

## Lesson 3 - Solve Equations with Rational Coefficients

**Multiplicative inverses, or reciprocals,** are two numbers whose product is 1. To solve an equation in which the coefficient is a fraction, multiply each side of the equation by the reciprocal of the coefficient.

### Example 1

Solve  $15 = 0.5n$ . Check the solution.

RECIPROCAL  
 $-\frac{18}{6} \left(-\frac{6}{18}\right) = \frac{1}{1} = 1$

Write the equation.  
 $15 = 0.5n$   
 Division Property of Equality  
 $\frac{15}{0.5} = \frac{0.5n}{0.5}$   
 $30 = n$   
 Simplify.

$\frac{1}{2}$  IS THE COEFFICIENT

$\frac{1}{2} \left(\frac{1X}{2}\right) = (8)2$   
 $X = 16$

3 IS THE COEFFICIENT

$\frac{3X}{3} = \frac{15}{3}$   
 $X = 5$

$\frac{3}{2} \left(\frac{2}{3}\right) = \frac{6}{6} = 1$

### Example 2

Solve  $\frac{4}{5}x = 8$ . Check your solution.

Write the equation.  
 $\frac{4}{5}x = 8$   
 Multiply each side by the reciprocal of  $\frac{4}{5}$ ,  $\frac{5}{4}$ .  
 $\left(\frac{5}{4}\right)\frac{4}{5}x = \left(\frac{5}{4}\right)8$   
 $x = 10$   
 Simplify.

The solution is 10.

(+)(+) = (+)      (+)(-) = (-)  
 (-)(-) = (+)      (-)(+) = (-)  
 POSITIVE PRODUCT      NEGATIVE PRODUCT

(+) OR (-) = (+)  
 (+) OR (-) = (-)

### Exercises

Solve each equation. Check your solution.

THE COEFFICIENT IS 0.7

1.  $\frac{4.9}{0.7} = \frac{0.7m}{0.7}$   
 $7 = m$

$\begin{array}{r} 4 \\ 0.7 \overline{) 4.9} \\ \underline{2.8} \phantom{0} \\ 2.1 \phantom{0} \\ \underline{2.1} \\ 0 \end{array}$

THE COEFFICIENT IS  $-\frac{6}{18}$

2.  $\frac{18}{6} \left(-\frac{1}{2}\right) = -\frac{6}{18}h \left(-\frac{18}{6}\right)$   
 $\frac{18}{12} = h$   
 $\frac{3}{2} = h$

THE COEFFICIENT IS 4

3.  $\frac{-2.8}{4} = \frac{4b}{4}$   
 $-0.7 = b$   
 $-2.8 = 4(-0.7)$

THE COEFFICIENT IS  $\frac{3}{5}$

4.  $\frac{5}{3} \left(\frac{3}{5}x\right) = \frac{12}{1} \left(\frac{5}{3}\right)$   
 $x = \frac{60}{3}$   
 $x = 20$   
 $\frac{3}{5} \left(\frac{20}{1}\right) = 12$   
 $\frac{60}{5} = 12$

THE COEFFICIENT IS  $\frac{10}{3}$

5.  $\frac{3}{5} \left(\frac{16}{10}\right) = \frac{10}{3}a \left(\frac{3}{10}\right)$   
 $\frac{24}{5} = a$   
 OR  
 $4\frac{4}{5} = a$

THE COEFFICIENT IS 0.3

6.  $\frac{9}{0.3} = \frac{0.3n}{0.3}$   
 $30 = n$   
 $\frac{0.3}{0.3} = 1$

THE COEFFICIENT IS  $\frac{15}{7}$

7.  $\frac{15}{7} \left(\frac{7}{15}y\right) = \frac{3}{1} \left(\frac{7}{15}\right)$   
 $y = \frac{7}{5}$   
 $\frac{15}{7} \left(\frac{7}{5}\right) = 3$

THE COEFFICIENT IS 0.75

8.  $\frac{21}{0.75} = \frac{0.75a}{0.75}$   
 $28 = a$

9.  $\frac{14}{3} = -\frac{7}{9}b$

$0.75 \overline{) 21.00}$   
 $\begin{array}{r} 28 \\ 0.75 \overline{) 21.00} \\ \underline{15.0} \phantom{0} \\ 6.0 \phantom{0} \\ \underline{6.0} \\ 0 \end{array}$   
 $21 = 0.75(28)$

## Lesson 3 Skills Practice

### Solve Equations with Rational Coefficients

Solve each equation. Check your solution.

1.  $3.4a = 57.8$

2.  $-2 = 0.8n$

3.  $\frac{5}{6}k = -20$

7.  $\frac{3}{5}y = 6$

8.  $-15 = \frac{3}{7}b$

9.  $\frac{6}{7}c = 18$

13.  $-\frac{m}{26} = -\frac{1}{2}$

THE COEFFICIENT IS  $\frac{1}{5}$

14.  $5(0.6) = \frac{n}{5} \left( \frac{5}{1} \right)$

15.  $1.5r = -5.07$

19.  $-14 = \frac{7}{9}m$

THE COEFFICIENT IS  $\frac{1}{8}$

20.  $3.2 = \frac{t}{8}$

21.  $\frac{\frac{m}{18}}{18} = -\frac{1}{9}$