"Math Doesn't Suck" Supplemental PDF

Algebra Problem Almost Gone Wrong!

...continued from "WATCH OUT!" in Chapter 20, p.253

When you're "doing things" to both sides of an equation in order to move all the stuff with *x*'s to one side and all the plain numbers to the other, at some point, you may make the mistake of dividing or multiplying too soon. Since you can always do "anything" to both sides of the equation and still keep an equality, you can't do much damage—but you must do it correctly. Here's an example of how you might do things out of order:

$$2x + 1 = 5$$

The *best* first step to isolate *x* is to subtract 1 from both sides. But let's say, instead, you wanted to divide both sides by 2. That's okay, but it makes things a little more complicated—you'll just have to be extra careful that you're doing it correctly. Remember: When you do something to an equation, you have to do it to *the entire side* of the equation. Here goes:

$$\frac{2x+1}{2} = \frac{5}{2}$$

That would be fine, but not the most efficient way to isolate *x*, because we've just made things more complicated. But what you really *don't* want to do here is divide *just* the 2*x* by 2, and ignore the 1.

2*x* + 1 = 5

? → $\frac{2x}{2} + 1 = \frac{5}{2}$ **{put a big X through this}**

This is wrong!

To avoid mistakes, your best bet is to first put everything with *x*'s on one side and all the plain numbers on the other, and then do multiplication or division to get just one "*x*" by itself.

<u>Now…</u>

If you really wanted to finish that problem on p.253 by *dividing* first, here's how it would go:

2*x* + 1 = 5

(Now we're going to divide… like you wanted to. It's not the best way to go about it, but here we go:)

$$\frac{2x+1}{2} = \frac{5}{2}$$

$$\frac{2x}{2} + \frac{1}{2} = \frac{5}{2}$$

(Why could we "break up" that fraction on the left? Just think about fraction *addition* with the same denominator; this is going in reverse. After all, you could add together $\frac{2x}{2}+\frac{1}{2}$ and get $\frac{2x+1}{2}$, right? So that means that $\frac{2x+1}{2}=\frac{2x}{2}+\frac{1}{2}$, see what I mean? And the *reason* I did this is to isolate *x* -remember, that's always our goal.)

$$\frac{2x}{2}+\frac{1}{2}-\frac{\mathbf{1}}{\mathbf{2}}=\frac{5}{2}-\frac{\mathbf{1}}{\mathbf{2}}$$

(subtracting $\frac{1}{2}$ from both sides, again just trying to isolate x – in other words, get it by itself)

$$\frac{2x}{2}=\frac{4}{2}$$

Now cancel 2 from top and bottom, on both sides:

$$\frac{\cancel{2}x}{\cancel{2}}=\frac{2\cancel{4}}{\cancel{2}}$$

$$\frac{x}{1}=\frac{2}{1}$$

$$x = 2$$

This was longer and messier than it needed to be, though. It would have been faster to subtract the 1 right away from both sides. But I wanted to show you that as long as you do the same thing to both sides and keep the equation balanced, you don't actually mess anything up, and you can *eventually* get to the right answer!