12}{2}}=-\frac{5}{13}$$

We got LHS=RHS

17. Question

Slove the following equations and verify your answer:

$$\frac{x+2}{x+5}=\frac{x}{x+6}$$

Answer

$$\frac{x+2}{x+5}=\frac{x}{x+6}$$

On transposing $\frac{x}{x+6}$ to LHS

$$\frac{9x-7}{3x+5}-\frac{x}{x+6}$$

On taking LCM of the denominators, we get

$$\frac{(x+2)(x+6)-x(x+5)}{(x+5)(x+6)}=0$$

On cross multiplication, we get

$$(x+2)(x+6)-x(x+5)$$

On opening the brackets:

$$x^2+8x+12-x^2-5x=0$$

$$3x+12=0$$

$$x=-4$$

Check:

Taking LHS

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

On substituting $x=-4$ we get

$$\frac{-4+2}{-4+5}=-2$$

Taking RHS

$$\frac{x}{x+6}$$

On substituting $x=-4$ we get

$$\frac{-4}{-4+6}=-2$$

We got LHS=RHS

18. Question

Slove the following equations and verify your answer:

$$\frac{2x-(7-5x)}{9x-(3+4x)}=\frac{7}{6}$$

Answer

$$\frac{2x-(7-5x)}{9x-(3+4x)}=\frac{7}{6}$$

$$\frac{2x-7+5x}{9x-3-4x}=\frac{7}{6}$$

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

On cross multiplication, we get

$6(7x-7)=7(5x-3)$

$42x-42-35x+21=0$

$7x-21=0$

$x=3$

Check:

Taking LHS

$\frac{2x-(7-5x)}{9x-(3+4x)}$

On substituting $x=3$ we get$\frac{2\times3-(7-5\times3)}{9\times3-(3+4\times3)}$

$\frac{6-(7-15)}{27-(3+12)}$

$\frac{6-(-8)}{27-(15)}=\frac{14}{12}=\frac{7}{6}$

We got LHS=RHS

19. Question

Slove the following equations and verify your answer:

$\frac{15(2-x)-5(x+6)}{1-3x}=10$

Answer

$\frac{15(2-x)-5(x+6)}{1-3x}=10$

$\frac{30-15x-5x-30}{1-3x}=10$

On cross multiplication, we get

$30-15x-5x-30=10-30x$

$-20x+30x=10$

$x=1$

Check:

Taking LHS

$\frac{15(2-x)-5(x+6)}{1-3x}$

On substituting $x=1$ we get$\frac{15(2-1)-5(1+6)}{1-3\times1}$

$\frac{15-35}{1-3}=-\frac{20}{-2}=10$

We got LHS=RHS

20. Question

Slove the following equations and verify your answer:

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

Answer

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

On taking LCM of denominators

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

On cross multiplication, we get

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

On opening brackets, we get

$$x^2+3x-2x-6+x^2-3x+2x-6=2(x^2-3x-2x+6)$$

$$2x^2-12=2x^2-10x+12$$

$$10x=24$$

$$x=\frac{24}{10}=\frac{12}{5}$$

Check:

Taking LHS

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

On substituting $x=\frac{12}{5}$ we get

$$\frac{\frac{12}{5}+3}{\frac{12}{5}-3}+\frac{\frac{12}{5}+2}{\frac{12}{5}-2}$$

$$\frac{\frac{12+15}{5}}{\frac{12-15}{5}}+\frac{\frac{12+10}{5}}{\frac{12-10}{5}}=\frac{\frac{27}{5}}{\frac{-3}{5}}+\frac{\frac{22}{5}}{\frac{2}{5}}=\frac{-27}{3}+\frac{22}{2}=-9+11=2$$

We got LHS=RHS

21. Question

Solve the following equations and verify your answer:

$\frac{(x+2)(2x-3)-2x^2+6}{x-5}=2$

Answer

$$\frac{(x+2)(2x-3)-2x^2+6}{x-5}=2$$

$$\frac{2x^2-3x+4x-6-2x^2+6}{x-5}=2$$

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

On cross multiplication, we get

2x - 10 = x2x - x = 10x = 10

Check:

Taking LHS

$$\frac{(x+2)(2x-3)-2x^2+6}{x-5}$$

On substituting $x = 10$ we get

$$\frac{(10+2)(2\times10-3)-2\times10^2+6}{10-5}$$

$$\frac{(12)(20-3)-200+6}{5}$$

$$\frac{(12)(17)-200+6}{5}=\frac{204-194}{5}=\frac{10}{5}=2$$

We got LHS=RHS

22. Question

Slove the following equations and verify your answer:

$$\frac{x^2-(x+1)(x+2)}{5x+1}=6$$

Answer

$$\frac{x^2-(x+1)(x+2)}{5x+1}=6$$

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

On cross multiplication, we get

$$-3x-2=30x+6$$

$$-33x=8$$

$$x=\frac{-8}{33}$$

Check:

Taking LHS

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

On substituting $x=-\frac{8}{33}$ we get

$$\frac{(-\frac{8}{33})^2-\left(-\frac{8}{33}+1\right)\left(-\frac{8}{33}+2\right)}{5\times(-\frac{8}{33})+1}$$

$$\frac{\frac{64}{1089}-(\frac{25}{33}\times\frac{58}{33})}{5\times(-\frac{8}{33})+1}=\frac{\frac{64}{1089}-\frac{1450}{1089}}{\frac{-40+33}{33}}$$

$$\frac{\frac{64-1450}{1089}}{\frac{-7}{33}} = \frac{-1386\times33}{1089\times-7} = \frac{1386}{33\times7} = 6$$

We got LHS=RHS

23. Question

Slove the following equations and verify your answer:

$\frac{(2x+3)-(5x-7)}{6x+11} = -\frac{8}{3}$

Answer

$$\frac{(2x+3)-(5x-7)}{6x+11} = -\frac{8}{3}$$

$$\frac{2x+3-5x+7}{6x+11} = -\frac{8}{3}$$

$$\frac{-3x+10}{6x+11} = -\frac{8}{3}$$

On cross multiplication, we get

$$3(-3x+10) = -8(6x+11)$$

$$-9x+30 = -48x-88$$

$$-9x+48x = -88-30$$

$$39x = -118$$

$$x = -\frac{118}{39}$$

Check:

Taking LHS

$$\frac{(2x+3)-(5x-7)}{6x+11}$$

On substituting $x = -\frac{118}{39}$ we get

$$\frac{\left(2\times-\frac{118}{39}+3\right)-\left(5\times-\frac{118}{39}-7\right)}{6\times-\frac{118}{39}+11} = \frac{\left(\frac{-336}{39}+3\right)-\left(-\frac{590}{39}-7\right)}{-\frac{708}{39}+11}$$

$$\frac{\left(\frac{-336+117}{39}\right)-\left(\frac{-590-273}{39}\right)}{\frac{-708+429}{39}} = \frac{\frac{-219+863}{39}}{\frac{-279}{39}}$$

$$\frac{644}{-279} = -\frac{8}{3}$$

We got LHS=RHS

24. Question

Find a positive value of x for which the given equation is satisfied:

(i) $\frac{x^2-9}{5+x^2} = -\frac{5}{9}$

(ii) $\frac{y^2+4}{3y^2+7}=\frac{1}{2}$

Answer

(i) $\frac{x^2-9}{5+x^2}=-\frac{5}{9}$

On cross multiplication, we get

$9x^2-81=-25-5x^2$

On transposing $5x^2$ to LHS and -81 to RHS

$9x^2+5x^2=-25+81$

$14x^2=56$

$x^2=4$

$x=2$

(ii) $\frac{y^2+4}{3y^2+7}=\frac{1}{2}$

On cross multiplication, we get

$2x^2+8=3y^2+7$

On transposing $3y^2$ to LHS and 8 to RHS

$2y^2-3y^2=7-8$

$-y^2=-1$

$y=1$

Exercise 9.4

1. Question

Four-fifth of a number is more than three-fourth of the number by 4. Find the number.

Answer

Let the number is x

According to the question:

Three-fourth of the number is $=\frac{3x}{4}$

Fourth-fifth of the number is $=\frac{4x}{5}$

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

LCM of 5 and 4 is 20

$\frac{16x-15x}{20}=4$

$x=80$

Therefore number is 80

2. Question

The difference between the squares of two consecutive numbers is 31. Find the numbers.

Answer

Let the two consecutive numbers are x - 1 and x

According to the question:

$$x^2 - (x-1)^2 = 31$$

$x^2 - (x^2 - 2x + 1) = 31$ [As, $(a - b)^2 = a^2 + b^2 + 2ab$]

$$x^2 - x^2 + 2x - 1 = 31$$

$$2x = 31 + 1$$

2x = 32

x = 16

Therefore two consecutive numbers are: (16 - 1) and 16 = 15 and 16

3. Question

Find a number whose double is 45 greater than its half.

Answer

Let the number is x

According to the question:

$$2x - \frac{x}{2} = 45$$

$$\frac{4x - x}{2} = 45$$

$$3x = 90$$

$$x = 30$$

Therefore the number is 30

4. Question

Find a number such that when 5 is subtracted from 5 times that number, the result is 4 more than twice the number.

Answer

Let the number is "x"

Then, five times the number will be = 5x

And, two times the number will be = 2x

then, According to the question:

5x - 5 = 2x + 4

On transposing 2x to LHS and -5 to RHS,

5x - 2x = 5 + 4

3x = 9

x = 9/3

x = 3

Therefore the number is 3

5. Question

A number whose fifth part increased by 5 is equal to its fourth part diminished by 5. Find the number.

Answer

Let the number is x

According to the question:

$$\frac{x}{5}+5=\frac{x}{4}-5$$

On transposing $\frac{x}{5}$ to RHS and -5 to LHS

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

$$\frac{4x-5x}{20}=-10$$

$$-x=-200$$

$$x=200$$

Therefore the number is 200

6. Question

A number consists of two digits whose sum is 9. If 27 is su btracted from the number the digits are reversed. Find the number.

Answer

Let the one didgit of a two digit number is x

Other digit is 9-x

Original two digit number is $10(9-x)+x$

Number obtained after interchanging the digits is $10x+(9-x)$

According to the question:

$$10(9-x)+x-27=\ 10x+(9-x)$$

$$90-10x+x-27=10x+9-x$$

$$-18x=-54$$

$$x=3$$

Therefore the number is $10(9-3)+3=63$

7. Question

Divide 184 into two parts such that one-third of one part may exceed one-seventh of another part by 8.

Answer

Let the one number is x

Other number is 184 - x

According to the question:

one-third of one part may exceed one-seventh of another part by 8.

$$\frac{x}{3}-\frac{184-x}{7}=8$$

$$\frac{7x-552+3x}{21}=8$$

$$10x-552=168$$

$$10x=720\,x=72$$

Therefore one number is 72

Other number is 184-72 = 112

8. Question

The numerator of a fraction is 6 less than the denominator. If 3 is added to the numberator, the fraction is equal to $\frac{2}{3}$. What is the original fraction equal to?

Answer

Let the denominator is x

Numerator is $x-6$

Fraction is : $\frac{Numerator}{Denominator}=\frac{x-6}{x}$

According to the question:

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

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

On cross multiplication, we get

$$3x-9=2x$$

$$x=9$$

Therefore denominator is = 9

Numerator is = $x-6=9-6=3$

Fraction is = $\frac{3}{9}=\frac{1}{3}$

9. Question

A sum of Rs 800 is in the form of denominations of Rs 10 and Rs 20. If the total number of notes be 50. Find the number of notes of each type.

Answer

Let the number of notes of Rs 10 are x

Number of notes of Rs 20 are $50-x$

Amount due to Rs 10 notes = $10\times x=10x$

Amount due to Rs 20 notes = $20\times(50-x)=1000-20x$

According to the question total amount = Rs 800

$$10x+1000-20x=800$$

$-10x = 800 - 1000$

$x = 20$

Therefore the number of notes of Rs 10 are 20

Number of notes of Rs 20 are $50 - 20 = 30$

10. Question

Seeta Devi has Rs 9 in fifty- paise and twenty five-paise coins. She has twice as may twenty- five paise coins as she has fifty- paise coins. How many coins of each kind does she have?

Answer

Let the number of coins of fifty paise are x

Number of coins of twenty five paise are $2x$

Amount due to fifty paise coins = $\frac{50 \times x}{100} = 0.50x$

Amount due to twenty five paise coins = $\frac{25 \times 2x}{100} = 0.50x$

According to the question total amount = Rs 9

$0.50x + 0.50x = 9$

$x = 9$

Therefore the number of coins of fifty paise are 9

Number of coins of twenty five paise are $2x = 2 \times 9 = 18$

11. Question

Sunita is twice as old as Ashima. If six years is subtracted from Ashima's age and four years added to Sunita's age, then Sunita will be four times Ashim's age. How old were they two years ago?

Answer

Let the present age of Ashima is x years

Present age of Sunita is 2x years

Ashima's new age = (x - 6) years

Sunita's new age = (2x + 4) years

According to the question:

$(2x + 4) = 4(x - 6)$

$2x + 4 = 4x - 24$

$2x - 4x = -4 - 24$

$-2x = -28$

$x = 14$

Therefore the age of Ashima is 14 years

Age of Sunita is 28 years

Two years agp, age of ashima = 14 - 2 = 12 yearsage of Sunita = 28 - 2 = 26 years

12. Question

The ages of Sonu and Monu are in the ratio 7:5 Ten years hence, the ratio of their ages will be 9:7 find their present ages.

Answer

Let the present age of Sonu is $7x$ years

Present age of Monu is $5x$ years

Sonu's age after 10 years = $(7x + 10)$ years

Monu's age after 10 years = $(5x + 10)$ years

According to the question:

$$\frac{7x + 10}{5x + 10} = \frac{9}{7}$$

On cross multiplication, we get

$$49x + 70 = 45x + 90$$

$$49x - 45x = 90 - 70$$

$$4x = 20$$

$$x = 5$$

Therefore present age of Sonu is $7x = 7\times5 = 35$ years

Present age of Monu is $5x = 5\times5 = 25$ years

13. Question

Five years ago a man was seven times as old as his son. Finve years hence, the father will be three times as old as his son. Find their present ges.

Answer

Five years ago let the age of son was x years

Five years ago the age of man was $7x$ years

After five years the age of son is $x + 5$ years

After five years the the age of man is $7x + 5$ years

According to the question:

Five years hence, the relation in their ages is:

$$7x + 5 + 5 = 3(x + 5 + 5)$$

$$7x + 10 = 3(x + 10)$$

$$7x + 10 = 3x + 30$$

$$7x - 3x = 30 - 10$$

$$4x = 20$$

$$x = 5$$

Therefore present age of man is $7x + 5 = 7\times5 + 5 = 40$ years

Present age of son is $x + 5 = 5 + 5 = 10$ years

14. Question

I am currently 5 times as old as his son. In 6 years time I will be three times as old as he will be then. What are our ages now?

Answer

Let the present age of Son is x years

Present age of father is $5x$ years

Son's age after 6 years = $(x+6)$ years

Father's's age after 6 years = $(5x+6)$ years

According to the question:

$5x+6=3(x+6)$

$5x+6=3x+18$

$5x-3x=18-6$

$2x=12$

$x=6$

Therefore present age of Son is 6 years

Present age of father is $5x=5\times6=30$ years

15. Question

I have Rs 1000 in ten and five rupee notes. If the number of ten rupee notes that I have is ten more than the number of five rupee notes, how many notes do I have in each denomination?

Answer

Let the number of five rupess notes are x

Number of ten rupees notes are $x+10$

Amount due to five rupees notes = $5\times x=5x$

Amount due to ten rupees notes = $10(x+10)=10x+100$

According to the question total amount = Rs 1000

$5x+10x+100=1000$

$15x=900$

$x=60$

Therefore the number of five rupess notes are 60

Number of ten rupees notes are $x+10=60+10=70$

16. Question

At a party, colas, squash and frut juice were offered to guests. A fourth of the guests drank colas, a thirk squash, two fifths drank fruit juice and just three did not drink any thing. How many guests were in all?

Answer

Let the number of guests are x

Number of guests who drank colas are $\frac{x}{4}$

Number of guests who drank squash are $\frac{x}{3}$

Number of guests who drank fruit juice are $\frac{2x}{5}$

Number of guests who didn't drink anyting are 3

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

LCM of 3, 4 and 5 is 60

$$\frac{15x+20x+24x-60x}{60}=-3$$

$$-x=-180$$

$$x=180$$

Therefore the number of guests were 180

Number of ten rupees notes are $x+10=60+10=70$

17. Question

There are 180 multiple choice questions in a test. If a candidate gets 4 marks for every correct answer and for every unattempted or wrongly answered question one mark is deducted from the total score of correct answers. If a candidate scored 450 marks in the test, how many questions did he answer correctly?

Answer

Let the number of correct answers are x

Number of wrong answered questions are (180 - x)

Total score due to right answers = 4x

Marks deducted due to wrong answers = 1(180 - x) = 180 - x

According to question:

$$4x-(180-x)=450$$

$$4x-180+x=450$$

$$5x=450+180$$

$$x=\frac{630}{5}$$

$$x=126$$

Therefore number of correct questions are 126

18. Question

A labourer is engaged for 20 days on the condition that he will receive Rs 60 for each day, he works and he will be fined Rs 5 for each day, he is absent. If he receives Rs 745 in all for how many days he remained absent?

Answer

Let the number of absent days are x

Number of present days = $20-x$

Wage for one day work = Rs 60

Fine for absent day = Rs 5

According to the question:

$60(20-x)-5x=745$

$1200-60x-5x=745$

$-65x=745-1200$

$x=7$

Therefore number of absent days are 7 days

19. Question

Ravish has three boxes whose total weight is $60\frac{1}{2}$ Kg. Box B weighs $3\frac{1}{2}$ kg more than box A and box C weighs $5\frac{1}{3}$ kg more than box B. Find the weight of box A.

Answer

Total weight of three boxes is $\frac{121}{2}$ kg

Let the weight of box A is x kg

Weight of box B = $x+\frac{7}{2}$ kg

Weight of box C = $x+\frac{7}{2}+\frac{16}{3}$ kg

According to the question:

$$x+x+\frac{7}{2}+x+\frac{7}{2}+\frac{16}{3}=\frac{121}{2}$$

$$3x=\frac{121}{2}-\frac{7}{2}-\frac{7}{2}-\frac{16}{3}$$

LCM of 2 and 3 is 6

$$3x=\frac{363-21-21-32}{6}$$

$$x=\frac{289}{18}$$

Therefore the weight of box A is $\frac{289}{18}$ kg

20. Question

The numerator of a rational number is 3 less than the denominator. If the denominator is increased by 5 and the numerator by 2, we get the rational number 1/2. Find the rational number.

Answer

Le the denominator is x

Numerator is x - 3

Fraction = $\frac{Numerator}{Denominator}=\frac{x-3}{x}$

According to the question:

Numerator is increased by 2 and Denominator is increased by 5, then fraction is 1/2

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

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

On cross multiplication, we get

2(x - 1) = x + 52x - 2 = x + 52x - x = 2 + 5x = 7

Therefore Denominator = 7

Numerator = x - 3 = 7 - 3 = 4

Therefore fraction = 4/7

21. Question

In a rational number, twice the numerator is 2 more than the denominator If 3 is added to each, the numerator and the denominator. The niw fraction is 2/3. Find the original number.

Answer

Le the numerator is x

Denominator is $2x-2$

Fraction = $\frac{Numerator}{Denominator}=\frac{x}{2x-2}$

According to the question:

Numerator and Denominator are increased by 3, then fraction is $\frac{2}{3}$

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

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

On cross multiplication, we get

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

$$3x+9=4x+2$$

$$3x-4x=2-9$$

$$x=7$$

Therefore numerator =7

Denominator = $2x-2=2\times7-2=12$

Therefore fraction = $\frac{7}{12}$

22. Question

The distance between two stations is 340 km. Two trains start simultaneously from these stations on parallel tracks to cross each other. The speed of one of them is greater then that of the other by 5 km/hr. If the distance between the two trains after 2 hours of their start is 30 km, find the speed of each train.

Answer

Let the speed of one train = x km/hr

Speed of other train = $(x+5)$ km/hr

Distance $= speed \times time$

Distance covered by one train in 2 hrs = $x \times 2 = 2x$ km

Distance covered by other train in 2 hrs = $2(x+5) = (2x+10)$ km

Remaining distance between the train = 30 km

$2x + 2x + 10 + 30 = 340$

$4x = 340 - 40$

$x = 75$

Therefore speed of one train = 75 km/hr

Speed of other train = $x + 5 = 75 + 5 = 80$ km/hr

23. Question

A steamer goes downstream from one point another in 9 hours. It covers the same distance upstream in 10 hours. If the speed of the stream be 1 km/hr, find the speed of the steamer in still water and the distance between the ports.

Answer

Let the speed of steamer = x km/hrSpeed of stream = 1 km/hrDownstream speed = (x + 1) km/hrUpstream speed = (x – 1) km/hrDistance = speed × time ⇒ 9 (x + 1) = 10 (x – 1)9 x + 9 = 10 x – 10x = 10 + 9 = 19 km/hr

Therefore speed of the steamer is 19 km/hrDistance travelled = 9(x + 1) = 9 × 20 = 180 km.

24. Question

Bhagwanti inherited Rs 12000.00. She invested part of it as 10% and the rest at 12%. Her annual income from these investements is Rs 1280.00 How much did she invest at each rate?

Answer

Let one part is Rs xOther part is $Rs(12000 - x)$

One part of investment = $x \times \frac{10}{100} = \frac{10x}{100}$

Other part of investment = $(12000 - x) \times \frac{12}{100} = \frac{144000 - 12x}{100}$

Total investment = 1280

$$\frac{10x}{100} + \frac{144000 - 12x}{100} = 1280$$

$$\frac{10x + 144000 - 12x}{100} = 1280$$

$$\frac{144000 - 2x}{100} = 1280$$

On cross multiplication, we get

$144000 - 2x = 128000$

$-2x = 128000 - 144000$

$-2x = -16000$

$x = 8000$

Therefore one part is Rs 8000 and other part is Rs 4000

25. Question

The length of a rectangle exceeds its breadth by 9 cm. If length and breadth are each increased by 3 cm, the area of the new rectangle will be 84 cm^2 more than that of the given rectangle. Find the length and breadth of the given rectangle.

Answer

Let the breadth of the rectangle is x meter

Length of the rectangle is $(x+9)$ meter

Area of the rectangle = length× breadth = $x(x+9)$ m^2

New length = $x+9+3=x+12$

New breadth = $x+3=x+3$

New area is 84 more than the pevious area:

$(x+12)(x+3)=x(x+9)+84$

$x^2+15x+36=x^2+9x+84$

$15x-9x=84-36$

$6x=48$

$x=8$

Therefore length of the rectangle = 17m and breadth of the rectangle is 17m.

26. Question

The sum of the ages of Anup and his father is 100. When Anup is as old as his father now, he will be five times as old as his son Anuj is now. Anuj will be eight years older than Anup is now, when Anup is as old as his father. What are their ages now?

Answer

Let the age of Anup is x years

Let the age of Anup's father is (100 - x) years

The age of Anuj = $\frac{100-x}{5}$ years

According to the question:

When Anup is as old as his father is now:

Then after (100 - x) years Anuj's age = present age of his father (Anup) + 8

Present age of Anuj + 100 - 2x = Present age of Anup + 8

$\frac{100-x}{5}+(100-2x)=x+8$

$\frac{100-x}{5}-3x=8-100$

$\frac{100-x-15x}{5}=-92$

On cross multiplication, we get

$100-16x=-460$

$-16x=-460-100$

$$x = \frac{560}{16} = 35$$

Therefore age of Anup is 35 years, Age of Anup's father = 100-35 = 65 years

The age of Anuj is = $\frac{100-x}{5} = \frac{100-35}{5} = \frac{65}{5} = 15$ years

27. Question

A lady went shopping and spent half of what she had on buying hankies and gave a rupee to a begger waiting outside the shop. She spent half of what was left of what was left on a lunch and followed that up with a two rupee itp. She spent half of the remaining amount on a book and three rupees on bus fare. When she reached home, she found that she had exactly one rupee left. How much money did she start with?

Answer

Let the amount available with lady is Rs x

Amount spend for hankies and given to bagger = $\frac{x}{2} + 1$

Remaining amount = $x - \left(\frac{x}{2} + 1\right) = \frac{x}{2} - 1 = \frac{x-2}{2}$

Expences for lunch $\left(\frac{x-2}{2}\right) \times \frac{1}{2} = \frac{x-2}{4}$

Amount of tip = Rs 2

Amount remained after lunch = $\left(\frac{x-2}{2}\right) - \frac{x-2}{4} - 2 = \frac{2x-4-x+2-8}{4} = \frac{x-10}{4}$

Amounts spend for books = $\frac{1}{2} \times \frac{x-10}{4} = \frac{x-10}{8}$

Bus fare = Rs 3

Amount left = $\frac{x-10}{4} - \frac{x-10}{8} - 3 = \frac{2x-20-x+10-24}{8} = \frac{x-34}{8}$

According to the question amount left = Re 1

$$\frac{x-34}{8} = 1$$

On cross multiplication, we get

$$x - 34 = 8$$

$$x = 42$$

Therefore original amount with lady was Rs. 42