Simple equations

To solve simple equations, start by thinking about what's happening to the variable. For instance, let's think about the equation $x + 5 = 12$. We're adding 5 to x in order to get 12, which means that if we want to get x by itself, we have to get rid of the extra 5.

Well what's the inverse operation of addition? How do we "undo" the addition of 5? Since the inverse operation of addition is subtraction, we'll subtract 5 to undo the addition of 5.

Whatever we do to one side of the equation, we have to do to the other, so if we want to subtract 5 from one side, we have to make sure to subtract 5 from both sides.

How to solve simple equations

In other words, solving simple equations is really just undoing everything that's happening to the variable in order to get the variable by itself.

We'll solve equations by working the order of operations in reverse. So we'll undo all the addition and subtraction first, then we'll undo all the multiplication and division, etc.

We'll keep applying inverse operations until the variable is alone, always remembering to do the same thing to both sides of the equation so that it stays balanced.

Example

Solve the equation for x.

$$x - 3 = 10$$

In this example, 3 is being subtracted from x. To undo that subtraction, we need to add 3 to both sides of the equation.

$$x - 3 + 3 = 10 + 3$$

$$x + 0 = 13$$

Remember that 0 can be added or subtracted from anything and it won't change the value of that thing, which means that $x + 0$ simplifies to just x, and the solution to the equation is

$$x = 13$$

If we plug $x = 13$ back into the original equation, we see that substituting this value makes the equation true.

$$13 - 3 = 10$$

$$10 = 10$$

Let's try another example where we solve a simple equation.

Example

Solve for the variable.

$$3x + 5 = 11$$

In this example, x is being multiplied by 3 and then 5 is being added to the result. To solve for x, we work backwards from the order of operations, so we need to first undo the addition by subtracting 5 from both sides of the equation.

$$3x + 5 - 5 = 11 - 5$$

$$3x + 0 = 6$$

$$3x = 6$$

Now we need to undo the multiplication by 3. Division is the inverse operation of multiplication, so we'll divide both sides by 3.

$$\frac{3x}{3} = \frac{6}{3}$$

$$x = 2$$

If we plug $x = 2$ back into the original equation, we see that substituting this value makes the equation true.

$$3(2) + 5 = 11$$

$$6 + 5 = 11$$

$$11 = 11$$