RELATIONS & FUNCTIONS DICTIONARY

Graphing Basics	DEFINITION	EXAMPLE OR VISUAL
Coordinate Plane		
x-axis		
y-axis		
Quadrants		
Origin		
Ordered Pair		
x-Coordinate		

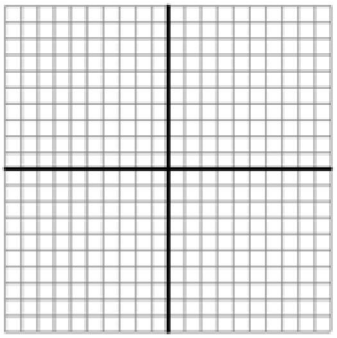
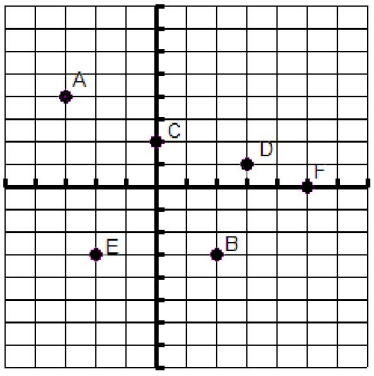
y-Coordinate		
Discrete Graph		
Continuous Graph		
Relation		
Domain		
Range		
Mapping		

Functions	DEFINITION	EXAMPLE OR VISUAL
Function		

Function Notation		
Input		
Output		
Vertical Line Test		
Zeros		

Sequences & Patterns	DEFINITION	EXAMPLE OR VISUAL
Arithmetic Sequence		
Common Difference		
Arithmetic Sequence Formula		

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes
DEFINITION	
PARTS OF THE PLANE	**Label the *origin*, *quadrants*, *x-axis*, and *y-axis*.** 
ORDERED PAIR	
NAMING POINTS	**Identify the ordered pair and quadrant of each point.**
	
DISCRETE GRAPH	
CONTINUOUS GRAPH	

Point	*Ordered Pair*	*Quadrant*
A		
B		
C		
D		
E		
F		

Relations

Definition: _____

The set of all <u>x-values</u> is called the _____. **The set of all <u>y-values</u> is called** the _____.

Representing Relations

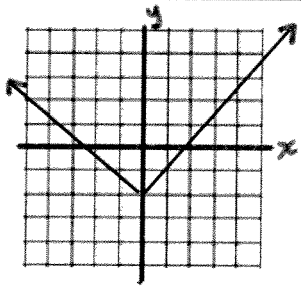
Ordered Pairs	Table	Mapping	Graph
{ (-3, 1), (-2, 0), (1, 2), (3, -4), (-3, 5)} **Domain:** _____ **Range:** _____			
{ (-2, -3), (-1, 4) , (0 ,-2), (2, 4), (5, -1)} **Domain:** _____ **Range:** _____			
Domain: _____ **Range:** _____			

DOMAIN & RANGE
OF CONTINUOUS GRAPHS

- For **DOMAIN**, scan your pencil _____ to _____ along the ___-axis.
- For **RANGE**, scan your pencil _____ to _____ along the ___-axis.

EXAMPLES:

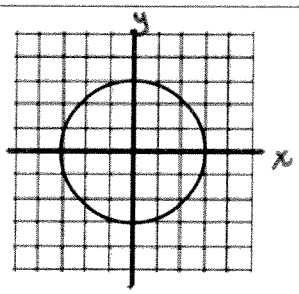
1



Domain = _____

Range = _____

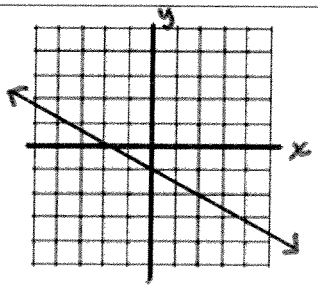
2



Domain = _____

Range = _____

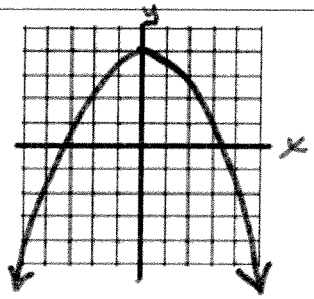
3



Domain = _____

Range = _____

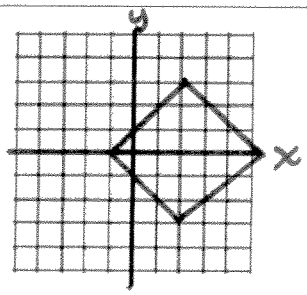
4



Domain = _____

Range = _____

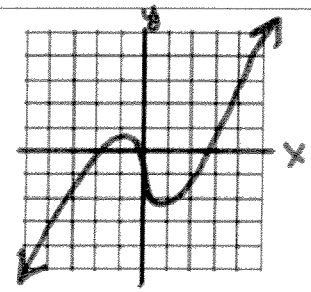
5



Domain = _____

Range = _____

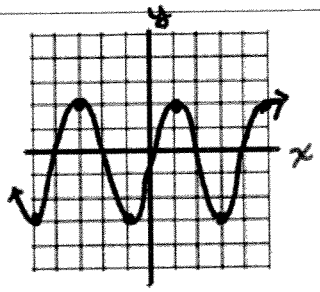
6



Domain = _____

Range = _____

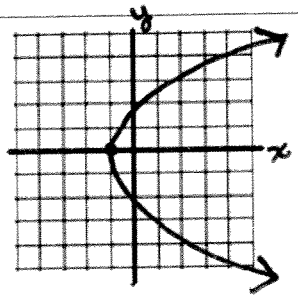
7



Domain = _____

Range = _____

8



Domain = _____

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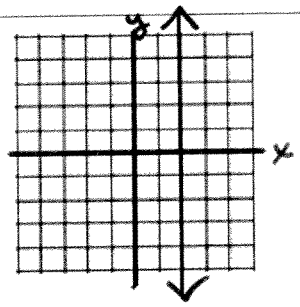
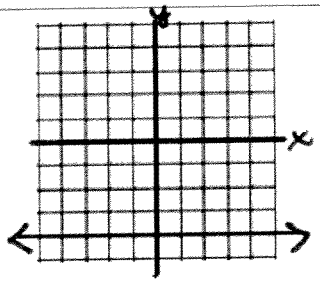
9



Domain = _____

Range = _____

10



Domain = _____

Range = _____

FUNCTIONS

What is a function? _____

_____

To test whether a relation is a function:

Given Ordered Pairs	**If x-values repeat, then it is NOT a function.**
Given Graphs	**Use the Vertical Line Test.** If a vertical line intersects a graph more than once, then it is NOT a function.

Determine whether the following are functions:

1. {(5, -2), (3, -5), (2, -5), (0, -2), (-1, -3)}

2. {(-2, 3), (0, 1), (2, -4), (3, -1), (2, 4)}

3. {(-4, -1), (-3, -1), (-2, -3), (-1, 0), (-3, 2)}

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

5.

x	y
2	3
-1	0
0	1
1	1
2	2

6.

x	y
-2	3
-1	0
0	1
1	1
2	2

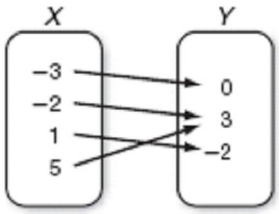
7.

x	y
-3	4
-1	2
0	1
-1	3
-2	5

8.

x	y
1	−5
−4	3
7	6
1	−2

9.



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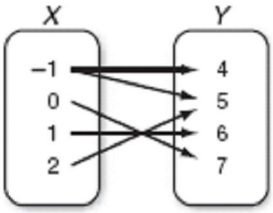

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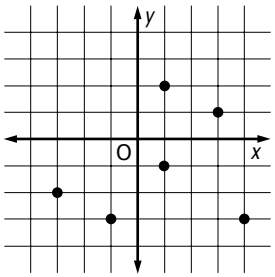

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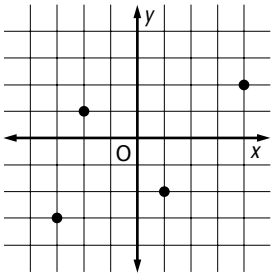

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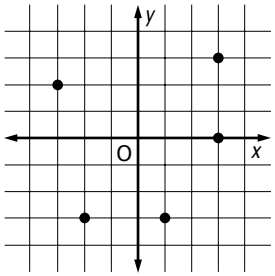

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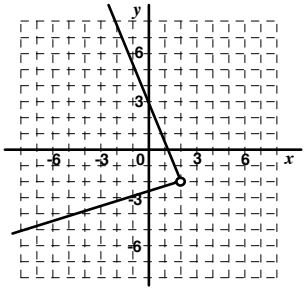

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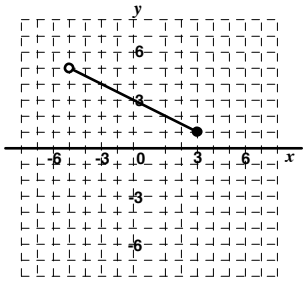

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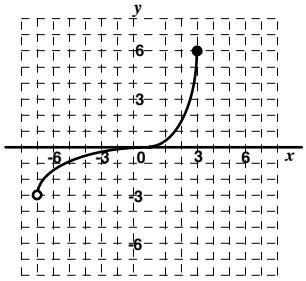


Name: _____ **Unit 3:** Functions & Linear Equations

Date: _____ **Bell:** _____ **Homework 1:** Relations & Functions

**** This is a 2-page document! ****

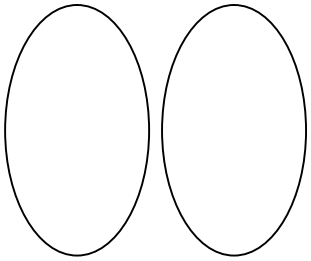
Find the domain and range, then represent as a table, mapping, and graph.

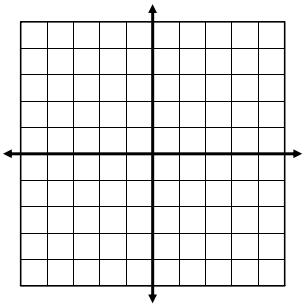
1. {(-5, 4), (-4, -1), (-2, 1), (0, 4), (1, 3)}

Domain = _____

Range = _____

x	*y*



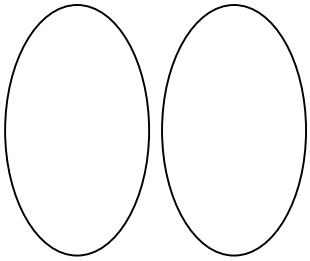


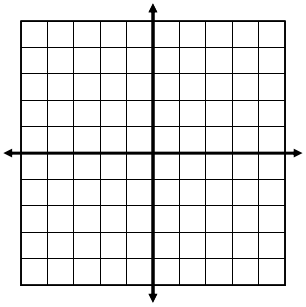
2. {(-3, -4), (-1, 2), (0,0), (-3, 5), (2, 4)}

Domain = _____

Range = _____

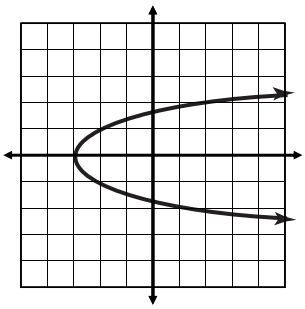
x	*y*





Determine the domain and range of the following continuous graphs.

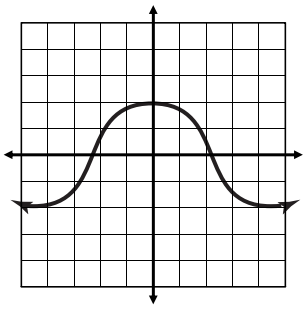
3.



Domain = _____

Range = _____

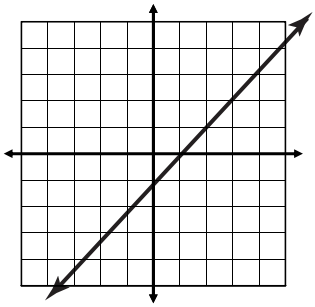
4.



Domain = _____

Range = _____

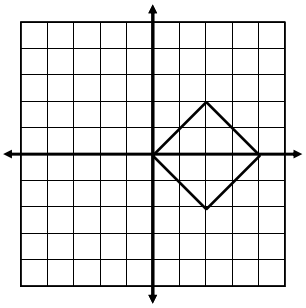
5.



Domain = _____

Range = _____

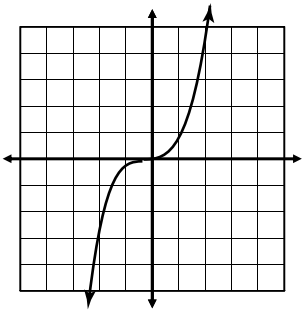
6.



Domain = _____

Range = _____

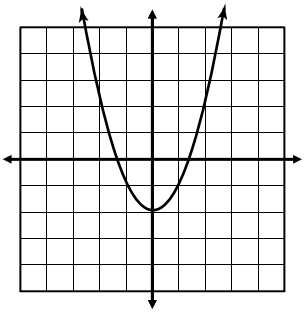
7.



Domain = _____

Range = _____

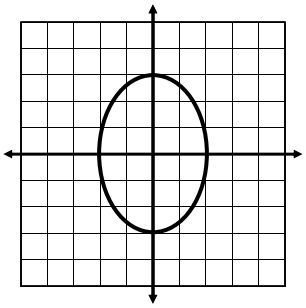
8.



Domain = _____

Range = _____

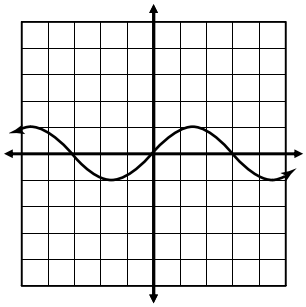
9.



Domain = _____

Range = _____

10.



Domain = _____

Range = _____

Determine which of the following relations could represent functions.

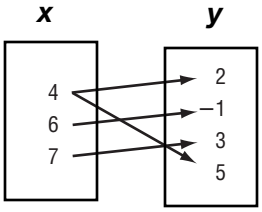
11. {(-2, 6), (2, 0), (3, 6), (4, -1), (5, 3)}

13. {(-3, 2), (-2, 2), (1, 2), (-3, 1), (0, 3)}

14.

x	*y*
2	−3
−1	0
5	5
3	2
2	1

15.



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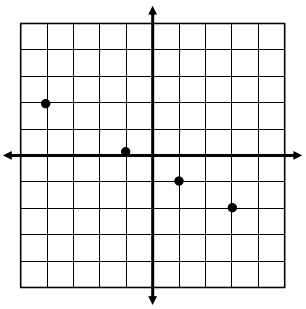

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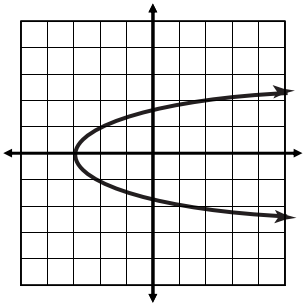

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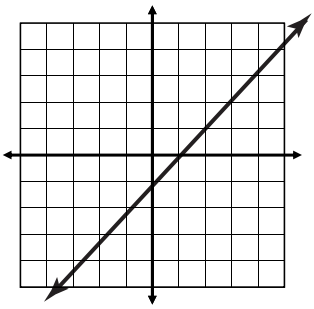

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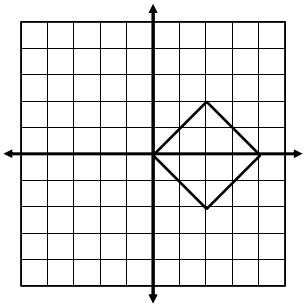
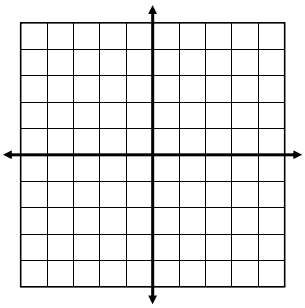


Graphing Functions

Functions can be represented by an equation. To graph them, you can create a table to plot the points.

Example: $y = 2x - 3$

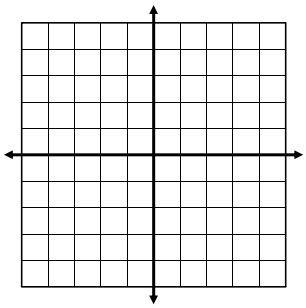
x	y
-1	
0	
2	
4	



Directions: ***Complete the function table, then graph your results.***

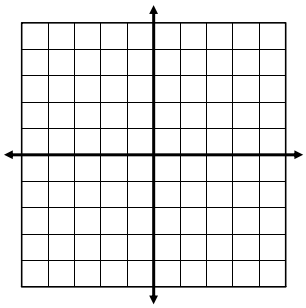
1. $y = x + 4$

x	y
-5	
-4	
-2	
0	



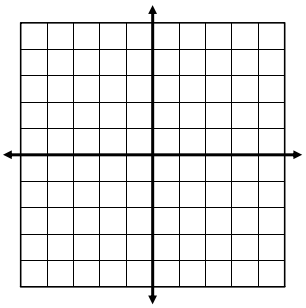
2. $y = \frac{3}{4}x - 2$

x	y
-4	
0	
4	
8	



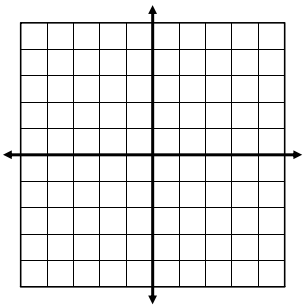
3. $y = 3x$

x	y
-2	
-1	
0	
1	



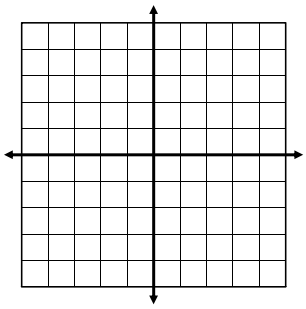
4. $y = -\frac{3}{2}x + 2$

x	y
-2	
0	
2	
4	



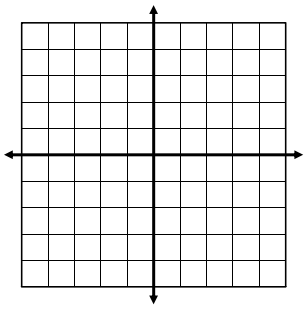
5. $y = -x + 1$

x	y
-3	
-1	
0	
4	



6. $y = 1 - \frac{1}{3}x$

x	y
-3	
0	
3	
6	



Directions: ***Given the domain, find the range values.***

7. $y = x - 5$ Domain = {4, 6, 8}	**8.** $y = 3x + 1$ Domain = {-1, 0, 1, 4}
9. $y = 4 - x$ Domain = {-2, 3, 5}	**10.** $y = \frac{3}{5}x + 2$ Domain = {-10, 0, 5}
11. $y = 7 - \frac{1}{2}x$ Domain = {-4, 0, 6}	**12.** $y = -\frac{2}{3}x + 9$ Domain = {-12, -6, 3}

Name: _____ **Unit 3:** Relations & Functions

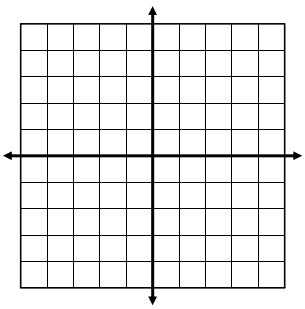
Date: _____ **Bell:** _____ **Homework 2:** Functions

**** This is a 2-page document! ****

Given the function, complete the table of values then graph the ordered pairs.

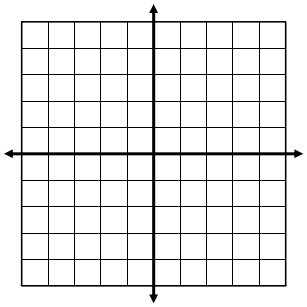
1. $y = -4x + 3$

x	y
0	
1	
2	
3	



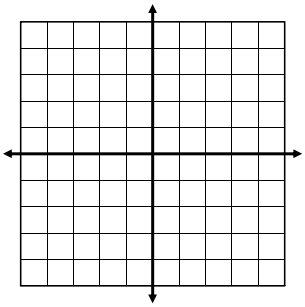
2. $y = \frac{2}{3}x - 1$

x	y
-6	
-3	
0	
3	



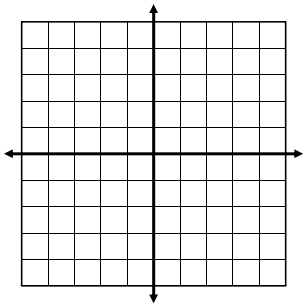
3. $y = 2x$

x	y
-1	
0	
1	
2	



4. $y = 5 - \frac{1}{2}x$

x	y
-2	
0	
2	
4	



5. Find the range of the function $y = 7x - 1$ when the domain is {-1, 0, 1}

6. Find the range of the function $y = \frac{1}{2}x + 3$ when the domain is {-2, 0, 2, 4}?

Match the function to the table of values.

_____**7.** $y = \frac{2}{3}x + 4$

_____**8.** $y = x - 7$

_____**9.** $y = \frac{1}{2}x + 2$

_____**10.** $y = -3x + 1$

A.

x	-3	-1	2	6
y	-10	-8	-5	-1

B.

x	-1	2	3	5
y	4	-5	-8	-14

C.

x	-3	0	3	9
y	2	4	6	10

D.

x	-2	2	4	6
y	1	3	4	5

Function Notation

Equations can be written in a form called function notation.
We use this as a quick way to evaluate functions for a given input.

Example: $\boxed{y = 2x - 8}$ ⟹ $\boxed{}$

This is read as _____

Evaluating Functions

To evaluate a function for a specific value, substitute the value in for _____.

1 $f(x) = x + 7$

a. $f(5)$

b. $f(-1)$

c. $f(-3)$

2 $g(x) = 3x - 8$

a. $g(1)$

b. $g(-3)$

c. $g(0)$

3 $h(x) = \frac{2}{3}x - 1$

a. $h(-3)$

b. $h(0)$

c. $h(9)$

4 $f(x) = x^2 - x$

a. $f(-4)$

b. $f(-1)$

c. $f(7)$

5 $h(x) = 3x^2 + 7$

a. $h(-4)$

b. $h(-2)$

c. $h(0)$

6 $f(x) = -x^2 + 6x - 4$

a. $f(-3)$

b. $f(-1)$

c. $f(5)$

7 $g(x) = -\frac{1}{2}x + 9$

a. $g(-8)$

b. $g(-2)$

c. $g(0)$

8 $h(x) = 2 - 4x$

a. $h(-5)$

b. $h(-2)$

c. $h(4)$

9 $f(x) = 2x^2 + 4x - 9$

a. $f(-8)$

b. $f(-5)$

c. $f(-2)$

10 $g(x) = |x - x^2|$

a. $g(4)$

b. $g(-7)$

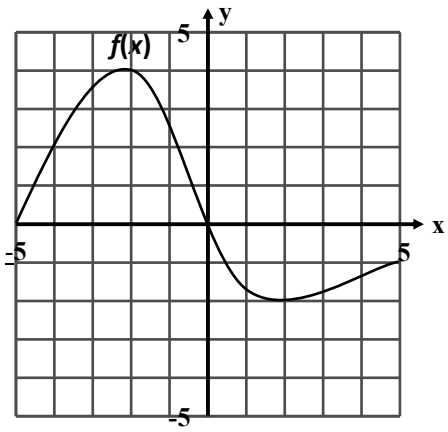
c. $g(-3)$

11 Anthropologists use the length of certain bones of human skeleton to estimate the height of the living person. One of these bones is the femur. To estimate the height in centimeters of a female with a femur length of x, the function $h(x) = 61.41 + 2.32x$ can be used.

a. Find $h(46)$

b. What does this mean?

12 ***Given the graph of the function f(x), find each of the following.***



a. $f(-4)$

b. $f(0)$

c. $f(2)$

d. $f(5)$

Name: _____ **Unit 3:** Relations & Functions

Date: _____ **Bell:** _____ **Homework 3:** Function Notation & Evaluating Functions

1. Given $\boldsymbol{f(x) = -3x - 2}$, find the following.

a. $f(3)$

b. $f(-1)$

c. $f(-2)$

2. Given $\boldsymbol{g(x) = \frac{1}{2}x + 5}$, find the following.

a. $g(4)$

b. $g(-10)$

c. $g(0)$

3. Given $\boldsymbol{h(x) = x^2 - 5x + 7}$, find the following.

a. $h(2)$

b. $h(-5)$

c. $h(-8)$

4. Given $\boldsymbol{f(x) = 1 - \frac{3}{4}x}$, find the following.

a. $f(-12)$

b. $f(0)$

c. $f(4)$

5. Given $\boldsymbol{g(x) = -x^2 + 10x - 3}$, find the following.

a. $g(9)$

b. $g(-1)$

c. $g(-3)$

6. Given $\boldsymbol{h(x) = |1 - 7x|}$, find the following.

a. $h(1)$

b. $h(-7)$

c. $h(9)$

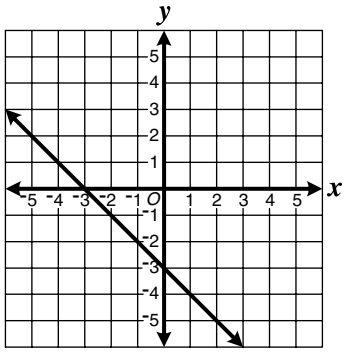
7. Given $\boldsymbol{f(x) = \frac{9}{5}x + 32}$, find the following.

a. $f(60)$

b. $f(0)$

c. $f(25)$

8. The following represents the graph of a function f(x). Find each of the following.

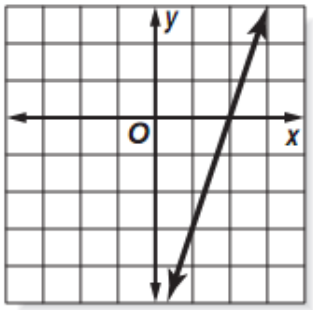
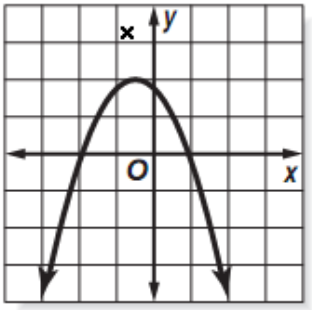
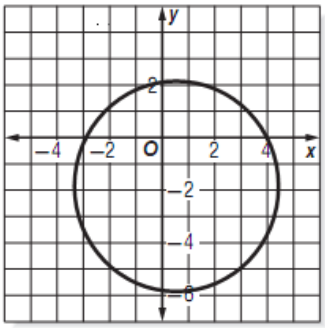
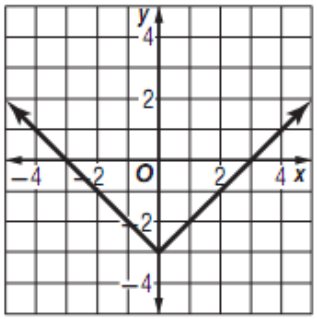
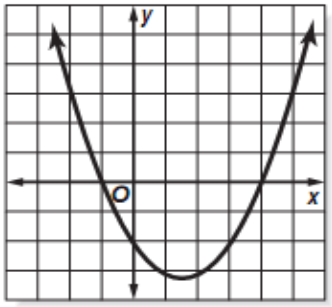
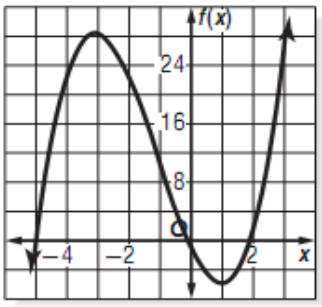


a. f(-4)

b. f(2)

c. f(0)

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes
DEFINITION	
What are they also called?	
GIVEN GRAPH	1.  2.  3.  4.  5.  6. 

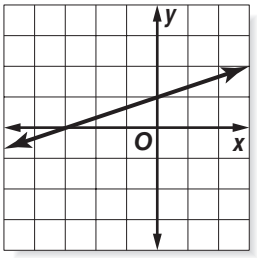
Main Ideas/Questions	Notes
ALGEBRAICALLY (By hand) **Step 1:** **Step 2:**	**1.** $f(x) = 4x - 8$ **2.** $f(x) = 2x + 2$ **3.** $f(x) = -x + 7$ **4.** $f(x) = \frac{2}{3}x - 6$ **5.** $f(x) = \frac{1}{2}x + 2$ **6.** $f(x) = -\frac{2}{5}x + 4$
BY GRAPHING CALCULATOR **Step 1:** Hit Y = to enter the function **Step 2:** Hit GRAPH to view the graph.	**1.** $f(x) = x^2 - 16$ **2.** $f(x) = 5x^2 + 5x - 30$ **3.** $f(x) = -x^2 - 2x + 24$ **4.** $f(x) = x^2 + 7x - 8$ **5.** $f(x) = x^2 - 3x - 28$ **6.** $f(x) = -x^2 + 7x - 10$ **7.** $f(x) = x^3 - 5x^2 + 2x + 8$ **8.** $f(x) = x^3 + 2x^2 - 15x$ **9.** $f(x) = 3x^3 - 3x$ **10.** $f(x) = x^4 + 2x^3 - 25x^2 - 50x$

Name: _____ **Unit 3:** Relations & Functions

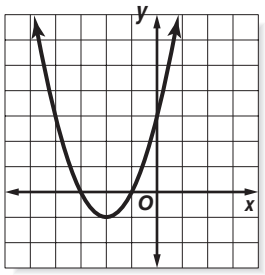
Date: _____ **Bell:** _____ **Homework 4:** Zeros of Functions

Directions: Find the zeros of each function given the graph.

1.



2.



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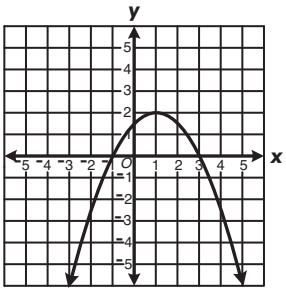

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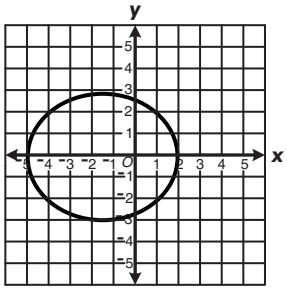

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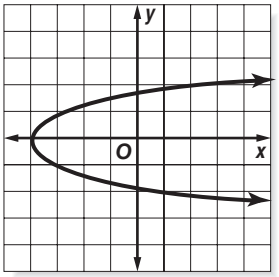

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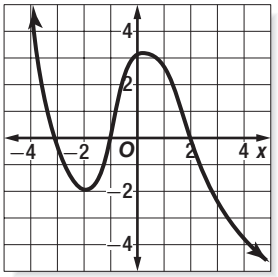


Directions: Find the zeros of each function algebraically.

7. f(x) = x + 2

8. f(x) = -2x + 6

9. $f(x) = \frac{1}{3}x - 6$

10. f(x) = 2x + 10

11. $f(x) = -\frac{2}{5}x + 4$

12. f(x) = 4x

Directions: Find the zeros of each function by using your graphing calculator.

13. $f(x) = x^2 - 16$

14. $f(x) = x^2 - 2x - 15$

15. $f(x) = x^2 - 5x + 6$

16. $f(x) = x^3 - 6x^2 + 3x + 10$

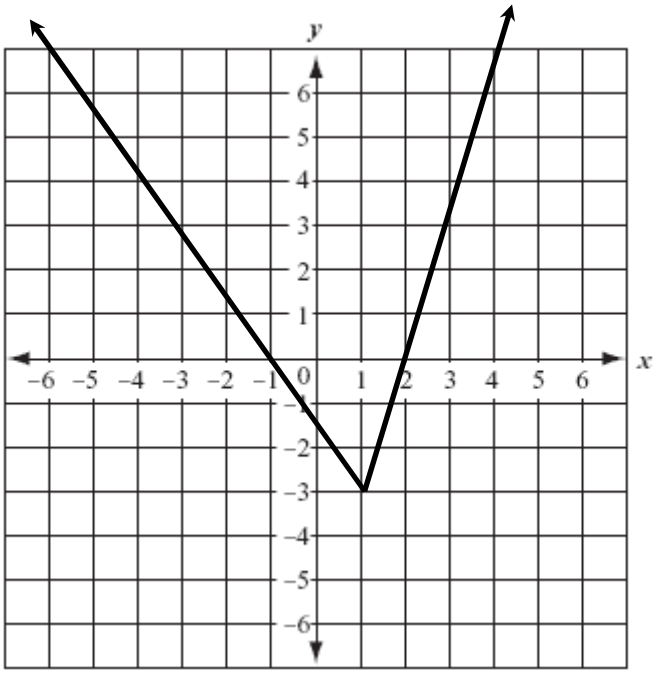
17. $f(x) = x^3 - 2x^2 - x + 2$

18. $f(x) = x^4 - 5x^3 + 20x - 16$

Analyzing Graphs

DIRECTIONS: Given the graph below, write a description in words. Use the elements of the vocabulary list below. Be very descriptive as if you were teaching somebody how to analyze the graph.

VOCABULARY: DISCRETE OR CONTINUOUS GRAPH, DOMAIN, RANGE, FUNCTION, VERTICAL LINE TEST, ZEROS



Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes	
Arithmetic Sequence		
Common Difference		
Identifying an Arithmetic Sequence	***Determine whether the sequences are arithmetic sequences. If yes, identify the common difference.*** **1.** 1, 5, 9, 13, … **2.** 1, 3, 5, 8, … **3.** 8, 6, 4, 2, … **4.** -5, -8, -11, -14, … **5.** 5, 10, 20, 40, … **6.** 7, 6, 5, 4, …	
Continuing Arithmetic Sequences	***Given the arithmetic sequence, find the next three terms.*** **7.** 9, 13, 17, 21, _____, _____, _____ **8.** 5, 2, -1, -4, _____, _____, _____ **9.** -8, -2, 4, 10, _____, _____, _____	
Arithmetic Sequence Formula	**The n th term of an arithmetic sequence can be found using the following formula:** **d =** **a_1 =**	
Examples **Write the rule for the nth term, then find a_{19}.**	**10.** 7, 13, 19, 25, …	**11.** 30, 26, 22, 18,…

Main Ideas/Questions	Notes	
	12. -11, -8, -5, -2 …	**13.** -2, 0, 2, 4, …
	14. -16, -21, -26, -31, …	**15.** 101, 92, 83, 74, …
Real Life Applications	**16.** You visit the Grand Canyon and drop a penny off the edge of the cliff. The distance the penny will fall is 16 feet for the first second,48 feet the next second, 80 feet the third second, and so on. **a.** Write a formula to represent this sequence. **b.** How far will the penny have traveled after 6 seconds?	
	17. The total bank loan for Sarah's new car is $15,265. The bank automatically withdraws $295.80 each month to pay off the car. **a.** Write a formula to represent this sequence. **b.** What will be the balance of the loan after 2 years?	

Name: _____ **Unit 3:** Relations & Functions

Date: _____ **Bell:** _____ **Homework 5:** Arithmetic Sequences & Quiz 3-2 Review

**** This is a 2-page document! ****

Determine whether each sequence is an arithmetic sequence. If yes, identify the common difference.

1. 4, 7, 9, 12, …

2. 15, 13, 11, 9, …

3. 7, 10, 13, 16, …

4. -6, -5, -3, -1, …

5. -13, -6, 1, 8, …

6. -9, -14, -19, -24, …

Find the next three terms of each arithmetic sequence.

7. 3, 7, 11, 15, _____, _____, _____

8. 22, 20, 18, 16, _____, _____, _____

9. -13, -11, -9, -7, _____, _____, _____

10. -2, -5, -8, -11, _____, _____, _____

Write an equation to find the nth term of each sequence. Then find a_{24}

11. 1, 3, 5, 7, …

12. -1, -4, -7, -10, …

13. -4, -9, -14, -19, …

14. 7, 13, 19, 25, …

15. Charlie deposited $115 in a savings account. Each week thereafter, he deposits $35 into the account.

a. Write a formula to represent this sequence.

b. How much total money has Charlie deposited after 30 weeks?

16. As manager of the soccer team, Wendy is to hand out cups of water at practice. Each cup of water is 4 ounces. She begins practice with a 128-ounce cooler of water.

a. Write a formula to represent this sequence.

b. How much water is remaining after she hands out the 14th cup?

review! **Evaluating functions, and identifying zeros of functions will also be on the quiz.**

1. Given $f(x) = -8x + 1$, find $f(5)$

2. Given $g(x) = x^2 + 3x - 19$, find $g(-2)$

3. Given $h(x) = 3 - \frac{1}{4}x$, find $h(-8)$

4. Given $f(x) = |9 - 4x|$, find $f(7)$

Use $\boldsymbol{f(x) = 3x - 5}$ and $\boldsymbol{g(x) = 2x^2 + 7x + 1}$ to answer questions 5 – 8.

5. $f(-6) + 17$

6. $g(1) - 9$

7. $f(8) + g(-1)$

8. $12 - 2[g(3)]$

9. Find the zero(s) of the following functions <u>algebraically</u>:

a. $f(x) = 3x - 21$

b. $f(x) = \frac{2}{5}x + 4$

10. Find the zero(s) of the following functions using your <u>graphing calculator</u>:

a. $f(x) = x^2 - 7x + 10$

b. $f(x) = x^3 - 9x^2 + 14x + 24$

Unit 3 Test Study Guide

Relations & Functions

Relations

1. {(-6, 4), (5, -1), (0, 3), (-2, 4)}

a. Domain = _____

b. Range = _____

c. Function? _____

2.

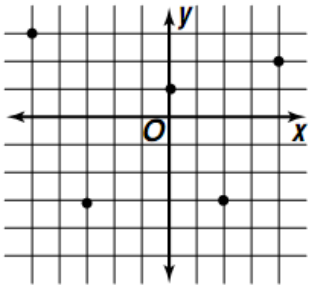
x	-4	-3	0	-3
y	8	1	-5	2

a. Domain = _____

b. Range = _____

c. Function? _____

3.

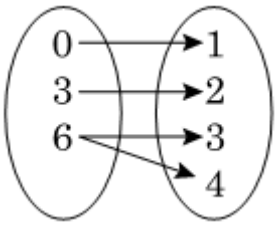


a. Domain = _____

b. Range = _____

c. Function? _____

4.

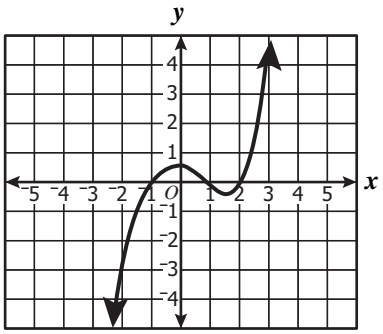


a. Domain = _____

b. Range = _____

c. Function? _____

5.



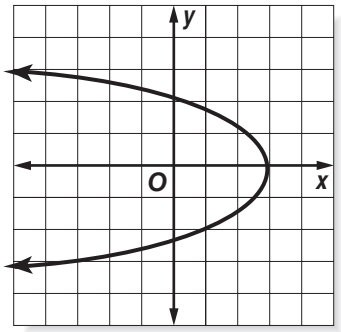
a. Domain = _____

b. Range = _____

c. Function? _____

d. Zero(s)? _____

6.



a. Domain = _____

b. Range = _____

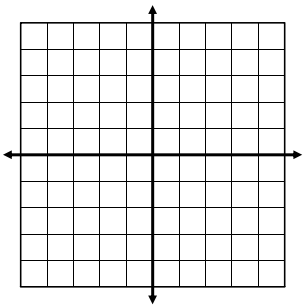
c. Function? _____

d. Zero(s)? _____

Graphing Functions

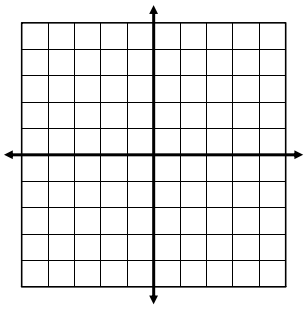
7. y = -2x + 5

x	y
0	
1	
3	
5	



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

x	y
-2	
0	
2	
4	



Function Notation

Use $f(x) = 5x - 20$, $g(x) = x^2 + 5x - 11$, and $h(x) = |2x + 7|$

9. $f(6)$

10. $g(-3)$

11. $h(-8)$

12. $f(-1) + g(2)$

Zeros

13. Find the zero(s) algebraically:

$$f(x) = 8x - 16$$

14. Find the zero(s) using your graphing calculator:

$$f(x) = x^4 - 8x^3 + 5x^2 + 14x$$

Arithmetic Sequences

$a_n = d(n - 1) + a_1$

15. Given **{5, 3, 1, -1, ...},** Find a_{18}

16. Given **{-2, 5, 12, 19, ...}**, Find a_{34}