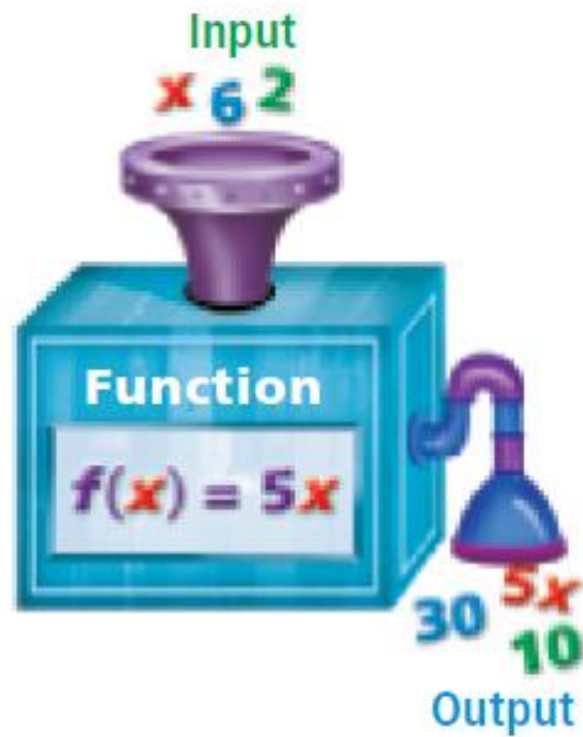


# Algebra

## Chapter 4: FUNCTIONS



Name: \_\_\_\_\_

Teacher: \_\_\_\_\_

Pd: \_\_\_\_\_

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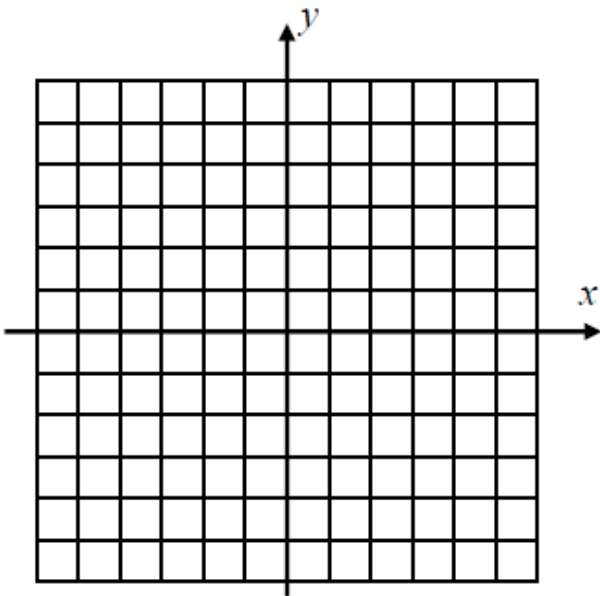
## **Chapter 4 EXAM**

Chapter 4-1 – Relations and Functions (Day 1)

- SWBAT:** (1) Match simple graphs with situations  
(2) Identify the domain and range of relations and functions

Warm – Up:

*Exercise #2:* Given the points  $A(1, 2)$ ,  $B(-3, 4)$ ,  $C(2, -5)$ , and  $D(-4, -6)$ , plot and label them on the grid given below and state the quadrant that each point lies in.



**QUADRANTS**

$A$ : \_\_\_\_\_

$B$ : \_\_\_\_\_

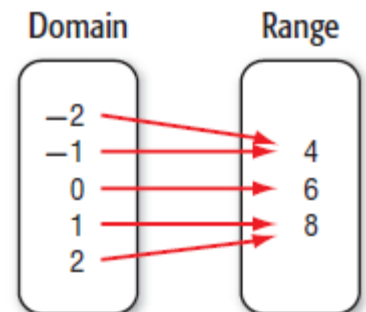
$C$ : \_\_\_\_\_

$D$ : \_\_\_\_\_

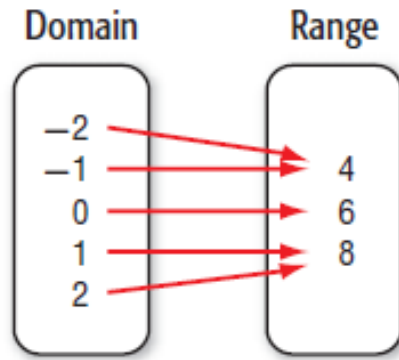
---

A set of ordered pairs is called a \_\_\_\_\_. A relation can be depicted in several different ways. An equation can represent a relation as well as \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

A **mapping** illustrates how each element of the *domain* is paired with an element in the *range*. The set of the first numbers of the ordered pairs is the **domain**. The set of second numbers of the ordered pairs is the **range** of the relation.



Using the mapping to the right, right the ordered pairs that represent this relation.



(\_\_, \_\_), (\_\_, \_\_), (\_\_, \_\_), (\_\_, \_\_), (\_\_, \_\_).

Study the different representations of the same relation below.

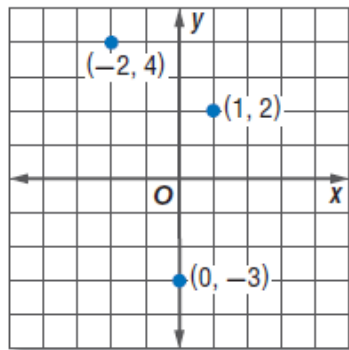
Ordered Pairs

- (1, 2)
- (-2, 4)
- (0, -3)

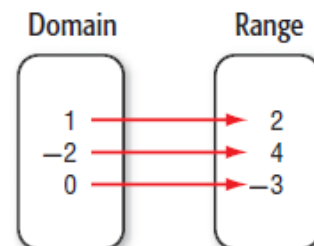
Table

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

Graph

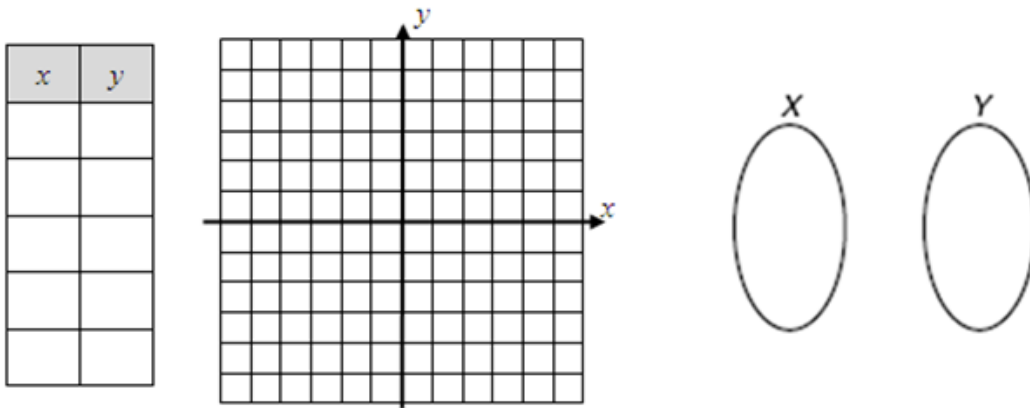


Mapping



The  $x$ -values of a relation are members of the domain and the  $y$ -values of a relation are members of the range. In the relation above, the domain is { \_\_, \_\_, \_\_ } and the range is { \_\_, \_\_, \_\_ }.

**Example 1:** Express the relation  $\{(-4, -1), (-1, 2), (1, -4), (2, -3), (4, 3)\}$  as a table, a graph, and a mapping. Then, state the domain and range of the relation.

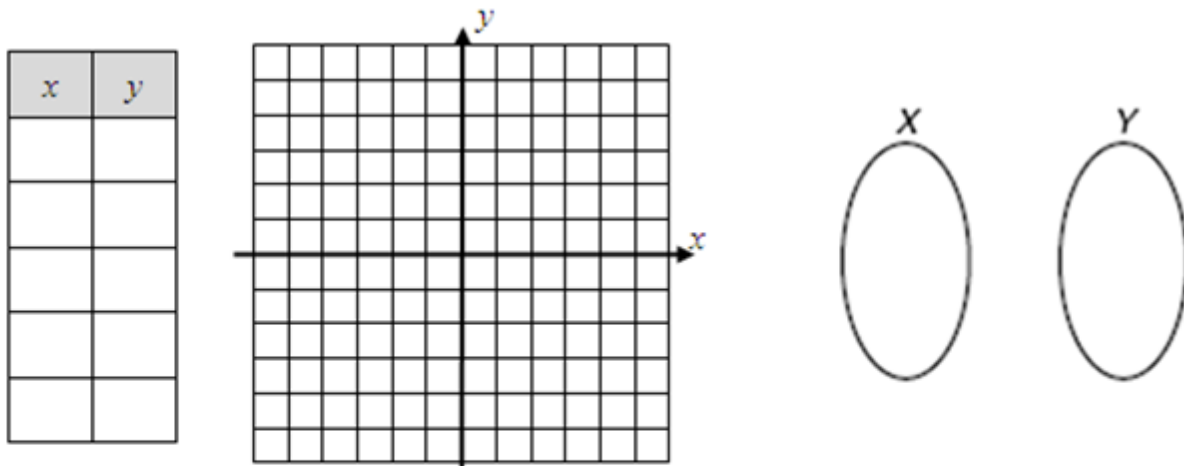


Domain: \_\_\_\_\_

Range: \_\_\_\_\_

**Practice Problems:**

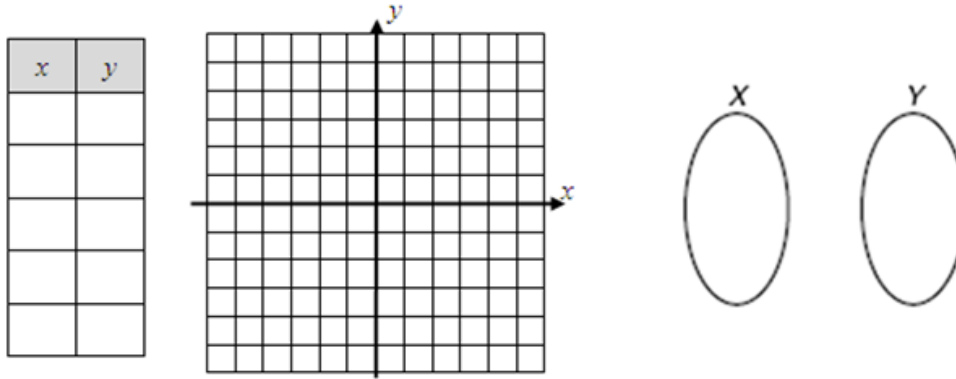
a) Express the relation  $\{(-2, 1), (-1, 0), (1, 2), (2, -4), (4, 3)\}$  as a table, a graph, and a mapping. Then, state the domain and range of the relation.



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

- b) Express the relation  $\{(-3, -3), (-1, 1), (0, 2), (2, -3), (2, 3)\}$  as a table, a graph, and a mapping. Then, state the domain and range of the relation.



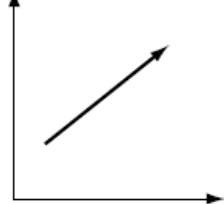
Domain: \_\_\_\_\_

Range: \_\_\_\_\_

**Graphs of a Relation** A relation can be graphed without a scale on either axis. These graphs can be interpreted by analyzing their shape.

Graphs are a way to turn words into pictures. Be sure to read the graphs from left to right.

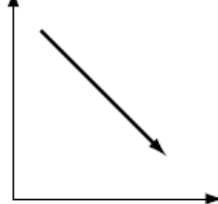
**increasing**



Other descriptions:

rose  
gained  
grew

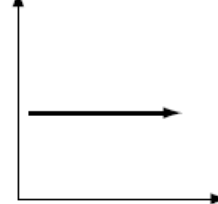
**decreasing**



Other descriptions:

fell  
lessened  
diminished

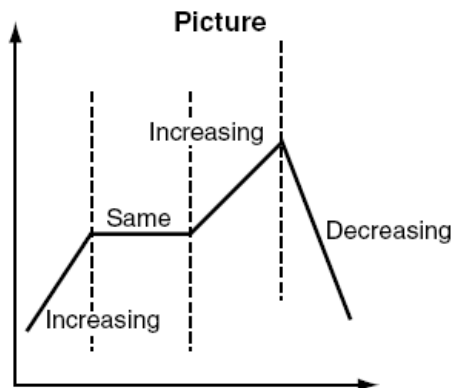
**stays the same**



Other descriptions:

constant  
steady  
continuous

You can divide the graph into sections every time the graph changes directions. Then label each section.



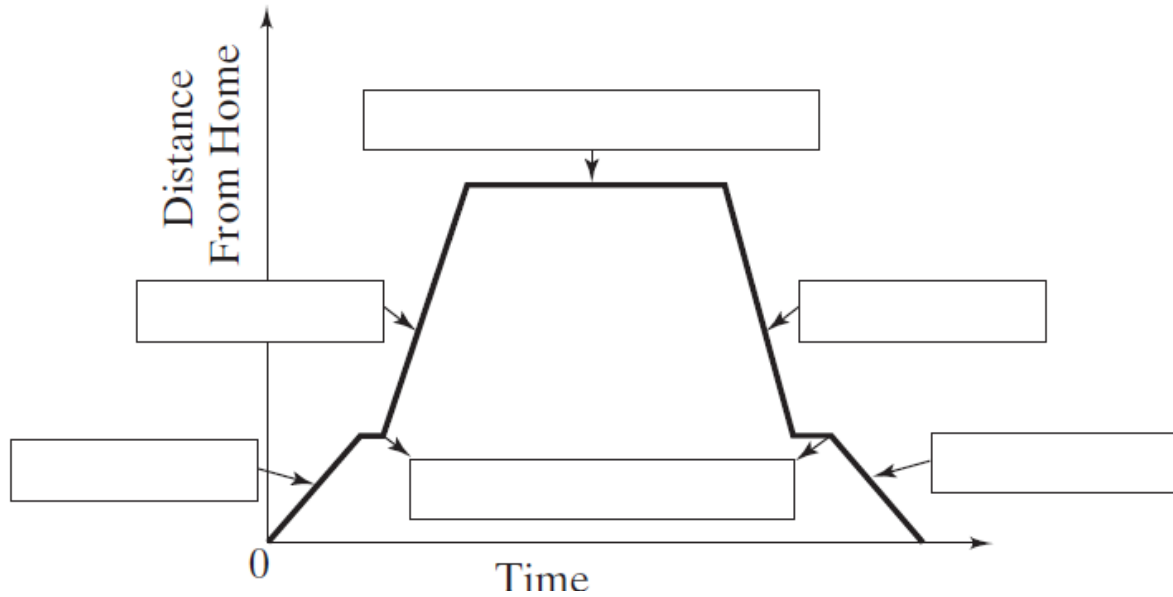
**Words**

This graph increases, then stays constant, increases again, and finally decreases sharply.

**Example 2:**

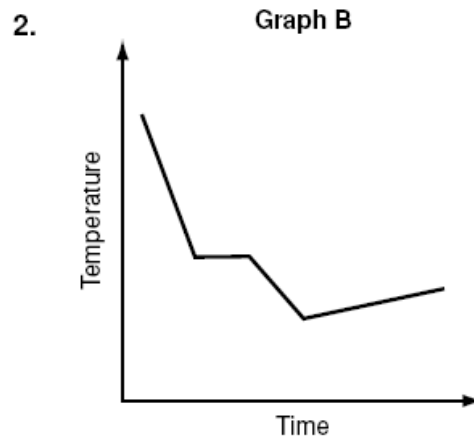
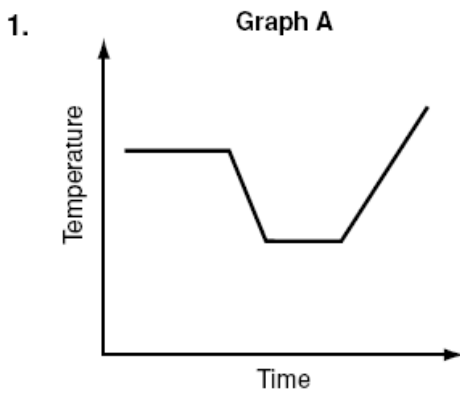
The graph shows a trip from home to school and back. The trip involves walking and getting a ride from a neighbor. Label each section of the graph.

**Daily Commute**



**PRACTICE PROBLEMS: YOU TRY!**

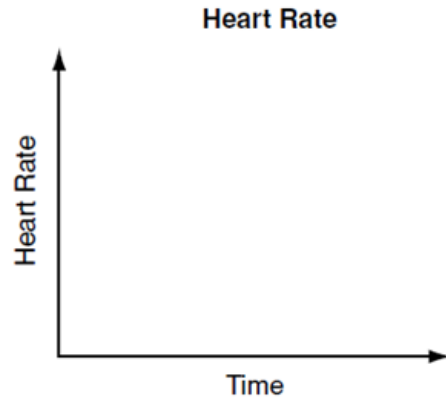
Divide each graph into sections where the graph changes directions. Then label the sections as *increasing*, *decreasing*, or *same*.



3. Which graph above shows that the air temperature fell steadily, leveled off, fell again, and then increased slightly?

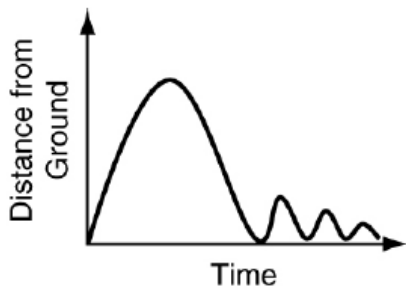
\_\_\_\_\_

4. Sketch the graph of the situation below.  
 The heart rate of someone walking, then running, then resting.



**Challenge Problem:**

Write a possible situation for each graph.




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**SUMMARY**

A **relation** is a set of ordered pairs. The relation can be in the form of a table, graph, or mapping diagram. The **domain** is all the  $x$ -values. The **range** is all the  $y$ -values.

Find the domain and range.

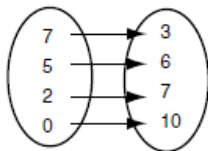
$x$	3	4	5	6
$y$	1	2	2	3

D: {3, 4, 5, 6}; R: {1, 2, 3}

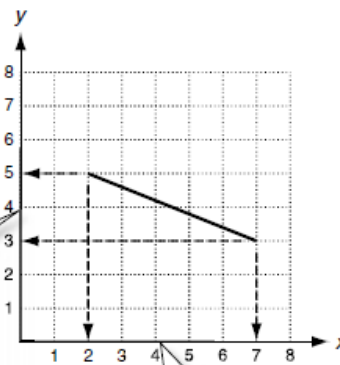
Do not list 2 twice in the range.

Find the domain and range.

Find the domain and range.



D: {7, 5, 2, 0}; R: {3, 6, 7, 10}



range: from 3 to 5

D:  $2 \leq x \leq 7$   
 R:  $3 \leq y \leq 5$

domain: from 2 to 7



### Exit Ticket

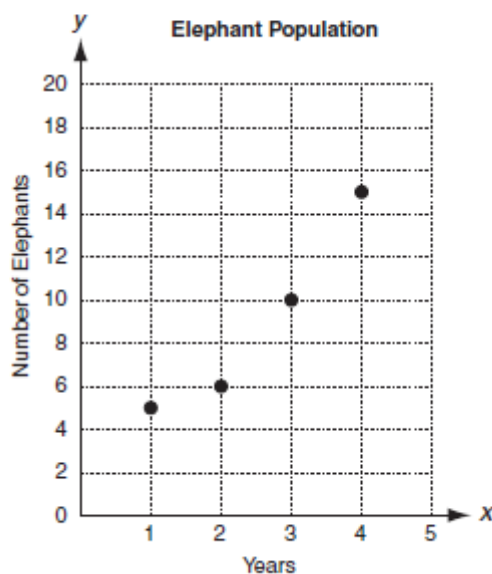
Use the graph below to answer questions 5–6. A conservation group has been working to increase the population of a herd of Asian elephants. The graph shows the results of their efforts. Select the correct answer.

5. Which relation represents the information in the graph?

- A  $\{(1, 4.5), (2, 6), (3, 10), (4, 14.5)\}$
- B  $\{(1, 5), (2, 6), (3, 10), (4, 15)\}$
- C  $\{(4.5, 1), (6, 2), (10, 3), (14.5, 4)\}$
- D  $\{(5, 1), (6, 2), (10, 3), (15, 4)\}$

6. What is the range of the relation shown in the graph?

- F  $\{0, 1, 2, 3, 4, 5\}$
- G  $\{1, 2, 3, 4\}$
- H  $\{4.5, 6, 10, 14.5\}$
- J  $\{5, 6, 10, 15\}$

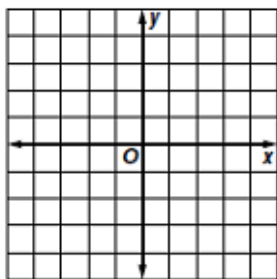


### Homework – Chapter 4-1

Express each relation as a table, a graph, and a mapping. Then determine the domain and range.

1.  $\{(-1, -1), (1, 1), (2, 1), (3, 2)\}$

$x$	$y$

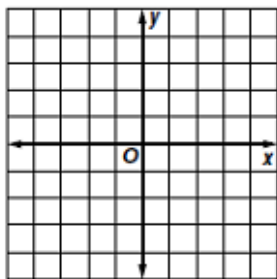


Domain: \_\_\_\_\_

Range: \_\_\_\_\_

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

$x$	$y$

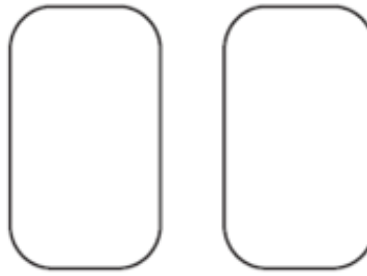
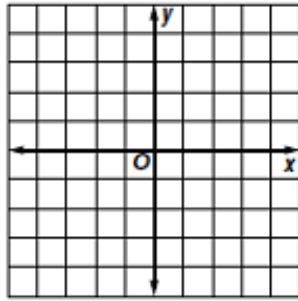


Domain: \_\_\_\_\_

Range: \_\_\_\_\_

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

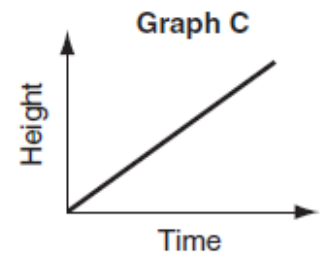
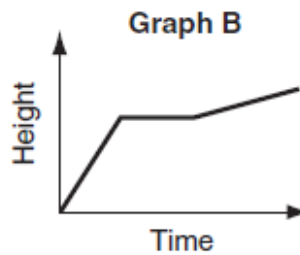
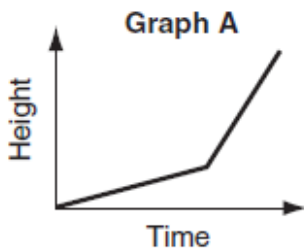
$x$	$y$



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

4. Choose the graph that best represents each situation.



A tomato plant grows taller at a steady pace.

\_\_\_\_\_

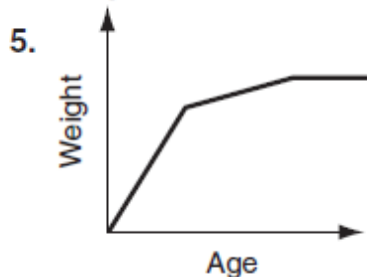
A tomato plant grows quickly at first, remains a constant height during a dry spell, then grows at a steady pace.

\_\_\_\_\_

A tomato plant grows at a slow pace, then grows rapidly with more sun and water.

\_\_\_\_\_

Write a possible situation for each graph.



\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

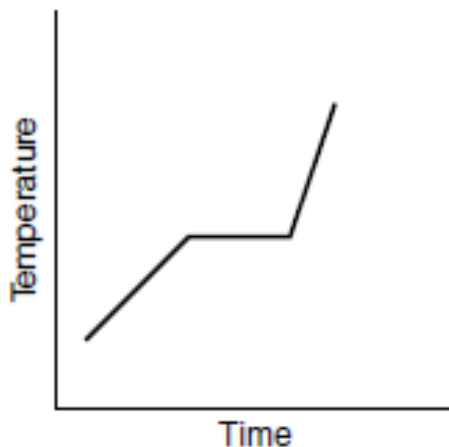
## Chapter 4-2 – FUNCTIONS (Day 2)

**SWBAT:** Determine if a relation is a function, by examining ordered pairs and inspecting graphs of relations

### Warm – Up:

Which situation is represented by the graph below?

- A temperature increases, decreases, then increases rapidly
- B temperature stays constant, increases, then stays constant
- C temperature decreases, stays constant, then decreases rapidly
- D temperature increases, stays constant, then increases rapidly



### Key Concept

### Function

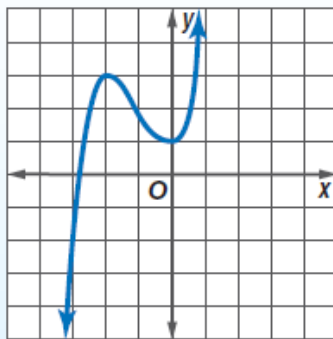
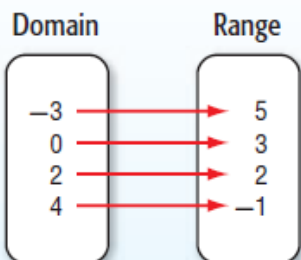
For Your

FOLDABLE

#### Words

A function is a relation in which each element of the domain is paired with *exactly* one element of the range.

#### Examples



#### Definition

- A **function** is a relation in which each element of the domain is paired with *exactly* one element of the range.
- **Vertical Line Test:** If each vertical line passes through no more than one point of the graph of a relation, then the relation is a function.

**Example 1: Determining if a Relation is a Function**

**Directions:** Determine whether each relation is a function. Explain your answer.

**A)**  $\{(7, 4), (6, 3), (5, 2)\}$

**B)**  $\{(15, 0), (15, -2)\}$

**C)**  $\{(0, 1), (2, 1), (0, 3)\}$

Function? \_\_\_\_\_

Function? \_\_\_\_\_

Function? \_\_\_\_\_

Explain: \_\_\_\_\_

Explain: \_\_\_\_\_

Explain: \_\_\_\_\_

**Practice: Determining if a Relation is a Function**

1) $\{(-1, 8), (0, 15), (1, -4), (2, 0)\}$	2) $\{(-5, 2), (5, 2), (0, -3), (3, -8)\}$	3) $\{(-2, 7), (6, 2), (-2, -3), (0, 9)\}$
4) $\{(7, 2), (4, -6), (2, -2), (4, -9)\}$	5) $\{(2, 3), (2, 4), (2, 5), (2, 6)\}$	6) $\{(1, -4), (2, -4), (3, -4), (4, -4)\}$

**Example 2: Determining if a Relation is a Function**

**Directions:** Determine whether each relation is a function. Explain your answer.

**D)**

x	y
-1	10
-2	13
-3	16

**E)**

x	y
2	0
2	-1
3	-4

**F)**

x	y
33	10
35	8
36	10

Function? \_\_\_\_\_

Function? \_\_\_\_\_

Function? \_\_\_\_\_

Explain: \_\_\_\_\_

Explain: \_\_\_\_\_

Explain: \_\_\_\_\_

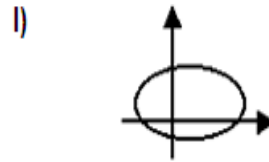
**Practice: Determining if a Relation is a Function**

**Directions:** Determine whether each relation is a function. Explain your answer.

7) <table border="1" style="margin-left: 20px; border-collapse: collapse;"> <thead> <tr> <th style="width: 30px;">x</th> <th style="width: 30px;">y</th> </tr> </thead> <tbody> <tr><td>-2</td><td>1</td></tr> <tr><td>-1</td><td>-1</td></tr> <tr><td>0</td><td>1</td></tr> <tr><td>-1</td><td>-1</td></tr> <tr><td>-2</td><td>1</td></tr> </tbody> </table>	x	y	-2	1	-1	-1	0	1	-1	-1	-2	1	8) <table border="1" style="margin-left: 20px; border-collapse: collapse;"> <thead> <tr> <th style="width: 30px;">x</th> <th style="width: 30px;">y</th> </tr> </thead> <tbody> <tr><td>5</td><td>0</td></tr> <tr><td>2</td><td>-3</td></tr> <tr><td>-6</td><td>1</td></tr> <tr><td>3</td><td>-3</td></tr> <tr><td>0</td><td>4</td></tr> </tbody> </table>	x	y	5	0	2	-3	-6	1	3	-3	0	4	9) <table border="1" style="margin-left: 20px; border-collapse: collapse;"> <thead> <tr> <th style="width: 30px;">x</th> <th style="width: 30px;">y</th> </tr> </thead> <tbody> <tr><td>6</td><td>2</td></tr> <tr><td>1</td><td>-1</td></tr> <tr><td>0</td><td>3</td></tr> <tr><td>-1</td><td>6</td></tr> <tr><td>-6</td><td>-2</td></tr> </tbody> </table>	x	y	6	2	1	-1	0	3	-1	6	-6	-2
x	y																																					
-2	1																																					
-1	-1																																					
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x	y																																					
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1	-1																																					
0	3																																					
-1	6																																					
-6	-2																																					

**Example 3: Determining if a Relation is a Function (Vertical Line Test)**

**Directions:** Determine whether each relation is a function. Explain your answer.



Function? \_\_\_\_\_

Function? \_\_\_\_\_

Function? \_\_\_\_\_

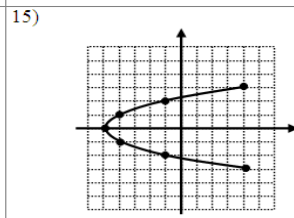
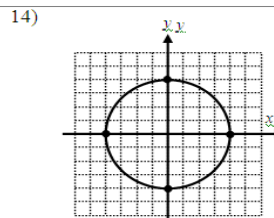
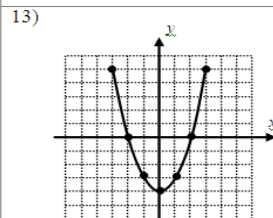
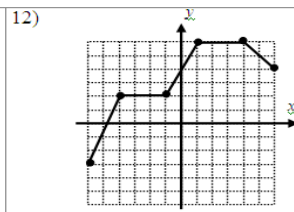
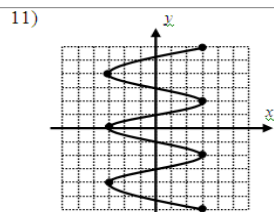
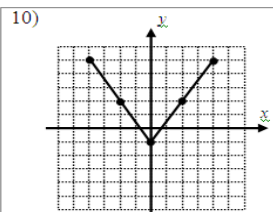
Explain: \_\_\_\_\_

Explain: \_\_\_\_\_

Explain: \_\_\_\_\_

**Practice: Determining if a Relation is a Function (Vertical Line Test)**

**Directions:** Determine whether each relation is a function. Explain your answer.

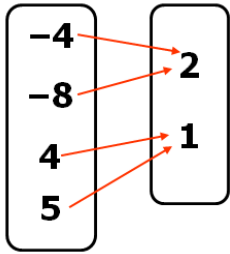


10. Function? Yes or no; _____ the vertical line test
11. Function? Yes or no; _____ the vertical line test
12. Function? Yes or no; _____ the vertical line test
13. Function? Yes or no; _____ the vertical line test
14. Function? Yes or no; _____ the vertical line test
15. Function? Yes or no; _____ the vertical line test

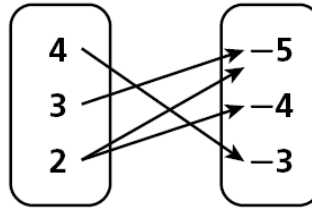
**Example 4: Determining if a Relation is a Function**

**Directions:** Determine whether each relation is a function. Explain your answer.

J)



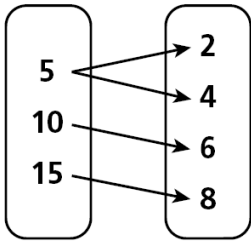
K)



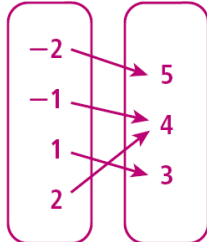
**Practice: Determining if a Relation is a Function**

**Directions:** Determine whether each relation is a function. Explain your answer.

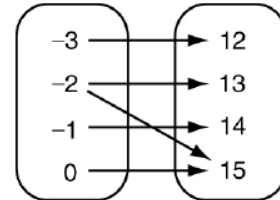
16)



17)



18)



**Challenge Problem:**

What values of  $a$  make the relation  $\{(a, 1), (2, 3), (4, 5)\}$  a function? Explain.

What values of  $b$  make the relation  $\{(5, 6), (7, 8), (9, b)\}$  a function? Explain.

## Summary

### Determining if a Relation is a Function

#### Examples:

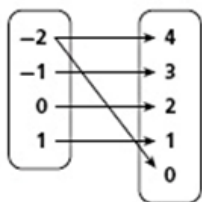
(a) Is  $\{(1, 2), (1, 3)\}$  a function?

No, the relation is not a function.  
An  $x$  value has more than one  $y$  value.

(c) Is  $\{(1, 4), (3, 2), (5, 4)\}$  a function?

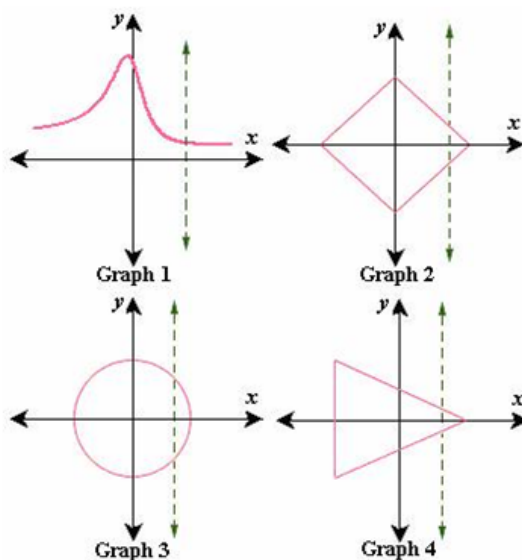
Yes, the relation is a function.  
Each  $x$  value has only one  $y$  value.

(b)



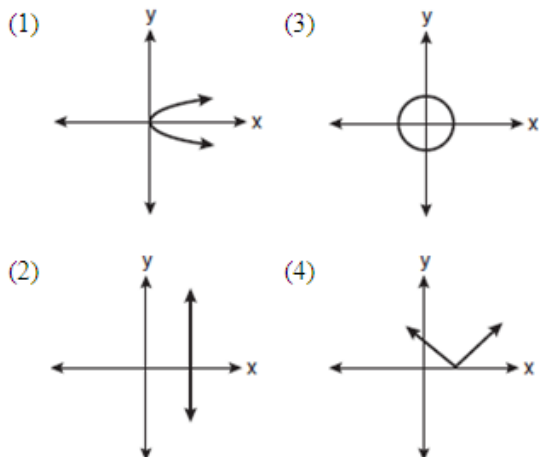
No, the relation is not a function.  
An  $x$  value has more than one  $y$  value.

(d)



### Exit Ticket:

Which graph represents a function?

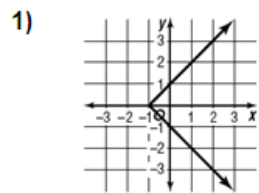


Which relation represents a function?

- (1)  $\{(0, 3), (2, 4), (0, 6)\}$
- (2)  $\{(-7, 5), (-7, 1), (-10, 3), (-4, 3)\}$
- (3)  $\{(2, 0), (6, 2), (6, -2)\}$
- (4)  $\{(-6, 5), (-3, 2), (1, 2), (6, 5)\}$

### Homework 4-2

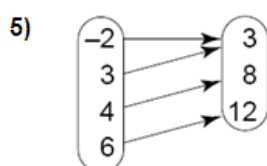
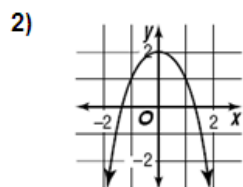
Directions: Tell whether the relation is a function. Explain.



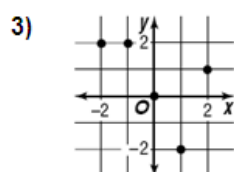
4) 

x	y
1	1
2	1
3	1

7)  $\{(1, 1), (2, 2), (3, 1), (3, 2)\}$



8)  $\{(-6, 5), (-3, 8), (-6, 9)\}$



6) 

x	y
1	3
2	4
3	6

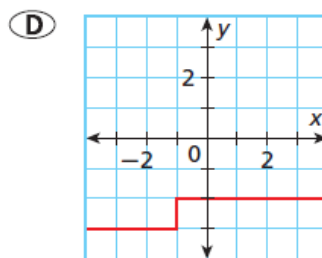
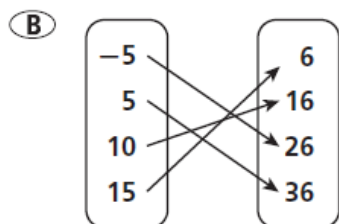
9)  $\{(1, 1), (0, 2), (3, -2)\}$

10) Which of the following relations is NOT a function?

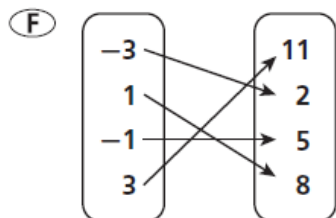
(A)  $\{(6, 2), (-1, 2), (-3, 2), (-5, 2)\}$

(C) 

x	3	5	7
y	1	15	30

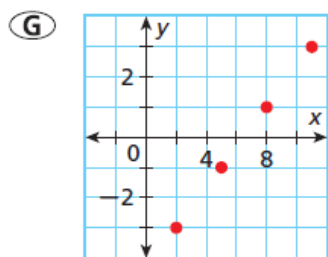


11) Which is NOT a correct way to describe the function  $\{(-3, 2), (1, 8), (-1, 5), (3, 11)\}$ ?



(H) Domain:  $\{-3, 1, -1, 3\}$

Range:  $\{2, 8, 5, 11\}$



(J) 

x	y
-3	2
-1	5
1	8
3	11



## Chapter 4–3 – WRITING FUNCTIONS (Day 3)

- SWBAT:** (1) Model functions using rules, tables, and graphs  
 (2) Write a function rule from a table or real world – situation  
 (3) Evaluate Function

### Warm – Up:

Find the domain and range of each relation.

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

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

2.  $\{(-6, -4), (-3, -1), (1, 2), (2, 4), (3, 7)\}$

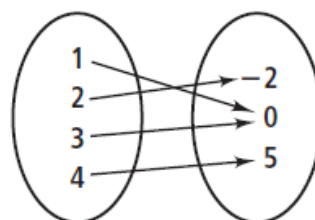
Domain: \_\_\_\_\_

Range: \_\_\_\_\_

Determine whether each relation is a function.

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

4.



**Find Function Values** Equations that are functions can be written in a form called **function notation**. For example, consider  $y = 3x - 8$ .

Equation  
 $y = 3x - 8$

Function Notation  
 $f(x) = 3x - 8$

In a function,  $x$  represents the elements of the domain, and  $f(x)$  represents the elements of the range. Suppose you want to find the value in the range that corresponds to the element 5 in the domain. This is written  $f(5)$  and is read “ $f$  of 5.” The value  $f(5)$  is found by substituting 5 for  $x$  in the equation.

### Example 1:

Evaluate  $f(x) = 4x - 2$  for  $x = 0, 1,$  and  $2$ .

$f(x) = 4x - 2$

$f(0) = 4( ) - 2$

$f(1) = 4( ) - 2$

$f(2) = 4( ) - 2$  ← **Substitute each value for  $x$ .**

$f(0) =$

$f(1) =$

$f(2) =$  ← **Simplify.**

$f(0) =$

$f(1) =$

$f(2) =$

Evaluate each function rule for  $x = -2$ .

a.  $f(x) = 4x$

b.  $f(x) = -2x + 1$

c.  $f(x) = -\frac{3}{2}x + 2$

**Practice:**

If  $g(x) = -x^2 - x + 7$ , find each value.

1.  $g(2)$

2.  $g(-6)$

3.  $g(-3)$

**Example 3: Calculating for the Range**

**Finding the Range** Evaluate the function rule  $f(g) = -2g + 4$  to find the range for the domain  $\{-1, 3, 5\}$ .

$$f(g) = -2g + 4$$

$$f(g) = -2g + 4$$

$$f(g) = -2g + 4$$

$$f(\boxed{\phantom{00}}) = -2(\boxed{\phantom{00}}) + 4$$

$$f(\boxed{\phantom{00}}) = -2(\boxed{\phantom{00}}) + 4$$

$$f(\boxed{\phantom{00}}) = -2(\boxed{\phantom{00}}) + 4$$

$$f(\boxed{\phantom{00}}) = \boxed{\phantom{00}} + 4$$

$$f(\boxed{\phantom{00}}) = \boxed{\phantom{00}} + 4$$

$$f(\boxed{\phantom{00}}) = \boxed{\phantom{00}} + 4$$

$$f(\boxed{\phantom{00}}) = \boxed{\phantom{00}}$$

$$f(\boxed{\phantom{00}}) = \boxed{\phantom{00}}$$

$$f(\boxed{\phantom{00}}) = \boxed{\phantom{00}}$$

The range is  $\{\boxed{\phantom{0000}}\}$ .

## Practice

Find the range of each function, given the domain.

a.  $g(m) = m^2; \{-2, 0, 2\}$

b.  $h(x) = -\frac{1}{3}x - 1; \{-3, 0, 6\}$

---

### Example 4: Writing Functions

An aerobics class is being offered once a week for 6 weeks. The registration fee is \$15 and the cost for each class attended is \$10. Write a function rule to describe the total cost of the class. Find a reasonable domain and range for the function.

rule: \_\_\_\_\_

domain: \_\_\_\_\_

range: \_\_\_\_\_

### Practice:

Giselle is going to rent a scooter for at least one hour. The fee is \$45 plus \$5 for each hour it is rented. Write a function rule to describe the total cost of renting a scooter. Find a reasonable domain and range for the function if Giselle has \$65.

rule: \_\_\_\_\_

domain: \_\_\_\_\_

range: \_\_\_\_\_

## Challenge

If  $f(3b - 1) = 9b - 1$ , find one possible expression for  $f(x)$ .

## Summary:

After identifying the independent and dependent variables, you can write a rule in function notation. Remember that  $f(x)$  is the **dependent variable** and  $x$  is the **independent variable**.

**Identify the dependent and independent variables. Write a function rule for each situation.**

A zoo charges \$6 for parking and \$17.50 for each child.

1. *Identify the dependent and independent variables.*

The **cost of admission** depends on the **number of children**.

Dependent  $f(x)$ : cost of admission                      Independent  $x$ : number of children

2. *Write the equation in words.*

The cost of admission is \$17.50 multiplied by the number of children plus \$6 for parking.

3. *Write the function using cost of admission =  $f(x)$  and number of children =  $x$ .*

$$f(x) = \$17.50x + \$6.00$$

**Evaluate the function above when  $x = 4$  and  $x = 10$ .**

$$x = 4$$

$$f(x) = \$17.50x + \$6.00$$

$$f(4) = \$17.50(4) + \$6.00$$

$$= \$70.00 + \$6.00$$

$$= \$76.00$$

$$x = 10$$

$$f(x) = \$17.50x + \$6.00$$

$$f(10) = \$17.50(10) + \$6.00$$

$$= \$175.00 + \$6.00$$

$$= \$181.00$$

---

## Exit Ticket:

Marsha buys  $x$  pens at \$0.70 per pen and one pencil for \$0.10. Which function gives the total amount Marsha spends?

(A)  $c(x) = 0.70x + 0.10x$

(C)  $c(x) = (0.70 + 0.10)x$

(B)  $c(x) = 0.70x + 1$

(D)  $c(x) = 0.70x + 0.10$

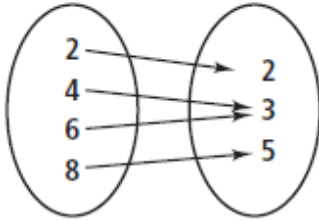
**Homework - Chapter 4-3 (Day 3)**

Determine whether each of the following relations is a function.

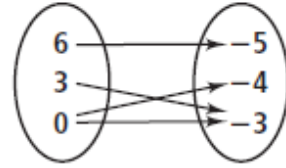
1.  $\left\{(-1, 0), (1, 1), (3, 2), \left(4, 2\frac{1}{2}\right)\right\}$

2.  $\{(2, 2), (3, 3), (6, 5), (3, 1)\}$

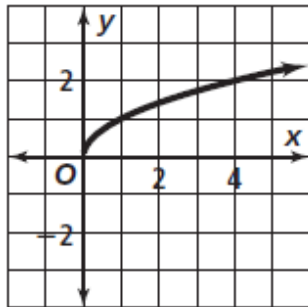
3.



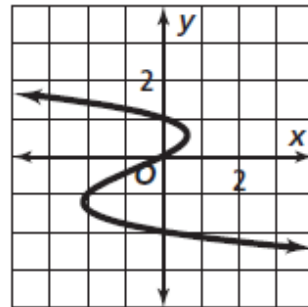
4.



5.



6.



Evaluate each function rule for  $x = 2$ .

7.  $f(x) = 3x - 4$

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

Find the range of each function for the given domain.

9.  $f(x) = -2x + 1; \{3, -1, 0, 1\}$

10.  $f(x) = x^2 + x; \{-1, 0, 2\}$

11.  $h(x) = -x^2; \{-2, -1, 3\}$

12.  $g(x) = -\frac{1}{2}|x| + 1; \{-2, -1, 1\}$

13. A tanning salon charges a one-time maintenance fee of \$12 plus \$4 for each tanning visit. Write a function to describe the situation. Find a reasonable domain and range for the function for up to 6 visits.

**Chapter 4-4 – WRITING and GRAPHING FUNCTIONS (Day 4)**

- SWBAT:** (1) Write a function rule from a table  
 (2) Graph functions given a limited domain

**Warm – Up:** Find the range of each function for the given domain.

$$f(x) = x^2 + x - 2; \{-2, 0, 1\}$$

**Example 1:** Determine a relationship between the  $x$ - and  $y$ -values. Write an equation.

**Example**

- ① **Writing a Rule from a Table** Write a function rule for the table.

$x$	$y$
1	2
2	5
3	10
4	17

Ask yourself, “What can I do to 1 to get 2, 2 to get 5, ...?” You multiply each  $x$ -value times  and add  to get the  $y$ -value.

**Relate**   $y$  equals   $x$  times itself plus  1

**Write**  =  +

A rule for the function is .

**Quick Check**

1. Write a function rule for each table.

a.

$x$	$f(x)$
1	-1
2	0
3	1
4	2

b.

$x$	$y$
1	2
2	4
3	6
4	8

c.

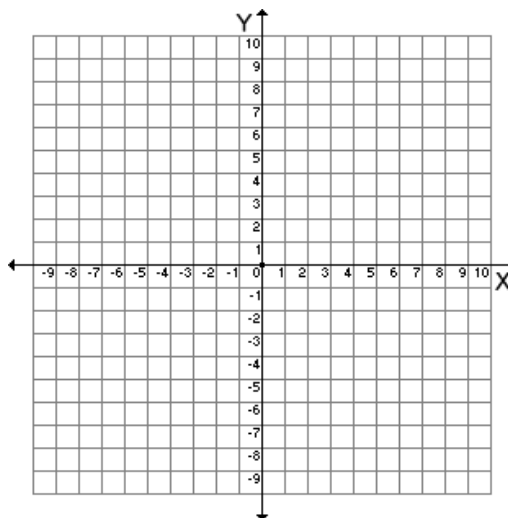
$x$	$y$
1	3
2	4
3	5
4	6

### Example 2: Graphing Solutions Given a Domain

Graph each function for the given domain.

1)  $F(x) = \frac{1}{2}x - 3$ ;  $D:\{-4, -2, 0, 2, 4\}$

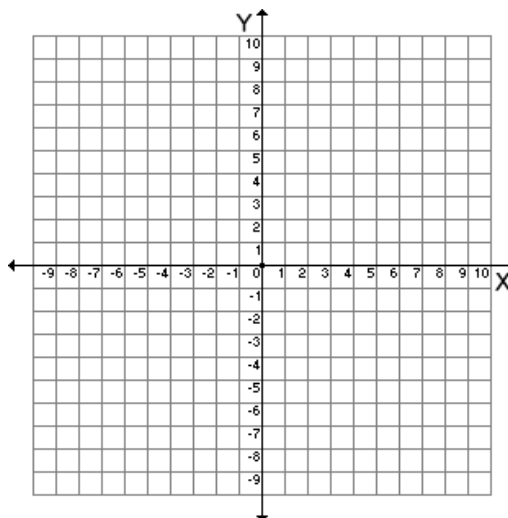
x		(x, y)



What type of function is this? \_\_\_\_\_

2)  $F(x) = |x + 3|$ ;  $D:\{-2, -1, 0, 1, 2\}$

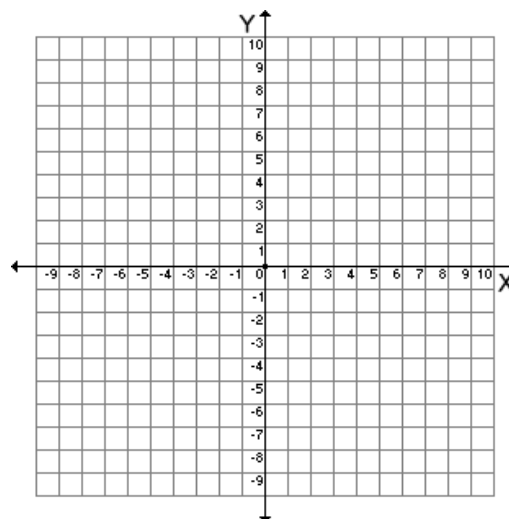
x		(x, y)



What type of function is this? \_\_\_\_\_

3)  $F(x) = x^2 + 2$ ;  $D:\{-2, -1, 0, 1, 2\}$

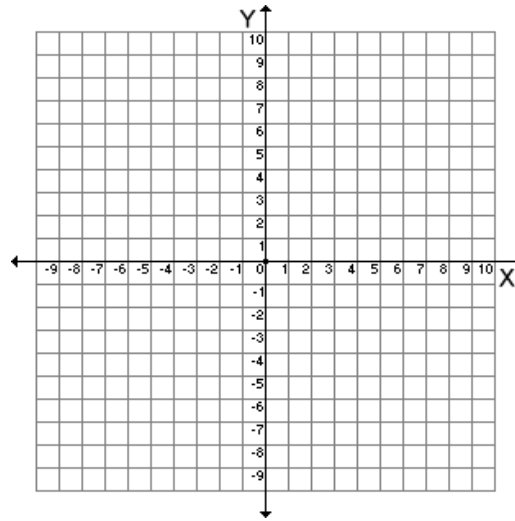
x		(x, y)



What type of function is this? \_\_\_\_\_

4)  $F(x) = 2^x - 1$       $D: \{-1, 0, 1, 2, 3\}$

x		(x, y)



What type of function is this? \_\_\_\_\_

**Practice**

Identify each of the following functions as one of the following:  
linear, quadratic, absolute value or exponential.

$y = -13x^2 + 2$      \_\_\_\_\_

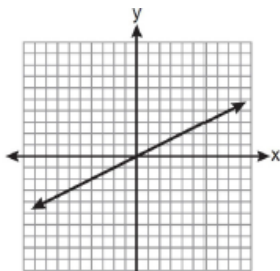
$y = 3^x$      \_\_\_\_\_

$y = 7x - 3$      \_\_\_\_\_

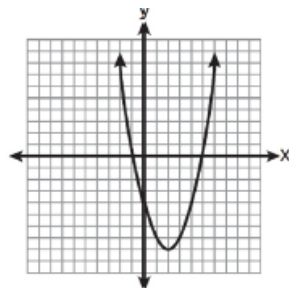
$y = |x + 4|$      \_\_\_\_\_

**Practice**

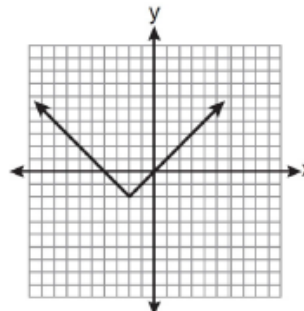
Identify each of the following functions as one of the following:  
linear, quadratic, absolute value or exponential.



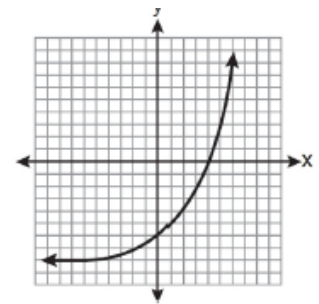
\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



**Example 3: Identifying Points on a Line**

- a) Is the point (2, 5) on the graph of the linear equation  $2x + 1 = y$ ?
- b) Find the value of  $x$  so that  $(x, 7)$  satisfies  $y = 4x - 5$ .


**Practice:**

- c) Find the value of  $y$  so that  $(-4, y)$  satisfies  $y = \frac{1}{2}x + 3$ .

- d) Is the point (1, 3) on the graph of the linear equation  $x - 2y = 7$ ?

**Challenge Problem:**

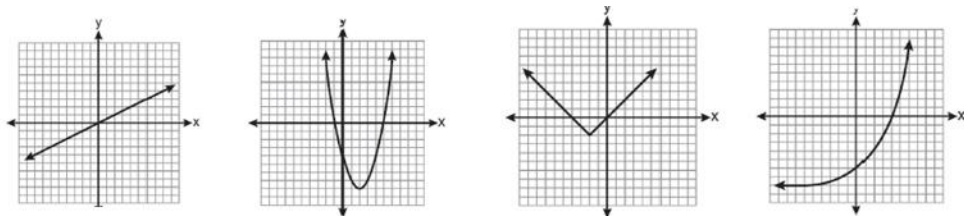
1. Use this table to find  $f(g(x))$  for each  $x$ -value.



$x$	$g(x) = -2x$	$g(x)$	$f(x) = x^2 - 4$	$f(g(x))$
-2	$g(-2) = -2(-2) = 4$	4	$f(4) = 4^2 - 4 = 16 - 4 = 12$	12
-1				
0				
1				
2				

## Summary:

### Identifying Types of Functions



Linear

Quadratic Absolute Value Exponential

### Writing Function Rules from Tables

$x$	$f(x)$
1	3
2	4
3	5

← **Add 2** or multiply by 3.

← **Add 2** or multiply by 2.

← **Add 2**.

$$f(x) = x + 2.$$

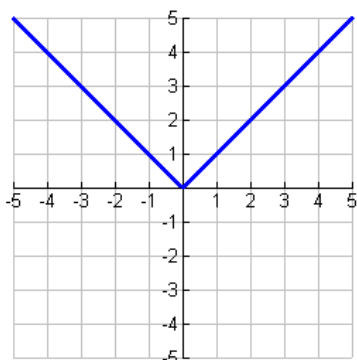
$x$	$y$
-2	2
-1	-1
0	-4
1	-7
2	-10

+1 → -3  
+1 → -3  
+1 → -3  
+1 → -3

For  $y = -3x - 4$ ,  
a constant change of +1 in  
 $x$  corresponds to a constant  
change of -3 in  $y$ .

### Exit Ticket

1.



What type of function is graphed at the left?

**Choose:**

- quadratic
- absolute value
- linear
- exponential



2. Write a function rule based on the following table. \_\_\_\_\_

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

## Homework – Writing and Graphing Functions – Day 4

Write a function rule for each table.

1. 

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

2. 

$x$	$f(x)$
0	0
1	3
3	9
5	15

3. 

$x$	$f(x)$
5	0
10	5
15	10
20	15

Write a function rule for each table.

6. 

$x$	$f(x)$
-4	-2
-2	-1
6	3
8	4

7. 

$x$	$f(x)$
-3	9
0	0
1	1
5	25

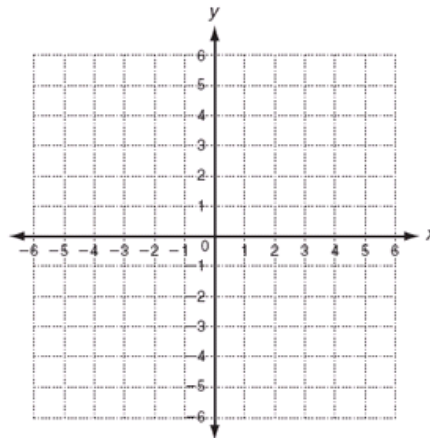
8. 

$x$	$y$
-4	14
-3	11
-2	8
-1	5

Graph the function for the given domain.

9.  $y = x + 2$ ; D:  $\{-2, -1, 0, 1, 2\}$

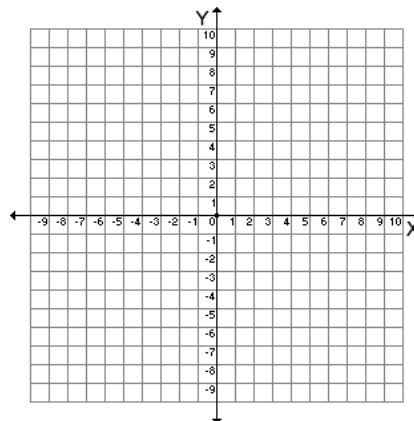
$x$	$y = x + 2$	$(x, y)$



What type of function is this? \_\_\_\_\_

10.  $y = |x| - 1$ ; D:  $\{-1, 0, 1, 2, 3\}$

$x$		$(x, y)$

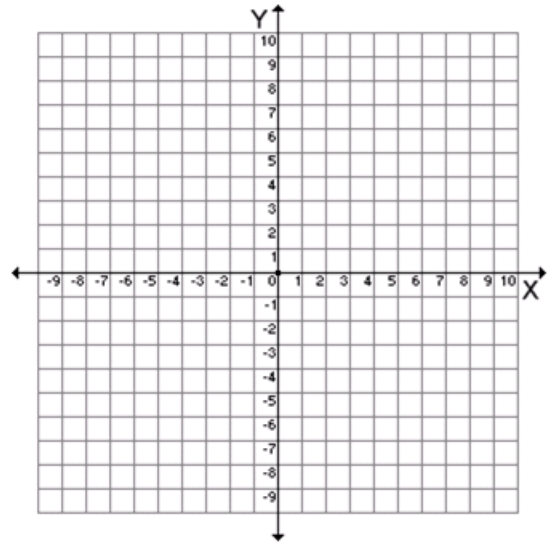


What type of function is this? \_\_\_\_\_

Graph each function for the given domain.

11.  $G(x) = x^2 - 2x - 8$ ;  $D: \{-1, 0, 1, 2, 3\}$

x		(x, y)



What type of function is this? \_\_\_\_\_

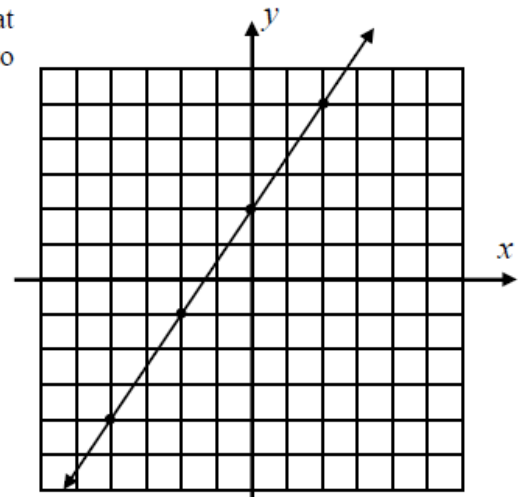
12) Is the ordered pair  $(-8, 1)$  a solution to the equation  $y = \frac{1}{2}x - 3$ ? Justify.

13) Given the equation  $y = \frac{1}{2}x - 3$ , find the value of  $b$  given the fact that the point  $(0, b)$  satisfies the equation.

14) *Exercise #9* The graph of the equation  $2y - 3x = 4$  is shown at the right. Which of the following ordered pairs is *not* a solution to this equation? Explain your choice.

- (1)  $(-2, -1)$
- (2)  $(0, 2)$
- (3)  $(-3, 4)$
- (4)  $(2, 5)$

Explanation:



# Day 5 - Review of Relationships & Functions

## I) Multiple Representations of Relations

In the scoring of some track meets, for 1<sup>st</sup> place you get 5 points, for 2<sup>nd</sup> place you get 3 points, for 3<sup>rd</sup> place you get 2 points and for 4<sup>th</sup> place you get 1 point.

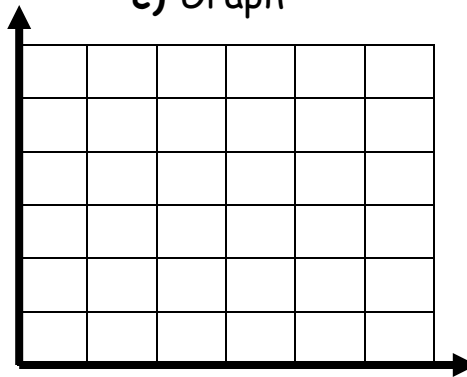
1. Express the RELATION above as a ...

a) Set of ordered pairs: \_\_\_\_\_

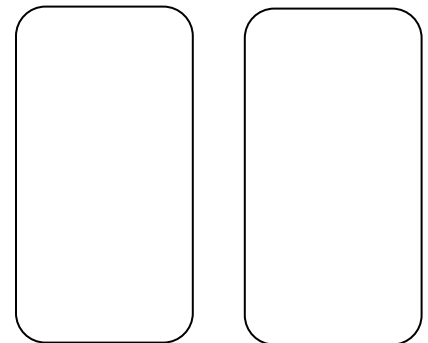
b) Table of values

Track Scoring	
Place	Points

c) Graph

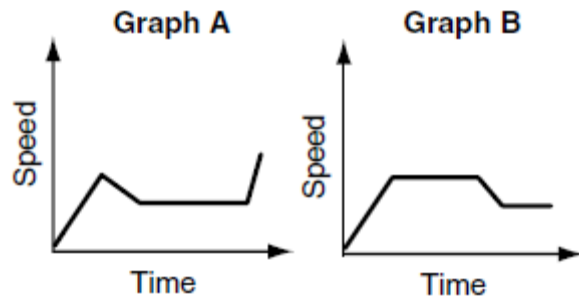


d) Mapping

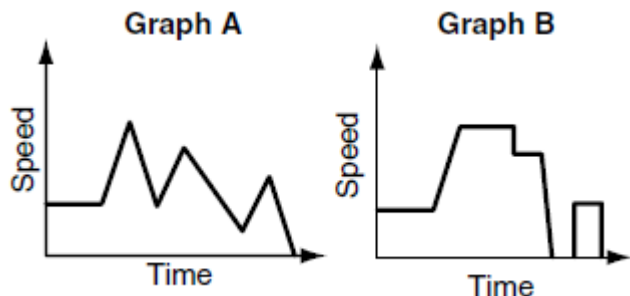


## 2. Analyzing Graphs

A runner in a race ran quickly for the first few minutes, slowed down some and ran a steady pace for most of the race, and then ran as fast as he could at the very end. Choose the graph that best represents this situation.



A man walks to the train station, takes a train into the city, takes a taxi, waits on a bench, and then walks home. Choose the graph that best represents this situation.



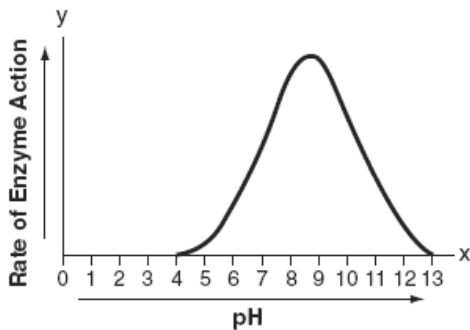
## II) Domain and Range

3. The accompanying graph shows the heart rate, in beats per minute, of a jogger during a 4-minute interval.



What is the range of the jogger's heart rate during this interval?

4. The effect of pH on the action of a certain enzyme is shown on the accompanying graph.



What is the domain of this function?

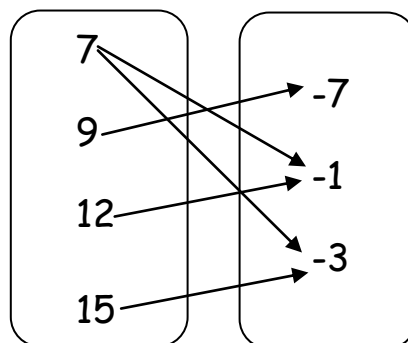
## III) Identifying Functions

Give the **DOMAIN** and **RANGE** of each relation. Tell whether the relation is a **FUNCTION**

5)

Field Trip	
Students (x)	Buses (y)
75	2
68	2
125	3

6)



7)

$\{(1, 4), (2, 6), (1, 10), (6, 0)\}$

D: \_\_\_\_\_

R: \_\_\_\_\_

Function? \_\_\_\_\_

D: \_\_\_\_\_

R: \_\_\_\_\_

Function? \_\_\_\_\_

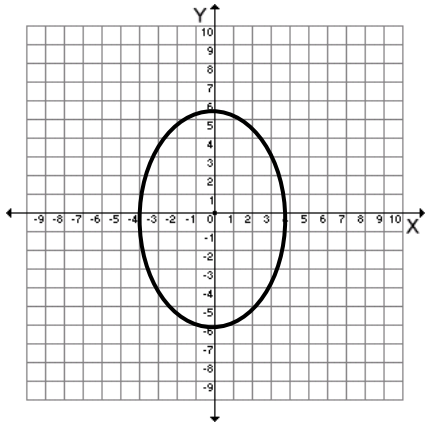
D: \_\_\_\_\_

R: \_\_\_\_\_

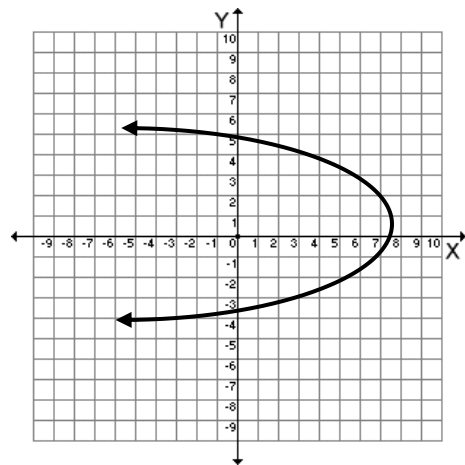
Function? \_\_\_\_\_

#### IV) VERTICAL LINE TEST: Tell whether the relation is a **FUNCTION**

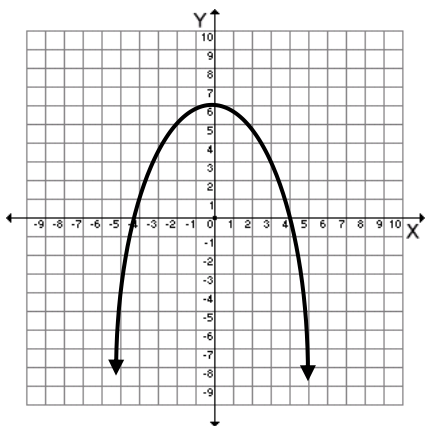
8)



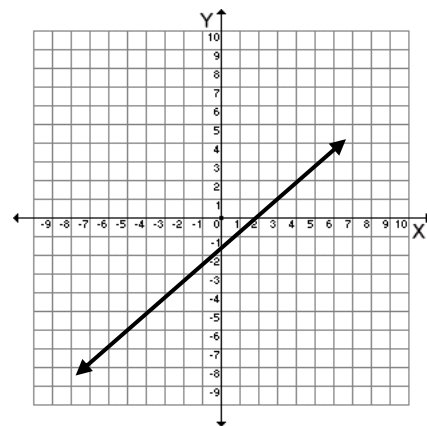
9)



10)



11)



#### V) Functional Notation

12) Evaluate  $f(x) = 3x + 2$  for  $f(-3)$

13) Find  $f(7)$  for  $f(x) = x^2 - 10$ .

14) Find the range of each function when the domain is  $\{-4, -1, 0, 3\}$ .

$$y = \frac{1}{2}x + 8$$

## VI) Writing Functions

Write a rule in function notation for each situation.

15) A buffet charges \$8.95 per person.

Function : \_\_\_\_\_

16) A moving company charges \$130 for weekly truck rental plus \$1.50 per mile.

Function : \_\_\_\_\_

17) Write a function to describe the situation. Find a reasonable domain and range for the function.

A theater can be rented for different hours. The cost is a \$100 deposit plus \$200 per hour.

Function : \_\_\_\_\_

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

The tables below show two relationships. What equation represents the relationship between  $x$  and  $y$  or  $w$  and  $b$ ?

18.

$x$	$y$
2	8
4	10
6	12
8	14
10	16

19.

$x$	$y$
2	1
3	3
5	7
7	11

20.

Week ( $w$ )	Balance ( $b$ )
1	\$10
2	\$24
3	\$38
4	\$52
5	\$66
6	\$80

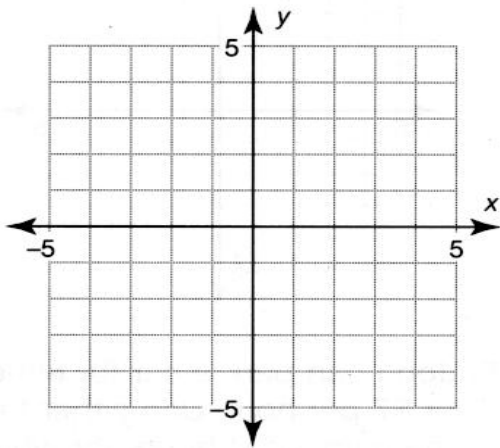


## VI) Graphing Functions

Graph each function using the Domain:  $\{-2, -1, 0, 1, 2\}$ . Identify each function.

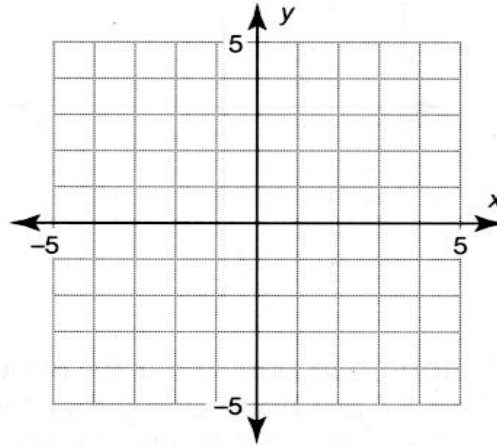
21.  $y = x^2 - 4$

x		(x, y)



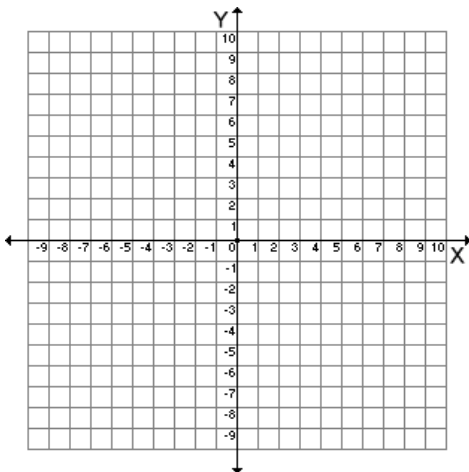
22.  $y = |x - 1|$

x		(x, y)



23.  $y = 3^x - 1$

x		(x, y)



24.  $y = 2 - x$

x		(x, y)

