

9 Solve Equations

Key Words

equation
inverse
operation

An **equation** is a mathematical statement that has an equals sign (=). An equation contains two equivalent expressions separated by the equals sign. Examples of equations are shown below.

$$1 + 2 = 3 \quad 5 + x = 6 \quad y = 9 \quad 2z + 1 = 11 - 2$$

The solution to an equation is the value(s) for a variable that makes the expressions equal to each other. To solve an equation, use an **inverse operation** to get the variable by itself on one side of the equation. Whatever you do to one side of the equation must be done to the other side. Then substitute your answer for the variable to see if it makes the equation true.

Example

Agatha earns \$8.25 per hour at the movie theater. She earned \$66 one weekend. How many hours did she work that weekend?

Write an equation to represent the problem.

Let h = the number of hours Agatha worked.

She worked for h hours at \$8.25 per hour, so she earned $\$8.25 \times h$ or $\$8.25h$.

She earned \$66 in all.

$$8.25h = 66$$

Solve the equation.

Divide both sides by 8.25 to get h by itself.

$$8.25h = 66$$

$$\frac{8.25h}{8.25} = \frac{66}{8.25}$$

$$h = 8$$

Check the answer by substituting the value for the variable.

$$8.25h = 66$$

$$8.25(8) = 66$$

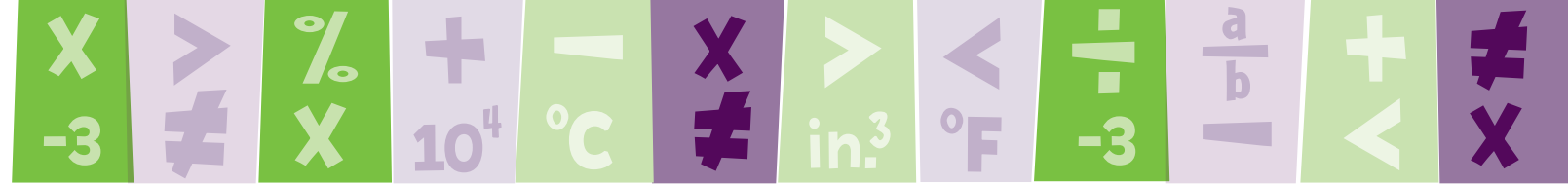
$$66 = 66$$

Agatha worked 8 hours that weekend.

DEMONSTRATE

Solve for n in the equation below.

$$285 + n = 436$$



Guided Practice

1 Which value, if any, from the set $\{10, 11, 12\}$ makes $5y = 60$ true?

Step 1 Substitute the values from the set in the equation.

Try 10:	Try 11:	Try 12:
$5y = 60$	$5y = 60$	$5y = 60$
$5(\underline{\quad}) = 60$	$5(\underline{\quad}) = 60$	$5(\underline{\quad}) = 60$
$\underline{\quad} \stackrel{?}{=} 60$	$\underline{\quad} \stackrel{?}{=} 60$	$\underline{\quad} \stackrel{?}{=} 60$

REMEMBER

If a variable has a number directly in front of it, multiply their values.

Step 2 Determine which value makes the equation true.

The value that makes the equation true is _____.

The solution to the equation $5y = 60$ is _____.

2 Henri earned \$9 performing chores for his neighbors. Combined with his allowance, he has \$21. How much is Henri's allowance?

Step 1 Write an equation to represent the problem.
Let a = the amount of Henri's allowance.

REMEMBER

A variable is used to represent any unknown number.

Henri earned \$9. Combined with the allowance, he has \$21.

$$\begin{array}{ccccccc}
 \downarrow & & \downarrow & & \downarrow & & \downarrow & \downarrow \\
 \underline{\quad} & + & \underline{\quad} & = & \underline{\quad} & & &
 \end{array}$$

Step 2 Solve the equation.

Use an inverse operation to get the variable by itself.

$$\begin{aligned}
 9 + a &= 21 \\
 9 - \underline{\quad} + a &= 21 - \underline{\quad} \\
 a &= \underline{\quad}
 \end{aligned}$$

REMEMBER

Whatever is done to the equation must be done to both sides of the equation.

Henri's allowance is _____.