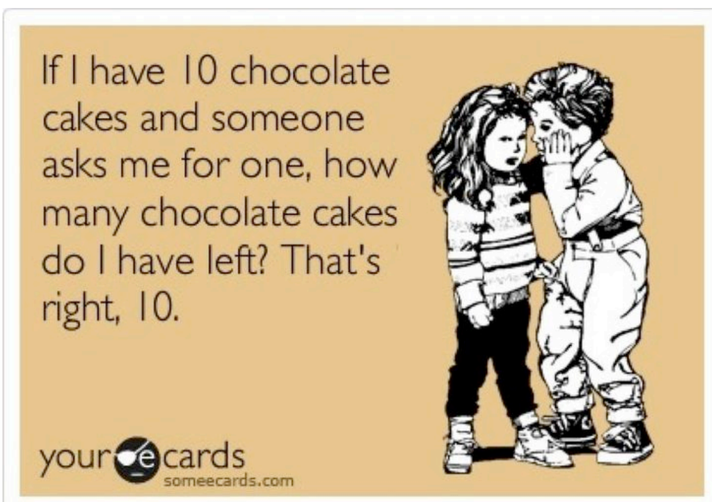
Name: ____________________________

Hour: _____

Chapter 3
Linear Functions



Lesson 3-1: Linear Function Intro & Constant-Increase & Constant-Decrease Situations

Vocabulary

Linear Equation: ____

____

Requirements:
- Variables must be in ____________________ terms
- Variables cannot be located in the ____________________
- Variables cannot have ________________________

Linear Equations: Important Information

- A solution to a linear equation is a pair of numbers written as a ____________________
- There are ____________________ solutions to a linear equation
- When solutions are graphed, the points form a _________________________________
- Linear equations can always be written in _____________________________________

Slope-Intercept Form (remember this is just ONE way to write a linear equation, but there are other ways as well!)

- Slope = a measure of a line's ___________________________
- y-intercept = the point where a line cross the _________________ on a graph

Constant-Increase or Constant-Decrease Situations

- can be represented with a _____________________________________
- two parts: initial value = _____________________ & rate of change = ______________

Practice

1. Identify the equations that are considered linear equations.

$y = 3x + 1$	$2x + 3y = 9$	$y = 2x^2 + 7$
$4xy = 11$	$\frac{7}{x} = y$	$y = 12$

2. Find three solutions to the linear equation: $y = 3x - 2$.

3. Identify the slope & *y*-intercept of each linear equation.

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

   Slope =

   y-intercept =

   B. $y = 2 - 4x$

   Slope =

   y-intercept =

4. An empty crate weighs 3 kilograms. It is filled with oranges that each weigh 0.2kg.

   A. Is this is a constant-increase or constant-decrease situation?

   B. Identify the initial value and rate of change.

   C. Write as a linear function.

5. At the beginning of the month, Katie bough a 50 lb sack of wild bird feed. She puts 2/3 of a pound into the feeder each morning. Let *y* represent the amount of remaining feed after *x* days. Write a linear equation relating *x* and *y*.

6. Al’s temperature at 4:00pm was 99.5°. It rose at a steady rate of 0.3° per hour for 6 hours. Then it stayed constant for four hours. Then, it fell steadily by 0.4° per hour for four hours. Make a graph to represent the situation.

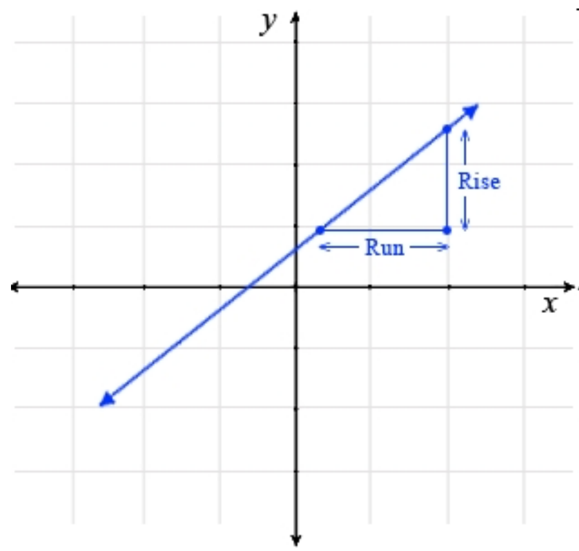
Lesson 3-2: The Graph of *y* = *mx* + *b*

Vocabulary

Slope: ____

____

Slope = ____________



Parallel Lines: ____

____

Example:

Perpendicular Lines: ____

____

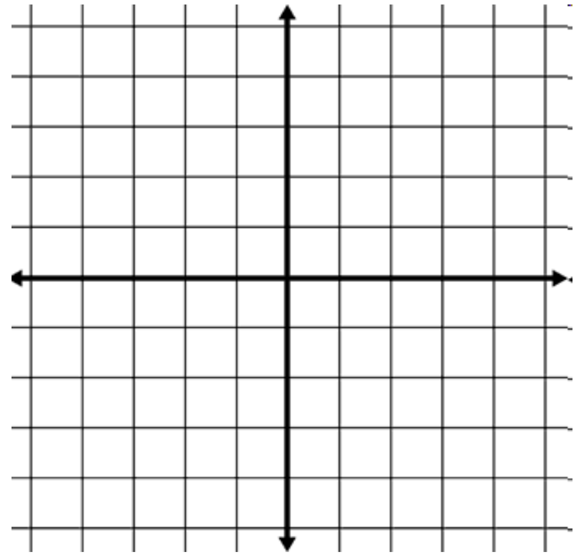
Example:

Practice

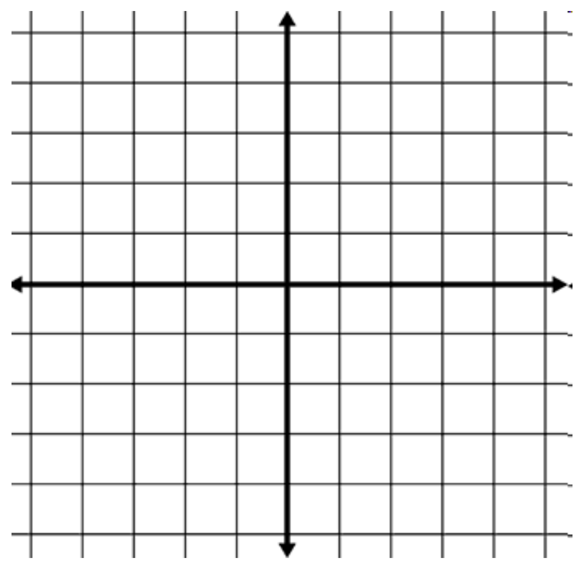
1. Graph the line $y = 2x - 3$.

STEPS:

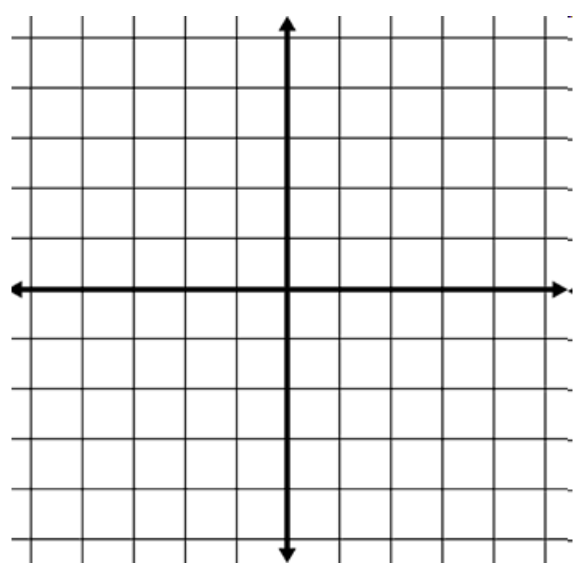
1. Get "y" alone first!
2. Start by plotting the *y*-intercept.
3. Convert the slope to a fraction.
4. Use the "rise" & the "run" to plot the next few points.
5. Connect the points w/ a straight line.



2. Graph the line $y = -\frac{1}{2}x + 3$.

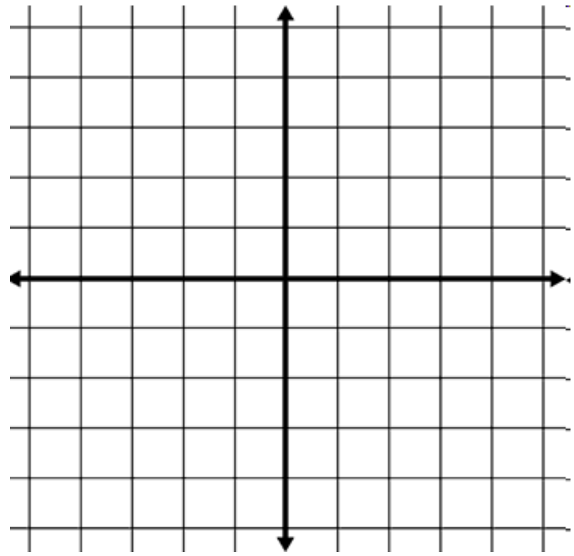


3. Graph the line $2y = -3x + 8$.

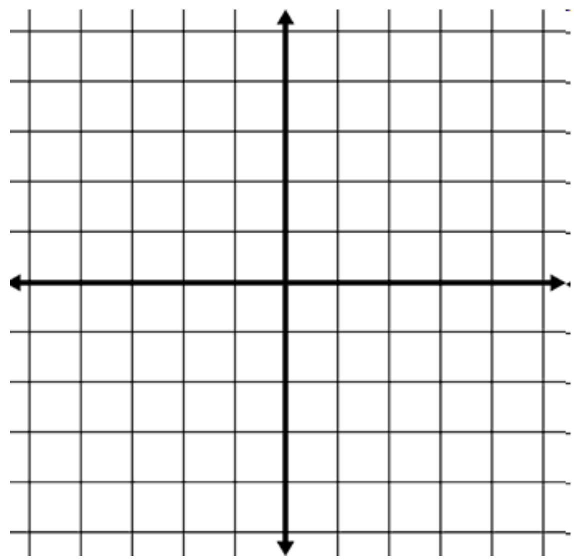


Weird Cases...

4. Graph the line $y = 4$.



5. Graph the equation $x = -2$.



Looking at the weird cases...

Example 4 shows a _______________________________.

• Any equation in the form _____________ will be a horizontal line.

• These lines have a slope of ______________.

Example 5 shows a _______________________________.

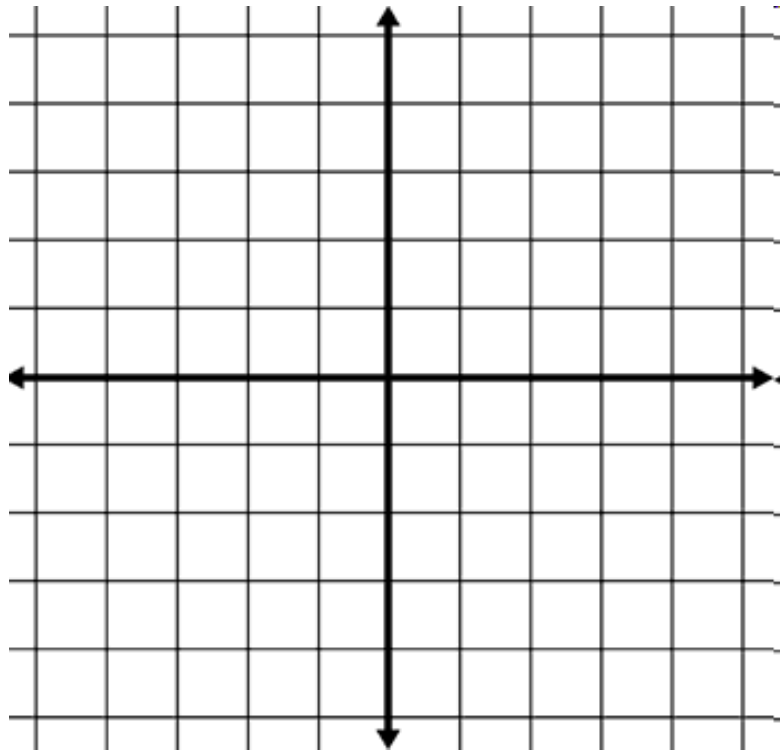
• Any equation in the form _____________ will be a vertical line.

• These lines have an ________________________ slope.

6. Graph both lines on the same graph.

$y = -2x + 3$

$y = -2x - 2$



What do you notice???

7. Consider the equation $y = 3x - 5$.

A. Write an equation for a line that is parallel to this line and crosses the y-axis at 4.

B. Write an equation for a line that is perpendicular to this line and crosses the y-axis at -2.

Lesson 3-3: Linear Combination Situations

Vocabulary

Slope: ____

Slope = ____________ OR ____________

Practice

1. In pro hockey, a win is worth 2 points, a tie is worth 1 point, and a loss is worth 0 points. Early in the season a team had 11 points.

   A. Write a linear combination to express the relationship among the number of wins W, the number of ties T, and the number of losses L.

   B. Make a table and graph of all possible (W, T) that could occur.

2. A chemist mixes *x* ounces of a 20% acid solution with *y* ounces of a 30% solution. The final mixture contains 9 ounces of acid.

   A. Write a linear combination relation *x*, *y*, and the total number of ounces of acid.

   B. How many ounces of the 30% acid solution must be added to 2.7oz of the 20% solution to get 9oz of acid in the final mixture?

3. Find the slope given two points (-2, 3) and (4, 15).

Lesson: Intercepts

We already know how to find the ________________ by looking at an equation in ________________________________. Now, we are going to learn how to find the _____ & _____ intercepts from ANY form.

Vocabulary

Intercept: ____

____

*they are very useful in graphing, solving, and interpreting real-life situations!

x-intercept: ____

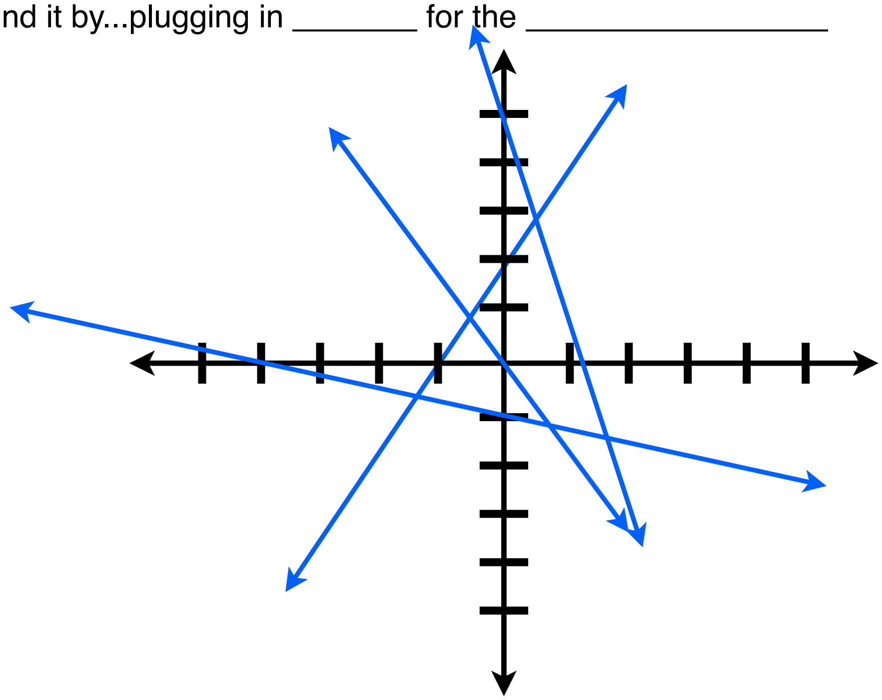
____

Find it by...plugging in _______ for the __________________

y-intercept: ____

____

Find it by...plugging in _______ for the __________________



Practice

Find the x & y intercepts of each equation.

1. $y = 2x - 3$

2. $2x + 4y = 32$

3. $y = -2$

Lesson 3-4: Graphing in Standard Form

Vocabulary

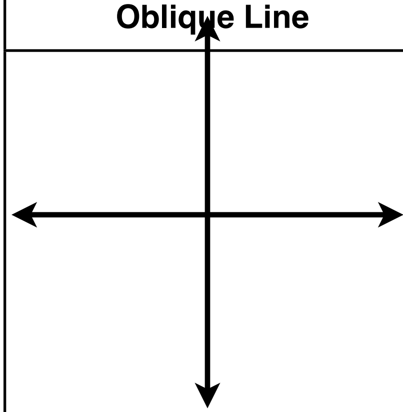
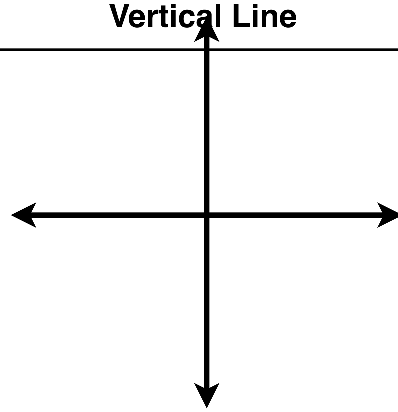
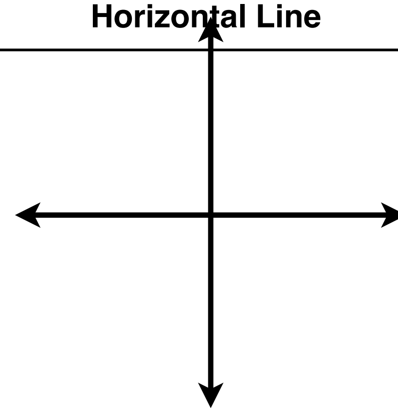
Remember, we already learned about slope-intercept form of a linear equation, but that is not the only form. We also have...

Standard Form: ____

• A, B, and C are all ____________________ (no fractions or decimals!)

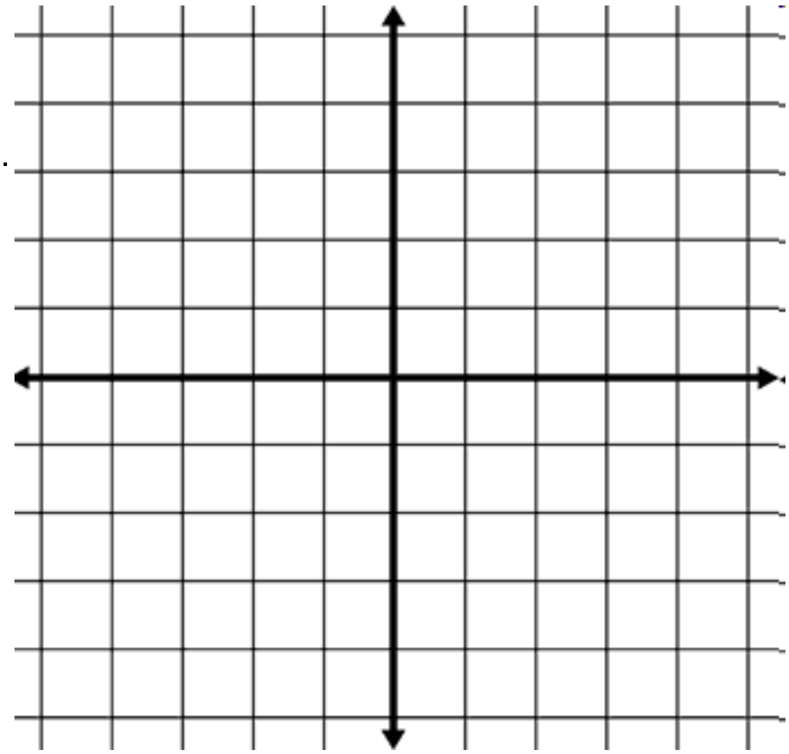
• It is easiest to graph from standard form using the ________________________

TYPES OF LINES

Oblique Line	Vertical Line	Horizontal Line
		
Looks like... or... Slope =	Looks like... Slope =	Looks like... Slope =

Practice

1. Using the equation $0.2x + 0.3y = 9$.

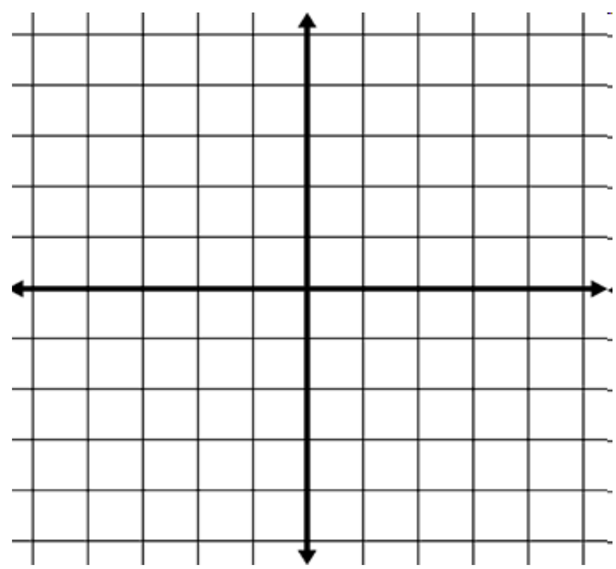


STEPS:
1. Find the intercepts.
2. Plot the intercepts & connect with a straight line!

***x*-intercept:**

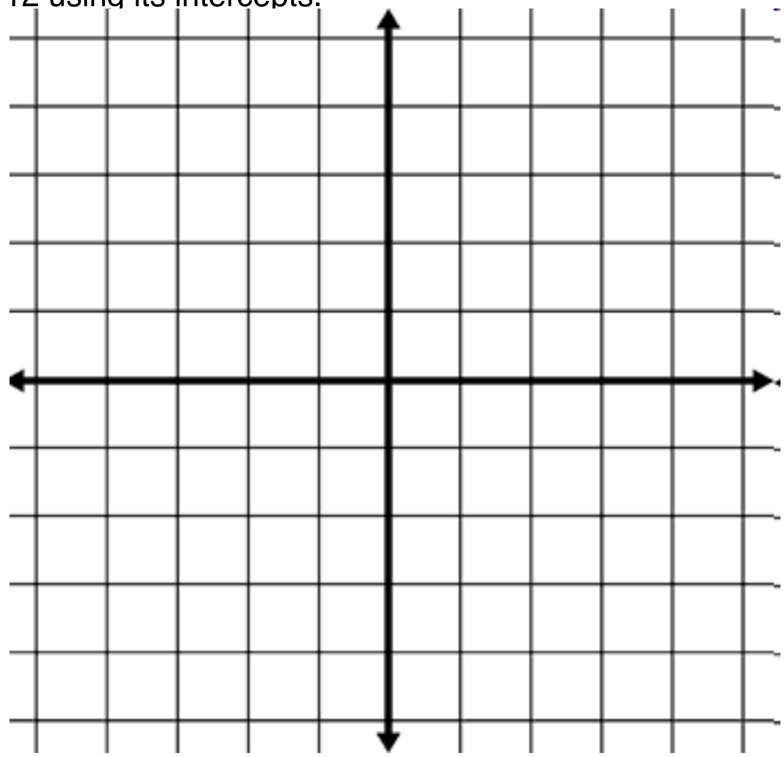
***y*-intercept:**

2. A. Graph the line $x = 2$.



B. Find the slope of the line.

2. Graph the equation $6x - 3y = 12$ using its intercepts.



Lesson 3-5: Writing the Equation for a Line

Vocabulary

When possible, use ________________________________! You only need two pieces of information...

Practice

1. slope = -3, *y*-intercept = 2 Equation: ___________________

2. slope = 1/2, *y*-intercept = -5 Equation: ___________________

3. slope = 0, *y*-intercept = -3.5 Equation: ___________________

4. slope = -4, *y*-intercept = 0 Equation: ___________________

BUT WAIT!!! What if you don't know the slope?!?! Then...__________________!

Practice

5. Contains points (-2, 3) & (6, -1); *y*-intercept = 2.

Equation: ___________________

6. Contains points (7, 3); *y*-intercept = 5.

Equation: ___________________

7. Contains points (-2, 4) & (0, 12).

Equation: ___________________

BUT WAIT!!! What if you don't know the y-intercept?!?! That's a little different...

When you don't know the *y*-intercept, you can use a new form called

____

We can work from point-slope form to find ________________________________!

Practice

8. Find the equation of a line with slope = 3, passing through point (-2, 10).

9. Find the equation of a line through point (3, 5) and (6, -1).

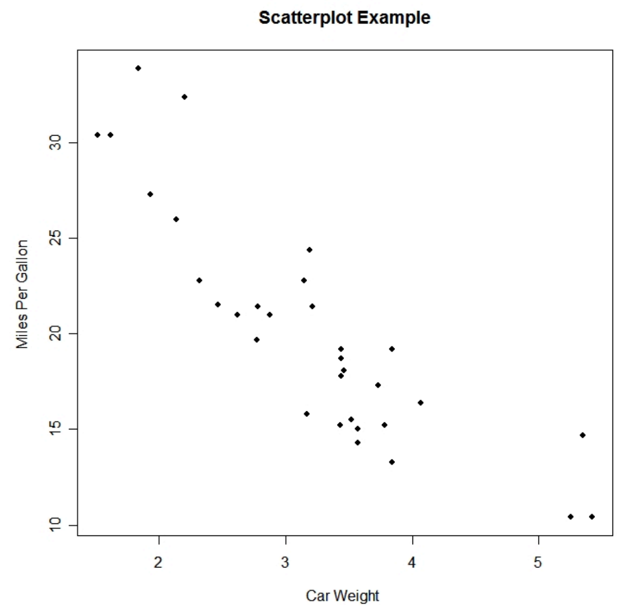
Lesson 3-6: Linear Regression

Vocabulary

Scatterplot: ____

____

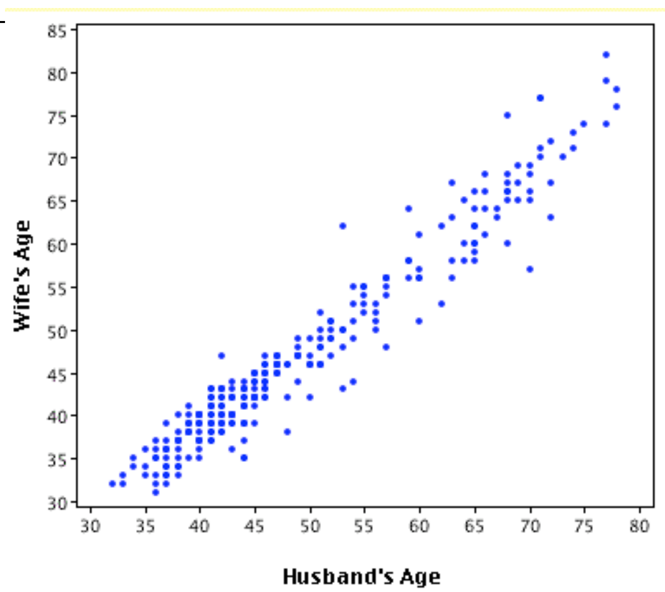
- Data is ____________________
- Data is usually collected from an experiment of some type of



Line of Best-Fit/Line of Regression: ______________________________

____

Example



***useful for making predictions with data**

Correlation: ____

____

Positive Correlation means that as one quantity ___________________, the other ___________________ as well.

Negative Correlation means that as one quantity ___________________, the other ___________________.

***NOTE: Correlation does NOT imply ________________________!!! Just because two variables are correlated, does NOT mean that one is causing the other!

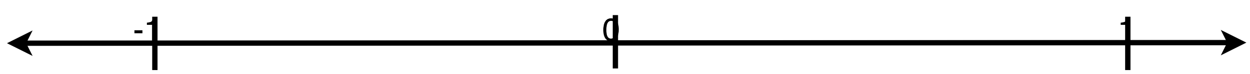
Correlation Coefficient (*r*): ____

____

If *r* is positive, the correlation is ______ & the slope of the line is ______.

If *r* is negative, the correlation is ______ & the slope of the line is ______.

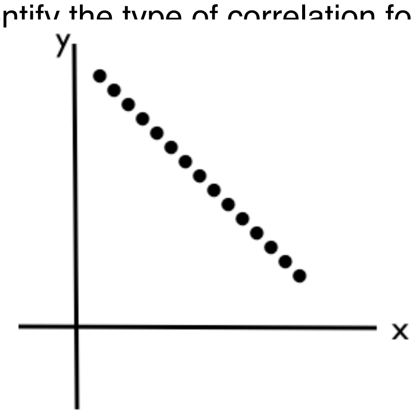
The **absolute value of *r*** indicates the __________________ of the correlation or linear relationship. The closer the magnitude of *r* is to 1, the stronger the linear relationship.



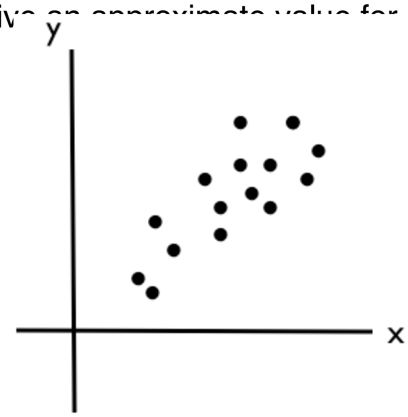
Practice

1. Identify the type of correlation for each data set. Give an approximate value for r

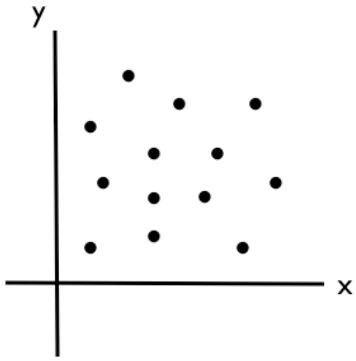
A.



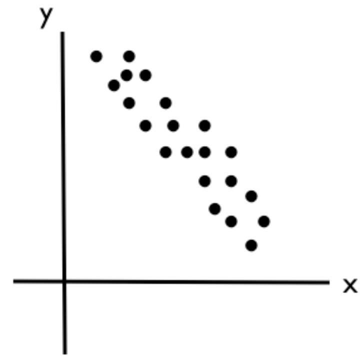
B.



C.



D.



2. Find the line of best-fit that represents the data below. Interpret the slope in context.

# of Absences	0	1	2	3	4	5	6	7	8
Avg. Grade	92	90	83	76	72	68	60	54	50

3. Find the line of best-fit that represents the data below. Interpret the slope in

# of siblings	0	1	2	3	4
Avg. Grade	78	84	86	76	80