

Two-Step Equations

Just like the name says, **two-step equations take two steps to solve**. We need to apply two different operations to both sides of the equation. Study the examples carefully. It is not difficult at all!

Example 1. Solve $2x + 3 = -5$.

On the side of the unknown (left), there is a multiplication by 2 and an addition of 3. To isolate the unknown, we need to undo those operations.

$$\begin{array}{l} 2x + 3 = -5 \\ 2x = -8 \\ x = -4 \end{array} \left| \begin{array}{l} - 3 \\ \div 2 \end{array} \right.$$

Check:

$$2 \cdot (-4) + 3 \stackrel{?}{=} -5$$

$$-8 + 3 \stackrel{?}{=} -5$$

$$-5 = -5 \quad \checkmark$$

What if you divide first?

In this equation you *could* start by dividing by 2 and then subtract next. However, it is easier to subtract first, then divide, because that way you avoid dealing with fractions.

The solution below shows the steps if you divide by 2 first. Notice that the 3 on the left side also has to be divided by 2 to become $3/2$.

$$\begin{array}{l} 2x + 3 = -5 \\ x + (3/2) = -5/2 \\ x = -5/2 - 3/2 \\ x = -4 \end{array} \left| \begin{array}{l} \div 2 \\ - 3/2 \end{array} \right.$$

1. Solve. Check your solutions (as always!).

a. $5x + 2 = 67$

b. $3y - 2 = 71$

c. $-2x + 11 = 75$

d. $8z - 2 = -98$