

## HOMWORK ANSWERS FOR 60:18-50 EVENS

18. no  
20. yes  
22. no  
24.  $d=\{3,4,6\}$   $r=\{5\}$  function  
26.  $d=\{3,4,5,6\}$   $r=\{3,4,5,6\}$  function  
28.  $d=\{-2.5,-1,0\}$   $r=\{-1,1\}$  not a function  
30.  $d=$  all real numbers  $range=$  all real numbers function  
32.  $d=$  all real numbers  $range=$  all real numbers function  
34.  $d=$  all number greater than or equal to 3  $r=$ all real numbers no  
36.  $d=\{52, 56, 48, 47\}$   $r=\{148, 147, 157, 165, 145\}$   
38.  $\{(1997, 39), (1998, 43), (1999, 48), (2000, 55), (2001, 61), (2002, 52)\}$   
40.  $d=\{1997, 1998, 1999, 2000, 2001, 2002\}$   $r=\{39, 43, 48, 55, 61, 52\}$   
42.  $\{(1987, 12), (1989, 13), (1991, 11), (1993, 12), (1995, 9), (1997, 6), (1999, 3)\}$   
44.  $d=\{1987, 1989, 1991, 1993, 1995, 1997, 1999\}$   $r=\{12, 13, 11, 12, 9, 6, 3\}$   
46. -14  
48.  $-2/9$  or  $-.222222$   
50.  $3a-5$

17 points possible  
1 each

## Linear Equations

An equation whose graph is a straight line and:

- has no exponents or variables under roots
- no variables multiplied together
- no variables in denominators

Linear:  $y = 3x + 5$  or  $-4x + 3y = 7$  or  $x = 3$  or  $y = -8$   
Non Linear:  $x + xy = 1$  or  $y = \sqrt{x + 1}$  or  $y = \frac{1}{x}$  or  $3x + 4y^2 = -5$



## Standard Form of a Linear Equation

Standard form is used so that the linear equation will always look the same.

- where A is always positive
- x and y are on the same side of the equal sign
- the x term goes first, the y term goes second
- the x term is always positive
- A, B and C are integers (non fractions or decimals)

$$Ax + By = C$$

*Equation*  $y = -2x + 3$

$+ 2x$   $+ 2x$

Standard Form:  $2x + y = 3$

Write  $-\frac{3}{5}x = 3y - 2$  in Standard Form:

**STANDARD FORM:**

1. x term goes first and is positive
2. x and y are on the same side
3. no fractions or decimals

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

$-3y \quad -3y$

$$-5 \left( -\frac{3}{5}x - 3y \right) = (-2)(-5)$$

$$3x + 15y = 10$$

## X and Y Intercepts

The x-intercept of a graph is where the graph crosses the x axis

- To find the x-intercepts, plug a 0 in for y and solve for x.

The y-intercept of a graph is where the graph crosses the y axis

- To find the y-intercepts, plug a 0 in for x and solve for y.

Find the x and y intercepts for the equation

$$3x - 4y = 12$$

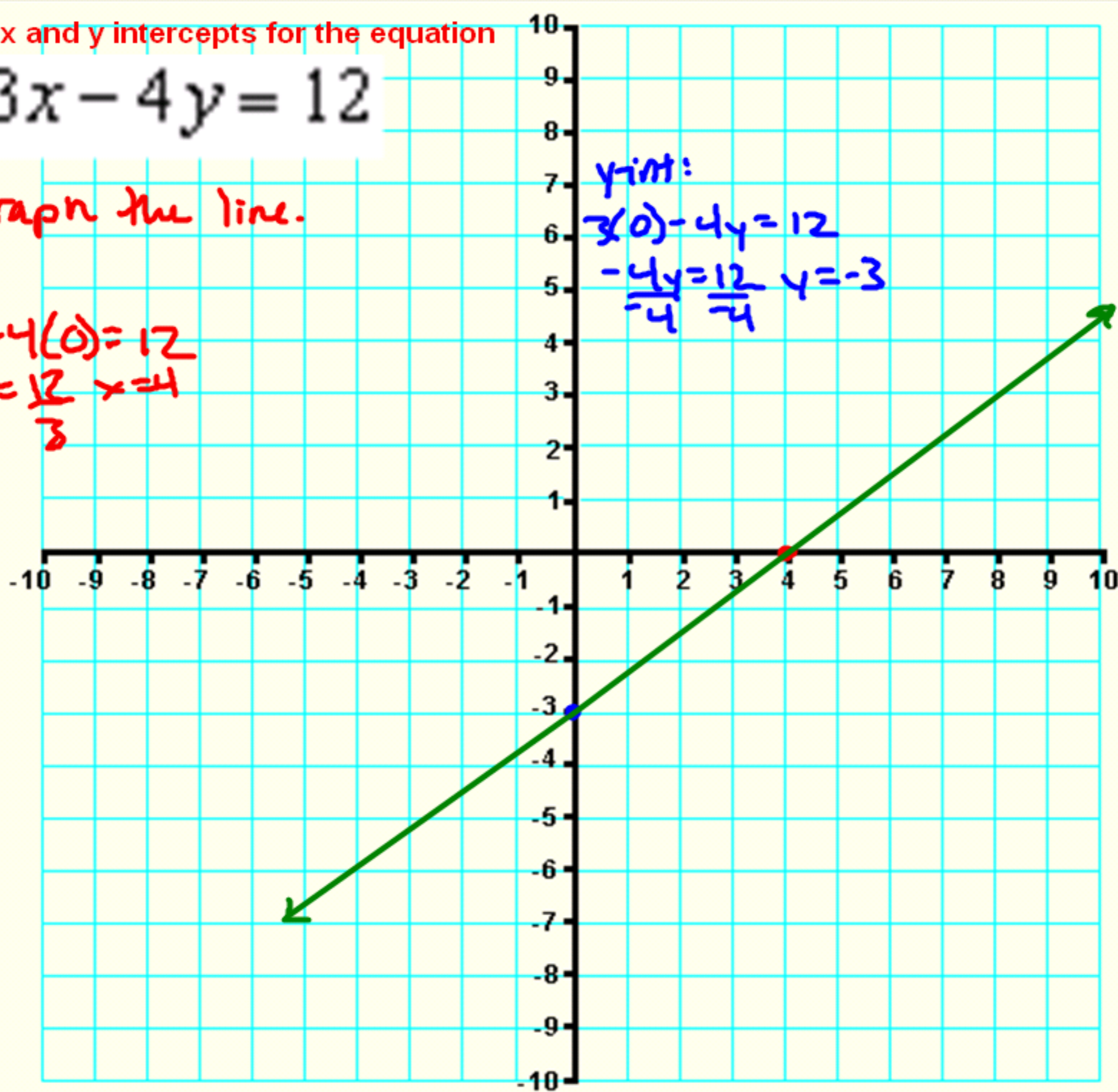
Graph the line.

x-int:

$$\begin{aligned} 3x - 4(0) &= 12 \\ 3x &= 12 \quad x = 4 \\ \frac{3x}{3} &= \frac{12}{3} \end{aligned}$$

y-int:

$$\begin{aligned} 3(0) - 4y &= 12 \\ -4y &= 12 \quad y = -3 \\ \frac{-4y}{-4} &= \frac{12}{-4} \end{aligned}$$



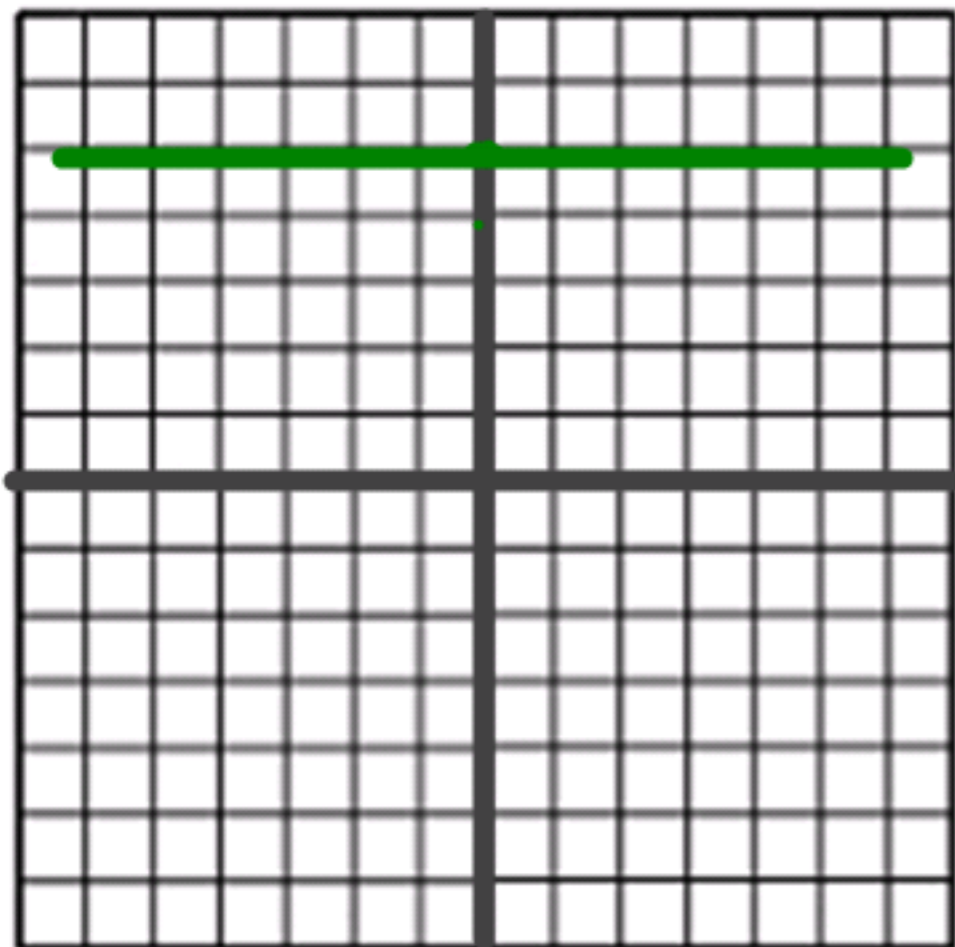
**NOTE:**

If there is no  $x$  in the equation then it has no  $x$  intercept and is a horizontal line

If there is no  $y$  in the equation then it has no  $y$  intercept and is a vertical line

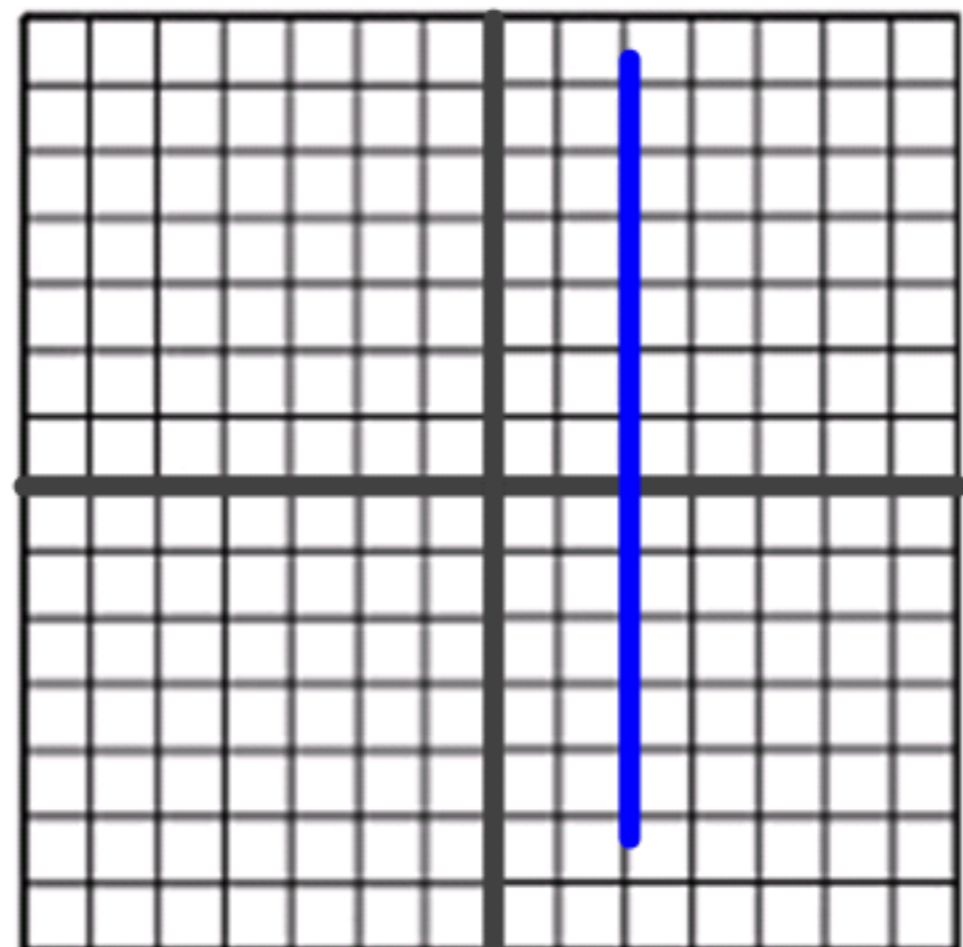
$y = 5$

$y\text{-int: } 5$   
 $x\text{-int: none}$



$x = 2$

$x\text{-int: } 2$     $y\text{-int: none}$



## Slope

Gives the direction a line on a graph is going as a ratio of the change in the y-direction to the change in the x-direction.

$$\text{slope} = \frac{\text{change in the y direction}}{\text{change in the x direction}} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$


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

Find the slope of the line between (1, 5) and (3, 13):

$$\begin{matrix} x_1 & y_1 \\ (1, & 5) \end{matrix}$$

$$\begin{matrix} x_2 & y_2 \\ (3, & 13) \end{matrix}$$

$$\frac{13 - 5}{3 - 1} = \frac{8}{2} = 4$$

$$m = 4 = \frac{4}{1}$$


$$\frac{5 - 13}{1 - 3} = \frac{-8}{-2} = 4$$

Find the slope of the line between (3, -2) and (5, 11):

$$\frac{11 - (-2)}{5 - 3} = \frac{13}{2}$$

↑  
→

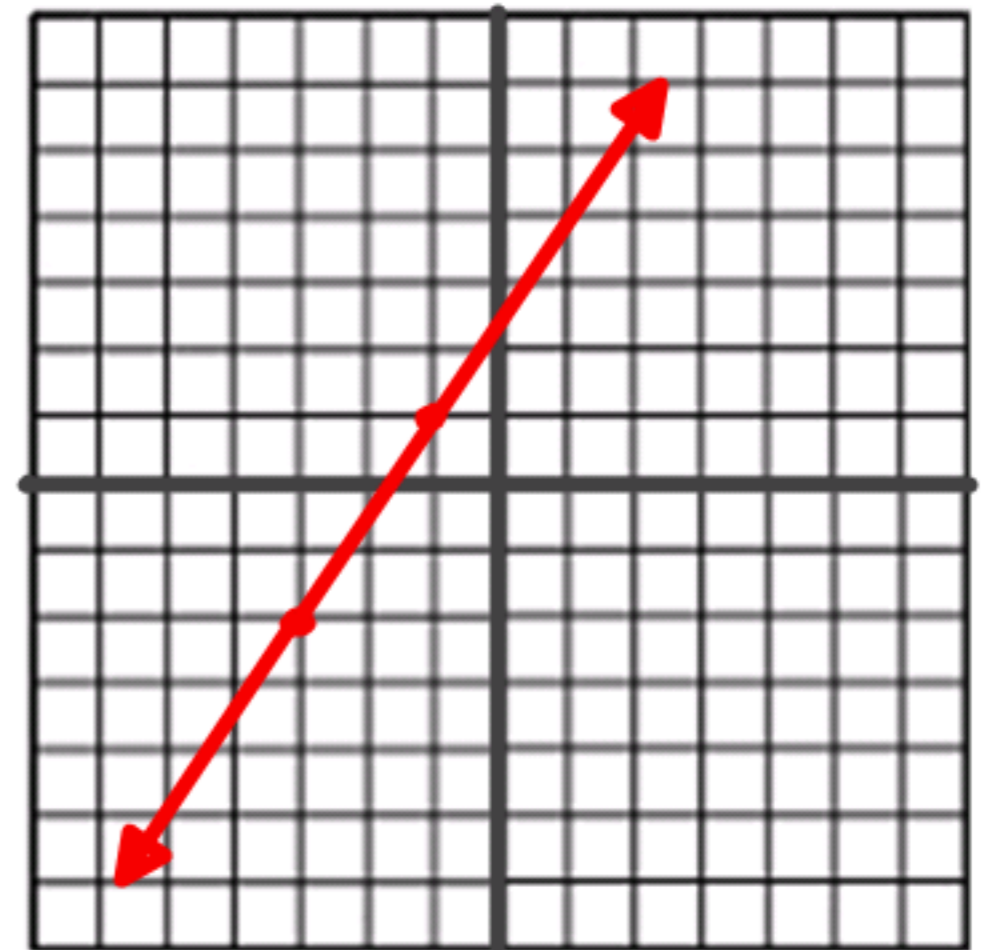
## Graphing Slope

When graphing a slope on a cartesian plane:

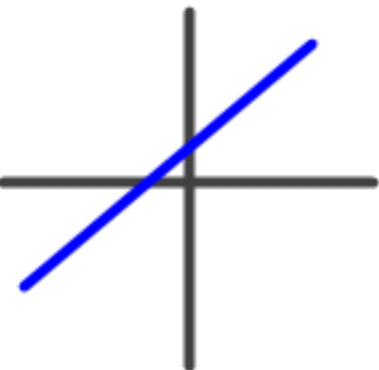
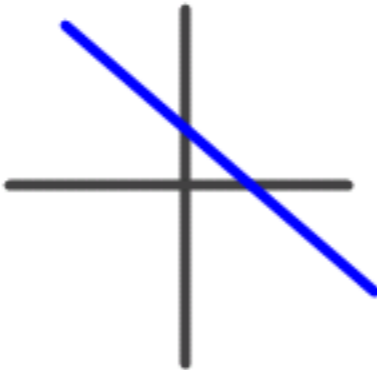
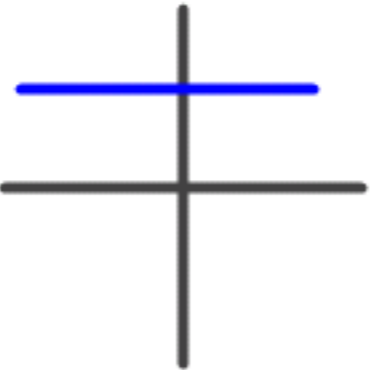
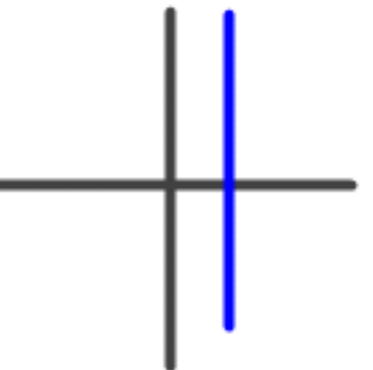
1. Start by plotting the point given
2. Rewrite the slope as a fraction if it is not already in fraction form
3. Always go right the amount in the bottom of the slope
4. Positive slopes go up the amount in the top of the slope
5. Negative slopes go down the amount in the top of the slope

Graph the line passing through  $(-3, -2)$  with a slope of  $\frac{3}{2}$

$\downarrow$   $\frac{3}{2}$   $\uparrow$   
 $\rightarrow$   $\frac{2}{2}$   
 $\rightarrow$   $\frac{2}{2}$



## Types of Slope

<b>POSITIVE SLOPE</b> Line rises to the right	<b>NEGATIVE SLOPE</b> Line falls to the right	<b>SLOPE IS ZERO</b> Line is horizontal	<b>SLOPE IS UNDEFINED</b> Line is vertical <i>*undefined means divided by zero</i>
			

$$(4,7)(4,12) \quad | \quad (2,3)(-4,3)$$

$$\frac{12-7}{4-4} = \frac{5}{0}$$

undefined

$$\frac{3-3}{-4-2} = \frac{0}{-6} = 0$$

## Rate of Change

The slope between two points is also called the “average rate of change” or “rate of change”. This term usually occurs in a story problem.

Mr. and Mrs. Wellman are taking their daughter to college. The table shows their distance from home after various amounts of time.

TIME (hours)	DISTANCE (mi)
0	0
1	55
2	110
3	165
4	165
5	225

Handwritten notes:  $(1, 55)$  and  $(3, 165)$  are written in blue next to the table. Red arrows point to the rows for (1, 55) and (5, 225). The word "slope" is written in red above the first problem.

1. Find the average rate of change of their distance from home between 1 and 3 hours after leaving home.

$$55 \text{ mph}$$

$$\frac{165 - 55}{3 - 1} = \frac{110}{2} = 55$$

2. Find the average rate of change of their distance from home between 0 and 5 hours.

$$\frac{225 - 0}{5 - 0} = \frac{225}{5} = 45 \quad 45 \text{ mph}$$

**HOMEWORK:**

**66:16-46 EVENS AND 72:15-22,37-39 ALL**