Objectives:

~ Use Slope Intercept Form to find the slope and y-int of an equation

~ Write Equations in Slope Intercept Form

~ Write Equations using Point Slope Form

$$Slope = m$$

$$m = \frac{Rise}{Run} \qquad m = \frac{y_2 - y_1}{x_2 - x_1}$$

Slope-Intercept Form

$$y = mx + b$$

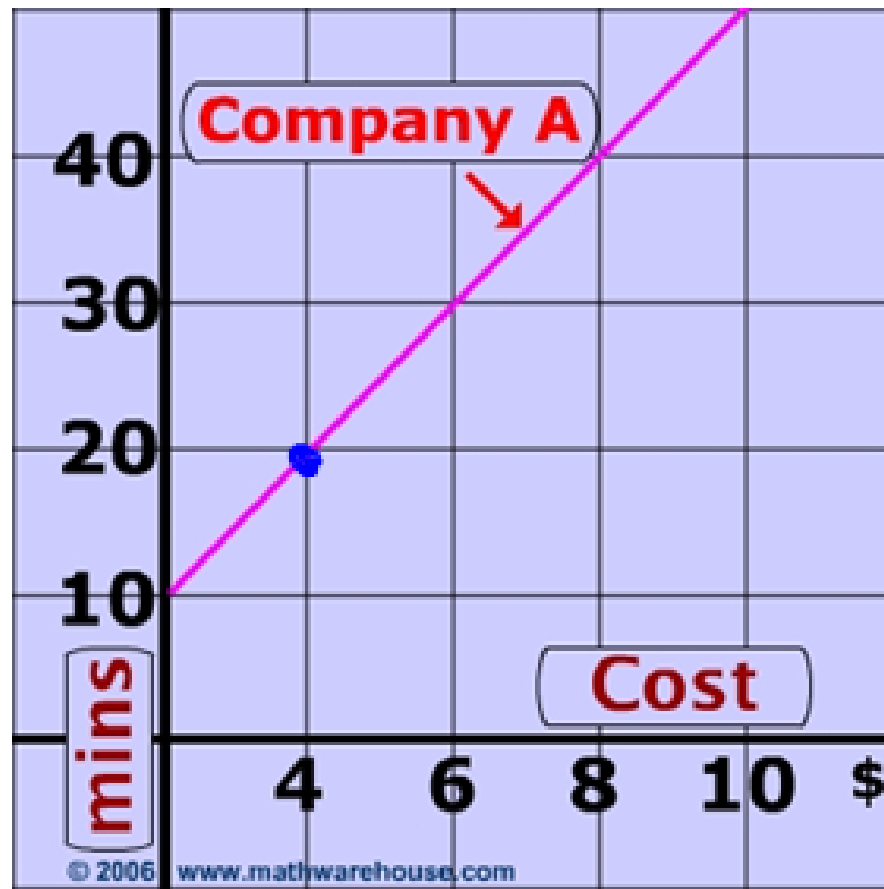Where m = slope and b = y-intercept

$$y = 3x + 10$$

$$m = \frac{3}{1} \quad b = 10$$

or

$$m = 3$$

Lesson 7: Section 2.3 & 2.4 - Slope Intercept Form

Cell Phone Company A's calling plan is represented by the line on the graph below. How much does Company Charge for 20 minutes of usage?
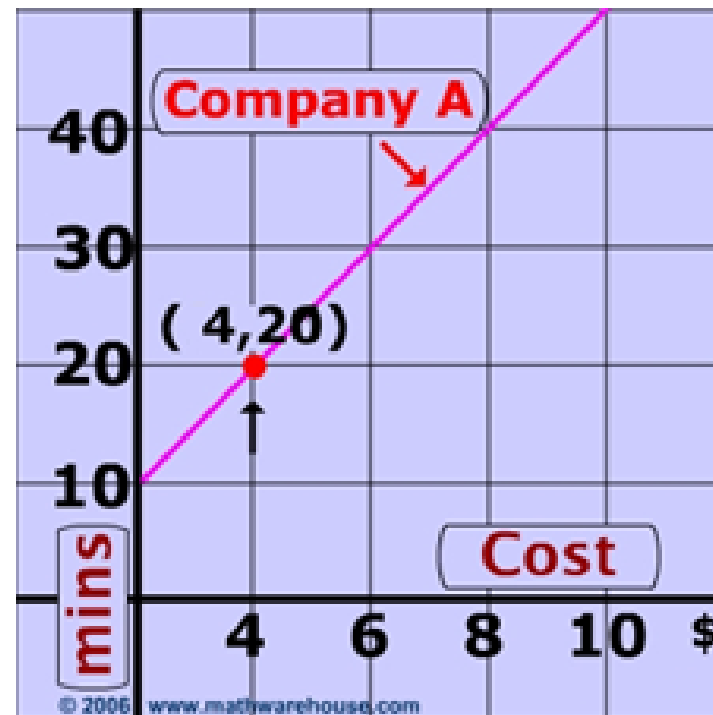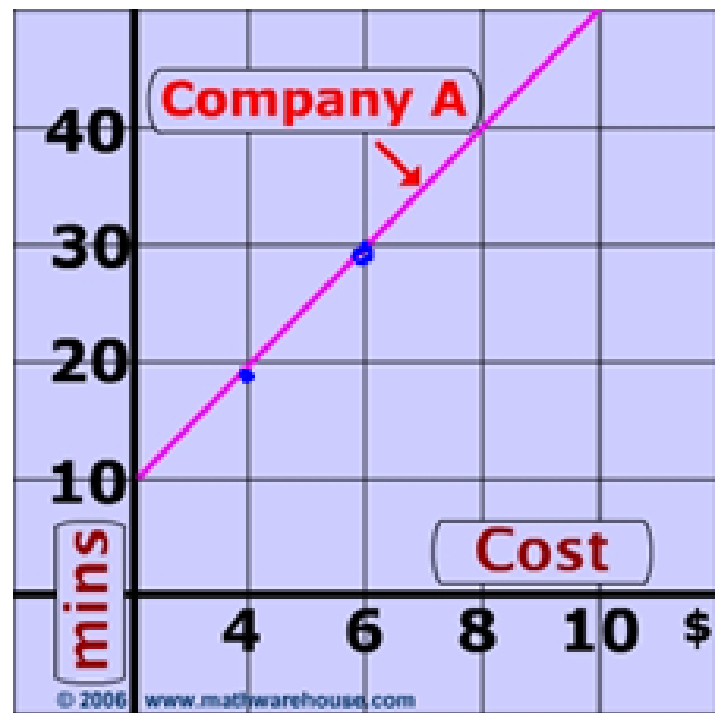
$ 4

Cell Phone Company A's calling plan is represented by the line on the graph below. How much does Company Charge for 20 minutes of usage?

Answer: $4

Company A

40

30

20   (4,20)

10

mins

Cost

4   6   8   10 $

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Use the graph to write Cell Phone A's calling plan cost in a linear equation using Slope-Intercept Form.

What is m? $m = \dfrac{10}{2} = \dfrac{5}{1}$

rise = 10
run = 2

What is b (the y-int)?

b = 10

$y = 5x + 10$

Slope-Intercept Form
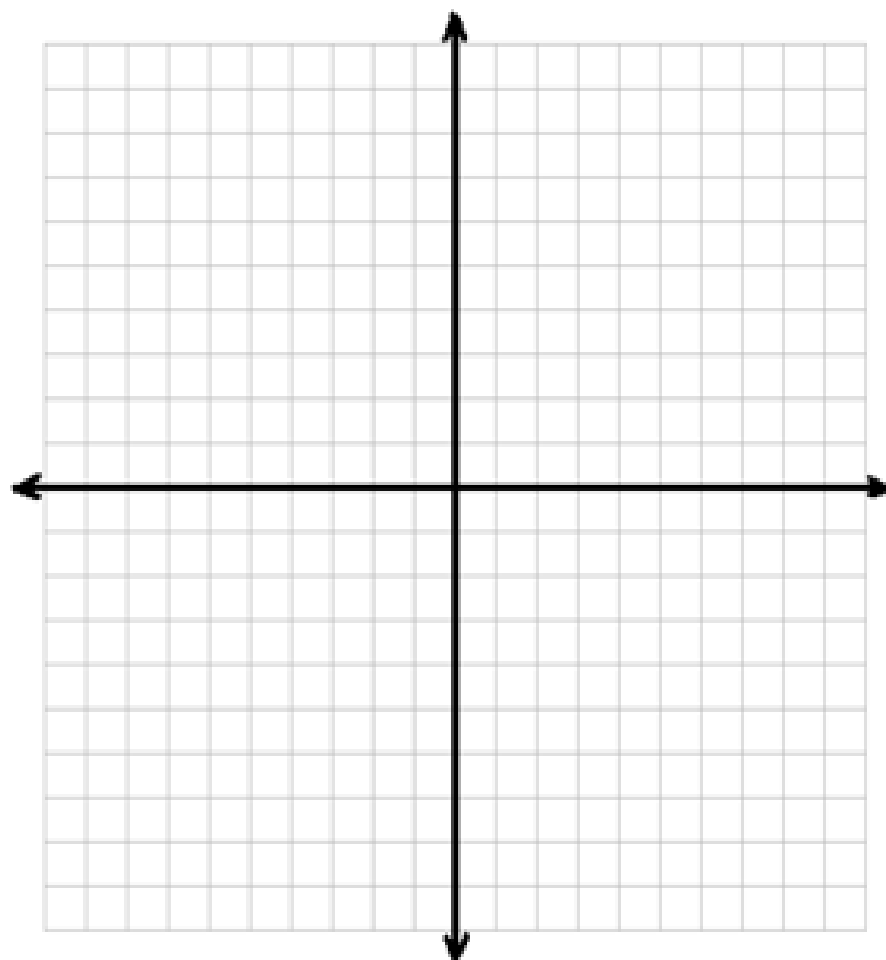
$y = mx + b$

Where m = slope and b = y-intercept

Ex 1:

$$y = mx + b$$

Write an equation in Slope-Intercept Form of the line that has slope (-1/2) and passes through the y-axis at -6.

$$y = -\frac{1}{2}x + (-6)$$

$$y = -\frac{1}{2}x - 6$$

Ex 2:

Write an equation in Slope-Intercept Form of the line that has slope (-2/3) and passes through the point (-6, 1).

Hint: We know the slope and the x and y values of one point on the graph. Substitute for m, x, and y in the slope-intercept form and find b.

$$y = mx + b$$

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

$$1 = -\frac{2}{3}\left(\frac{-6}{1}\right) + b$$

$$1 = 4 + b$$

$$\underline{-4 \quad -4}$$

$$-3 = b$$
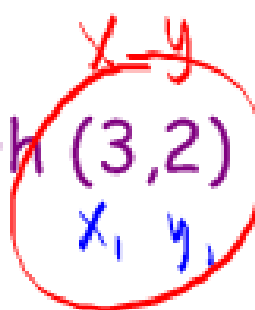
$$y = -\frac{2}{3}x - 3$$

Lesson 7: Section 2.3 & 2.4 - Slope Intercept Form

Ex 3:

$y = mx + b$

$$m = \frac{y_2 - y_1}{x_1 - x_1}$$

$x_1 \quad y_1$

Write an equation of the line that passes through $(3,2)$ and $(5,3)$.

$x_2 \quad y_2$

$$m = \frac{3-2}{5-3} = \boxed{\frac{1}{2}}$$

$$\frac{2 \cdot 2}{1 \cdot 2} - \frac{3}{2} = b$$

$$\frac{4}{2} - \frac{3}{2} = b$$

$$\boxed{\frac{1}{2} = b}$$

$$y = \frac{1}{2}x + b$$

$$2 = \frac{1}{2}\left(\frac{3}{1}\right) + b$$

$$2 = \frac{3}{2} + b$$

$$-\frac{3}{2} \quad -\frac{3}{2}$$

$$\boxed{y = \frac{1}{2}x + \frac{1}{2}}$$

If we are given the coordinates of two points on a line, we can use this form to write an equation.

Point-Slope Form

You don't have to use this form...

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

Where m = slope (we get the slope from two points) and (x_1, y_1).

Ex 4:

Write an equation of the line that passes through (-2,5) and (3,1).

$$x_1\ y_1$$

$$x_2\ y_2$$

$$m = \frac{1-5}{3++2} = \frac{-4}{5}$$

$$y = -\frac{4}{5}x + b$$

$$5 = -\frac{4}{5}\left(\frac{-2}{1}\right) + b$$

$$5 = \frac{8}{5} + b$$

$$-\frac{8}{5} \quad -\frac{8}{5}$$

$$\frac{5 \cdot 5}{1 \cdot 5} - \frac{8}{5} = b$$

$$\frac{25}{5} - \frac{8}{5} = b$$

$$\boxed{\frac{17}{5} = b}$$

$$\boxed{y = \frac{-4}{5}x + \frac{17}{5}}$$

Parallel lines:
In a plane, non-vertical lines with the same slope are parallel.

EXAMPLE:

$y = 3x + 7$

$y = 3x - 2$
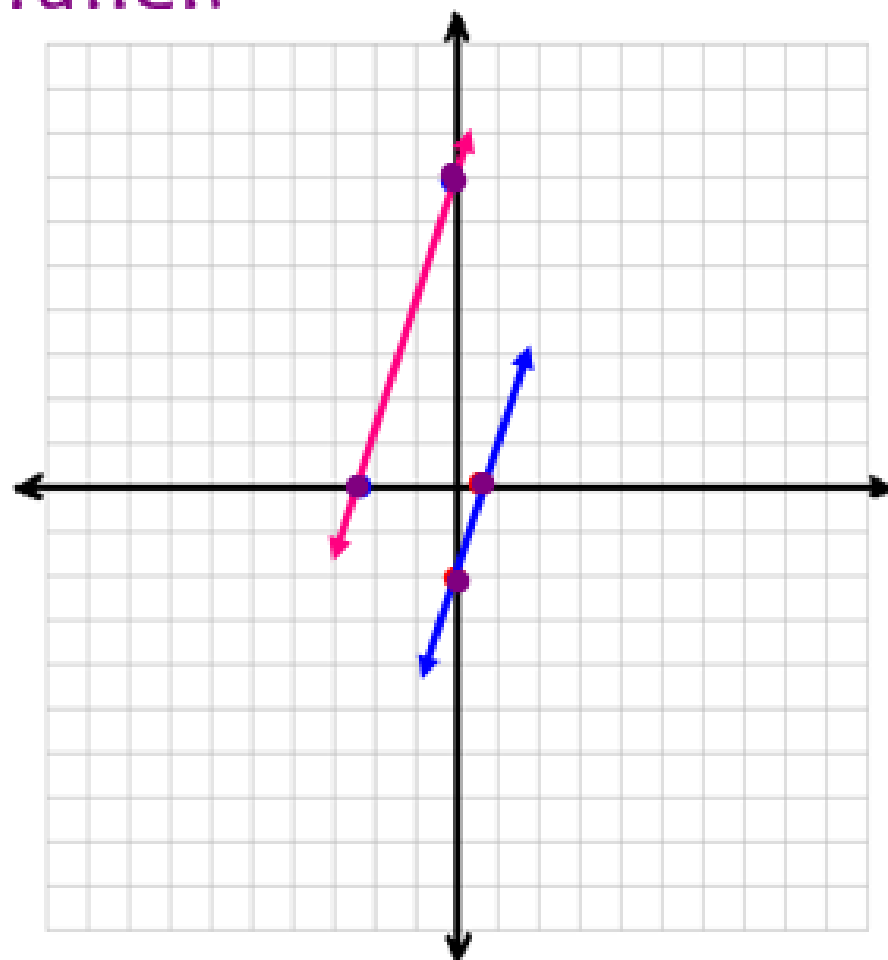
Perpendicular lines:

Two lines (NOT horizontal or vertical) are perpendicular if and only if the <u>slopes are negative reciprocals</u> of each other.

EXAMPLE:

$y = 2x + 6$

$y = (-1/2)x - 5$
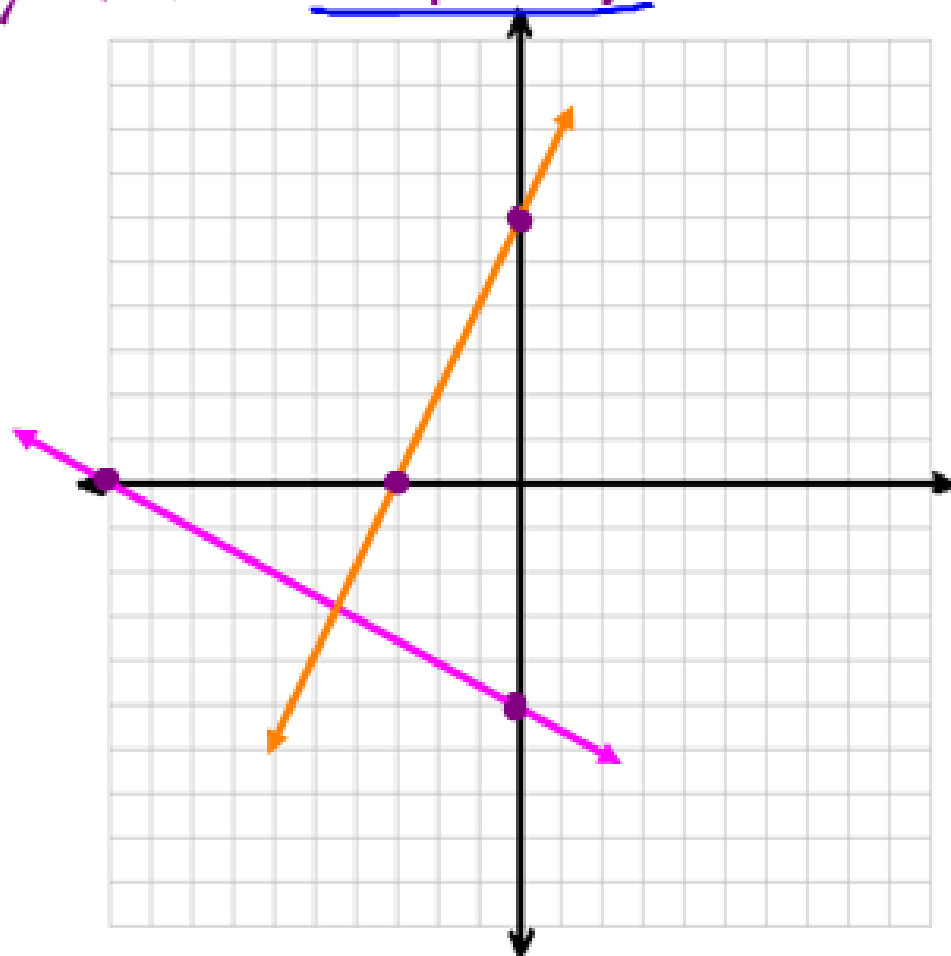
Ex 5:

Write an equation of the line that passes through (-9,5) and is perpendicular to the line whose equation is y = -3x + 2.
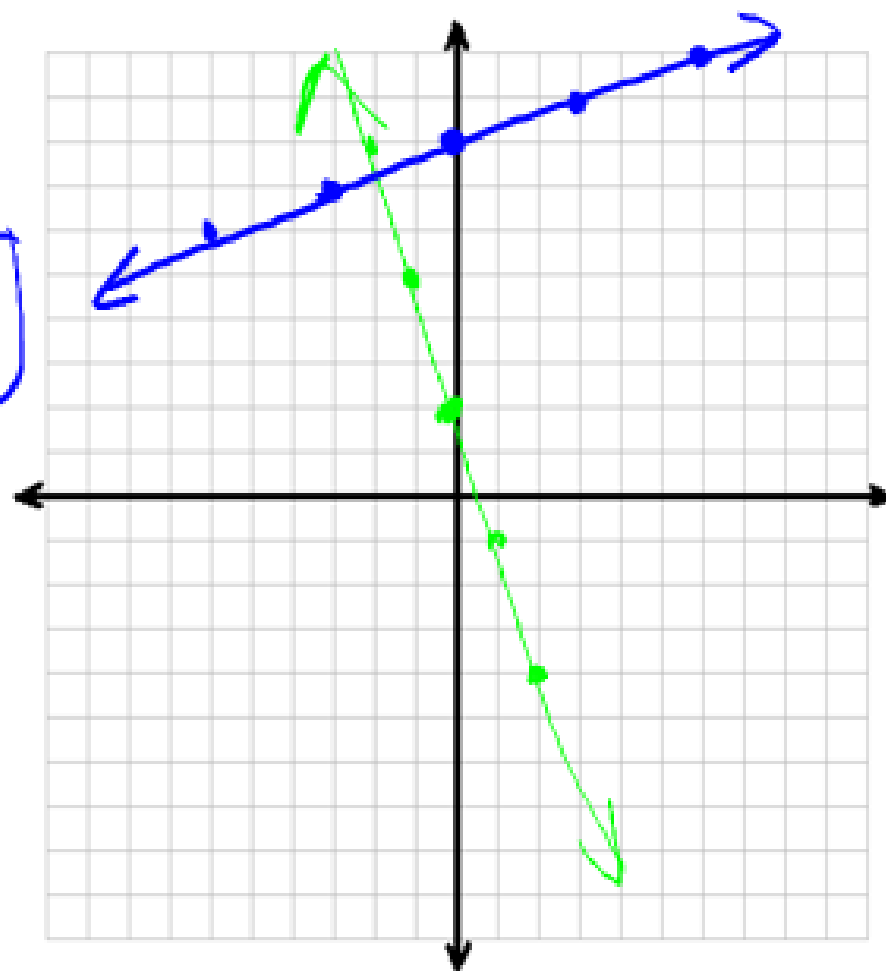
$m = \dfrac{1}{3}$

$y = \dfrac{1}{3}x + b$

$5 = \dfrac{1}{3}\left(\dfrac{-9}{1}\right) + b$

$5 = -3 + b$

$\dfrac{+3 \quad +3}{}$

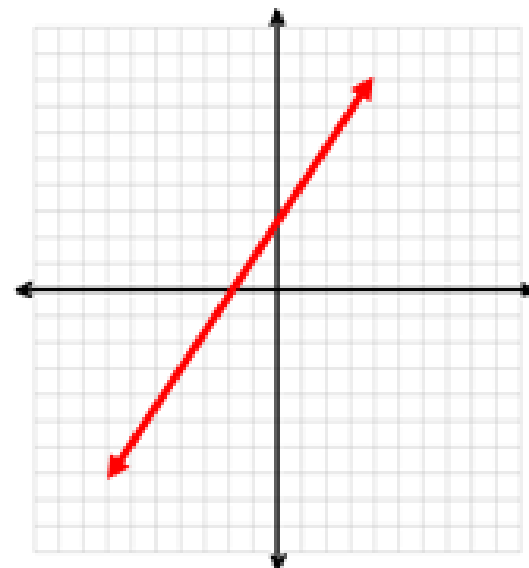$8 = b$

$y = \dfrac{1}{3}x + 8$

Ex 6:

Write an equation of the line that passes through x-int of 1/2 and y-int of -3. $b = -3$

$$\left(\frac{1}{2}, 0\right) \qquad (0, -3)$$

$$m = \frac{-3 - 0}{0 - \frac{1}{2}} = \frac{-3}{-\frac{1}{2}} = \frac{-3}{1} \cdot \frac{-2}{1}$$

$$= \frac{6}{1} = 6$$

$$m = 6$$

$$y = 6x - 3$$
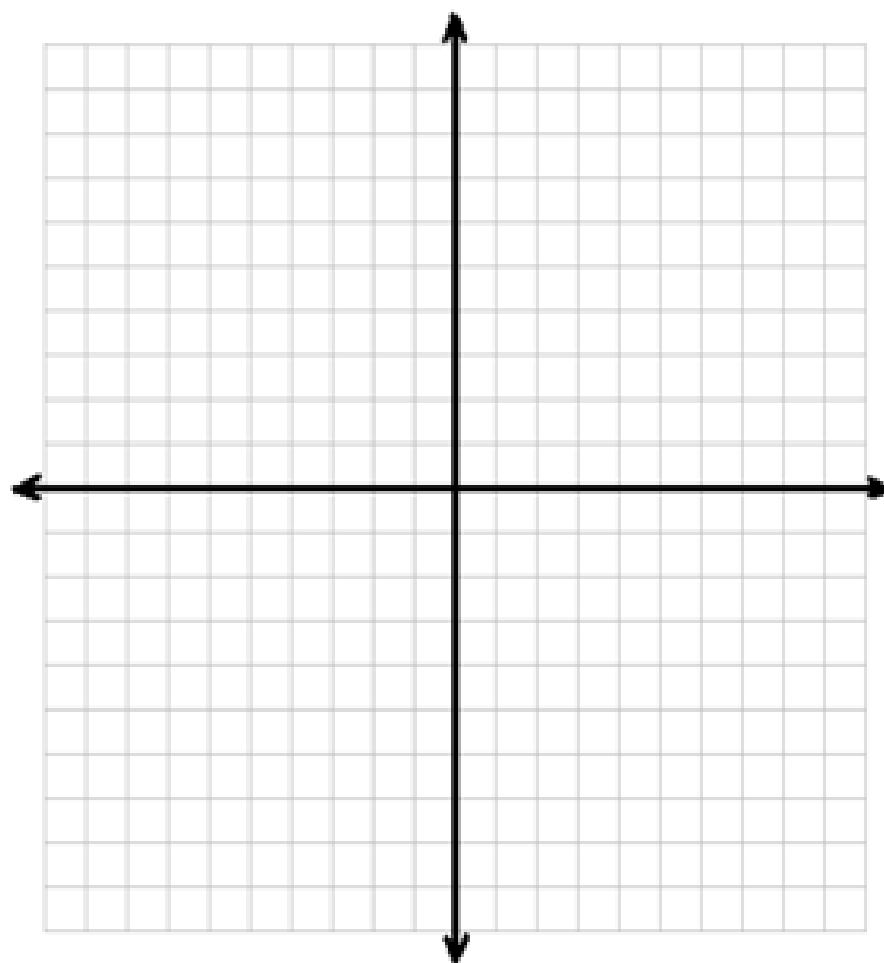
Ex 7:

Write an equation of the line that is parallel to

$x + 2y = -10$ and goes through $(-2,-6)$.

$$\frac{-x \qquad -x}{}$$

$$\frac{2y}{2} = \frac{-x - 10}{2}$$

$$y = -\frac{1}{2}x - 5$$

$$\boxed{y = -\frac{1}{2}x - 7}$$

$$m = -\frac{1}{2}$$

$$y = -\frac{1}{2}x + b$$

$$-b = -\frac{1}{2}\left(\frac{-2}{1}\right) + b$$

$$-b = 1 + b$$

$$\frac{-1 \qquad -1}{}$$

$$b = -7$$

Positive Slope Graphs (Increasing or Rising)

m>0
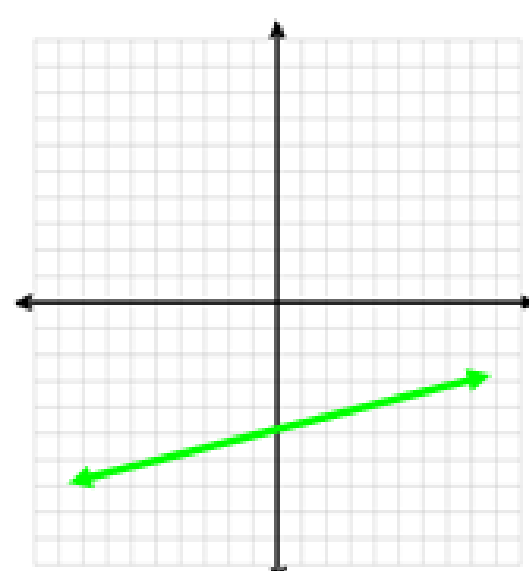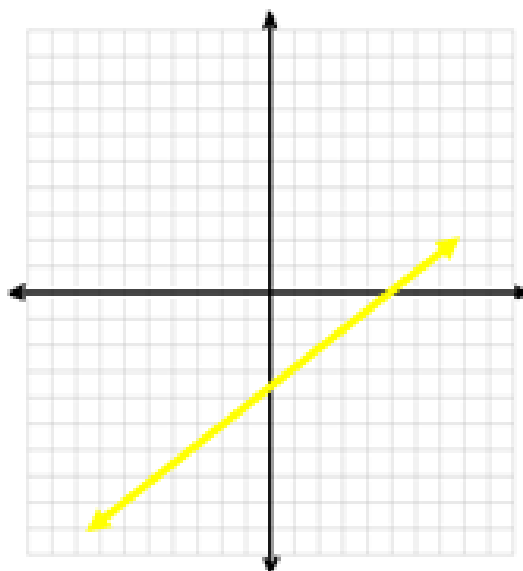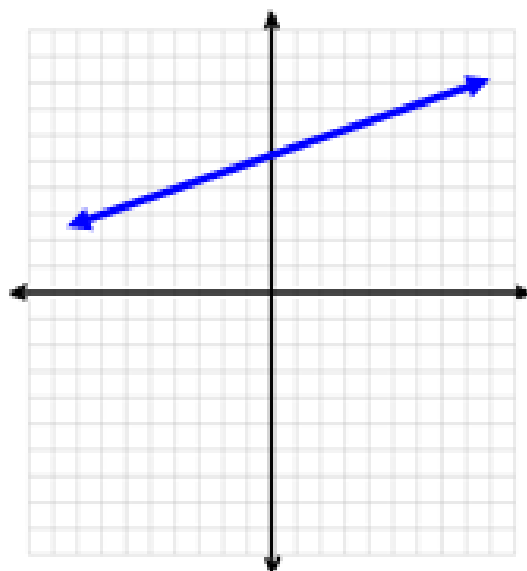
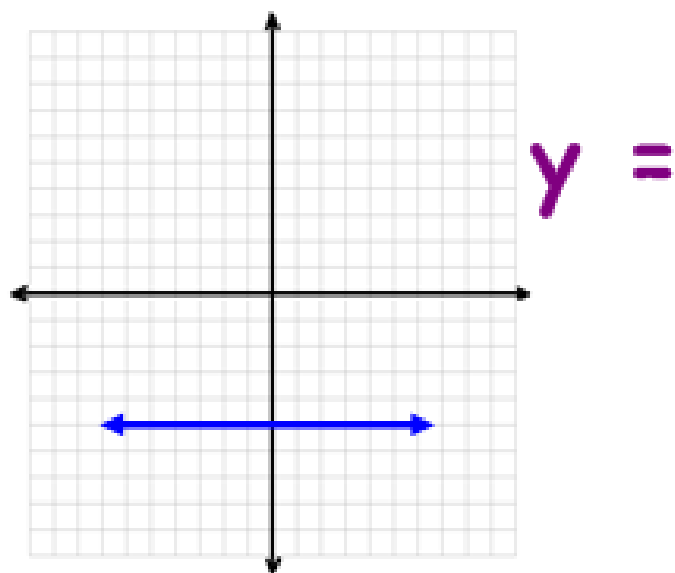# Negative Slope Graphs (Decreasing or Falling)

$m < 0$
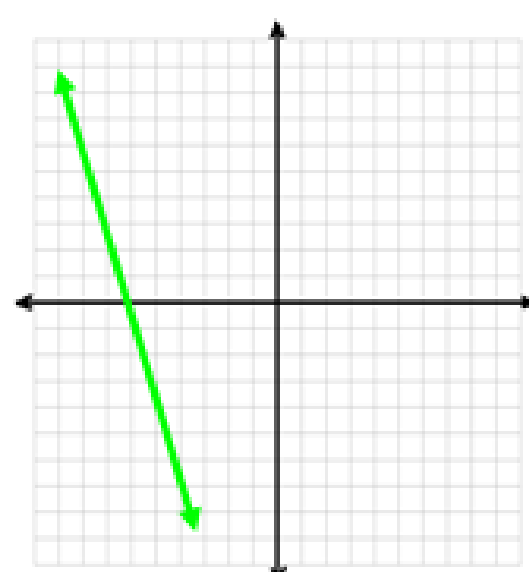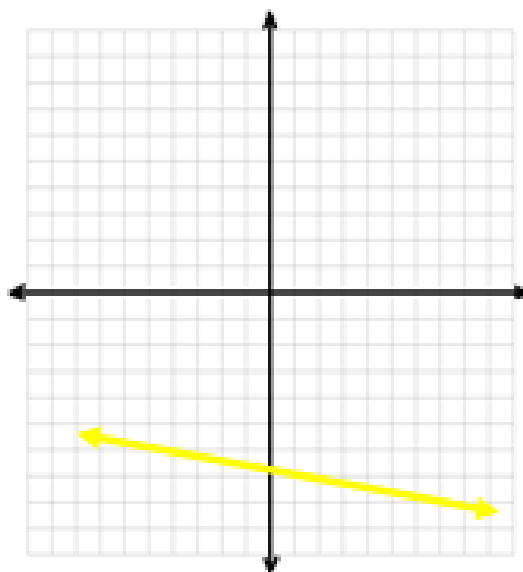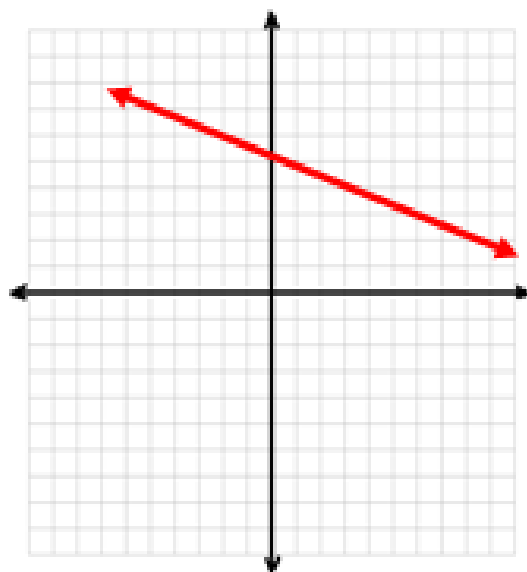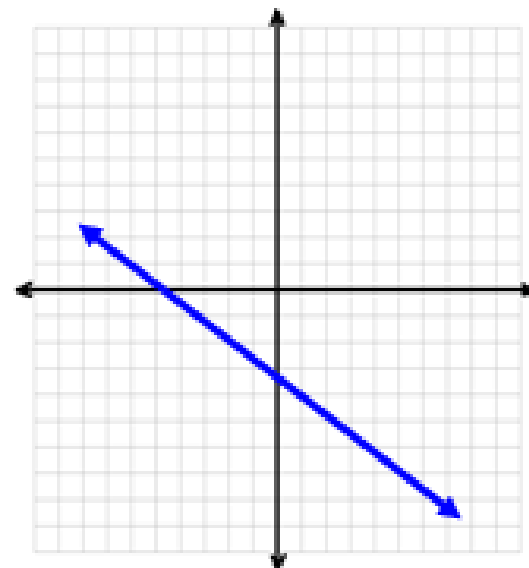
Slope=0 Graphs
Horizontal
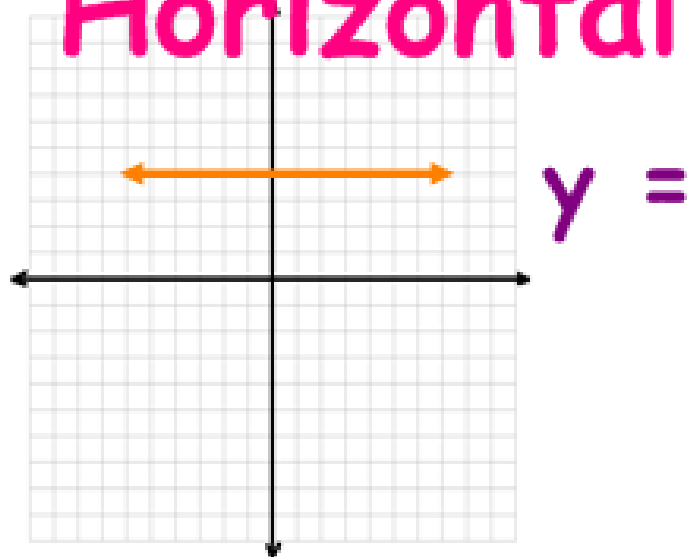
No Slope Graphs
(Undefined Slope)
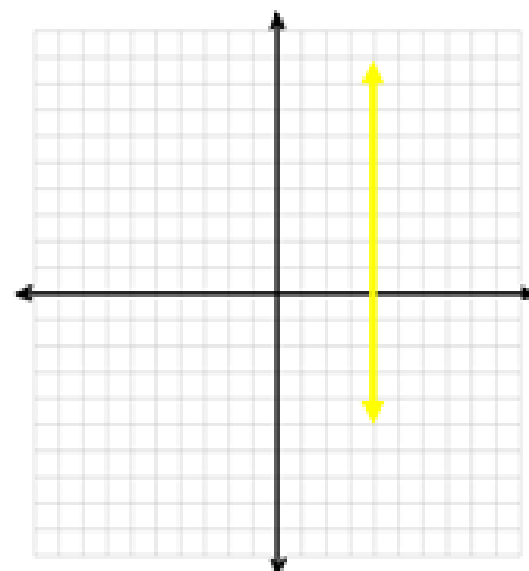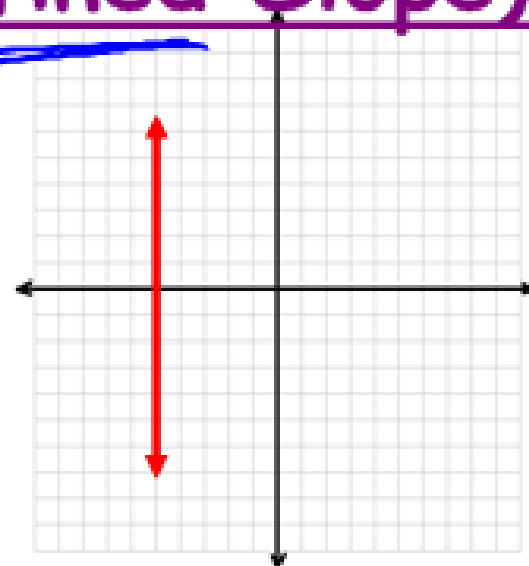
y =

y =

Vertical

x =

x =

Objectives:

~ Use Slope Intercept Form to find the slope
    and y-int of an equation
~ Write Equations in Slope Intercept Form
~ Write Equations using Point Slope Form

Can you?

Homework:

Assignment 7