# Do Now

1. $f(x)=\frac{1}{2}x-8$, find $f\left(\frac{1}{4}\right)$.

2. $f(x)=\frac{2}{3}x+7$, find $3f\left(-6\right)$.

3. $g(x)=3x-4$, find $g\left(x-2\right)$.

# Algebra 2

## Ch. 2 Handout 2.2

# Linear Equations

A linear equation is an equation that can be written in the form:

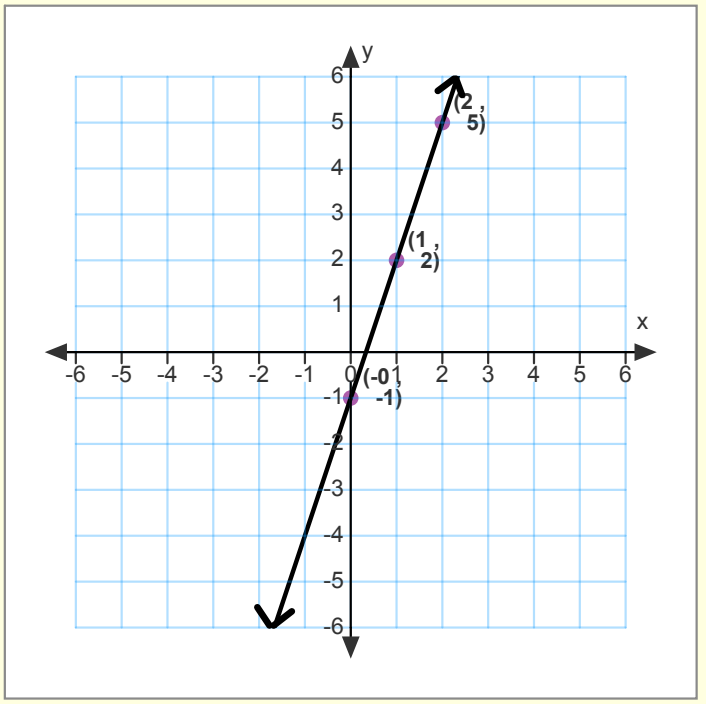
$y = mx + b$ → slope-intercept form because linear equations is solved for y

Equation form Example: $y = 3x - 1$ $m = 3$ $b = -1$

A linear function is a function that can be written in the form:

$f(x) = mx + b$ Function form Example: $f(x) = 3x - 1$ $m = 3, b = -1$

# A linear function



A **linear equation** can also be written in the form $Ax + By = C$ where the graph of that linear equation would be a line. ↳ standard Form

A **solution** of a linear equation is any ordered pair (x, y) that makes the equation true.

A linear equation will have a **independent variable** and an **dependent** variable.

## Three ways to graph a line (linear function)

1. x/y chart Pull

2. x-intercept/y-intercept/third point Pull

3. slope-intercept form Pull

# Method #1-- pick values for x and solve for y

1. Graph the linear equation $2x - 3y = 6$ using the

| x | y |
|---|---|

chart.

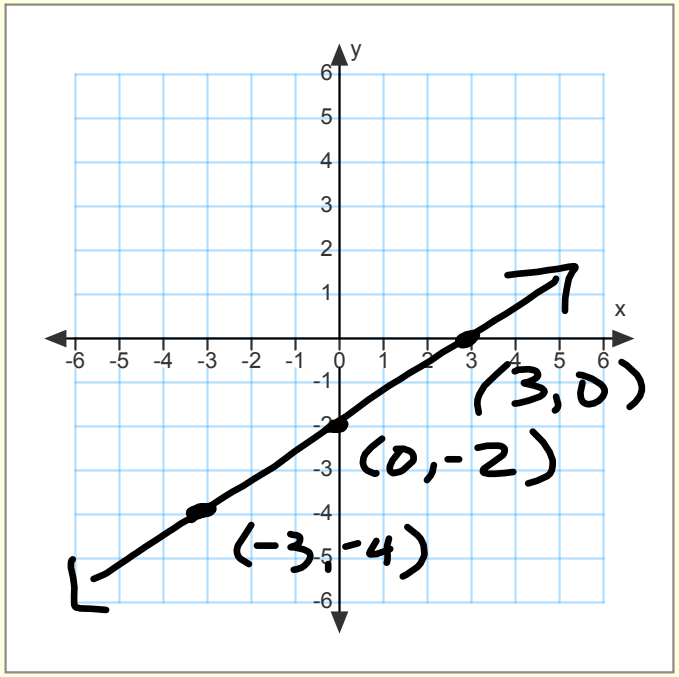
$2x - 3y = 6$

$-2x \quad -2x$

$\frac{-3y}{-3} = \frac{-2x}{-3} + \frac{6}{-3}$

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

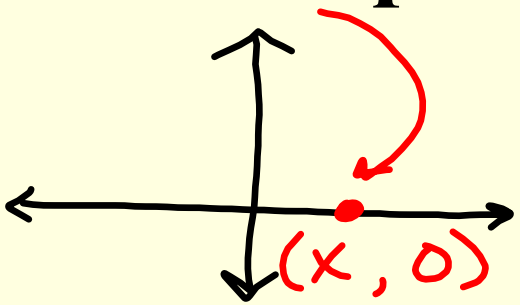
| x | $y = \frac{2}{3}x - 2$ | y |
|---|---|---|
| 0 | $y = \frac{2}{3}(0) - 2$ | -2 |
| 3 | $y = \frac{2}{3}(3) - 2$ | 0 |
| -3 | $= \frac{2}{3}(-3) - 2$ | -4 |



# Method #2 -- Finding x-intercepts, y-intercepts, and a third point

Pull

**x-intercept** is the point at which the line crosses x-axis

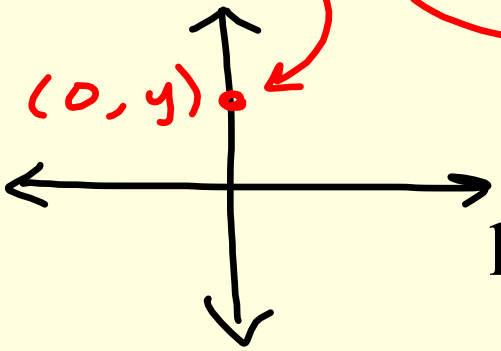



x-intercept (x, 0)

Let y = 0 and solve for x

Pull

**y-intercept** is the point at which the line crosses y-axis




y-intercept (0, y)

let x = 0 and solve for y

2. Graph the linear equation $x + 2y = 4$

by finding the x-intercept, y-intercept, and third point

x-int : (4, 0)

$x + 2y = 4$

$x + 2(0) = 4$

$x = 4$

y-int : (0, 2)

$x + 2y = 4$

$0 + 2y = 4$

$2y = 4$

$y = 2$

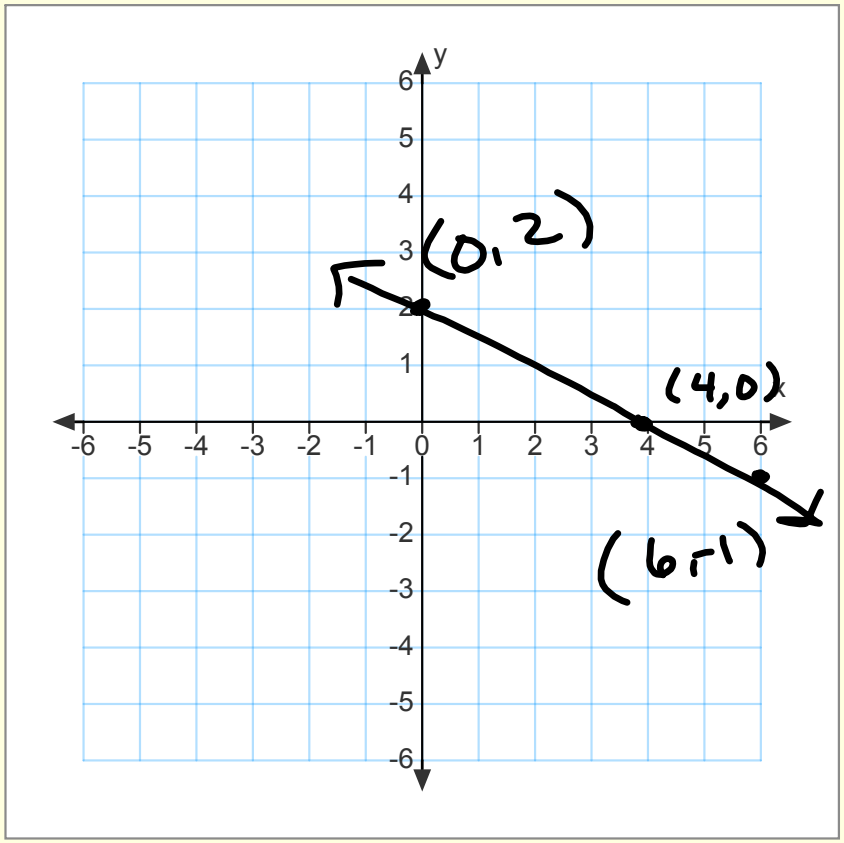
third pt : (6, -1)

$x + 2y = 4$

$6 + 2y = 4$

$2y = -2$

$y = -1$



# Method #3 -- Slope-intercept form

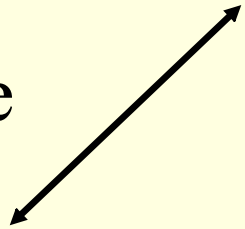
* Equation MUST be solved for y

$y = mx + b$

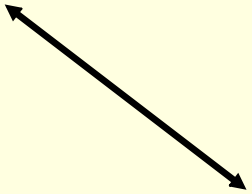
m = slope

$$\text{slope} = \frac{rise}{run}$$

positive slope



negative slope



b = y-intercept -- point where line crosses the y-axis

3. Graph the linear equation $3x + 6y = 9$ by using slope-intercept.

$3x + 6y = 9$

$-3x \quad -3x$

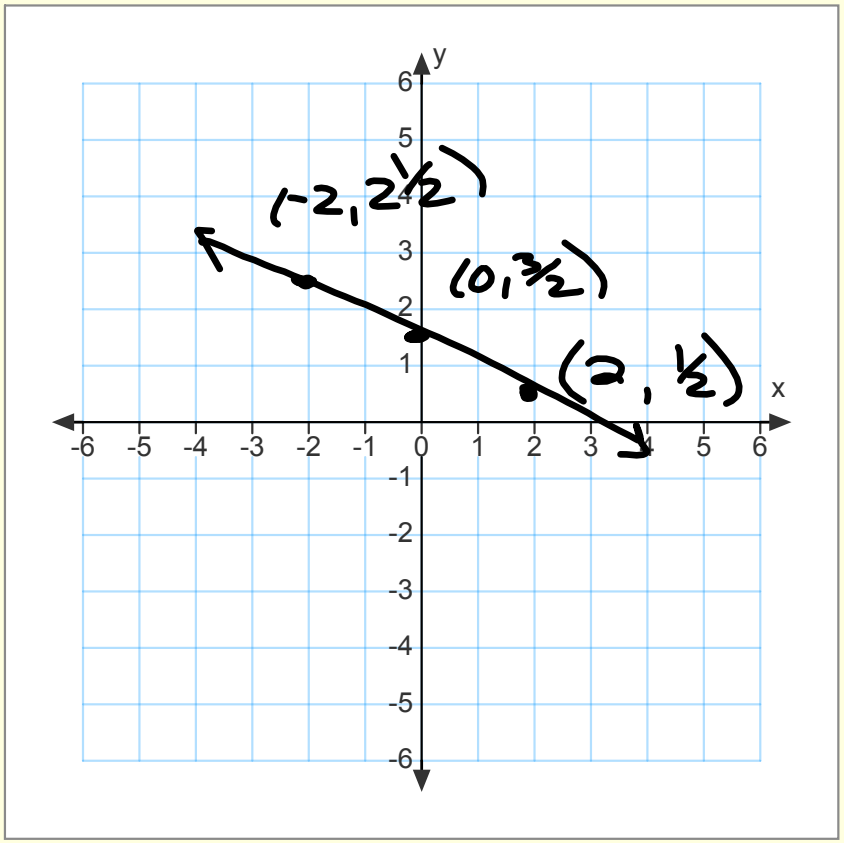
$\frac{6y}{6} = \frac{-3x}{6} + \frac{9}{6}$

$y = -\frac{1}{2}x + \frac{3}{2}$

Rise / Run

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

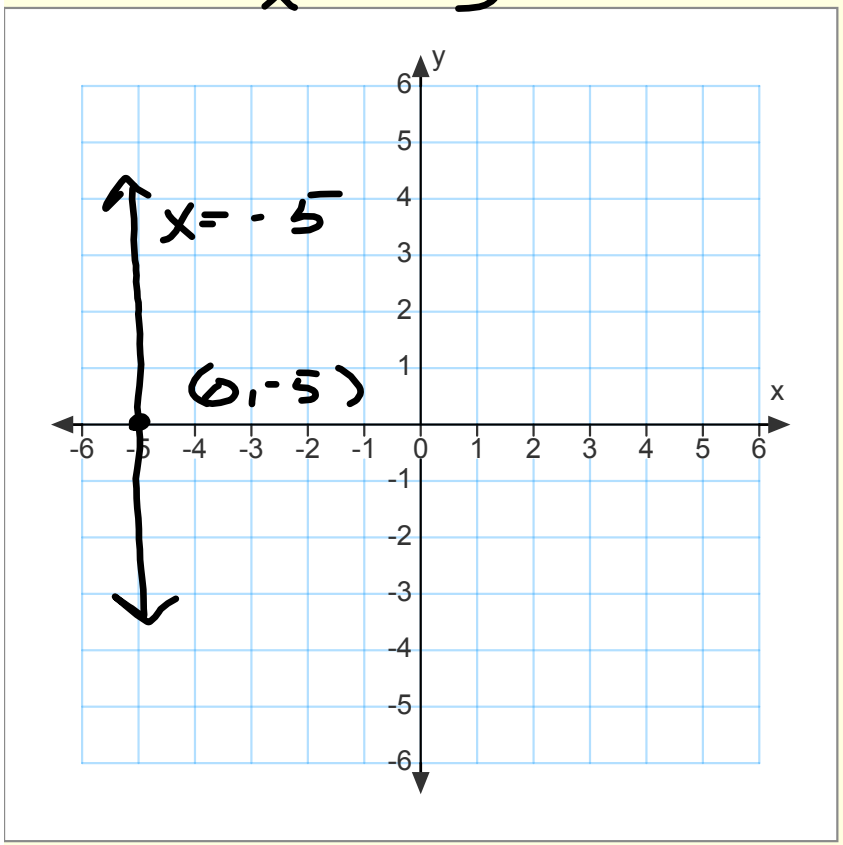
$b = \frac{3}{2}$



# 4. Graph the linear equation.

a) $x + 5 = 0$

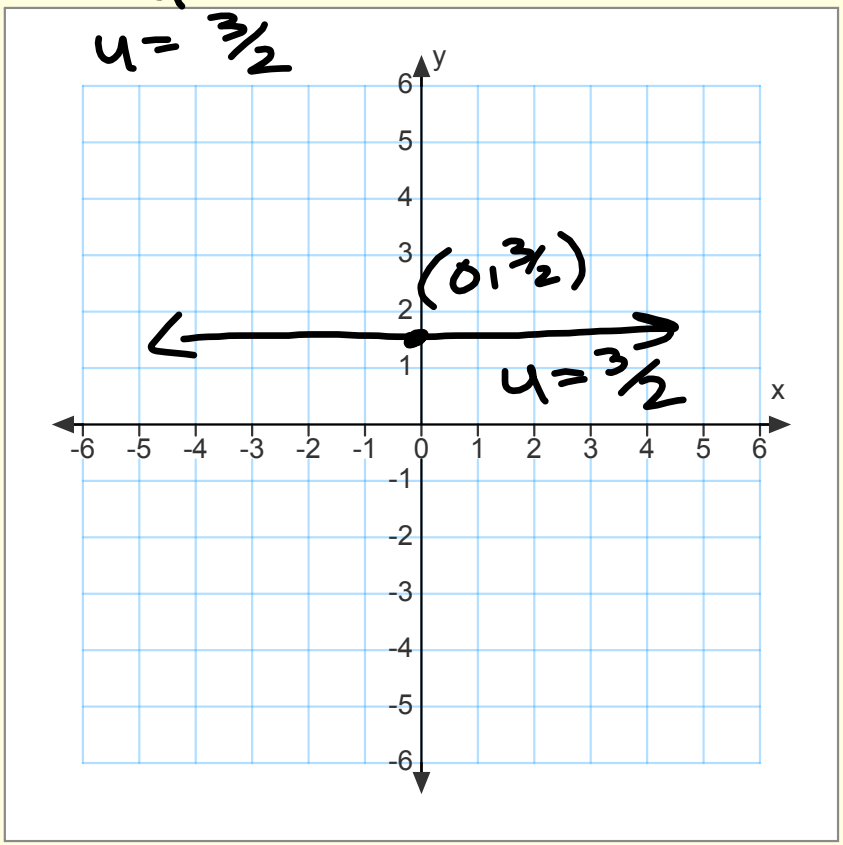
$x = -5$




b) $2y - 3 = 0$

$2y = 3$

$y = 3/2$



# Assignment:

## 2.2 Graphing Linear Equations

Pgs 67-70 1-9 all

x/y chart --1, 4, 7

x-int./y-int.--2, 5, 8

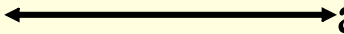
slope-intercept--3,6

# Slope

**Slope is used to describe the measurement of the steepness of a straight line.

**Slope is the rate of change from one point to the next point on a line.

**It tells how quickly a line is rising or falling.

Zero slope  a line that is horizontal

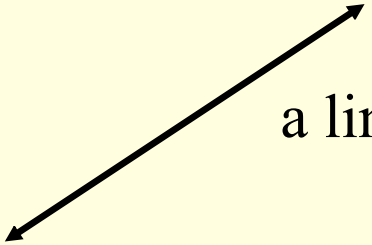
Undefined slope
(no slope)  a line that is vertical

Example:

The Building code for using asphalt shingles on roofs states that minimum pitch must be a rise of 4" for every 12" of horizontal distance (run) covered. Asphalt shingles are not to be use on roofs that have very little steepness. Builders check to see if the pitch (slope) of the roof is or 4:12 or $\frac{4}{12}$ or 4 to 12 before using asphalt shingles.

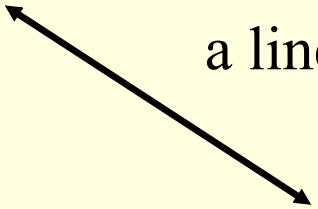

Builders need to know the pitch of a roof to determine which type of shingle will be appropriate for the roof.

Positive slope



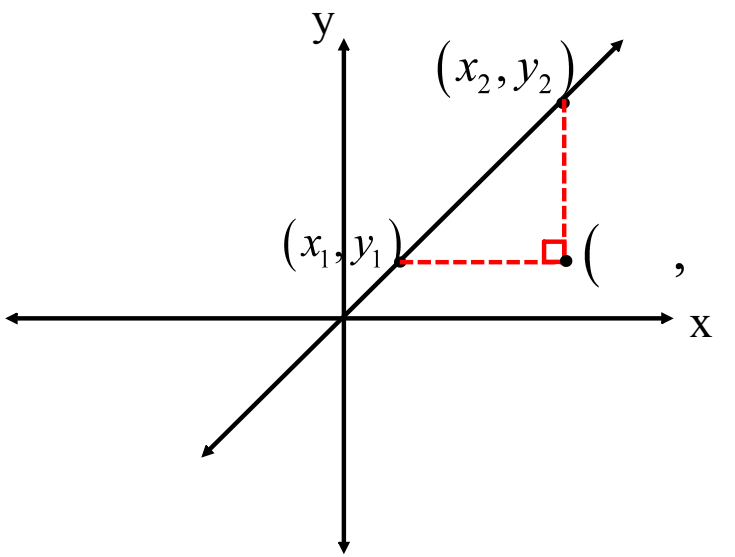
a line that rises from left to right

Negative slope



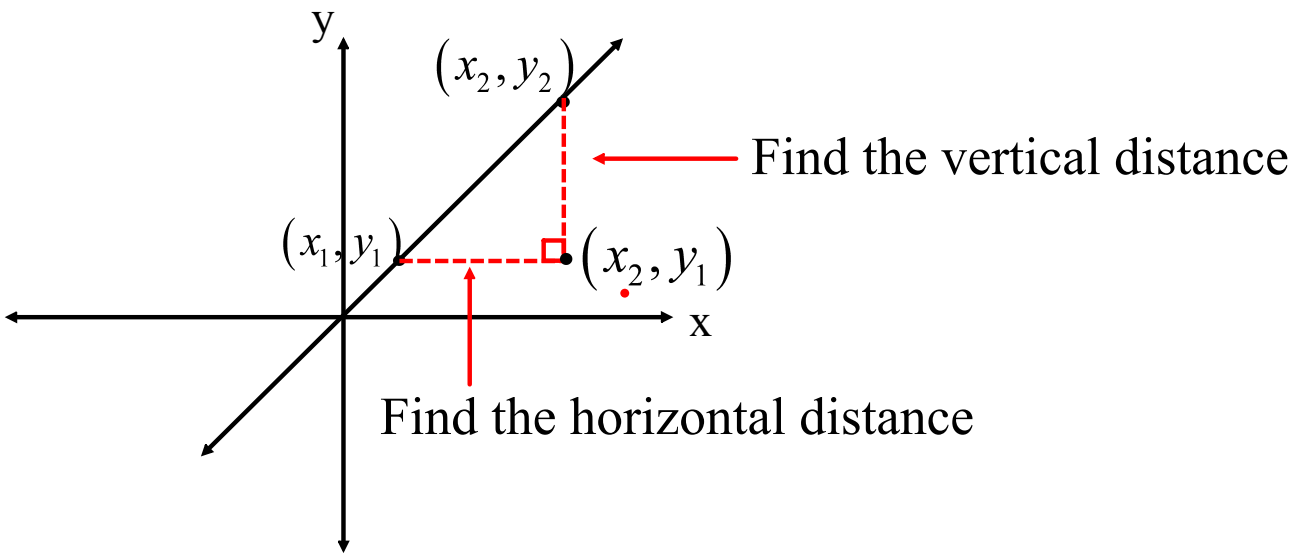
a line that falls from left to right

# Slope

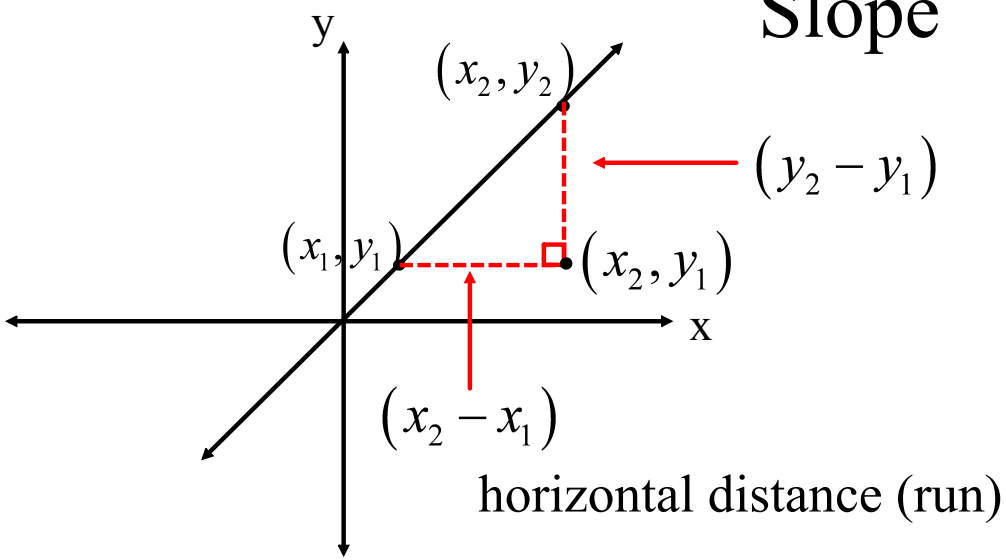



( , ) ⟵ find the ordered pair

# Slope


y
$(x_2, y_2)$
Find the vertical distance
$(x_1, y_1)$
$(x_2, y_1)$
x
Find the horizontal distance

# Slope




$$\text{Slope (m)} = \frac{\textit{vertical change}}{\textit{horizontal change}} = \frac{\textit{rise}}{\textit{run}} = \frac{(y_2 - y_1)}{(x_2 - x_1)}, \textit{where } x_2 - x_1 \neq 0$$

6. Find the slope of the line through the two points given

a) $(-2,7)$ and $(8,-6)$

b) $(-2,-2)$ and $(4,2)$

6. Find the slope of the line through the two points given

c) (3, 3) and (-4, 3)

d) ( 2, 5) and (2, -4)

To find the slope of a given line you need to solve the equation for y.

Find the slope of the equation:

$$-7x+2y=8$$

Find the slope of the equation:

$3x-12y=6$

$4x=-y+6$

Find the slope of the equation:

$x = 5$

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

5. The equation $10x + 5y = 40$ how you can give $.40 change if you have only dimes and nickels. The variable x is the number of dimes, and y is the number of nickels. Graph the equation. Explain what the x- and y- intercepts represent. Describe the domain and the range.

In 2003, federal vehicle emission standards allowed 4 hydrocarbons released per mile driven. By 2007, the standards allowed only 2 hydrocarbons per mile. What was the rate of change from 2003 to 2007?

# Assignment

Pgs 67-70 11-19 odds, 33-37 odds, 43-65 odds