Grade 7/8 Math

Introduction to Solving Algebraic Equations

Algebraic equations are different than algebraic expressions in that they end up equalling something. When there is a variable, an equation allows you to find out what the variable equals. When we do this, there are some rules that allow us to solve the mystery of the missing number. When it is a simple equation, our minds can easily solve the 'mystery' such as:

$x + 10 = 17$ – in this case, we should be able to tell that the missing number is 7 since **7** plus 10 is 17.

Or

$5x = 15$ – we should be able to figure that **three** times five is 15 and so the x is equal to 3.

We will approach all equations by looking at reversing the operations so that we can be prepared for equations that are much more complex like $2(3x - 5) = -3(3 - x)$

When we are solving an algebraic equation, we are looking at reversing the operation. This means that we have to look at what reverses an operation.

The opposite of adding is subtracting

The opposite of subtraction is addition

The opposite of multiplication is division

The opposite of division is multiplication

The opposite of square is square root

The opposite of square root is square

When we look at a problem, we want to find out what happened to the variable so that we can reverse it. The numbers are always right on the equation and so we look to the equation for our solution.

If we have the following equation, $4x = 24$. We ask the question, "What happened to x?" The answer is, it was multiplied by 4. In order to reverse this, we would divide by 4 so we do that.

$4x / 4 = 24 / 4$ -we do this to both sides and then rewrite it

$x = 6$ - this is the answer.

Here are examples of each of the operations:

$$x + 12 = 20$$
$$x + 12 - 12 = 20 - 12$$
$$x = 8$$

$$x - 20 = 9$$
$$x - 20 + 20 = 9 + 20$$
$$x = 29$$

$$5x = 45$$
$$5x / 5 = 45 / 5$$
$$x = 9$$

$$\frac{x}{6} = 7$$
$$\frac{x}{6} \times 6 = 7 \times 6$$
$$x = 42$$

$$x^2 = 36$$
$$\sqrt{x^2} = \sqrt{36}$$
$$x = 6$$

$$\sqrt{x} = 9$$
$$(\sqrt{x})^2 = 9^2$$
$$x = 81$$

TIPS:

Always put your variables (letters) to the left and the numbers to the right. (If you have to switch the variables to the left, do a full swap: $21 = 3x$ becomes $3x = 21$.

If you end up with a negative number, just divide out the negative (switch signs on all terms on both sides). This should only be done at the end.

Practice makes perfect (or at least a lot better). Make sure that you are checking your answers to make sure you are getting the right answers.