Foundations of Math

CHAPTER 9 PACKET

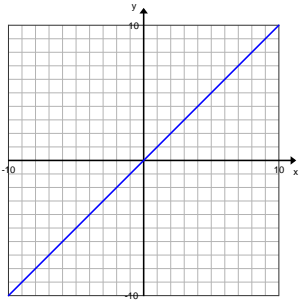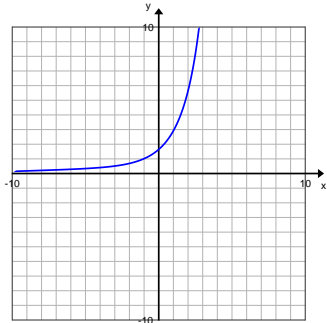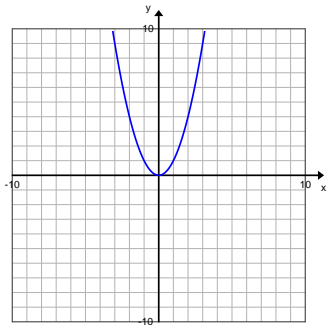NAME:

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Analyzing Graphs

Review:

The graphs below give examples for each parent function we have studied this year. For each graph, identify the function type, and the general form equation; then offer general observations on the key features of the graph that helped you identify the function type.

FUNCTION SUMMARY CHART		
Graph	**Function Type**	**Function Clues: Key Features, observations**

Eduardo has a summer job that pays him a certain rate for the first 40 hours each week and time-and-a-half for any overtime hours. The graph below shows how much money he earns as a function of the hours he works in one week.

Time (hours)
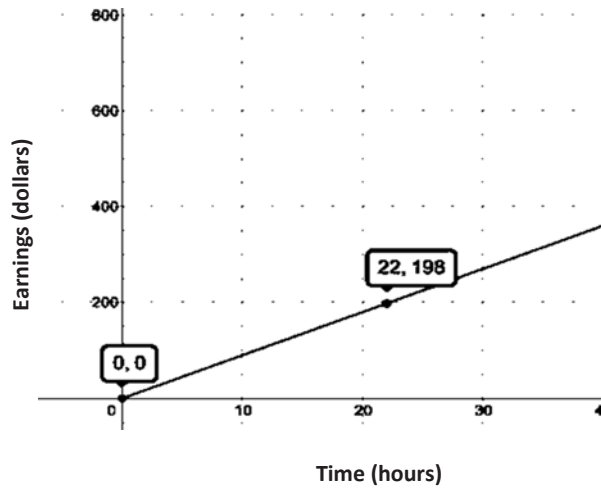
Exercises

1. Write the function in analytical (symbolic) form for the graph in Example 1.

    a. What is the function of this graph?

    b. What are the units of the graph?

    c. What is the equation of the graph?

    d. Explain the domain in the context of the problem?

    e. What are the domain restrictions for the context?

Identifying Functions from Tables

Review: Look at the three tables: identify what type of function is represented in the tables. Why?

x	$f(x)$
0	6
1	12
2	18
3	24
4	30
5	36

x	$g(x)$
0	0
1	14
2	24
3	30
4	32
5	30

x	$h(x)$
0	1
1	3
2	9
3	27
4	81
5	243

1. Explain why each function can or cannot be used to model the given data set:

   a. $f(x) = 3x + 5$

   b. $f(x) = -(x - 2)^2 + 9$

   c. $f(x) = -x^2 + 4x - 5$

   d. $f(x) = 3^x + 4$

   e. $f(x) = (x + 2)^2 - 9$

   f. $f(x) = -(x + 1)(x - 5)$

x	$f(x)$
0	5
1	8
2	9
3	8
4	5
5	0
6	-7

A

x	y
1	12
2	24
3	36
4	48
5	60

B

x	y
0	160
1	174
2	156
3	106
4	24

C

x	y
1	2
2	4
3	8
4	16
5	32

D

x	y
2	8
3	9
4	8
5	5
6	0

Equation:

Context:

Equation:

Context:

Equation:

Context:

Equation:

Context:

2. Match each table below to the function and the context, and explain how you made your decision.

Equations:

1. $f(x) = 12x$

2. $g(x) = -(x)(x - 6)$

3. $p(x) = 2^x$

4. $q(x) = -16x^2 + 30x + 160$

Contexts:

a. The population of bacteria doubled every month and the total population vs. time was recorded.

b. A ball was launched upward from the top of a building and the vertical distance of the ball from the ground vs. time was recorded.

c. The height of a certain animal's vertical leap was recorded at regular time intervals of one second; the animal returned to ground level after six seconds.

d. Melvin saves the same amount of money every month. The total amount saved after each month was recorded.

Identifying Functions Day 2

1. Analyze these data sets, recognizing the unique pattern and key feature(s) for each relationship. Then use your findings to fill in the missing data, match to the correct function from the list on the right, and describe the key feature(s) that helped you choose the function.

Table A

x	y
0	6
1	10
2	14
3	◯
4	22
5	◯

Table B

x	y
0	6
1	15
2	18
3	15
4	◯
5	◯

Table C

x	y
−1	$\frac{1}{6}$
0	1
1	◯
2	36
3	◯
4	1296

Table D

x	y
−1	◯
0	6
1	8
2	6
3	0
4	◯
5	−24

Equations:

$f(x) = 6^x$

$h(x) = -3(x - 2)^2 + 18$

$g(x) = -2(x + 1)(x - 3)$

$r(x) = 4x + 6$

Table A: _____   Key Feature(s): _____

Table B: _____   Key Feature(s): _____

Table C: _____   Key Feature(s): _____

Table D: _____   Key Feature(s): _____

2.

   a. Determine the function type that could be used to model the data set and explain why.

   b. Complete the data set using the special pattern of the function you described above.

   c. If it exists, find the minimum or maximum value for the function model. If there is no minimum/maximum, explain why.

x	y
-1	
0	
1	
2	16
3	64
4	256
5	1024

3.

   a. Determine the function type that could be used to model the data set and explain why.

   b. Complete the data set using the special pattern of the function you described above.

   c. If it exists, find the minimal or maximum value for the function model. If there is no minimum/maximum, explain why.

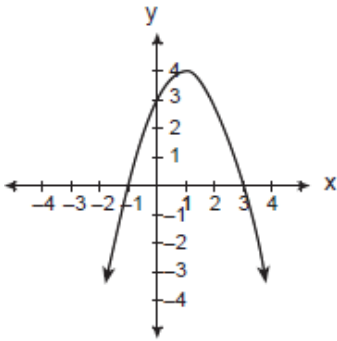| x	y
-1	
0	12
1	
2	24
3	
4	36
5	

equations and functions quiz review

For #1-6, identify the type of function that the following represent. Explain why you know this.

1.) $y = 3(10)^x$
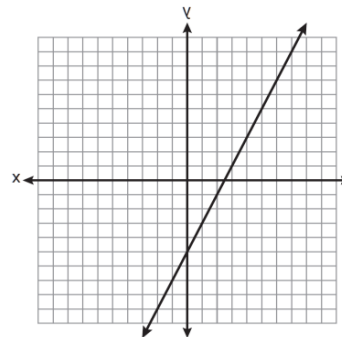
2.) $y = x^2 + 2x + 3$

3.)

4.)

x	f(x)
-1	$1/4$
0	1
1	4
2	16
3	64

5.)

x	f(x)
-1	-5
0	-1
1	3
2	7
3	11

6.)

7.) Determine if the function could represent the table. Why or why not?

a.) $f(x) = (x + 2)^2 - 16$

x	f(x)
-2	0
-1	-7
0	-12
1	-15
2	-16
3	-15
4	-12
5	-7
6	0

b.) $f(x) = x^2 - 4x - 12$

c.) $f(x) = -5x - 12$

d.) $f(x) = -x^2 + 4x - 12$

8.) The table below shows the number of bacteria in a piece of bread over time.

a.) Complete the table by correctly filling in the empty boxes.

b.) What type of function is shown in the table and how do you know?

Time (hours)	Number of Bacteria
0	
1	8
2	16
3	
4	64
5	
6	256

MODELING A FUNCTION FROM A SEQUENCE

A soccer coach is getting her students ready for the season by introducing them to High Intensity Interval Training (HIIT). She presents the table below with a list of exercises for an HIIT training circuit and the length of time that must be spent on each exercise before the athlete gets a short time to rest. The rest times increase as the students complete more exercises in the circuit. Study the chart and answer the questions below. How long would the 10th exercise be? If a player had 30 minutes of actual gym time during a period, how many exercises could she get done? Explain your answers.

Exercise #	Length of Exercise Time	Length of Rest Time	Total Time
Exercise 1	0.5 minutes	0.25 minutes	
Exercise 2	0.75 minutes	0.5 minutes	
Exercise 3	1 minute	1 minute	
Exercise 4	1.25 minutes	2 minutes	
Exercise 5	1.5 minutes	4 minutes	

1) How long would the 10th exercise be?

2) If a player had 30 minutes of actual gym time, how many intervals would they be able to complete?

Look at the sequence and determine the analytical representation of the sequence. Show your work and reasoning.

1.   A decorating consultant charges $50 for the first hour and $2 for each additional whole hour. How much would 1000 hours of consultation cost?

n	1	2	3	4	5	...	n
$f(n)$	50	52	54	56	58		?

2.   What would be the 10th term in the sequence?

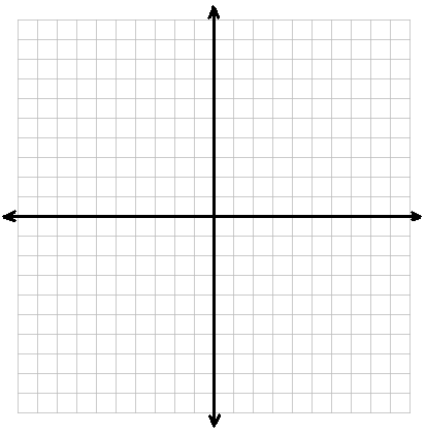| n	1	2	3	4	...	n
$f(n)$	3	6	12	24		?

Modeling a Function from Data

1. Identify the type of function the each table represents (e.g., quadratic, linear, exponential, square root, etc.).

2. Explain how you were able to identify the function.

3. Find the symbolic representation of the function.

A

x	y
1	5
2	7
3	9
4	11
5	13

B

x	y
1	6
2	9
3	13.5
4	20.25
5	30.375

C

| x	y
1	3
2	12
3	27
4	48
5	75

4. Plot the graphs of your data.
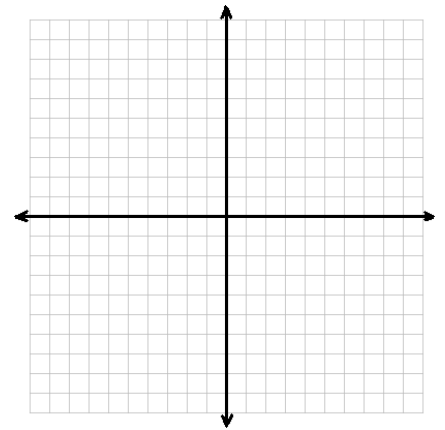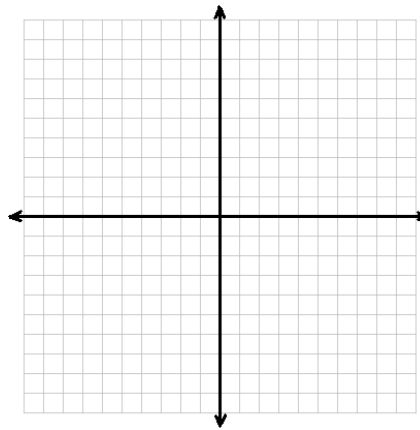
1. Bella is a BMX bike racer and wants to identify the relationship between her bike's weight and the height of jumps (a category she gets judged on when racing). On a practice course, she tests out 7 bike models with different weights and comes up with the following data.

Weight (lbs.)	Height (ft.)
20	8.9
21	8.82
22	8.74
23	8.66
24	8.58
25	8.5
26	8.42
27	8.34

a. Bella is sponsored by Twilight Bikes and must ride a 32-lb bike. What can she expect her jump height to be?

b. Bella asks the bike engineers at Twilight to make the lightest bike possible. They tell her the lightest functional bike they could make is 10 lbs. Based on this data, what is the highest she should expect to jump if she only uses Twilight bikes?

c. What is the maximum weight of a bike if Bella's jumps have to be at least 2 feet high during a race?
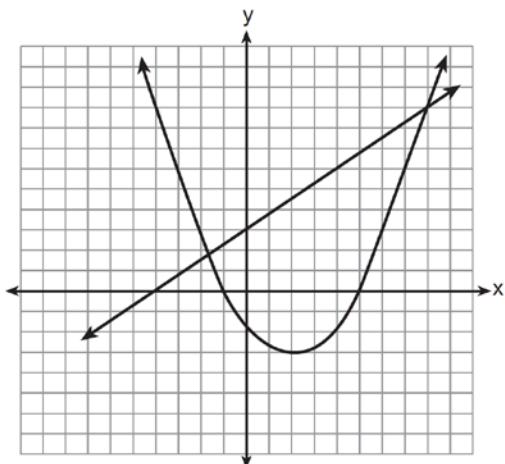
Linear and Quadratic Systems

1.) A system of equations is graphed on the set of axes below. What is the solution to the system of equations?
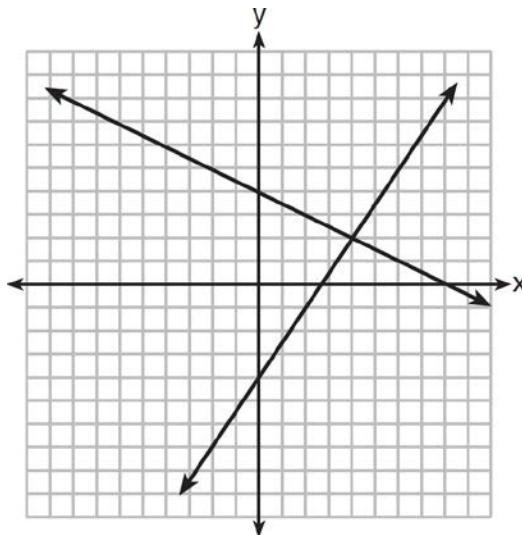
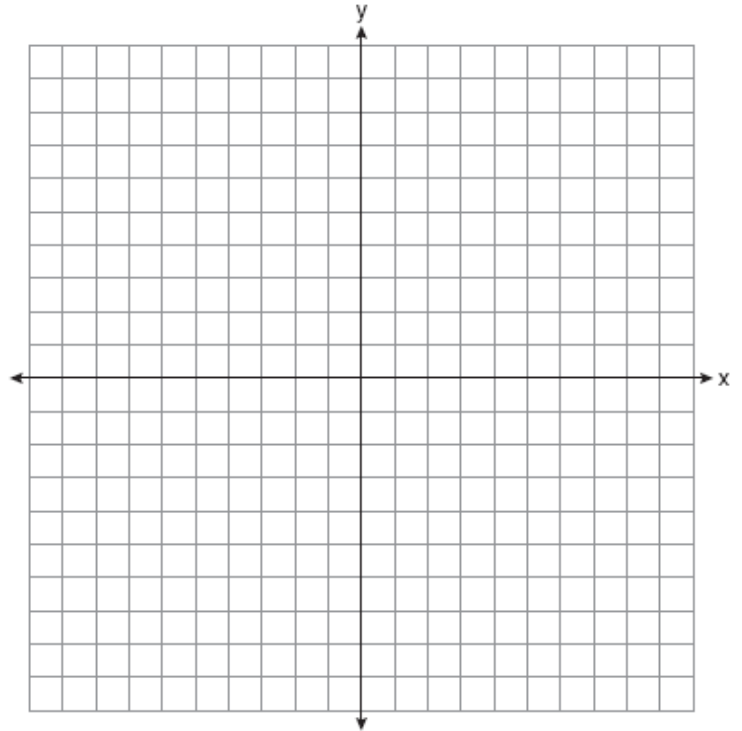**2.)** What are the solutions of the system of equations shown in the graph below?
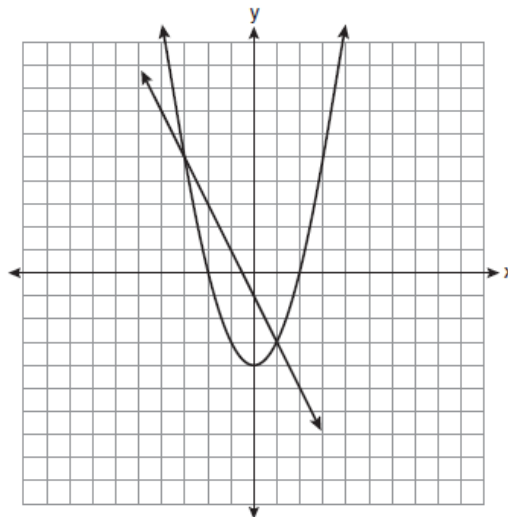
3.) What are the solutions of the system of equations shown in the graph below?

4.) On the grid below, solve the system of equations graphically for *x* and *y*.
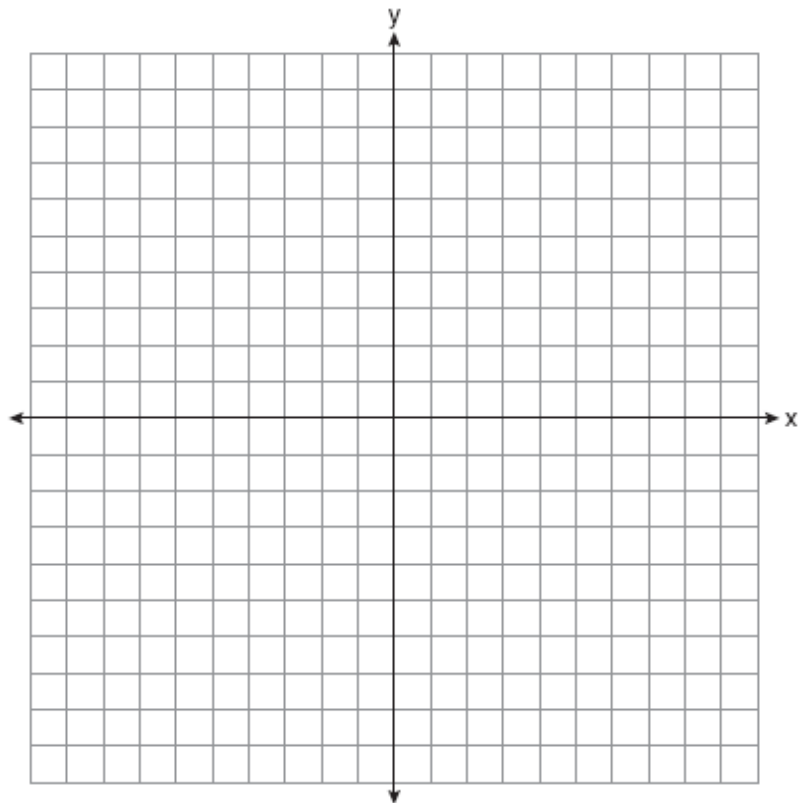
$$4x - 2y = 10$$
$$y = -2x - 1$$

5.) On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution set.

$$y = x^2 + 4x - 5$$
$$y = x - 1$$

6.) On the set of axes below, solve the following system of equations graphically for all values of x and y. State the coordinates of all solutions.

$$y = x^2 + 4x - 5$$
$$y = 2x + 3$$