

# Solving One-Step Addition and Subtraction Equations

If you are given the problem:

$$\text{Solve for } x: \quad x + 10 = 14$$

You probably know, without any work, that  $x = 4$ .

And if the teacher asks you to show work, you want to fight her because the problem is so easy.

Trust your teacher! This problem is easy, maybe all the problems in this lesson will be easy, but you need to learn the first steps to solving algebraic problems. And the key to solving these problems is:

**SHOW YOUR WORK!!!**

Even if you can do the problem in your head, you must show your work. And showing your work involves a little bit of writing.

In the following examples, I will show you exactly how to show your work for full credit.



### Example 1:


Solve the equation and show all of your work.

$$x + 10 = 14$$

The goal, in solving an equation, is to isolate the variable. That means to get the variable alone on one side of the equation and the number on the other side.


The first step is to show the two sides of the equation. Many students find it helpful to put a line down through the equal signs showing both sides.

Step 1: Indicate both sides of the equation.

$$x + 10 = 14$$


The purple line shows the two different sides of the equation.

Step 2: Determine what is keeping the variable from being isolated.

$$x + 10 = 14$$


The variable has a “ + 10 ” with it.

Step 3: Do the opposite of what is with the variable.

The opposite of + 10 is -10.

Therefore, -10 must be added to each side.

$$\begin{array}{r} x + 10 = 14 \\ - 10 \quad -10 \\ \hline \end{array}$$

#### Step 4: Solve.

$$\begin{array}{r} x + 10 = 14 \\ - 10 \quad -10 \\ \hline x + 0 = 4 \\ x = 4 \end{array}$$

The answer is “ $x = 4$ ”.

Now don't get scared! It seemed like a lot of work, but remember, I was showing and explaining each step.

All you have to do is show, not explain.

Let's try another one, this time with just a little explanation.

#### Example 2:

Solve the equation and show all of your work.

$$\begin{array}{r} w - 10 = -2 \\ + 10 = + 10 \\ \hline w + 0 = 8 \\ w = 8 \end{array}$$

*Determine what is with the variable.*

*Do the opposite to both sides.*

*Simplify.*

The answer is “ $w = 8$ ”.

Let's try some more!

**Example 3:**

Solve the equation and show all of your work.

$$y - (-9) = 12$$

$$y - (-9) = 12$$

*Determine what is with the variable.*

$$+ (-9) = + (-9)$$

*Do the opposite to both sides.*

---

$$y + 0 = 3$$
$$y = 3$$

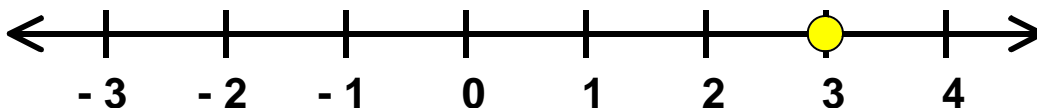
*Simplify.*

The answer is " $y = 3$ ".

There is one more thing that you need to do.

When you find the solution, you need to graph it on a number line. That is another way to show the solution to an equation.

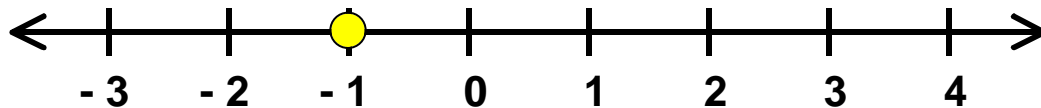
$y = 3$  is graphed like this:



Now, let's try something different.

Example 4:

Choose the equation whose solution is graphed.



a.  $-3 = t - 2$

b.  $-3 = t + 2$

c.  $3 = t - 2$

d.  $3 = t + 2$

Solve each equation and show your work.

a. 
$$\begin{array}{r} -3 = t - 2 \\ +2 = +2 \\ \hline -1 = t + 0 \\ -1 = t \end{array}$$

b. 
$$\begin{array}{r} -3 = t + 2 \\ -2 = -2 \\ \hline -5 = t + 0 \\ -5 = t \end{array}$$

c. 
$$\begin{array}{r} 3 = t - 2 \\ +2 = +2 \\ \hline 5 = t + 0 \\ 5 = t \end{array}$$

d. 
$$\begin{array}{r} 3 = t + 2 \\ -2 = -2 \\ \hline 1 = t + 0 \\ 1 = t \end{array}$$

Since the solution graphed is  $-1$ , the correct answer would be **a**.