LINEAR EQUATIONS WITH FRACTIONS

EXAMPLE 1 Solve the equation $\frac{2x-1}{3}+5=\frac{x+3}{4}$.

STEP 1: Determine the L.C.M of the denominators.

L.C.M of 3, 1 and 4 is 12

STEP 2: Multiply each term by the L.C.M.

$$12\left(\frac{2x-1}{3}\right)+12(5)=12\left(\frac{x+3}{4}\right)$$

$$4(2x-1)+60=3(x+3)$$

STEP 3: The fractions have been "eliminated" so that the equation can be solved using already known procedures.

$$4(2x-1)+60=3(x+3)$$

$$8x-4+60=3x+9$$

$$8x+56=3x+9$$

$$8x-3x+56=3x-3x+9$$

$$5x+56=9$$

$$5x+56-56=9-56$$

$$5x=-41$$

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

EXAMPLE 2 Solve the equation

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

SOLUTION

$$12(5)-12\left(\frac{2x-1}{3}\right)=12\left(\frac{x+3}{4}\right)$$

$$60-4(2x-1)=3(x+3)$$

$$60-4(2x-1)=3(x+3)$$

$$60-8x+4=3x+9$$

$$64-8x=3x+9$$

$$64-8x-3x=3x-3x+9$$

$$64-11x=9$$

$$64-64-11x=9-64$$

$$5x=-55$$

$$\frac{-11x}{-11}=\frac{-55}{-11}$$

$$x=5$$

EXAMPLE 3 Solve the equation

$$\frac{5x+2}{4}+\frac{1}{6}=\frac{1-3x}{12}$$

SOLUTION

$$12\left(\frac{5x+2}{4}\right)+12\left(\frac{1}{6}\right)=12\left(\frac{1-3x}{12}\right)$$

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

$$15x+6+2=1-3x$$

$$15x+8=1-3x$$

$$15x+3x+8=1-3x+3x$$

$$18x+8=1$$

$$18x+8-8=1-8$$

$$18x=-7$$

$$\frac{18x}{18}=\frac{-7}{18}$$

$$x=-\frac{7}{18}$$

Solve the following equations

1. $\frac{x-7}{4} = \frac{2x+3}{2}$
2. $\frac{2x-18}{4} = \frac{3x+1}{2}$
3. $\frac{x+9}{5} = \frac{x-7}{10}$
4. $\frac{x+2}{3} + \frac{x-1}{6} = 5$
5. $\frac{x+3}{2} + \frac{x+1}{4} = 10$
6. $\frac{x+3}{10} + \frac{x-2}{5} = 2$
7. $\frac{2x-1}{9} + \frac{x+2}{3} = 0$
8. $\frac{x-1}{4} - \frac{x+3}{2} = -4$
9. $\frac{4x+9}{15} - \frac{x-3}{5} = 1$
10. $\frac{x+4}{3} + \frac{x+1}{2} = 1$
11. $\frac{3x+5}{4} - \frac{x-7}{5} = 1$
12. $\frac{2x-5}{7} - \frac{2x-1}{2} = 3$
13. $\frac{x}{2} + \frac{4x+1}{10} = -8$
14. $\frac{1}{2} + \frac{x-1}{3} = \frac{x}{2}$
15. $x - \frac{x-1}{2} = 0$
16. $\frac{x+3}{8} - \frac{x}{2} = 5$
17. $\frac{x-5}{6} = \frac{x}{4} - 1$
18. $\frac{2x-1}{3} + 2 = \frac{x+1}{4}$
19. $\frac{2x+1}{4} + \frac{1}{6} = \frac{3x+2}{2}$
20. $\frac{1-x}{4} - \frac{2x+2}{6} = \frac{x}{8}$
21. $\frac{x+1}{2} + \frac{2x-1}{4} + \frac{x+2}{3} = 1$
22. $\frac{4x}{3} - \frac{3x-4}{6} = 5 - \frac{x-2}{2}$
23. $\frac{x+1}{2} + \frac{x+2}{3} - \frac{x+3}{4} = 2$
24. $\frac{5x-4}{3} - \frac{4x-3}{2} - 3x - 2 = 0$
25. $\frac{3(2x+7)}{5} - 3 = \frac{5x-2}{3}$

Answers

1. $x = -\frac{13}{3}$
2. $x = -5$
3. $x = -25$
4. $x = 9$
5. $x = 11$
6. $x = 7$
7. $x = -1$
8. $x = 9$
9. $x = -3$
10. $x = -1$
11. $x = -3$
12. $x = -\frac{9}{2}$
13. $x = -9$
14. $x = 1$
15. $x = -1$
16. $x = -\frac{37}{3}$
17. $x = 2$
18. $x = -\frac{17}{5}$
19. $x = -\frac{7}{12}$
20. $x = -\frac{2}{17}$
21. $x = \frac{1}{16}$
22. $x = 4$
23. $x = \frac{19}{7}$
24. $x = -\frac{11}{20}$
25. $x = 4$