

Define Algebraic Equations

An algebraic equation is a mathematical statement that says that the algebraic expression on one side of an equals sign HAS THE SAME VALUE AS the expression on the other side of the equals sign.

Solve 1-Step Equations: Addition & Subtraction

Scenario	Anticipate the Answer ✓	Write and Solve Algebraic Equation
Sam buys a t-shirt. He has a coupon for \$5 off. He spent \$8. What was the original price of the t-shirt?	$\begin{array}{r} \$13.00 \\ \hline \end{array}$ $8 + 5 = 13$	$t = \text{Price of t-shirt}$ $\begin{array}{r} t - 5 = 8 \\ + 5 \quad + 5 \\ \hline t = 13 \end{array}$
Sarah has 2 apples. Her uncle brings home a bag of apples. Now she has 7 apples. How many apples were in the bag?	$\begin{array}{r} 5 \text{ apples} \\ \hline \end{array}$ $7 - 2 = 5$	$a = \text{apples in a bag}$ $\begin{array}{r} a + 2 = 7 \\ - 2 \quad - 2 \\ \hline a = 5 \end{array}$
Michael owes Derek \$7. After he gets paid to dog-walk, Michael pays his debt and has \$8 left. How much did Michael get paid?	$\begin{array}{r} \$15.00 \\ \hline \end{array}$ $7 + 8 = 15$	$P = \text{ammount paid}$ $\begin{array}{r} -7 + P = 8 \\ + 7 \quad + 7 \\ \hline P = 15 \end{array}$ $\begin{array}{r} P + (-7) = 8 \\ P - 7 = 8 \\ + 7 \quad + 7 \\ \hline P = 15 \end{array}$

What do you notice?

- all problems has variables
- They are all one step equations
- We used inverse operations to get variable by it's self

**To get rid of positives, use -.

**To get rid of negatives, use +.

Example	Words	You Try
1) $-7 = r + 16$ $\begin{array}{r} -16 \quad -16 \\ \hline -23 = r \end{array}$	What's happening to the variable? <u>add 16</u> How do we undo that? <u>subtract 16</u>	4) $5 = n + 9$ $\begin{array}{r} -9 \quad -9 \\ \hline -4 = n \end{array}$
2) $-4 + x = 1$ $\begin{array}{r} +4 \quad +4 \\ \hline x = 5 \end{array}$	What's happening to the variable? <u>add 4</u> How do we undo that? <u>subtract -4 - (+4)</u>	5) $-2 + c = 7$ $\begin{array}{r} +2 \quad +2 \\ \hline c = 9 \end{array}$
3) $y - (-3) = 8$ $\begin{array}{r} y + 3 = 8 \\ -3 \quad -3 \\ \hline y = 5 \end{array}$	What's happening to the variable? <u>subtract (-3)</u> <u>add 3</u> How do we undo that? <u>subtract 3</u>	6) $p - (-2) = -1$ $\begin{array}{r} p + 2 = -1 \\ -2 \quad -2 \\ \hline y = -3 \end{array}$

Solve 1-Step Equations: Multiplication & Division

Scenario	Write the Answer	Write and Solve Algebraic Equation
Harry earns \$8 for each hour he works at his job. He earned \$48 today. How many hours did he work?	6 hours $8 \cdot 6 = 48$ $48 \div 8 = 6$	$h = \text{how many hours}$ $\frac{8h}{8} = \frac{48}{8}$ $h = 6$
Jimmy has a pile of candy that he splits into 10 piles. Each pile has 5 pieces. How many pieces were in the original pile?	50 $5 \cdot 10 = 50$ $50 \div 10 = 5$	$P: \text{pieces in pile}$ $\frac{P}{10} = 5 \cdot 10$ $P = 50$

What do you notice?

multiplication + divide are
inverse operation

**To undo multiplication, use $\div (/)$.

**To undo division, use $\cdot (x)$.

Example	Words	You Try
7) $\frac{3h}{3} = \frac{-9}{3}$ $h = -3$	What's happening to the variable? times 3 How do we undo that? divide by 3	10) $\frac{-4x}{4} = \frac{20}{4}$ ✓ $x = -5$
8) $\frac{n}{75} = 2 \cdot 5$ $n = -10$	What's happening to the variable? divide by (-5) How do we undo that? multi by (-5)	11) $\frac{d}{4} = -8 \cdot 4$ $d = -32$
9) $6 \cdot -4 = \frac{h}{6}$ $-24 = h$	What's happening to the variable? divide by 6 How do we undo that? multiply by 6	12) $7 \cdot 8 = \frac{y}{-7}$ $y = -56$

Key Ideas:

Solving an equation for a variable means isolating the variable.

To do that, we use the inverse operations on both sides.

Addition and subtraction undo each other. Multiplication and division undo each other.

We want the constant term to equal zero. $x + 0 = \# \rightarrow x = \#$

We want the variable term to have a coefficient of one. $1x = \# \rightarrow x = \#$