INTRODUCTION TO THE SLOPE OF A LINE

- Want some practice with preliminary concepts first?
  Locating Points in Quadrants and on Axes
  Practice with Points
  Introduction to Equations and Inequalities in Two Variables

(more mathematical cats)

Draw a line on a coordinate plane.

The line you just drew has a very simple description as an equation in two variables.

That is, there's a very simple equation in x and y that will be ***true*** for every point on the line, and ***false*** for every point that's not on the line.

Here's a preview of coming attractions:
If the line isn't vertical (straight up/down), then the equation of the line will look like this:

$$y = (\overbrace{\text{some number}}^{\text{we'll call this } m})x + (\overbrace{\text{some number}}^{\text{we'll call this } b})$$

With the names m and b in place, the equation of the line takes this form:

$$y = mx + b$$

Here are some examples of equations of this form:

$y = 2x + 3$	(m is 2 and b is 3)
$y = 3x + 2$	($m = 3$ and $b = 2$)
$y = \frac{1}{3}x - 7$	($m = \frac{1}{3}$ and $b = -7$)
$y = 5$	(rewrite as $y = 0x + 5$ to see that $m = 0$ and $b = 5$)

It ends up that the coefficient of x in this equation (which we've called m) gives information about the ***slant*** of the line. That is, the number m (which might equal zero) will answer questions like this:

- Is the line flat?
- If you're walking along the line moving from left to right, are you going uphill or downhill?
- How steep an uphill? How steep a downhill?

This kind of 'slant' information is so important that it's given a special name—it's called the ***slope of the line***. That is, the ***slope of a line*** is a number that gives information about its 'slant'.

The purpose of this section is to begin to develop your intuition about the slope of a line.
The next section, Practice with Slope, will make the ideas more precise.

In the web exercise that follows these examples, you'll be doing the computations and filling in the information that is highlighted in green.

EXAMPLES:

Consider the equation $y = 2x + 3$.
When x is 0, y is $2(0) + 3 = 3$.
When x is 1, y is $2(1) + 3 = 5$.
Thus, when x changes by 1 (going from 0 to 1),
y changes by 2 (going from 3 to 5).
Thus, y changes 2 times as fast as x.
So, if x changes by 4, then y will change by $2(4) = 8$.

Consider the equation $y = 3x + 4$.
When x is -2, y is $3(-2) + 4 = -2$.
When x is -1, y is $3(-1) + 4 = 1$.
Thus, when x changes by 1 (going from -2 to -1),
y changes by 3 (going from -2 to 1).
Thus, y changes 3 times as fast as x.
So, if x changes by 2, then y will change by $3(2) = 6$.