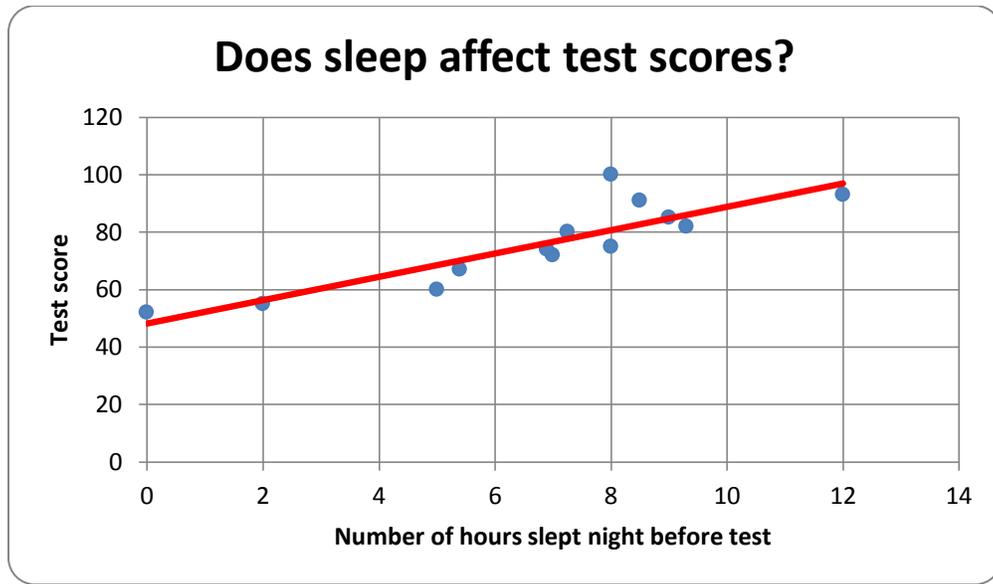


### Linear Functions and Slope



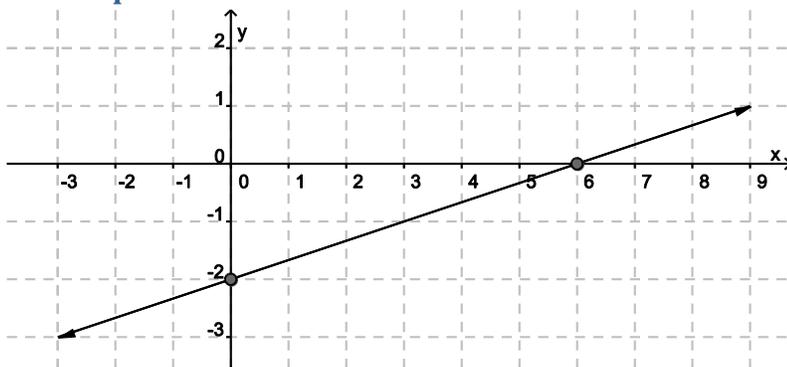
(Source: I made it up.)

The above graph of points is called a \_\_\_\_\_.

The line that best fits the data points is called a \_\_\_\_\_, and is used to model the relationship between two variables (in this case, hours of sleep and test scores).

The above regression line can be represented by the following equation, which is in \_\_\_\_\_ (that is, the form  $Ax + By = C$ ):  $-4x + y = 48$

#### Intercepts



The  $x$ -coordinate of a point where graph intersects  $x$ -axis is called an \_\_\_\_\_.

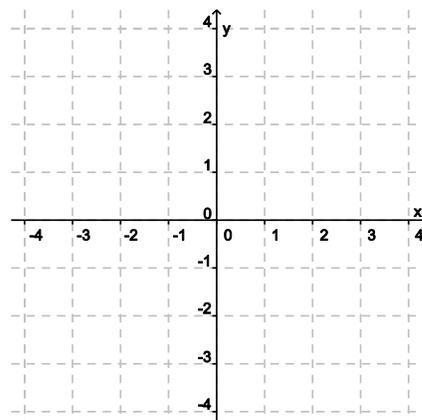
The  $y$ -coordinate of a point where graph intersects  $y$ -axis is called a \_\_\_\_\_.

What do all points on the  $x$ -axis have in common? \_\_\_\_\_

What do all points on the  $y$ -axis have in common? \_\_\_\_\_

**How to graph a linear equation  $Ax + By = C$  (standard form):**

1. Find  $x$ -intercept (let \_\_\_\_\_ and solve for  $x$ ).
2. Find  $y$ -intercept (let \_\_\_\_\_ and solve for  $y$ ).
3. Find a checkpoint (a third point).
4. Plot the 3 points and draw a line through them.

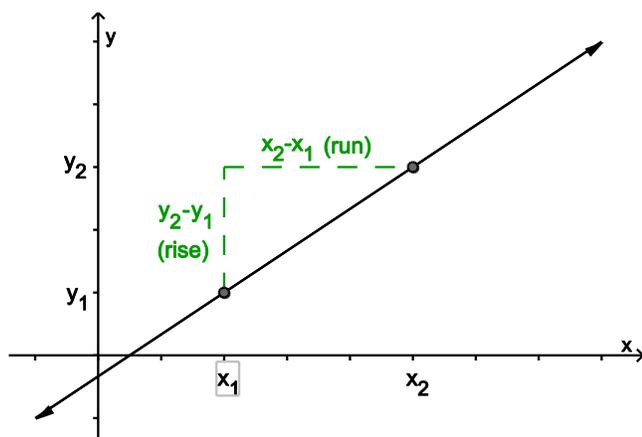
**Ex 1.**Graph  $3x - 2y = 6$ .

\_\_\_\_\_ is a measure of the \_\_\_\_\_ of a line.

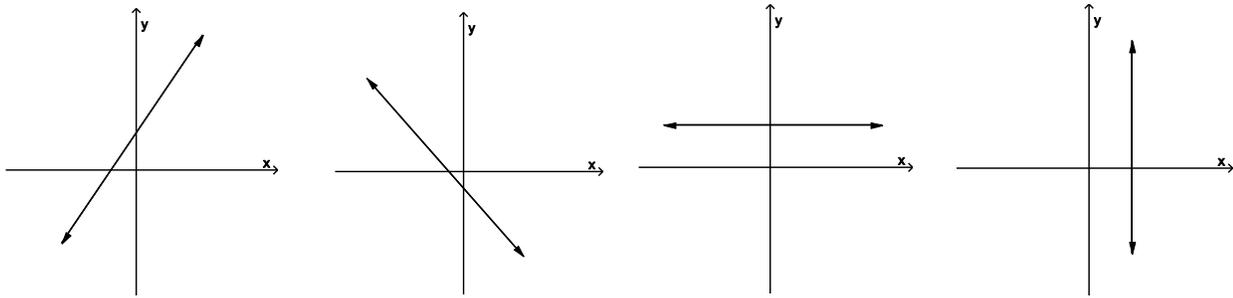
The calculation to find the slope of a line is:

$m =$

(where  $(x_1, y_1)$  and  $(x_2, y_2)$  are two points on the line, and  $m$  represents slope).

**Ex 2.**

Find the slope of the line passing through  $(-3, 4)$  and  $(-4, -2)$ .

**Ex 3.**

$y = mx + b$  is called \_\_\_\_\_ of a linear equation.  
(here  $m$  is the slope, and  $b$  is the y-intercept)

**Ex 4.**

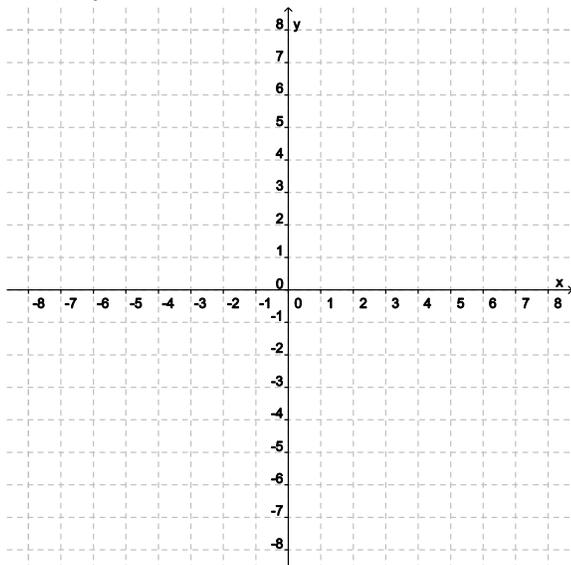
Give the slope and y-intercept for the line whose equation is  $8x - 4y = 20$ .

**How to graph a linear equation  $y = mx + b$** 

1. Plot  $(0, b)$ .
2. Use slope  $m$  to get a second point.
3. Draw line through the two points.

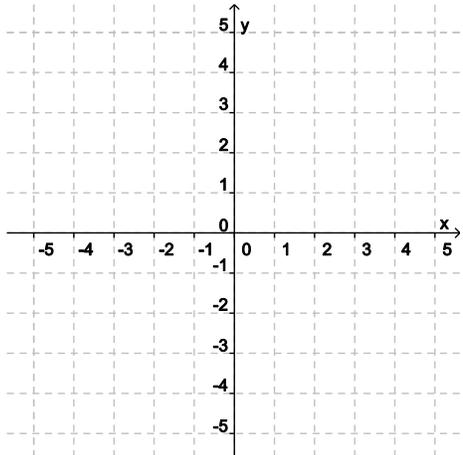
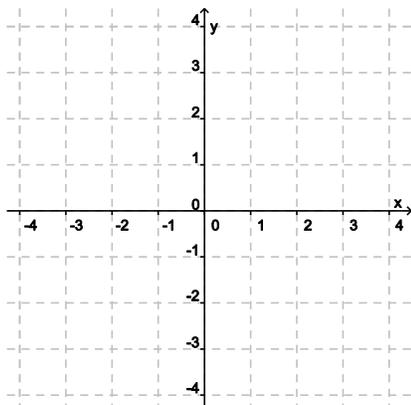
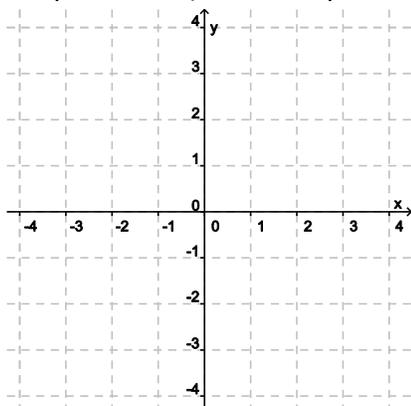
**Ex 5.**

Graph  $y = 2x - 5$ .

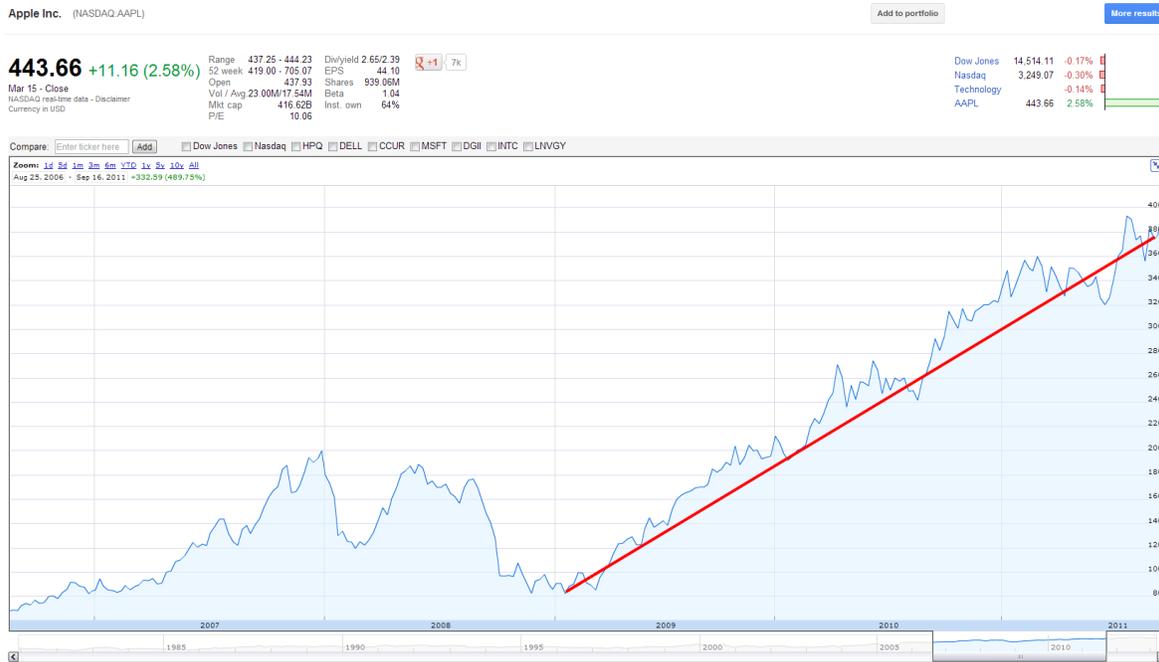


**Ex 6.**

Graph  $y = -\frac{3}{2}x + 2$ .

**Ex 7.**Graph  $y = -2$ . (Think: all points where  $y$ -value is  $-2$ )**Ex 8.**Graph  $x = 3$ . (Think: all points where  $x$ -value is 3)**Horizontal lines** have the form \_\_\_\_\_.**Vertical lines** have the form \_\_\_\_\_.

## Slope as a Rate of Change



On Jan 15, 2009, Apple's stock price was about \$82 per share.

On Sept 2, 2011, Apple's stock price was about \$374 per share.

Slope of line between these two points is:

$$m = \frac{\text{Rise}}{\text{Run}} = \frac{\text{Change in } y}{\text{Change in } x} = \frac{\text{Change in stock price}}{\# \text{ of days from 1/15/09 to 9/2/11}} = \frac{374 - 82}{959} = \frac{292}{959} \approx 0.304$$

This can be interpreted as the average rate of change of the stock price. Here, it means the stock price is going up at a rate of about 30.4 cents (per share) per day, on average.

### Ex 9.

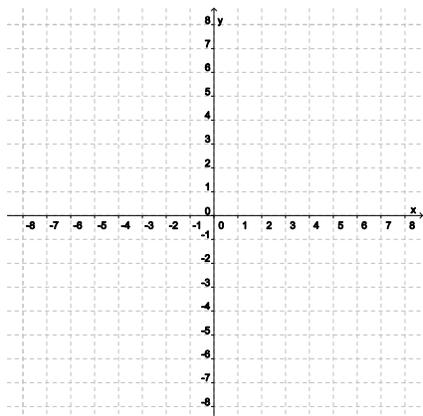
Find an equation for the above line in slope-intercept form (that is,  $y = mx + b$ ), where  $x$  represents the number of days after Jan 15, 2009.

If the trend continues, what will the stock price be on July 9, 2014 (2000 days after Jan 15, 2009)?

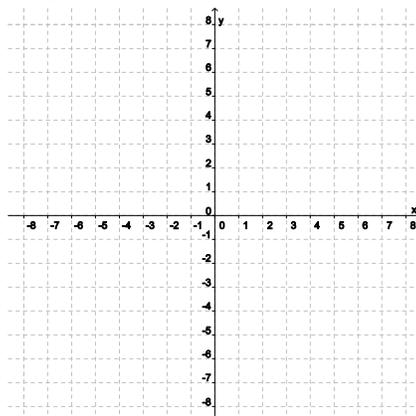
### Practice

1. Find the slope of the line passing through  $(-3, -2)$  and  $(2, 5)$ .
  2. Find the slope of the line passing through  $(-6, -3)$  and  $(4, -3)$ .
  3. For each of the following, determine the  $x$ -intercept and  $y$ -intercept. Then graph the equation.
    - a)  $2x + y = 4$
    - b)  $x - 4y = 8$
  4. For each of the following, determine the slope,  $x$ -intercept, and  $y$ -intercept. Then graph.
    - a)  $y = -3x + 2$
    - b)  $f(x) = \frac{3}{4}x - 3$
    - c)  $x = -1$
    - d)  $y = 2$
  5. Rewrite the equation  $7x + 2y = 14$  in slope-intercept form.
- Q: What goes around the world but stays in a corner?

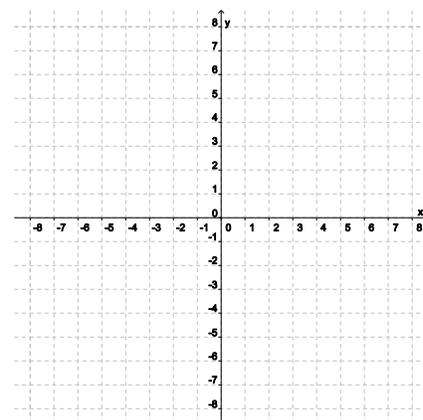
Here are some coordinate systems for graphing the above exercises:



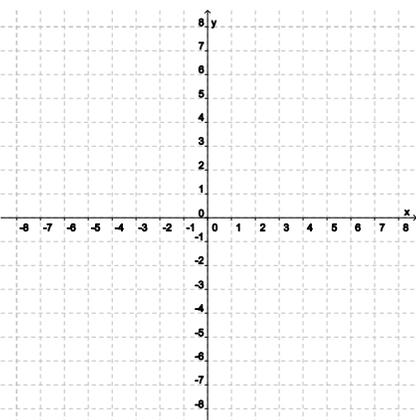
3a)



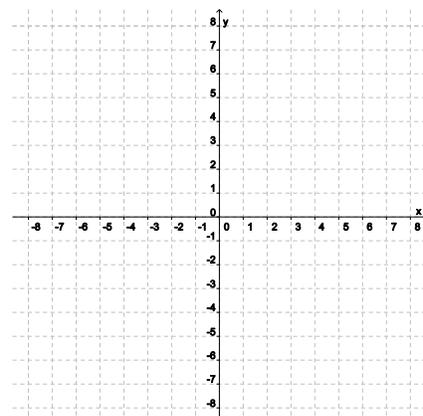
3b)



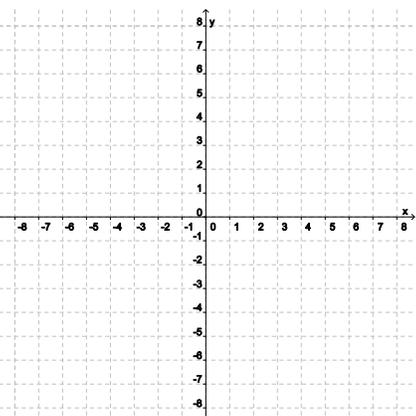
4a)



4b)



4c)



4d)