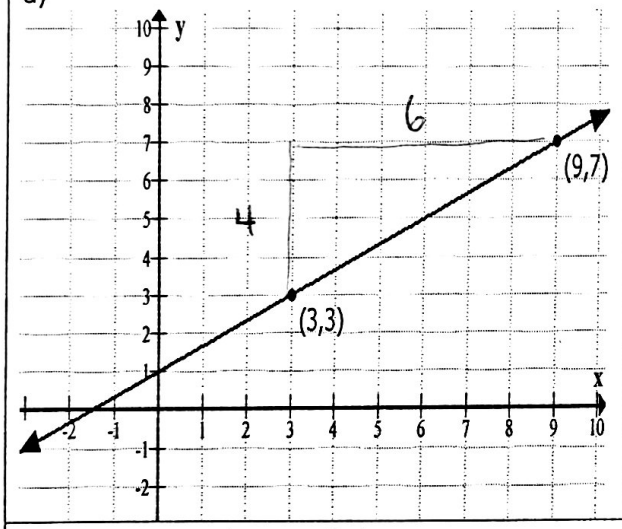
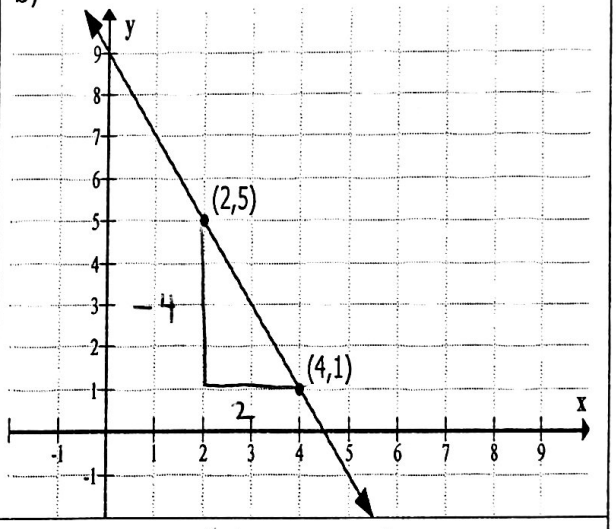
Determining the Equation of a Line | MFM2P

To determine the equation of a line, you need two things...

Slope & y-intercept

Today we will find equations of lines in various contexts (from a graph, using algebra, applications).

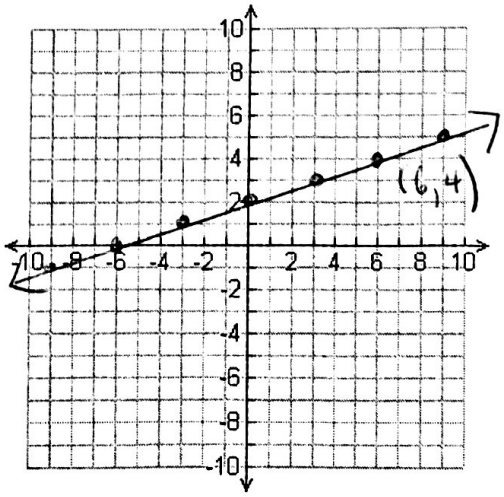
1) You've actually already been doing this from a graph. Mr. Smith has graphed some more lines for you. You need to figure out the slope of the line, the y-intercept of the line, and then from there write out the equation in $y = mx + b$ form.

a)	b)
	
Slope (m) = $4/6 = 2/3$	Slope (m) = $-4/2 = -2$
y-int (b) = 1	y-int (b) = 9
Equation: $y = \frac{2}{3}x + 1$	Equation: $y = -2x + 9$

2) Next, Mr. Smith will give you some information about a line, and you will have to graph the line yourself.

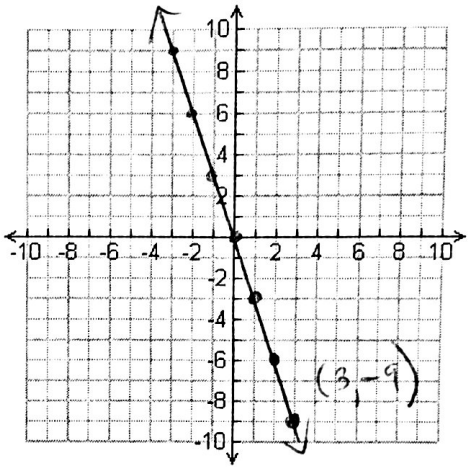
a) Find the equation of the line with a slope of $\frac{1}{3}$ through the point (6, 4).

Slope (m) = $1/3$
y-int (b) = 2
Equation: $y = \frac{1}{3}x + 2$



b) Find the equation of the line with a slope of -3 through the point (3, -9).

Slope (m) =	-3
y-int (b) =	0
Equation: $y =$	$-3x + 0$ OR $y = -3x$



3) Not every situation can be graphed however. We need an algebraic method to find the y-intercept if we are given a slope and a point. Mr. Smith has provided a sketch of the first to check our answer.

a) Find the equation of a line that has a slope of 2 and goes through the point (2,7).

Identify the slope, and your point:		
$m = 2$	$x = 2$	$y = 7$

Put in your slope:

$y = 2x + b$

Put in your point and solve for "b"

$7 = 2(2) + b$

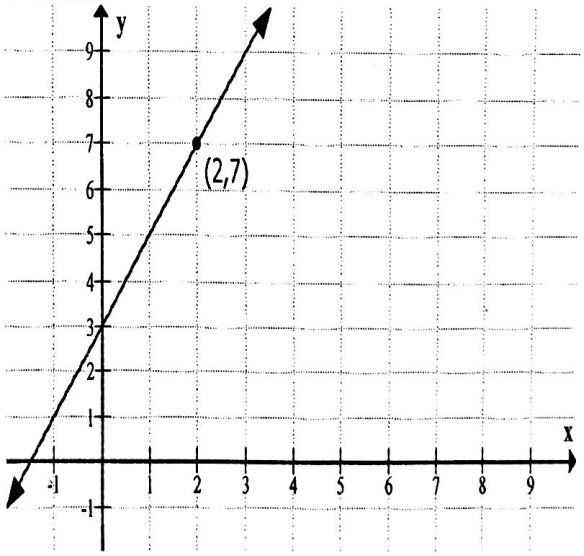
$7 = 4 + b$

$-4 \quad -4$

$3 = b$

Equation: $y =$ $2x + 3$ ✓

Sketch:



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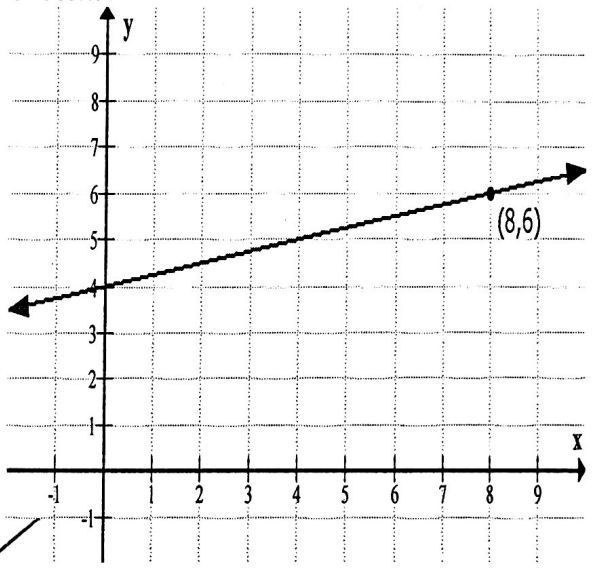
You try it:

a) Find the equation of a line that has a slope of $\frac{1}{4}$ and goes through the point (8,6).

Identify the slope, and your point:		
$m = \frac{1}{4}$	$x = 8$	$y = 6$
Put in your slope: $y = \frac{1}{4}x + b$		
Put in your point and solve for "b": $6 = \frac{1}{4}(8) + b$; $6 = 2 + b$; $4 = b$		
Equation: $y =$ $\frac{1}{4}$ x $+4$		

Sketch:



b) Find the equation of a line that has a slope of $\frac{1}{2}$ and goes through the point (-12,5).

Identify the slope, and your point:		
$m = \frac{1}{2}$	$x = -12$	$y = 5$
Put in your slope: $y = \frac{1}{2}x + b$		
Put in your point and solve for "b": $5 = \frac{1}{2}(-12) + b$; $5 = -6 + b$; $+6 \quad +6$; $11 = b$		
Equation: $y =$ $\frac{1}{2}$ x $+ 11$		

c) Find the equation of a line that has a slope of -2 and goes through the point (4,-13).

Identify the slope, and your point:		
$m = -2$	$x = 4$	$y = -13$
Put in your slope: $y = -2x + b$		
Put in your point and solve for "b": $-13 = -2(4) + b$; $-13 = -8 + b$; $+8 \quad +8$; $-5 = b$		
Equation: $y =$ -2 x $- 5$		