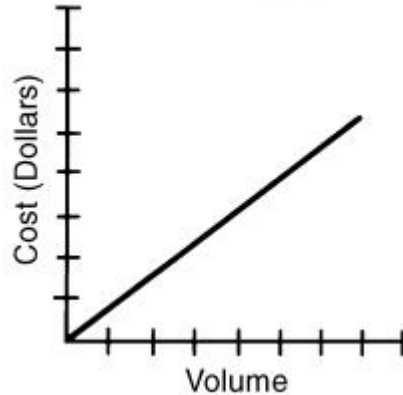


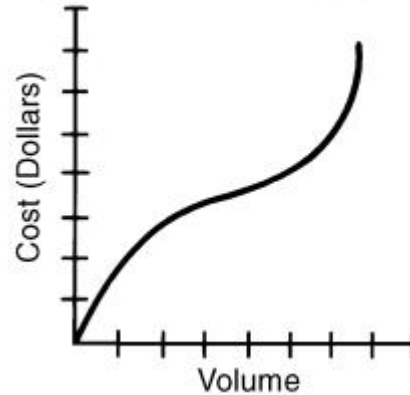
Unit 8 Notes

Linear and Non-Linear Functions

LINEAR RELATIONSHIP



NONLINEAR RELATIONSHIP



Tentative Schedule

Day	Classwork	Assignment
Mon. 3/9 Tues. 3/10	Quiz #7	Video #8.1 – Understanding Functions
Wed. 3/11	P.S. #8.1	Video #8.2 – Linear vs. Nonlinear Functions
Thurs. 3/12 Fri. 3/13	P.S. #8.2	Video #8.3 – Comparing Functions Day 1
Mon. 3/16	P.S. #8.3	Video #8.4 – Comparing Functions Day 2
Tues. 3/17 Wed. 3/18	P.S. #8.4	Catch-up on Checklist
Thurs. 3/19	Review for Quest #8	Review for Quest #8
Fri. 3/20 Mon. 3/23	Quest #8	Video #9.1 – Scatterplots

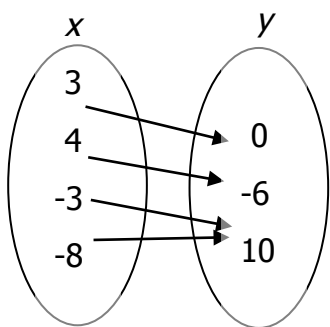
Name: _____

Notes 8.1 - Understanding Functions

Definition of a Function:

Determine whether each relation is a function. Explain your answers.

1.) $\{(2,3), (3,0), (5,2), (-1,-2), (4,1)\}$ _____



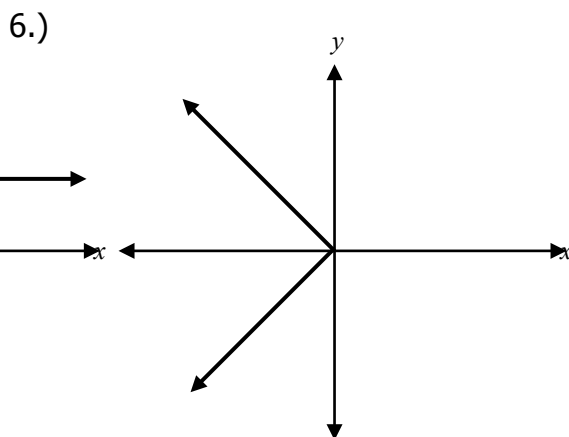
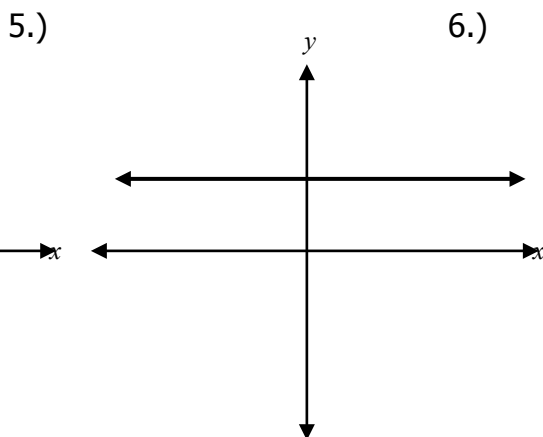
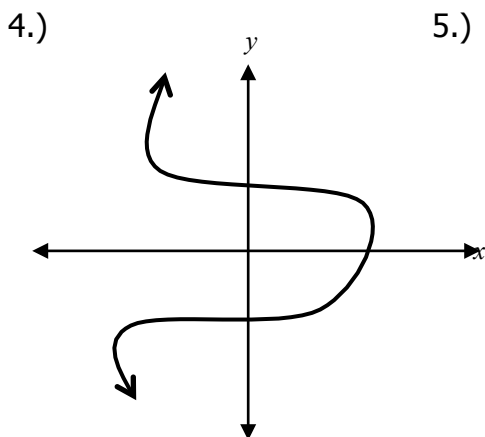
2.) _____

3.) $\{(2,5), (3,7), (2,1), (4,8)\}$ _____

Vertical Line Test

If any _____ passes through no more than _____ of the graph of a relation, then the relation is a _____.

Use the vertical line test to determine if each relation is a function.



7.) The high jumpers at a track meet are wearing numbers on their uniforms. Each of the five high jumpers on the team made one jump. The height cleared by each athlete is shown in the table.

Athlete Number	1	2	3	4	5
Height Cleared (cm)	145	143	139	151	151

a.) Use a mapping diagram to represent the relation between the numbers of the athletes and the heights they cleared.

b.) Tell whether the relation is a function and explain why.

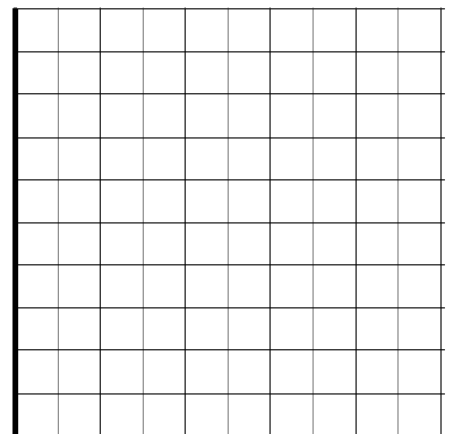
c.) Suppose the inputs are the heights cleared by the athletes and the outputs are the athletes' numbers. Use a mapping diagram to represent the relation. Is this relation a function?

8.) A tank contains 8 gallons of water. Water is then pumped into the tank at a rate of 2 gallons per minute. The total amount of water in the tank, y , gallons, is a function of the number of minutes, x , that water has been pumped into the tank.

a. Write an algebraic equation for the function.

b. Construct a table of x and y values for the function

c. Use the table of values to plot a graph to represent the function.



Notes 8.2 - Linear vs. Nonlinear Functions

How do you find out if a function is linear or nonlinear?

Identify if the following functions are linear or nonlinear.

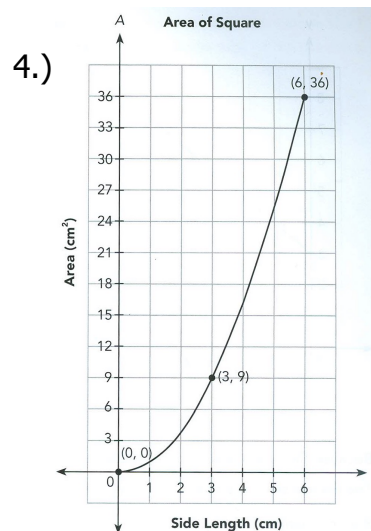
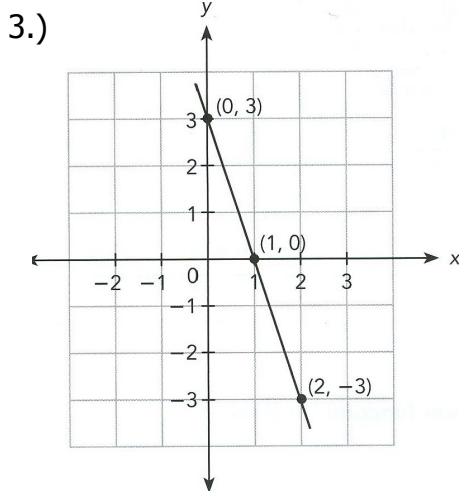
1.)

x	1	2	4	7	8
y	18	12	0	-18	-24

2.)

x	-5	-3	-1	1	3
y	28	26	22	14	4

For 3 – 4, determine if the graph is a function. Then determine if it is linear or non-linear. If it is linear, find the rate of change.



5.) The table below shows the total distance, y miles, indicated on the odometer of Ariel's car and the amount of gasoline used, x gallons, on a particular day.

Amount of Gasoline (x gallons)	0	1	2	3	4	5
Total Distance (y miles)	1,000	1,030	1,060	1,090	1,120	1,150

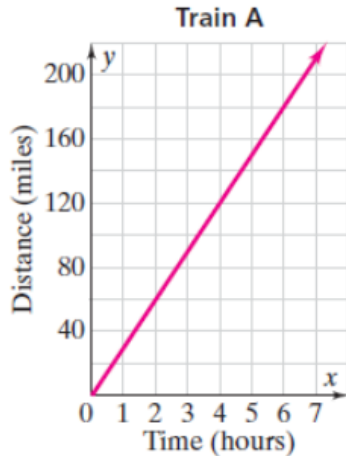
a. Write an algebraic equation for the function.

b. Describe how the slope and the y -intercept of the graph are related to the function.

Notes 8.3 - Comparing Functions Day 1

Example 1

Three trains (A, B, and C) leave a train station at the same time. The graph shows the relationship between time and distance for Train A.



Train B

$$y = 45x$$

Train C

Time (hours)	Distance (miles)
3	105
6	210
9	315
12	420

- 1.) What is the slope of the graph?
- 2.) What does this slope represent?
- 3.) The relationship between time and distance for Train B is given by the equation above, where x represents hours and y represents miles. Find the slope m .
- 4.) Which train is moving faster, Train A or Train B? How do you know?
- 5.) The time-distance relationship for Train C is shown in the table above. What is the ratio of distance to time?
- 6.) Compare the speed of Train C to the speeds of Train A and Train B.

Example 2

Water is pumped into two aquariums, P and Q. The tables show two functions relating the total amount of water, y liters, and the time taken, t minutes, to pump the water into each aquarium.

Aquarium P

Time Taken (t minutes)	5	10	20	30
Total Amount of Water (y liters)	70	120	220	320

Aquarium Q

Time Taken (t minutes)	5	10	20	30
Total Amount of Water (y liters)	95	170	320	470

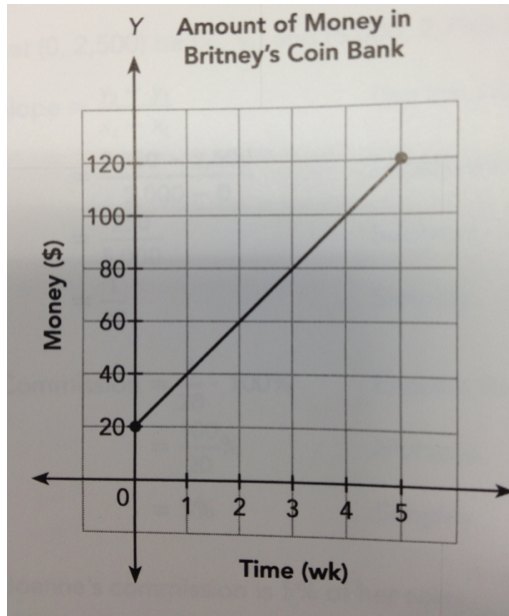
1.) Write an algebraic equation to represent each function.

2.) Which of the two aquariums is filled with water more quickly? Explain.

3.) Which of the two aquariums started with more water? Explain.

Notes 8.4 - Comparing Functions Day 2

- 1.) Britney and Dina each have a bank account. Britney starts with a certain amount of money and adds money at regular intervals. Dina starts with a different amount of money and takes money out over time. The amount of money, y dollars, in Dina's coin bank after x weeks is given by the equation $y = -30x + 120$. The graph shows the amount of money in Britney's coin bank after x weeks.



- a.) Find the y -intercept of Britney's graph and explain what information it gives about the situation.
- b.) Find the slope of Britney's graph and explain what information it gives about the situation.
- c.) What is Britney's equation?
- d.) Is Isa adding money at a faster rate or is Taylor taking out money at a faster rate? Explain.
- e.) After how many weeks will they have the same amount of money in their bank accounts?

2.) Which function has a greater rate of change?

x	1	3	4	6
y	5	13	17	25

$$2y - 2 = 4x$$

3.) The functions below represent stock prices each week, where w is the number of weeks and c is the cost. Order the stock prices from least to greatest based on their rate of change.

Alpha

The starting price of \$54
decreases weekly by \$2.50

Beta

$$9w - 2c = 54$$

Delta

w	0	2	4	6
c	\$24	\$17	\$10	\$3