Quantitative Aptitude

Modern Algebra

Improve your test grades with these 4 simple algebra tips!!

These 4 very simple tricks and tips can help you avoid those stupid mistakes that we all make on tests. You know, the small errors that throw off your answers and take your A and turn it into a C? Well I have the solution! If you take advantage of these small, important shortcuts, I guarantee you will make less mistakes in your algebra. The goal is to stop thinking of math so formally. Ditch the conventional methods, and skip some steps that really need not be shown. I will show you where skipping steps is absolutely necessary, or else you can make those stupid mistakes I mentioned above.

Sign Change vs. Multiply by -1

How many times have you made a mistake by forgetting to put a negative sign or maybe put one in by mistake? I don't claim that I can stop you from doing this in every situation, but this will eliminate some of your errors for sure.
Alright, we all know that too many negative signs tend to make things look more complicated. If were dealing with a really complicated algebraic expression, we don't need this extra confusion. Therefore, if you have an expression with more negative terms than positive terms, the first thing you should do is to change that. For example,

$$-2x + 5 - 16x^2 - 10x^3 = -10$$

Why do we need all of that extra confusion with the negative signs? The next step, before you try to solve, graph, or do anything to this, is to get rid of all the negatives. The conventional way says that you need to multiply both sides by -1, and that will cancel out most of the negatives. Let's do that.

$$-1(-2x + 5 - 16x^2 - 10x^3) = -1(-10)$$
$$2x - 5 + 16x^2 + 10x^3 = 10$$

Now that is all good and well, but what is the need for this formality? It can lead you to make a very costly mistake! What if you forget to distribute the -1 to just one of those terms? What if the expression is much, much longer and more complicated? It can be very easy to accidentally not distribute the negative. Well I'm here to tell you that it's okay to drop the formalities. Let loose! How about instead of

multiplying both sides by a -1, we just run a sign change? What that means, is that you change the sign of every single term. You just go right down the line, and if you have a +, you make it a -, and vice versa.

Yes, this accomplishes the exact same thing, but you don't have to think of it as distributing! It is a brilliant trick that gives you a slightly different perspective on the problem. This can eliminate mistakes made in distributing, and at the same time it can let you skip a step! So now, instead of doing it the first way, let's just run a sign change on the original expression.

$$-2x + 5 - 16x^2 - 10x^3 = -10$$
$$2x - 5 + 16x^2 + 10x^3 = 10$$

Please don't be skeptical of the power of these simple tricks! Try them out, and see how they work for you.

Move Left/Right vs. Subtract & Add Both Sides

When solving an equation, I've seen people do something that I consider unnecessary and in the way. The best way I can explain this is with an example. Let's say you have an equation like this,

$$2x - 10 = 6$$

and you need to solve for x.

What I see people do, is underneath the -10, they write +10, and under the 6 they write +10. "Add ten to both sides." Technically, this is correct, but why include this step? To show that they cancel? It is not needed, and, actually, it creates clutter that can sometimes be confusing. So, what is really going on when you take this step? You are trying to move the -10 from the left side over to the right side of the equals sign. So, why not just do that? All you have to do is know that when you move something from one side to the other, you much change its sign. You can even skip another step and instead of writing down 6+10, just write 16. No more "adding ten to both sides," instead just move it!

$$2x - 10 = 6$$
$$2x = 16$$
$$x = 8$$

I'm showing you a very simple example of this, but you can apply this to any complicated algebraic equation. You are allowed to simply move things from one side of an equation to the other, without showing a step for it. The old way is history. Instead just shove it over to the other side, and change its sign.

C & S vs. Cosx & Sinx

Here is a real winner. This is one of those things that you will see and say, "Why not?" Again, like my title implies, this is an extremely simple fix that can greatly reduce your algebra mistakes.

In many cases when you are working with sin's and cos's, they are of the exact same function. For example the entire problem may be working with cos(7x) and sin(7x), or maybe something more complicated like cos(x+2e^(x²)) and sin(x+2e^(x²)). Either way, throughout the whole problem, every one you come across is taking the sin or cos of the same thing. It might be sin² or cos³, but they are all of the exact same function.

So what is my shortcut? Well, in the situation I described above (which occurs more frequently than not), I invite you to write C and S instead of cos(x+2e^(x²)) and sin(x+2e^(x²)). If you have sin², you can write S². If you have cos³, you can write C³. This takes a lot of the pain out of copying a large expression from one line to the next. Most errors occur during copying, so if you have to copy a huge expression for sin or cos over and over again, why not simplify it just to C or S? In your answer, you should replace C by cos(x+2e^(x²)) of course. This is especially useful if you are leaving the cos or sin alone and changing other things in the equation. That way, you don't have to keep copying the entire thing. Just remember to change it back at the end! Also, if you have to take a derivative, don't forget the chain rule. And for integration, don't forget the U-Substitution (or skip it with this method).

Please do not underestimate this tip! The most common errors in math occur while you are copying an equation from one line to the next. If you shorten things with this abbreviation, you will be much less likely to make a mistake! Follow all of these great tips, and I guarantee you will have better test results!

Left/Right Cross Vs. Multiply & Divide Both Sides

This is very similar to the 2nd trick in this post. This can be used when all terms on both sides are being multiplied or divided, and it can be used in the most complicated of equations or the simplest. To use this trick, imagine there is a large X or cross on top of the equals sign. Any term on either side can move along these lines! Let me show you how it works

$$\frac{13x}{5} = \frac{20}{3x}$$

Normally, you would multiply both sides by 5. It would cancel on the left side, and you would have 100 / 3x on the right. Then, you would multiply both sides by 3x. This would cancel on the right, and you would have 39x² on the left.

$$\frac{13x}{5} = \frac{20}{3x}$$

$$5 \times \frac{13x}{5} = 5 \times \frac{20}{3x}$$

$$13x = \frac{100}{3x}$$

$$3x \times 13x = 3x \times \frac{100}{3x}$$

$$39x^2 = 100$$

And then you can solve from there. See how many steps there are? You have to multiply on both sides, or possibly divide both sides in a different example. Then you have to cancel terms and simplify. Instead, you can do it a faster way, that is less likely to let you make a mistake. Picture the terms sliding along those crosses. If you can see them sliding, just move them! It is as simple as that. You can even move more than one thing at a time!

$$\frac{13x}{5} = \frac{20}{3x}$$

$$13x \times 3x = 20 \times 5$$

$$39x^2 = 100$$

It is as simple as that! You just have to get yourself into a slightly different mindset about math. You don't have to conform and do things so technically. Abbreviating, skipping small steps, and other things of the sort is all okay. Consistency is the one thing that is most important! Be consistent with these tricks. They can really simplify things, and help you reduce your errors (most importantly those stupid mistakes on tests!).

I really hope you try these out! I know they are all very simple, but you will be amazed at how much they really can help! Please comment below, and let me know if this was of any help.