

Solving One-Step Equations

An equation is a sentence stating that two quantities are equal (contains an equal sign).

Example: $x + 2 = 6$

The value of a variable that makes an equation true is called the solution of the equation.

In the equation $x + 2 = 6$, the solution is $x = 4$.

$x + 2 = 6$ and $x + 4 = 4$ are equivalent equations because they have the same solution.

To solve equations, do the opposite of what's being done to the variable!

To undo addition, subtract.

To undo subtraction, add.

To undo multiplication, divide.

To undo division, multiply.

Example 1: Solve the equation. Check your solution.

$$\begin{array}{l} y + 6 = 9 \\ -6 \quad -6 \\ \hline y = 3 \end{array} \qquad \begin{array}{l} -3 = a \\ -4 \quad -4 \\ \hline -7 = a \end{array}$$

Example 2: The highest recorded temperature in Warsaw, Missouri, is ~~118~~ 118°F . This is 158°F greater than the lowest recorded temperature.

Find the lowest recorded temperature.

$$\begin{array}{r} 118 = 158 + x \\ -158 \quad -158 \\ \hline -40 = x \end{array} \qquad -40^\circ\text{F}$$

Example 3: Solve the equation. Check your solution.

$$\begin{array}{l} y + 3 = 4 \\ -3 \quad -3 \\ \hline y = 1 \end{array} \qquad \begin{array}{l} r + 4 = 42 \\ -4 \quad -4 \\ \hline r = 38 \end{array}$$

Example 4: The average lifespan of a tiger is 17 years. This is 3 years less than the average lifespan of a lion. Write and solve an equation to find the average lifespan of a lion.

$$\begin{array}{r} l - 3 = 17 \\ +3 \quad +3 \\ \hline l = 20 \text{ years} \end{array}$$

Example 5: Solve.

$$\begin{array}{l} -6a = 36 \\ \div -6 \quad \div -6 \\ \hline a = -6 \end{array} \qquad \begin{array}{l} 80 = 6x \\ \div 6 \quad \div 6 \\ \hline 5 = x \end{array} \qquad \begin{array}{l} -9d = -72 \\ \div -9 \quad \div -9 \\ \hline d = 8 \end{array}$$

Example 6: Mrs. Acosta's car can travel an average of 24 miles per gallon of gasoline. Write and solve an equation to find how many gallons she will need for a trip of 348 miles.

$$\begin{array}{r} 24g = 348 \\ \div 24 \quad \div 24 \\ \hline g = 14.5 \text{ gallons} \end{array}$$

Example 7: Solve.

$$\begin{array}{l} \cdot (-3) \\ \frac{y}{-3} = 28 \\ \cdot (-3) \quad \cdot (-3) \\ \hline y = -84 \end{array} \qquad \begin{array}{l} \cdot (5) \\ \frac{m}{5} = -35 \\ \cdot 5 \quad \cdot 5 \\ \hline m = -175 \end{array} \qquad \begin{array}{l} \cdot (-6) \\ \frac{b}{-6} = 30 \\ \cdot (-6) \quad \cdot (-6) \\ \hline b = -180 \end{array}$$

Example 8: The distance d that Lea travels on his bike at a rate of 20 miles per hour for 4 hours is given by the equation $d = 20h$. How far did he ride?

$$d = 20 \cdot 4 \qquad d = 80 \text{ miles}$$