

Algebra2
Lesson 1 - Linear Equation
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In Algebra I we discovered that a function is considered to be linear if the independent variable increases or decreases at a constant rate. Graphically, a function that graphs out to be a line is a linear function.

Vocabulary

x – This is the independent variable and is graphed on the horizontal axis.

y – This is the dependent variable and is the output of the function resulting when an x-value is put into the linear equation.

x-intercept – The location where a line crosses the x-axis: (x,0) .

y-intercept – The location where a line crosses the y-axis: (0,y) .

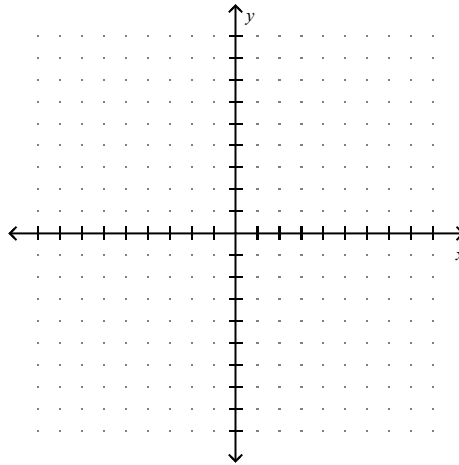
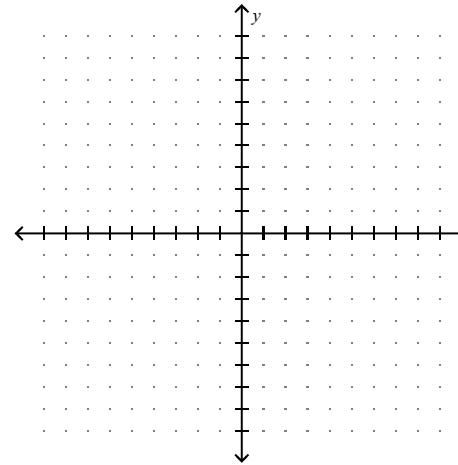
rate of change – the measure of the steepness of the line. It is ratio of the vertical change over the horizontal change between two points. The rate of change is also called the **slope**:

$$\text{rate of change} = \text{slope} = m = \frac{\text{change in } f(x)}{\text{change in } x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

General Forms of a Linear Equation

1. Standard Form: $Ax + By = C$
2. Slope-intercept Form: $y = mx + b$
3. Point-slope Form: $y - y_1 = m(x - x_1)$

Solve each equation for y. Then find the slope and y-intercept and graph.

$2x - 5y = 0$	$5x - y = 2$
	

Find the slope through the points

$(0, 1), (3, 0)$	$(4, -1), (-2, -3)$

Write the equation in point-slope form of the line that goes through the points:

$(-3, -2), (1, 6)$

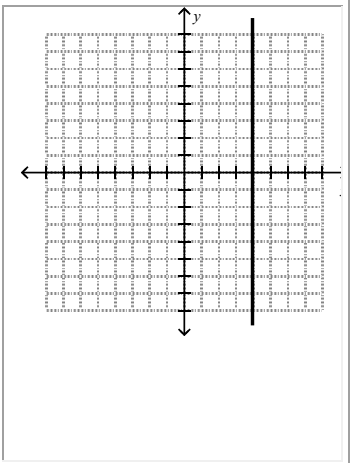
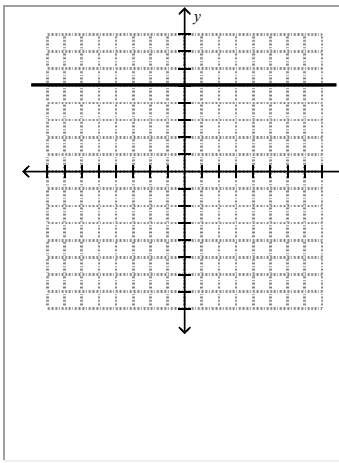
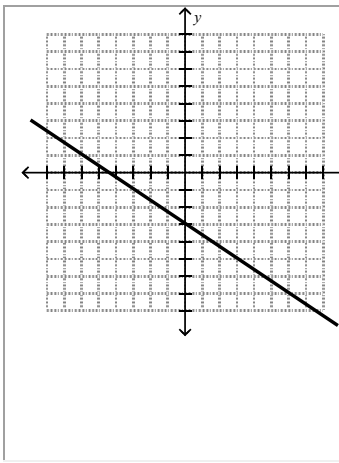
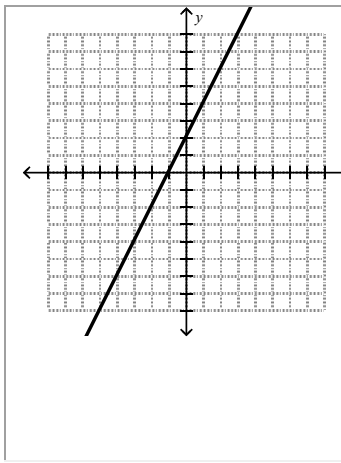
$(1, 0), (5, 5)$

Write the equations of the lines:

A horizontal line through $(4, 1)$

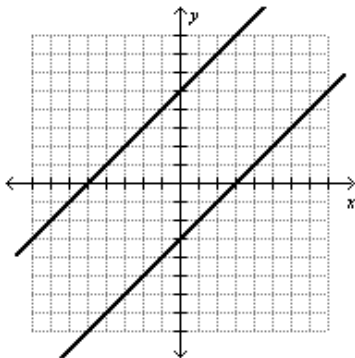
A vertical line through $(-3, 4)$

We need to readily recognize whether the sign of the slope is positive or negative or something else!

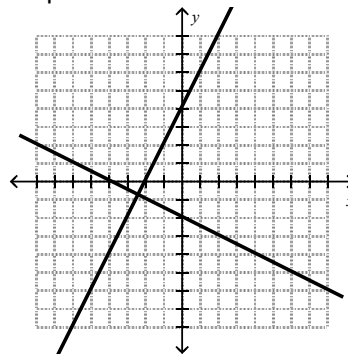


Relationship between special linear systems and their slopes

Parallel lines:



Perpendicular lines:



We are able to find an equation of a line passing through a point and perpendicular to another line if we are given the reference line and the point. Also, we can find a line parallel to another if given the same information.

Through $(-1, 3)$ and parallel to the line $y = 2x + 1$

Through $(2, 2)$ and perpendicular to the line

$$y = \frac{3}{5}x + 2$$

Write the following equations in standard form

$$y = -2x + 7$$

$$y = \frac{1}{3}x - 5$$