

Remember: how you learned to solve 1-step equations last year.

$$\begin{array}{r} x + 3 = 12 \\ -3 \quad -3 \\ \hline x = 9 \end{array}$$

$$\begin{array}{r} 3x = 12 \\ \frac{3x}{3} = \frac{12}{3} \\ \hline x = 4 \end{array}$$

$$\begin{array}{r} x - 3 = 12 \\ +3 \quad +3 \\ \hline x = 15 \end{array}$$

$$\begin{array}{r} \frac{x}{3} = 12 \\ \frac{3 \cdot x}{3} = \frac{12}{3} \\ \hline x = 4 \end{array}$$

Accelerated Math Notes
(Lesson 8.1)
Solving Equations with Rational Coefficients

Recall:

*An equation is a mathematical sentence stating that two expressions are equal.

*A value for the variable that makes an equation true is called a solution.

*Multiplication Property of Equality
If $a = b$ then, $ca = cb$

*Division Property of Equality
If $a = b$ then, $\frac{a}{c} = \frac{b}{c}$ as long as $c \neq 0$.

Solve and check

EX #1 $-4.2x = 840$

$$\begin{array}{r} -4.2x = 840 \\ -4.2 \quad -4.2 \\ \hline x = -200 \end{array}$$

Rewrite and Divide both sides by the coefficient

Do the arithmetic

Use Identity Property

$$\begin{array}{r} 4.2 \overline{)840} \\ \underline{260} \\ 42 \overline{)8400} \\ \underline{84} \end{array}$$

Solve and check

EX #2 $\frac{2}{3}x = -12$

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

Multiply both sides by the reciprocal of the coefficient

Do the arithmetic (Multiplicative Inverse Property)

Use Identity Property

$$x = -18$$

Solve and check

EX #3 $-5x + 2x = -21$

$$-3x = -21$$

Simplify left side of equation.

Divide by the coefficient.

$$\frac{-3x}{-3} = \frac{-21}{-3}$$

Do the arithmetic

Use Identity Property

$$1x = 7$$

$$x = 7$$

Solve and check

EX #4 $-3(2x) = -30$

$$-6x = -30$$

Simplify left side of equation.

Divide by the coefficient.

$$\frac{-6x}{-6} = \frac{-30}{-6}$$

Do the arithmetic

Use Identity Property

$$x = 5$$

Sometimes the rational numbers are constants, not coefficients. Note the difference in how we solve these equations.

$$n + \frac{5}{6} = -\frac{2}{9}$$

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

$$n = \frac{-19}{18}$$

$$\text{or } -1\frac{1}{18}$$

$$\frac{2}{3}n = -\frac{2}{3}$$

$$\frac{3}{2} \cdot \frac{2}{3}n = -\frac{2}{3} \cdot \frac{3}{2}$$

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

Show arithmetic away from equation (to side or below)

$$\frac{-2}{9} - \frac{5}{6}$$

$$\frac{-4}{18} + \frac{-15}{18}$$

$$\frac{-19}{18}$$

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

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

Solve and Check

$$-6x - 10x = 5$$

$$-16x = 5$$

$$\frac{-16x}{-16} = \frac{5}{-16}$$

$$x = \frac{-5}{16}$$

Start with orig. eq.

$$-6x - 10x = 5$$
$$-6\left(\frac{-5}{16}\right) - 10\left(\frac{-5}{16}\right) \stackrel{?}{=} 5$$

$$\frac{30}{16} + \frac{50}{16} \stackrel{?}{=} 5$$

$$\frac{80}{16} \stackrel{?}{=} 5$$

$$5 = 5 \checkmark$$