

## Objectives:

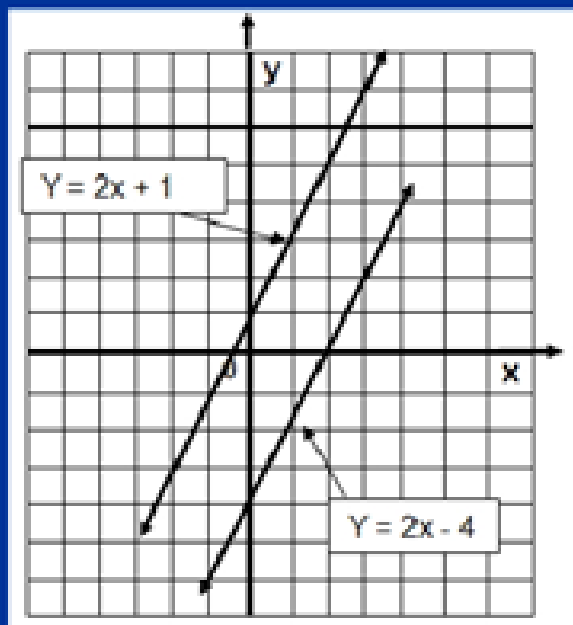
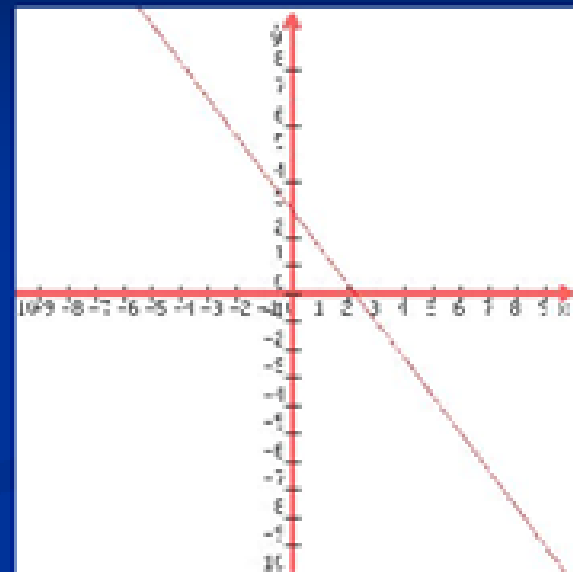
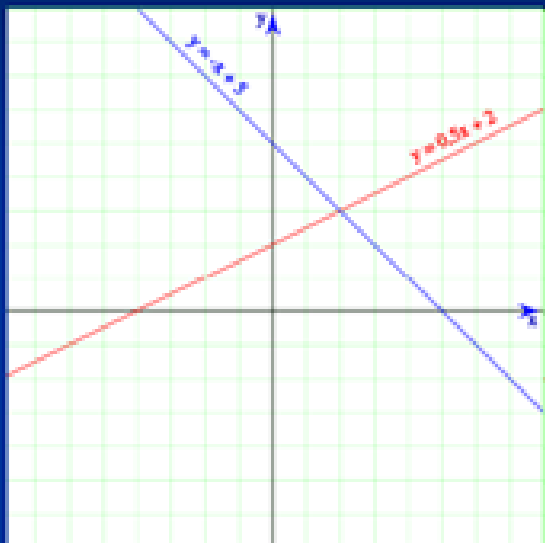
- ~ Find the Slope of a line
- ~ State whether an equation is Linear
- ~ Find x and y intercepts of a line
- ~ Graph a line by x and y intercepts

# Linear Equations

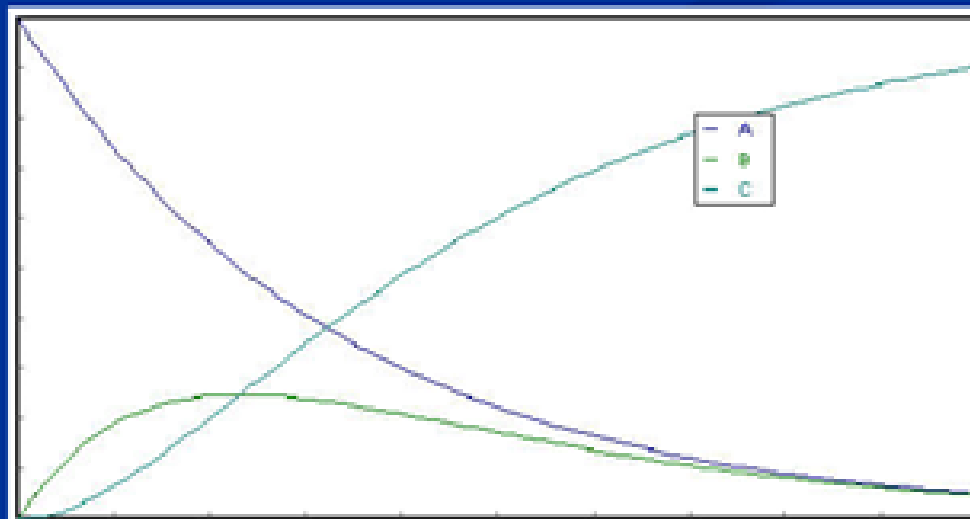
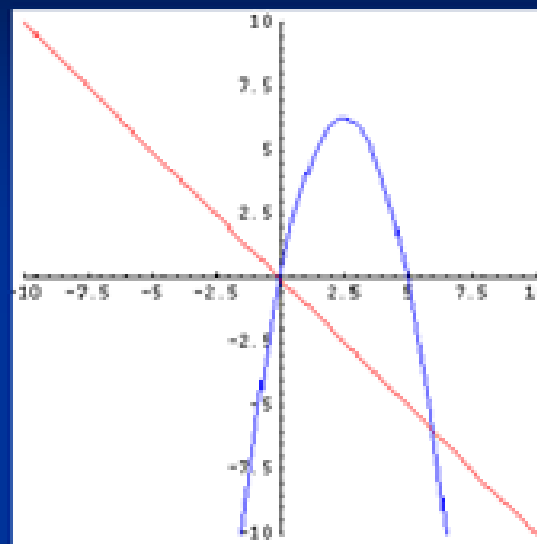
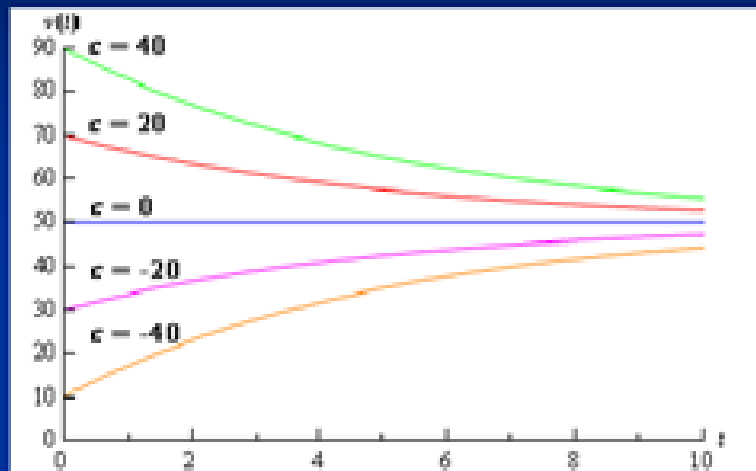
## Definition:

A Linear Equation is an equation that when graphed forms a straight line.

# Graph Examples



# Graph Non-Examples



# How can we tell from just an equation...?

A linear equation needs to have one or two variables. They are usually “x” and “y”. You cannot have more than two variables.

Standard Form:

$Ax + By = C$ , where  $A, B, C$  are Real numbers and  $A, B$  are not 0.

# How can we tell from just an equation...?

A linear equation CANNOT have:

- ★ Powers (exponents) on variables
- ★ Square roots on variables
- ★ Dividing by variables
- ★ Multiplying variables
- ★ Variables in the denominator of a fraction

# Linear Equations Examples

$$y = 5x - 7$$

$$y = x/2$$

$$3^2x + 4y = 1$$

$$42y + 21x = 14$$

$$3y = 4^2x$$

$$7n - 8m = 4 - 2m$$



## Linear Equations Non-Examples

$$y = 5xy - 10$$

$$y = 3/x$$

$$3x^2 + 4y = 1$$

$$42y^2 + 21x^2 = 14$$

$$3y = 4x + 3z$$

$$8m = 4 - 2m^2$$

## Your Turn: Ex or Non-Ex?

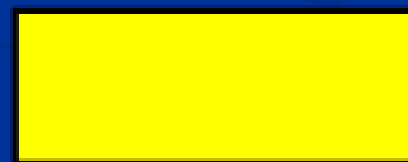
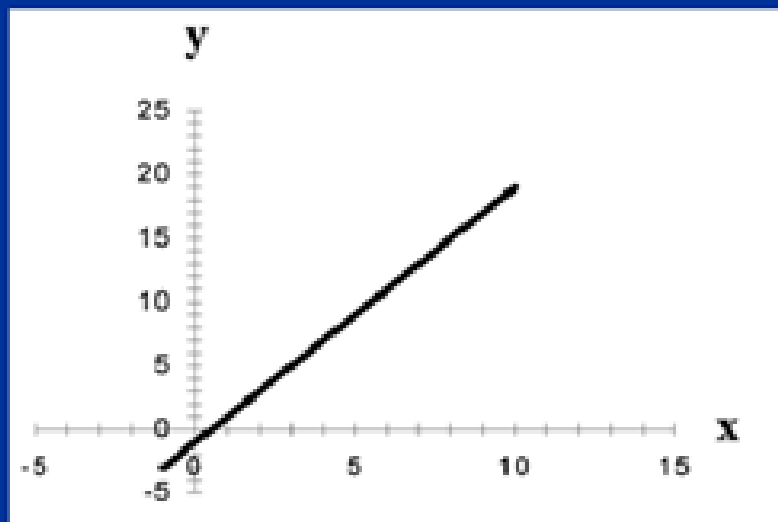
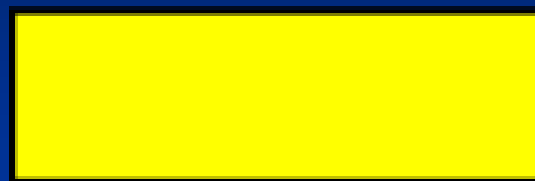
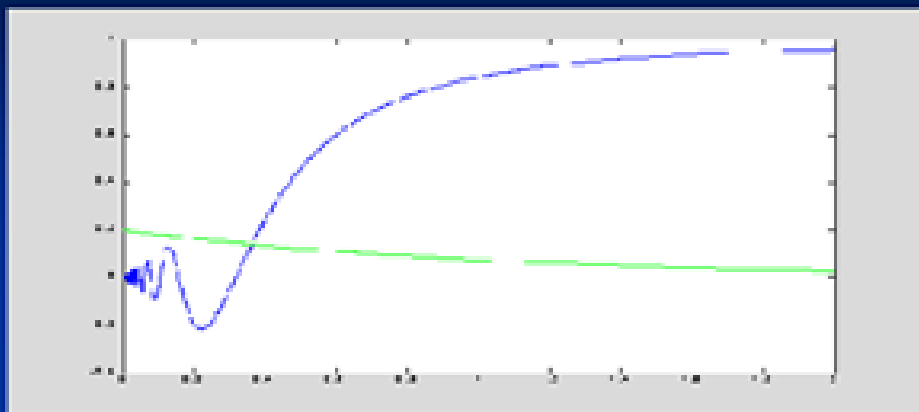
$$y = 3x + x$$

$$4y = 3x + yx$$

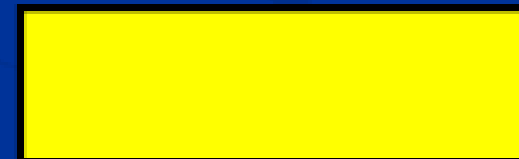
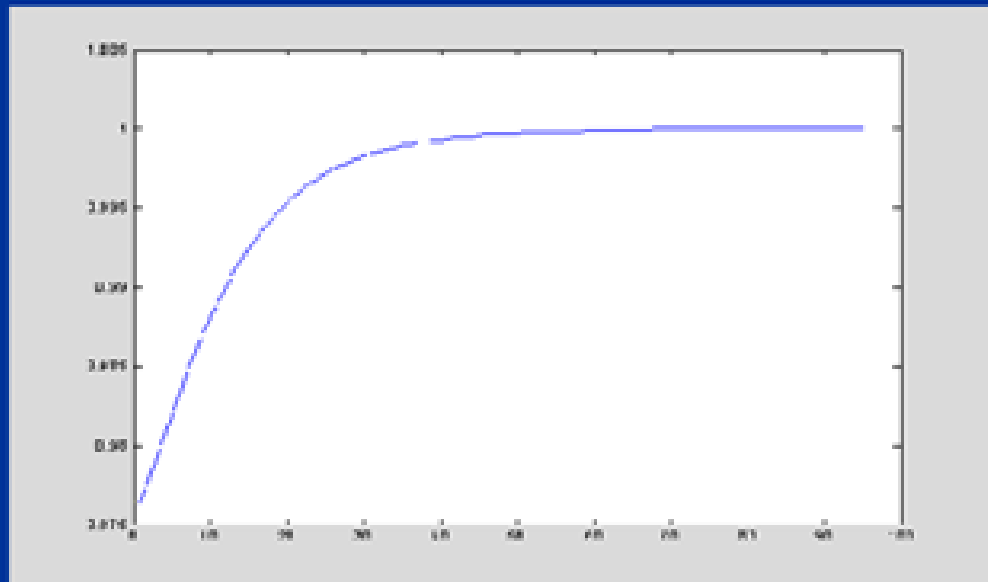
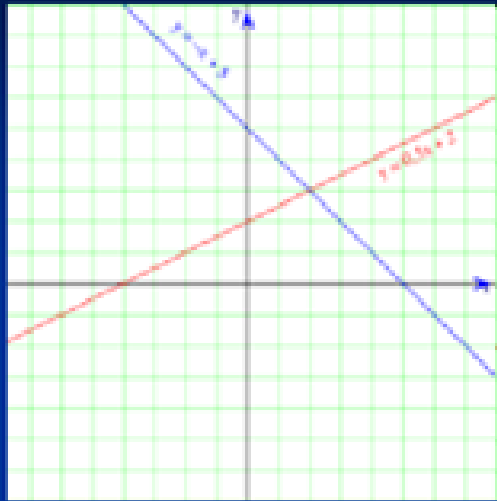
$$x = 1/y$$

$$10^2y - 3x = 2$$

# Your Turn: Ex or Non-Ex?

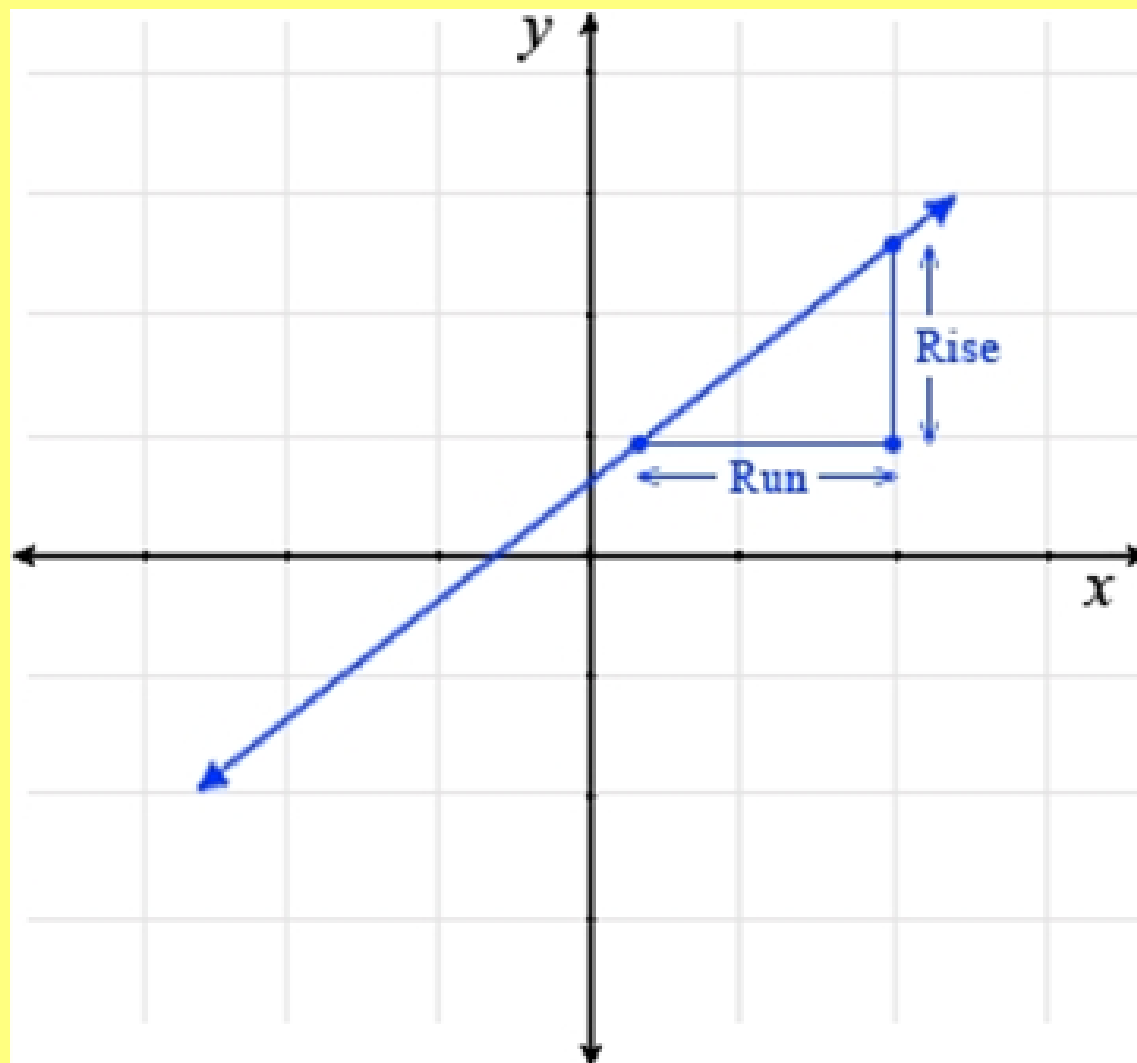


# Your Turn: Ex or Non-Ex?



# Slope! of Linear Equations

Rise  
Run

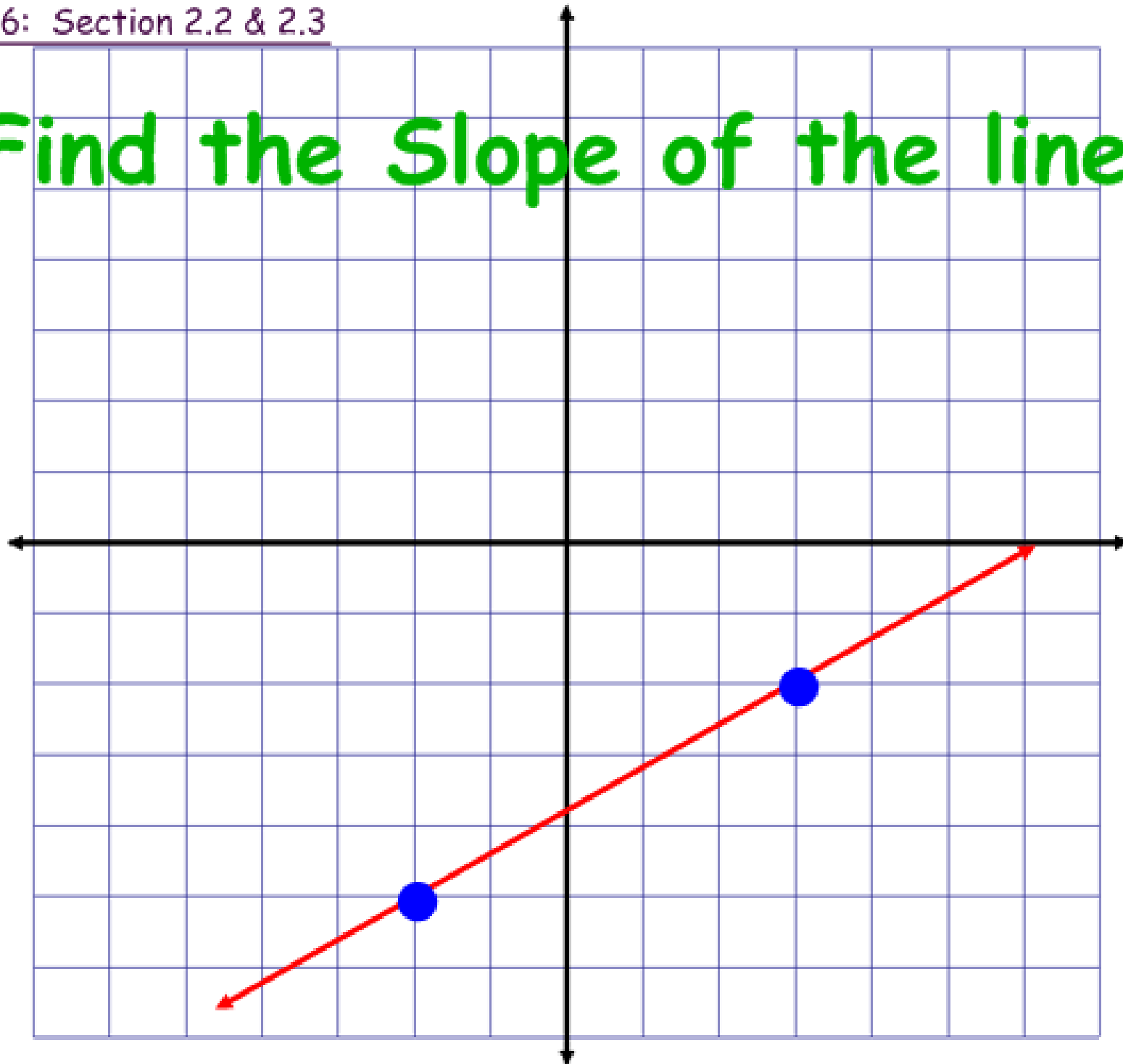


Slope =  $m$

$$m = \frac{\text{Rise}}{\text{Run}}$$

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

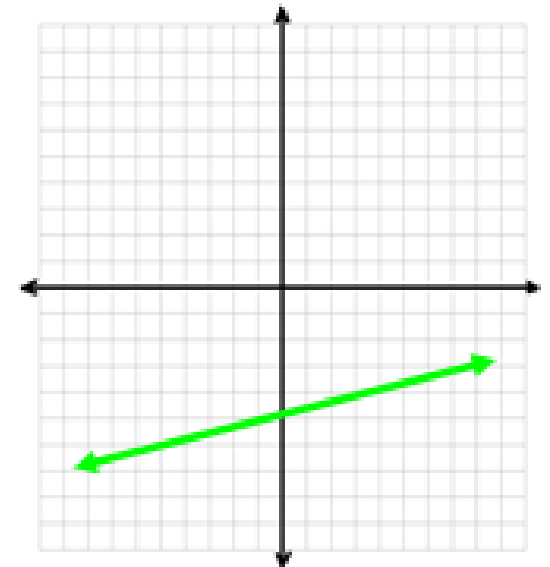
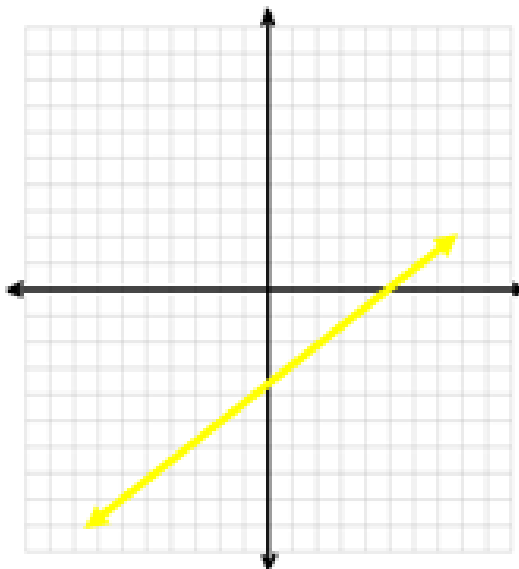
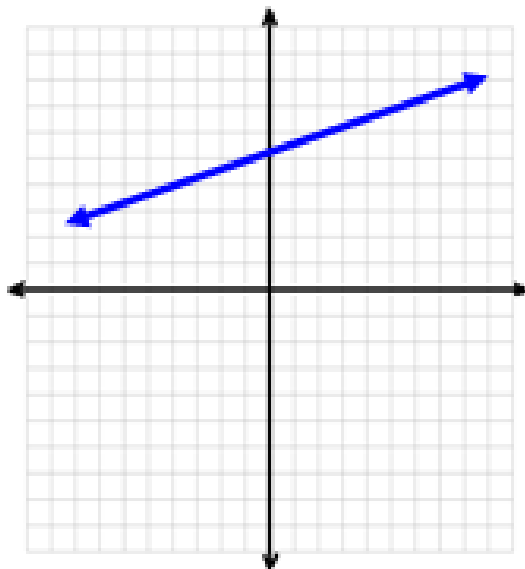
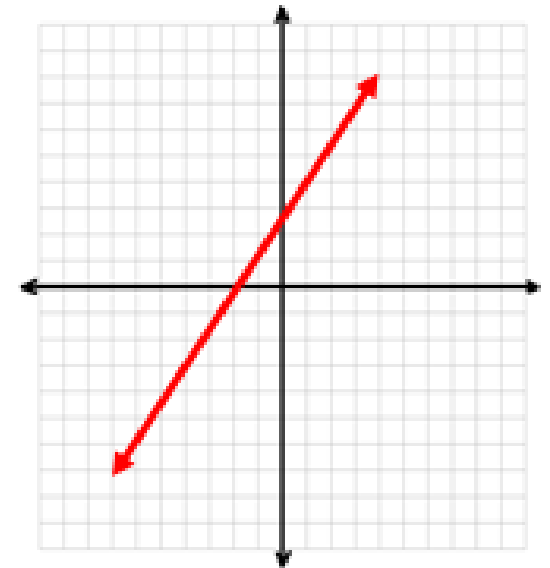
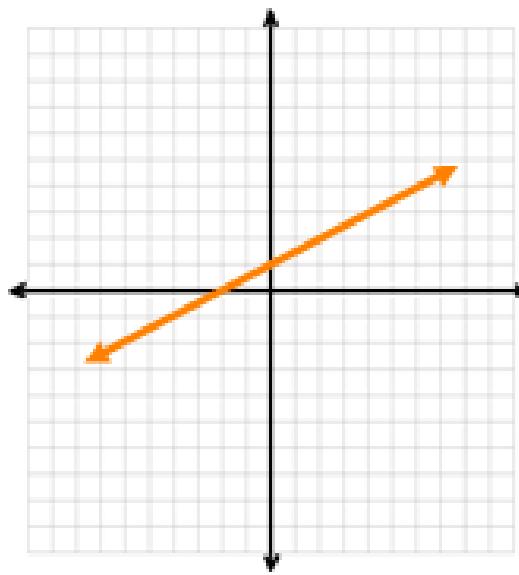
Find the Slope of the line.



Lesson 7: Section 2.3 & 2.4 - Slope Intercept Form

Positive Slope  
Graphs

$m > 0$

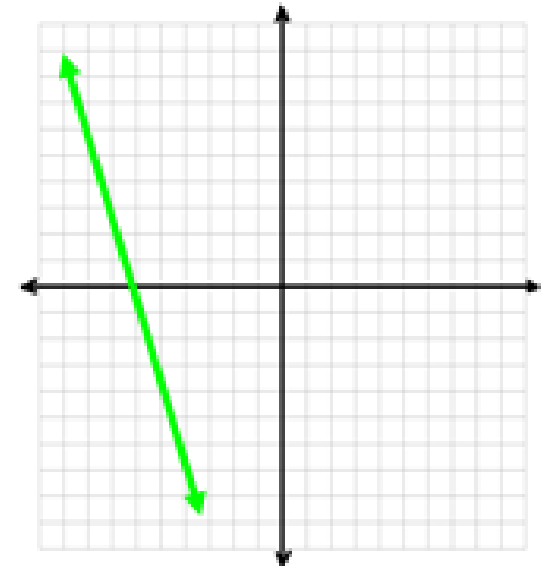
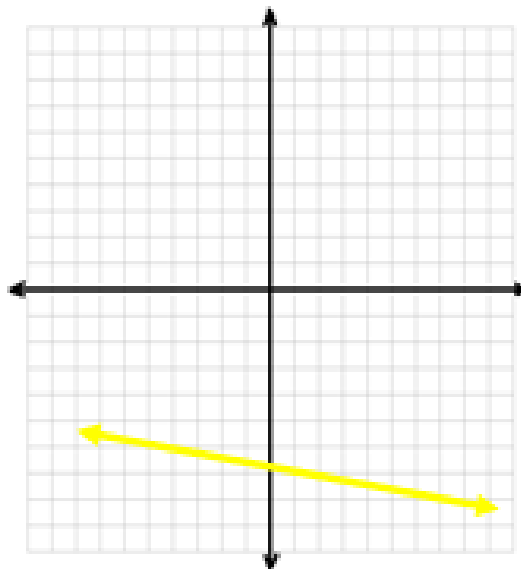
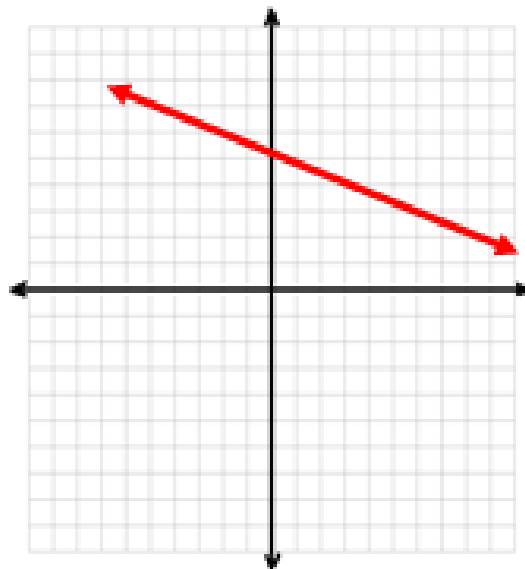
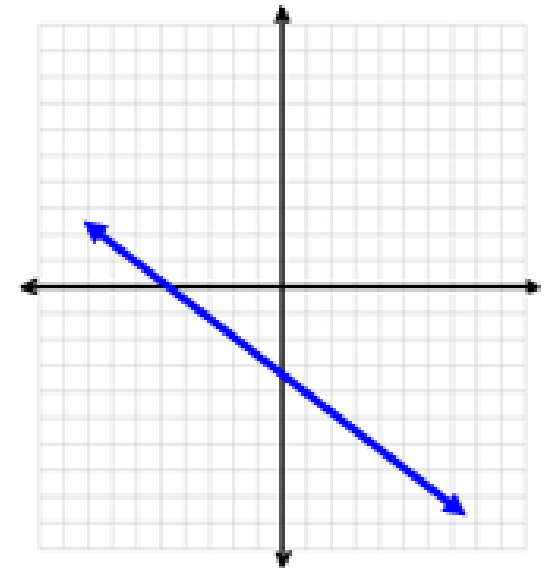
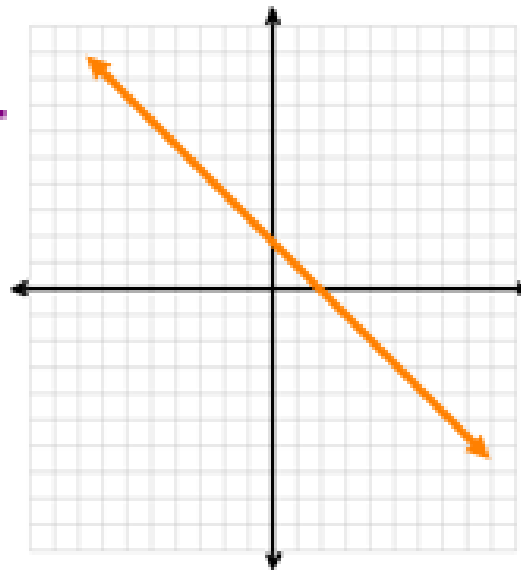




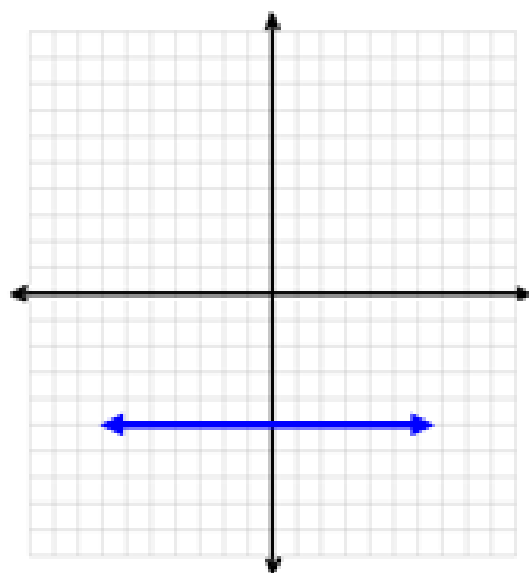
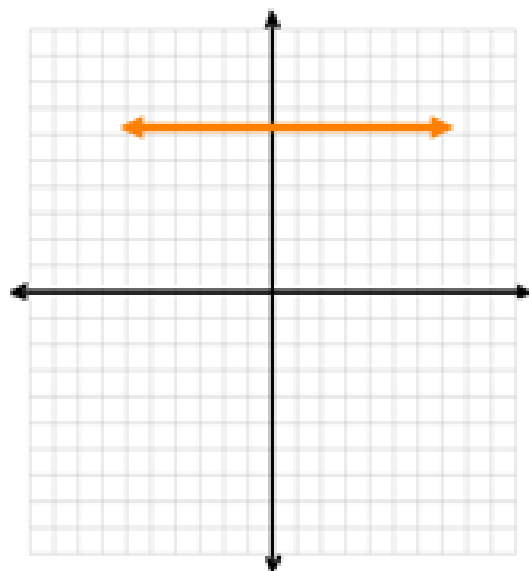
Lesson 7: Section 2.3 & 2.4 - Slope Intercept Form

Negative Slope  
Graphs

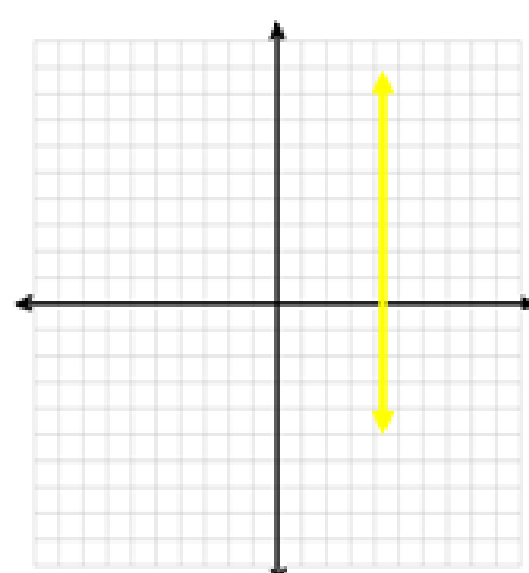
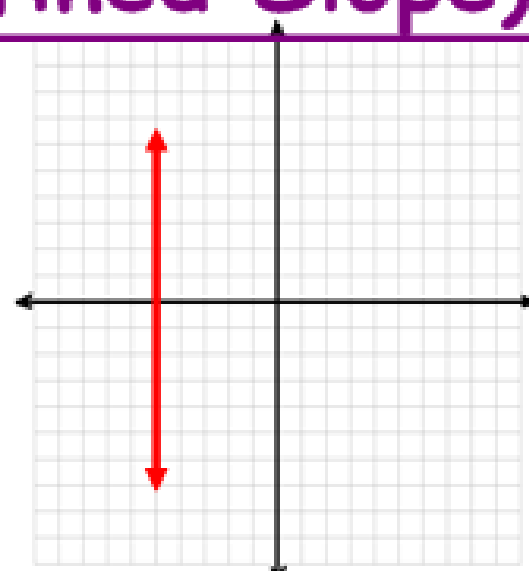
$m < 0$



## Slope=0 Graphs

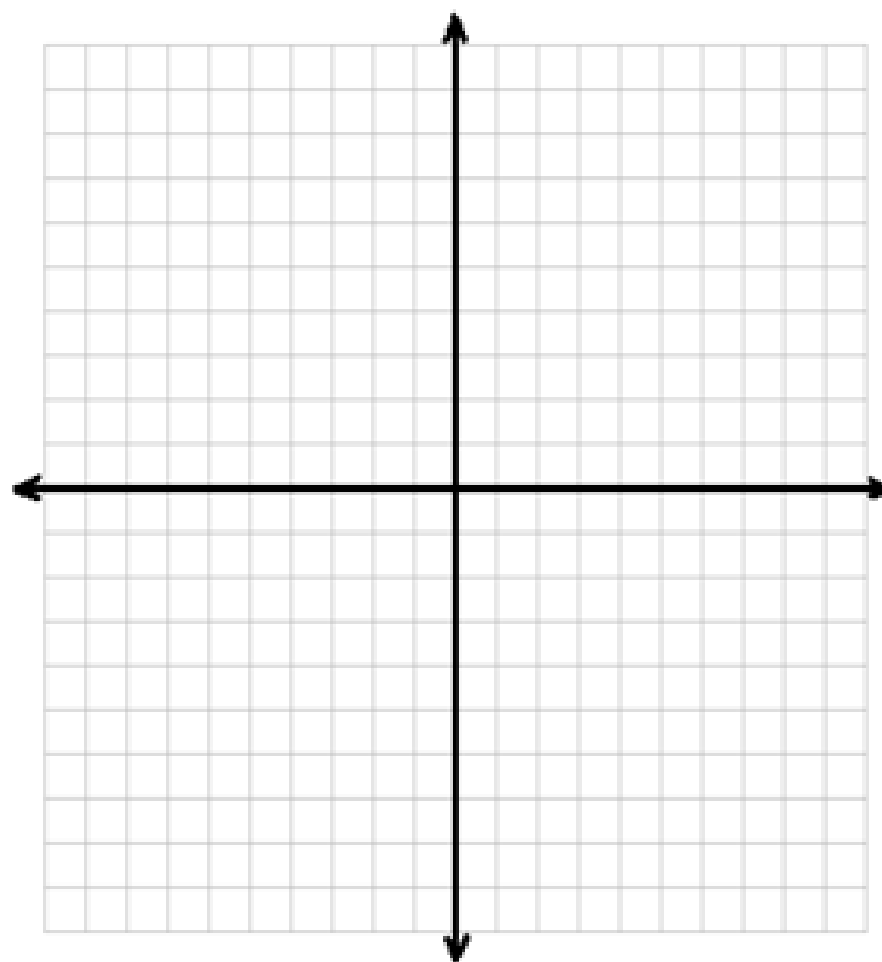


## No Slope Graphs (Undefined Slope)



Lesson 6: Section 2.2 & 2.3

Find the Slope of the line that passes through the points  $(3,4)$  and  $(6, -8)$ .



Lesson 6: Section 2.2 & 2.3

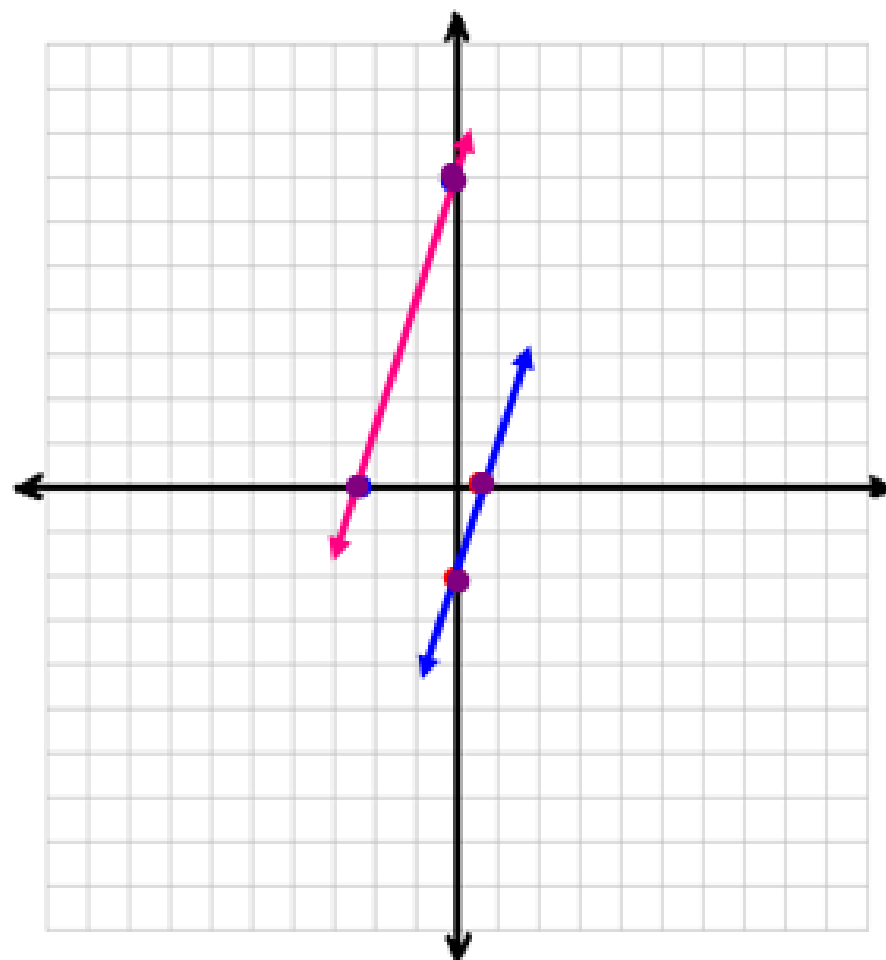
Parallel lines:

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

EXAMPLE:

$$y = 3x + 7$$

$$y = 3x - 2$$



Lesson 6: Section 2.2 & 2.3

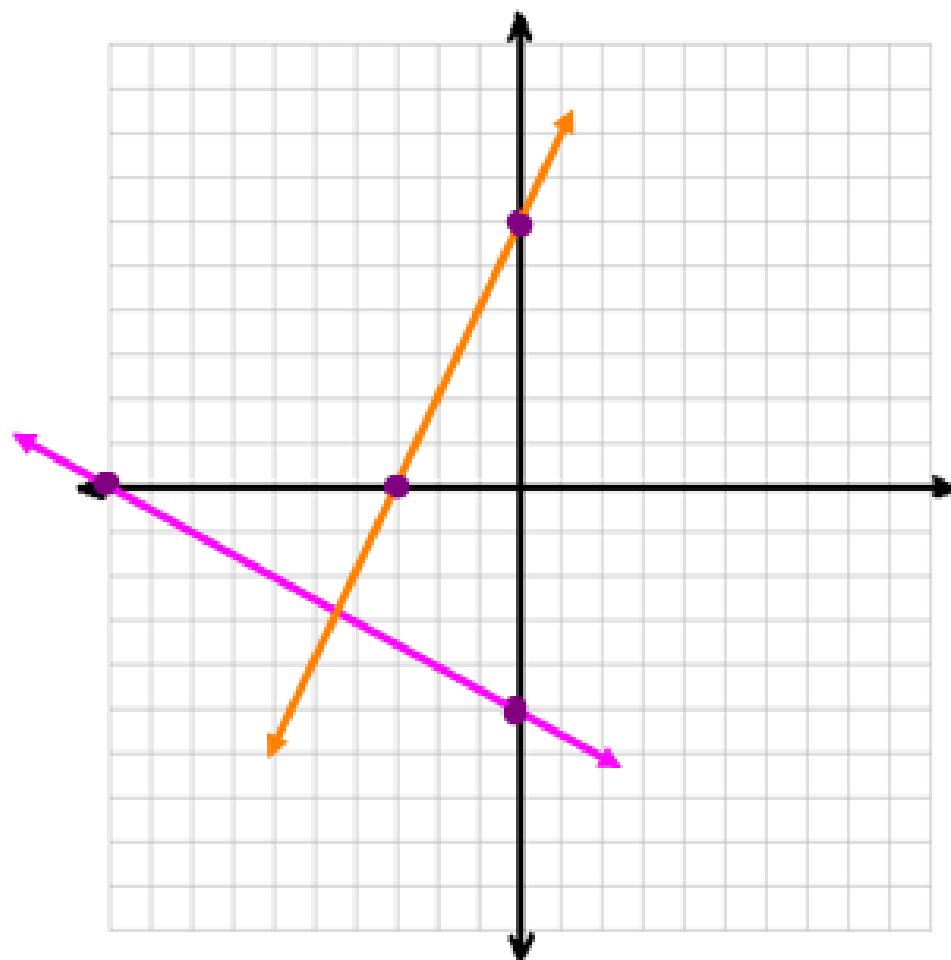
Perpendicular lines:

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

EXAMPLE:

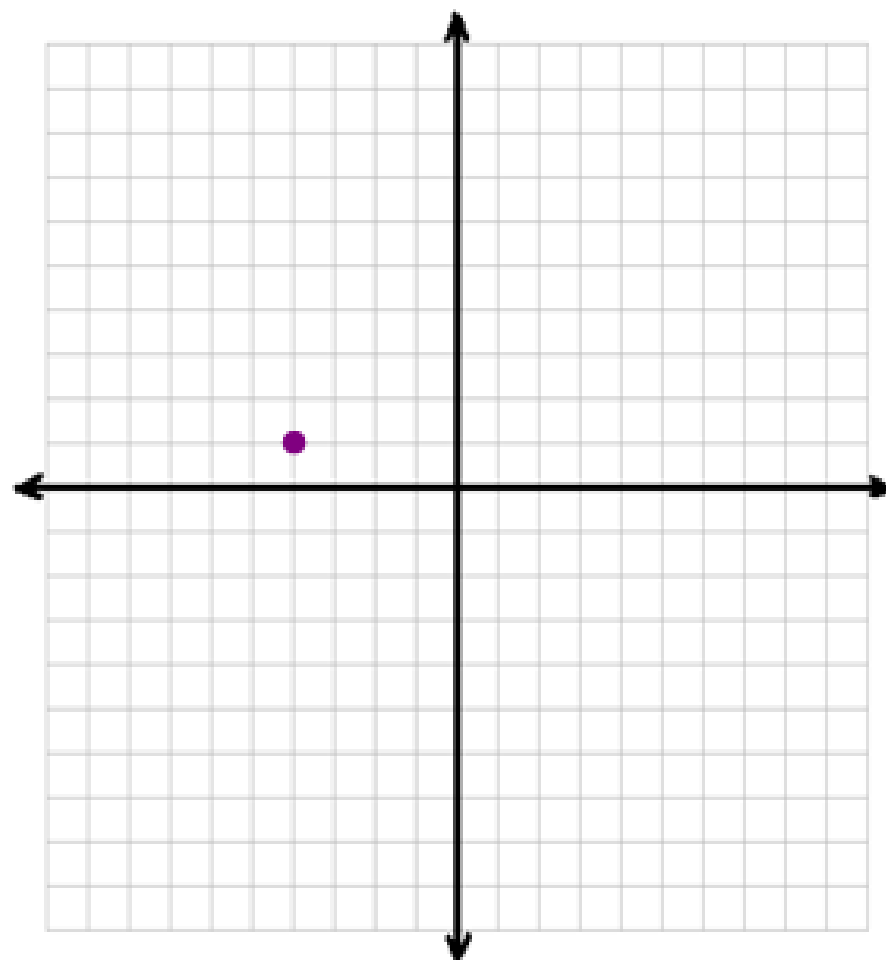
$$y = 2x + 6$$

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



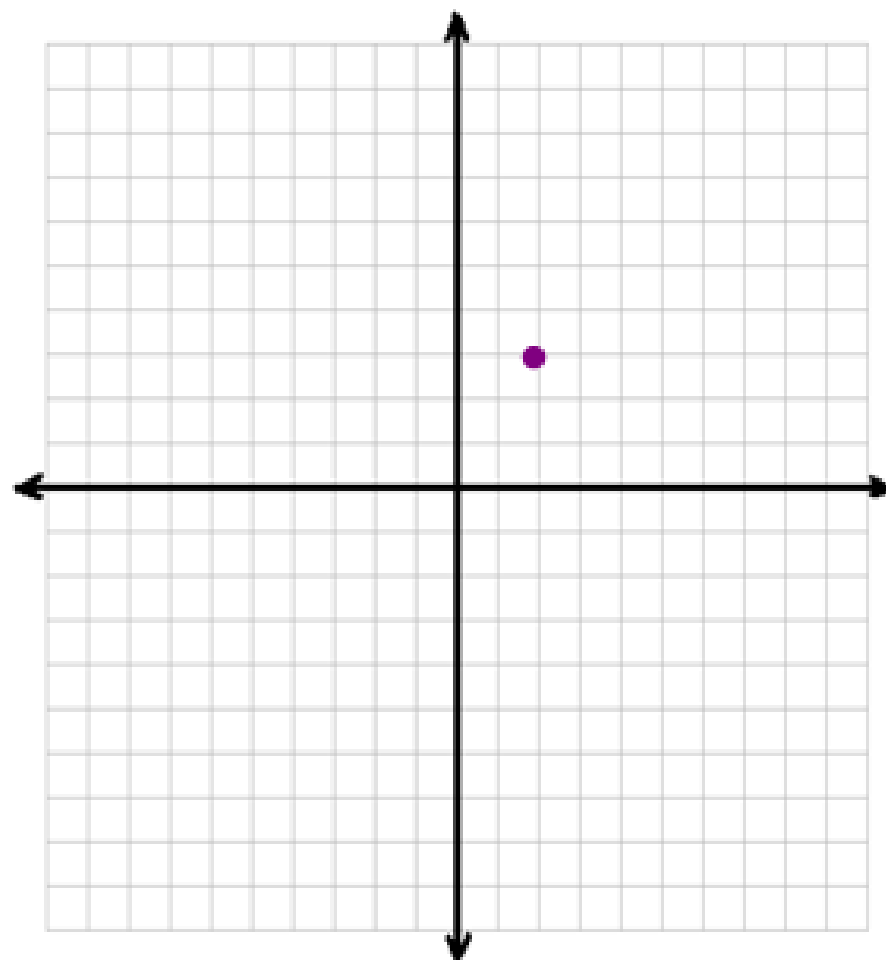
Lesson 6: Section 2.2 & 2.3

Graph a line through  $(-4, 1)$  that is perpendicular to a line whose slope is  $(-3/2)$ .



Lesson 6: Section 2.2 & 2.3

Graph a line through  $(2, 3)$  that is parallel to a line that has slope  $(5/4)$ .



# Intercepts!!!

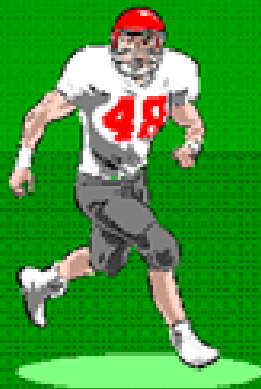


# Football

- In football what is an interception?
- What needs to happen in order for an interception to occur?
  - The "interceptor" and the football need to be at the same place at the same time.

# Some amazing interceptions...

- But first let me introduce you to our players...



The interceptor



Football

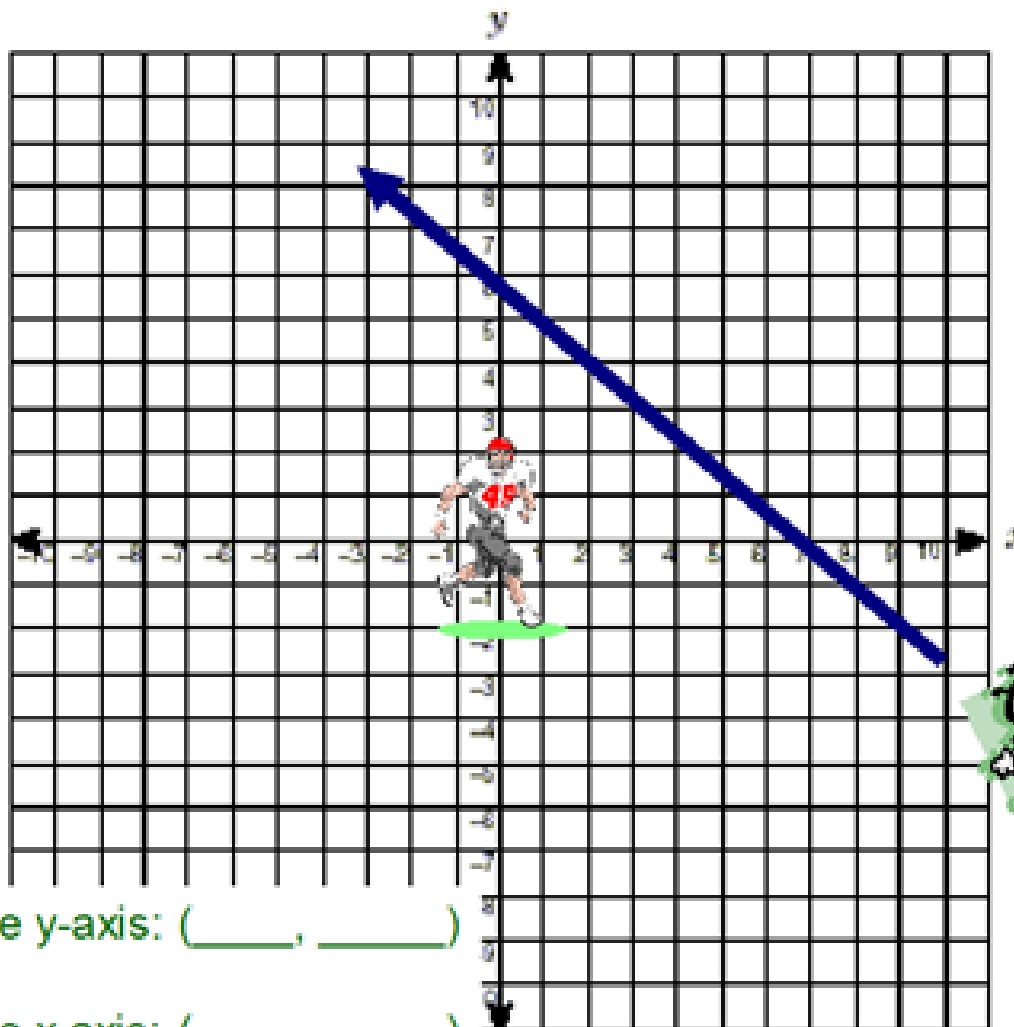


Quarterback

# The “Interceptor”

- The Interceptor is the star player on the opposing team. He has 29 interceptions already this year.
- The only problem is that the “interceptor” can only run vertically or horizontally from his starting position.
- We are going to call his starting point the origin and his running path will be either up and down the y-axis, or right and left along the x-axis.

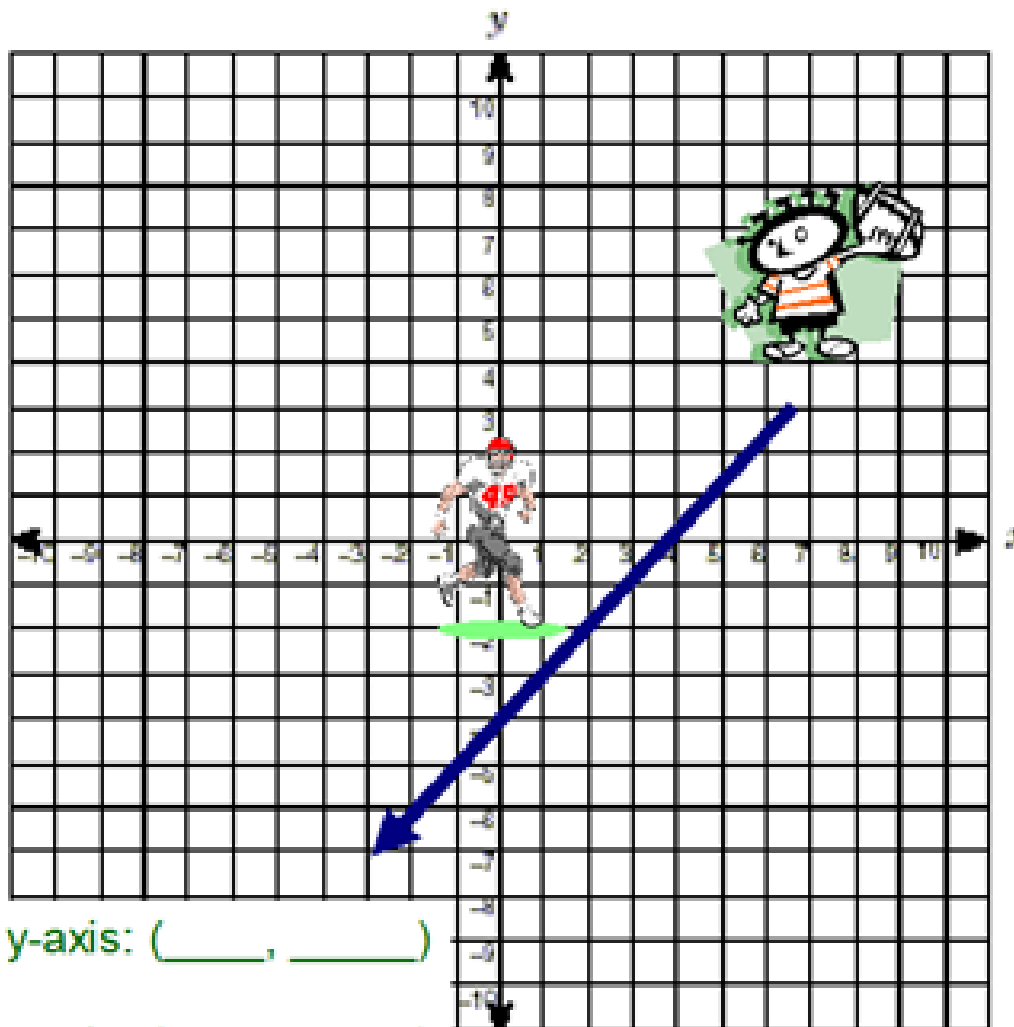
# First Down and 10



Interception on the y-axis: (\_\_\_\_, \_\_\_\_)

Interception on the x-axis: (\_\_\_\_, \_\_\_\_)

# Second Down and 12



Interception on the y-axis: (\_\_\_\_, \_\_\_\_)

Interception on the x-axis: (\_\_\_\_, \_\_\_\_)

# Observations

- What is special about all of the interception points?
  - They all have a zero!
  - When the interception happens on the y-axis the zero is in the **x** coordinate.
  - When the interception happens on the x-axis the zero is in the **y** coordinate.

## But how do we find the interception point without a picture?

- When looking for the y-interception, plug a zero in for    **X**    and solve for    **Y**   .
- When looking for the x-interception, plug a zero in for    **Y**    and solve for    **X**   .

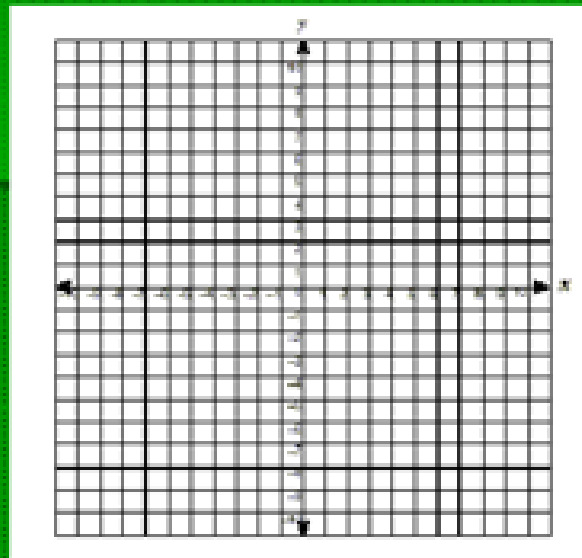
# Name the x- and y-intercepts for $3x + 4 = 7y$

- y-intercept...
  - Plug in a zero for x
  - Solve for y
- x-intercept...
  - Plug in a zero for y
  - Solve for x



# Graphing x- and y-intercepts

- We've found two points, (x-intercept, 0) and (0, y-intercept).
- Now we can plot them on a coordinate plane.



**Can the point of interception on the x-axis and the point of interception on the y-axis ever be the same point?**

**$(0,0)$**

**Can we draw a line if we  
only know one point?**

**NO**

- When we only have one point  $(0,0)$ , we need to pick another  $X$  and plug it into the equation to find  $Y$ . We now have another point to plot and can connect the points to make a line.

## Objectives:

- ~ Find the Slope of a line
- ~ State whether an equation is Linear
- ~ Find x and y intercepts of a line
- ~ Graph a line by x and y intercepts

Can you?

Homework:

Journal 6 – Due at end of Math  
Lab

Assignment 6 – Due at the  
beginning of B1 class