

Lesson 3.4

Solving Equations Using Multiplication or Division

Essential Question

How can you use multiplication or division to solve equations?

Key Ideas

3.4 Notes

Get out your spiral notebooks!

Multiplication Property of Equality

Words Multiplying each side of an equation by the same number produces an equivalent equation.

Algebra If $a = b$, then $a \cdot c = b \cdot c$.

Division Property of Equality

Words Dividing each side of an equation by the same number produces an equivalent equation.

Algebra If $a = b$, then $a \div c = b \div c$, $c \neq 0$.

Example 1:

a. Solve $\frac{x}{3} = -6$

$$\begin{array}{r} \cdot 3 \mid \cdot 3 \\ \hline x = -18 \end{array}$$

x is being divided by 3

The inverse is to multiply by 3

$$\frac{-18}{3} = -6 \checkmark$$

b. Solve $18 = -4y$

$$\begin{array}{r} \overline{-4} \mid \overline{-4} \\ \hline -4.5 = y \end{array}$$

y is being multiplied by -4

The inverse is to divide by -4

$$-4(-4.5) = +18 \checkmark$$

$$\begin{array}{r} 4.5 \\ \times 4 \\ \hline 18.0 \end{array}$$

Solve the equation. Check your solution.

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

$$\cdot 5 \quad | \quad \cdot 5$$

$$x = -10$$

$$\frac{-10}{5} = -2 \checkmark$$

$$2. -a = -24$$

$$\frac{-1}{-1} \quad | \quad \frac{-1}{-1}$$

$$a = 24$$

$$-24 = -24 \checkmark$$

$$3. 3 = -1.5n$$

$$\frac{-1.5}{-1.5} \quad | \quad \frac{-1.5}{-1.5}$$

$$-2 = n$$

$$-1.5(-2) = 3 \checkmark$$

Example 2:

Solve $-\frac{4}{5}x = -8$.

$$\div -\frac{4}{5} \quad | \quad \div -\frac{4}{5}$$

$$x = 10$$

$$-8 \div \left(-\frac{4}{5}\right)$$

$$\overset{2}{\cancel{-8}} \cdot \left(-\frac{5}{\cancel{4}}\right) = 10$$

$$-\frac{4}{5} \cdot 10 = -\frac{40}{5} = -8 \checkmark$$

Solve the equation. Check your solution.

$$4. -14 = \frac{2}{3}x$$

$$\div \frac{2}{3} \quad \div \frac{2}{3}$$

$$\boxed{-21 = x}$$

$$\cancel{-14} \cdot \frac{3}{2}$$

$$\frac{2}{\cancel{2}} \cdot (\cancel{-21}) = -14$$

$$5. -\frac{8}{5}b = 5$$

$$\div -\frac{8}{5} \quad \div -\frac{8}{5}$$

$$\boxed{b = -\frac{25}{8}}$$

$$5 \cdot (-\frac{5}{8})$$

$$-\frac{\cancel{8}}{5} \cdot (-\frac{25}{\cancel{8}}) = 5$$

$$6. \frac{3}{8}h = -9$$

$$\div \frac{3}{8} \quad \div \frac{3}{8}$$

$$\boxed{h = -24}$$

$$\cancel{-9} \cdot \frac{8}{3}$$

$$\frac{3}{\cancel{3}} \cdot (\cancel{-24}) = -9$$

Example 3:

The record low temperature in Arizona is 1.6 times the record low temperature in Rhode Island. What is the record low temperature in Rhode Island?



Record low temperature in Arizona

AZ is 1.6 times RI

$$\frac{-40}{1.6} = \frac{1.6r}{1.6}$$

$$-25 = r$$

$$\boxed{-25^\circ\text{F}}$$

$$1.6 \overline{)40} \rightarrow 16 \overline{)400}$$

$$\begin{array}{r} 25 \\ 16 \overline{)400} \\ \underline{-32} \\ 80 \\ \underline{-80} \\ 0 \end{array}$$