"Hot X: Algebra Exposed"

Supplemental PDF: <u>Point-Slope Form</u>

...as promised on p.150

As I mentioned on p.150, a common form for lines is called **point-slope form**. I personally think that the slope-intercept form is way better, but for some reason most of us have to learn this one, too.

You know how the slope-intercept form, $y = mx + b$, tells us the slope and an intercept? Well, the point-slope form is made from a *point* and – you guessed it – the line's slope. (They stayed up all night thinking up these names.)

WHAT'S IT CALLED

If you are given a point (x_1, y_1) and the slope m, then these numbers can be plugged into the **point-slope form** of the line:

$$(y - y_1) = m(x - x_1)$$

Once you stick in the numbers and simplify, you'll have a nice equation for the line!

I know those little 1's (the subscripts) can look scary, but it's not so bad when you realize that they just stand in for the coordinates of a specific point (x_1, y_1). It's like, "Hey, this is point #1!

The other x and y don't get little numbers because they're just the generic variables and will stay like that while we simplify.

Let's do an example:

Find an equation for a line with slope 3 and passing through the point (–2, 4), using the point-slope formula.

So in this case, $m = 3$, $x_1 = -2$ and $y_1 = 4$, right? We can just plug them in and simplify:

$$(y - y_1) = m(x - x_1)$$

$$\rightarrow (y - \mathbf{4}) = 3(x - (\mathbf{-2}))$$

$$\rightarrow y - 4 = 3(x + 2)$$

$$\rightarrow y - 4 = 3x + 6$$

$$\rightarrow y = 3x + 10$$

$$\rightarrow \mathbf{y = 3x + 10}$$

And voila, we've found a nice, recognizable form of the line.

The hardest part of dealing with the point-slope formula is actually remembering the formula, but I'll help you with that in a second. To be honest though, there's no real advantage to the point-slope formula. Notice that we do this same problem on p.147-148 of *Hot X: Algebra Exposed*, using slope-intercept formula, and we were fine!

To practice using the point-slope formula, go back and do the problems on p.149, using the point-slope formula. Once you have a slope and a point, just plug 'em in, and then solve for *y* like we did above – you should get the exact same answers for all of them.

What's the Deal?

How to remember the point-slope formula:

$$(y - y_1) = m(x - x_1)$$

It's actually not that hard to remember the point-slope formula if you think about the *definition of slope*…

$$\frac{change\ in\ y}{change\ in\ x} = m$$

And if we just multiply both sides of the "equation" by (*change in x*), and cancel the "common factors," we get:

$$\frac{(change\ in\ y)}{(change\ in\ x)}(change\ in\ x) = m(change\ in\ x)$$

$$\rightarrow\ (change\ in\ y) = m(change\ in\ x)$$

…which you have to admit, looks an awful lot like $(y - y_1) = m(x - x_1)$. This is just a way to help you remember the formula, in case your teacher wants you to learn it. Otherwise, I'd stick to our trusty $y = mx + b$.