# 2-step problems

2-step problems are problems in which you need to not only solve an equation for the value of a variable (say $x$), but then also use the solution to evaluate some expression that depends on that variable.

There are a couple things you need to remember in order to solve 2-step problems. The first is how to solve equations, and the second is to remember that after you've solved the equation you need to finish the problem and find what they're actually asking you for!

To solve equations, we'll follow these steps:

1. Simplify both sides of the equation as much as possible using the order of operations (distribute, combine like terms, etc.)

2. If the variable (letter) you're trying to solve for appears on both sides of the equation, move one of them to the other side. Get all your "$x$'s to Texas," that is, get all the $x$'s to one side of the equation.

3. Solve by working backwards from the order of operations (PEMDAS). Use inverse operations (operations that undo each other, such as using subtraction to undo addition, and using division to undo multiplication) until the variable is alone, and remember to do the same thing to both sides of the equation so that it stays balanced.

**Example**

If $6x - 4 = 8$, what is $x + 3$?

First, solve the equation $6x - 4 = 8$. Work backwards from the order of operations and add $4$ to both sides of the equation.

$$6x - 4 + 4 = 8 + 4$$

$$6x = 12$$

Divide both sides by $6$.

$$\frac{6x}{6} = \frac{12}{6}$$

$$x = 2$$

We're not done! Now we need to find $x + 3$, so plug in $2$ for $x$ and simplify.

$$2 + 3$$

$$5$$

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Let's try another example of 2-step problems.

**Example**

If $-2(3x + 5) = -34$, what is $6x - 7$?

First, solve the equation $-2(3x + 5) = -34$. We need to divide both sides by $-2$.

$$\frac{-2(3x + 5)}{-2} = \frac{-34}{-2}$$

$$3x + 5 = 17$$

Subtract $5$ from both sides.

$$3x + 5 - 5 = 17 - 5$$

$$3x = 12$$

Divide both sides by $3$.

$$\frac{3x}{3} = \frac{12}{3}$$

$$x = 4$$

Now, in the expression $6x - 7$, plug in $4$ for $x$ and simplify.

$$6x - 7$$

$$6(4) - 7$$

$$24 - 7$$

$$17$$