Solving Some Simple Equations

You probably already know how to solve the equations that we'll see in this section. The point of this section isn't to learn how to solve these equations, but rather to focus on a method for solving these equations that will be helpful for us later in the semester.

First example. Let's begin with the equation $x + 2 = 3$. To solve this equation, we want to isolate the variable x on one side of the equal sign, and to have a known number on the other side of the equal sign (a known number like 4, $\frac{7}{2}$, or π, but nothing with an x or a y etc.).

To isolate the x, we'll want to "erase" the $+2$. You can erase a $+2$ by writing its "opposite" on the other side of the equation. The opposite of adding 2 is subtracting 2. That means

$$x = 3 - 2$$

In other words,

$$x = 1$$

Second example. Let's solve $3x = 6$. To isolate the variable x, we can erase multiplication by 3 if we write its opposite—division by 3—on the other side of the equation. That is,

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

More simply,

$$x = 2$$

Third example. To isolate x in the equation $4x + 1 = 8$, we'll have to erase multiplication by 4 and adding 1, and the order in which we perform those two tasks matters. Always start with what happens to x LAST.

Let me explain. If you are given a number to use for x, say if $x = 3$, what would you do to find $4x + 1$? First you would multiply x by 4, then you would add 1. Multiply by 4 happens first. What happened last was adding 1. We always start by erasing what happened last.

So, take $4x + 1 = 8$, and erase $+1$ by writing -1 on the other side of the equation:

$$4x = 8 - 1$$

which is
$$4x = 7$$

Now erase the multiplication by 4 by writing division by 4 on the other side of the equation:
$$x = \frac{7}{4}$$

Fourth example. In the equation $2x - 3 = 5$, the first thing that happens to x is that it is multiplied by 2. The second, and last, thing that happens is subtraction by 3.

Start by erasing what happened last:
$$2x = 5 + 3 = 8$$

Then erase the multiplication by 2:
$$x = \frac{8}{2} = 4$$