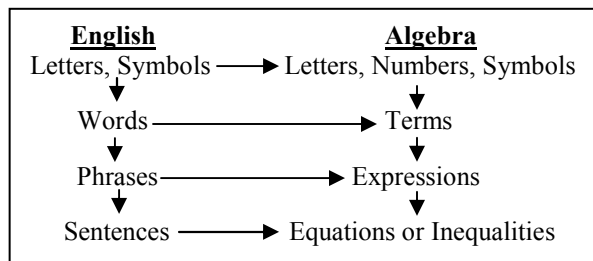


Algebra

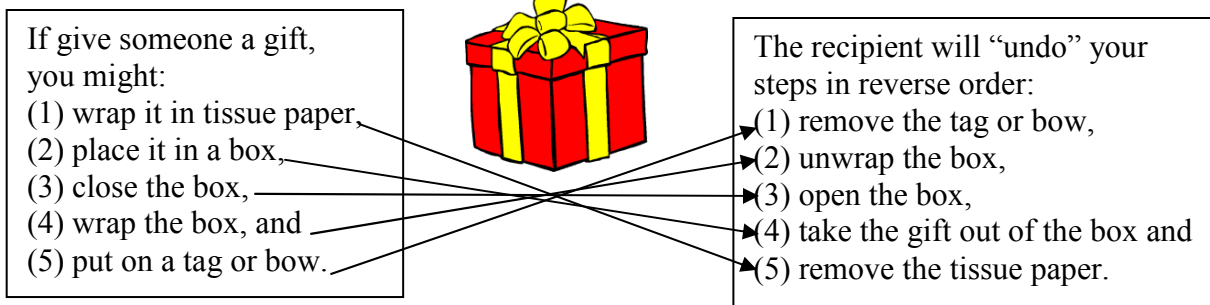
Algebra is a necessary math skill which helps us use formulas and equations instead of having to solve every problem from scratch. It teaches thinking skills and organization.

In many ways, Algebra is like learning a new language. In English we use letters (to form words) and symbols (usually for punctuation). In Algebra, we use numbers and letters (to form “terms”) and symbols to modify these terms. When we combine words, we get phrases, when we combine terms, we get expressions. If we combine words, using a verb and subject, we can get a sentence; if we combine terms using a relation symbol (such as = or >), we can get an equation or inequality.



When we solve an equation or inequality, our goal is to get the variable by itself, with everything else on the opposite side of the equal sign or inequality. We can represent an equation as a pencil balanced on a finger tip. The equal sign is your fingertip. The left and right sides of the pencil do not have to be the same length; they have to have the same mass (value). If we change one end, we have to change the other end the same way.

To get the variable by itself, we need to remove everything that is with the variable. We do this by using the opposite operation. The opposite of “open the door” is “shut the door.” The opposite of “add five” is “subtract five.” We remove the easy ones first, sort of like doing the order of operations in reverse. Try to picture the order in which the problem was created, then undo those steps to solve it.



Now let’s build an Algebra problem. We decide what answer we want the student to get; we’ll use “7.” Think “ $x = 7$ ” Now multiply both sides by 5. Our problem is now $5x = 35$. Then we’ll add 3 to both sides, so that our equation is $5x + 3 = 38$.

Now we give the problem to a student to solve.

$$5x + 3 = 38$$

$$\underline{-3} \quad \underline{-3}$$

$$\underline{5x} = \underline{35}$$

$$\frac{5x}{5} = \frac{35}{5}$$

$$x = 7$$

The student should subtract 3 from both sides to undo our addition.

This gives $5x + 0 = 35$, but we drop the zero.

The student now divides both sides by 5 to undo the multiplication.

The student now knows what number we started with.

We can sum up equation (and inequality) solving with three basic rules:

1. **Get the variable alone.**
2. **Remove the items from easiest to hardest (or reverse order of their use).**
3. **What you do to one side, you do to the other.**