

## NOTES: Section 2.1 - Represent Relations and Functions

Goals: #1 - I can determine whether a relation is a function.

#2 - I can state the domain and range of a relation.

#3 - I can determine whether a function is linear and evaluate functions for given inputs.

#4 - I can graph a linear function.



*Homework: Lesson 2.1 Worksheet*

**Exploration #1: Work with a partner.**

1. What do you know about a *relation*?

2. What do you know about a *function*?

**Notes:**

A relation is a mapping, or pairing, of two or more variables.

**Examples:**

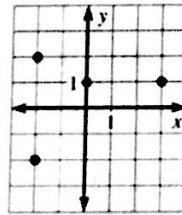
**Ordered Pairs**

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

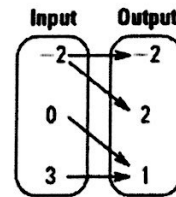
**Table**

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

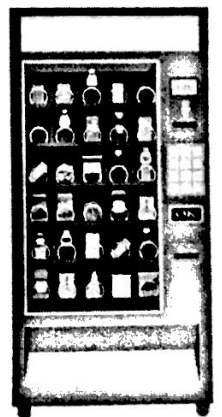
**Graph**



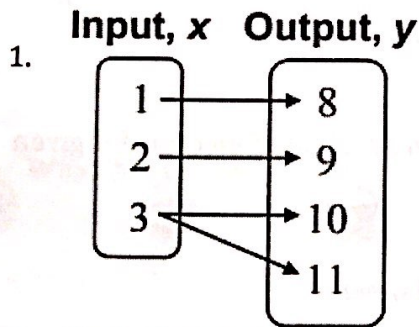
**Mapping Diagram**



A function is a relation where each input gives exactly 1 output.

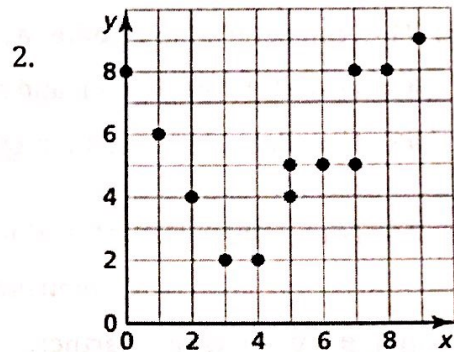


Example #1: Determine whether each relation represents a function. Explain your reasoning.



No, the input 3 has two different outputs (10 & 11)

D:  $\{1, 2, 3\}$     R:  $\{8, 9, 10, 11\}$



No, the inputs 5 : 7 have more than one output

D:  $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$     R:  $\{2, 4, 5, 6, 8, 9\}$

3.  $(-2, 0), (-1, 0), (0, 1), (1, 2), (2, 2)$

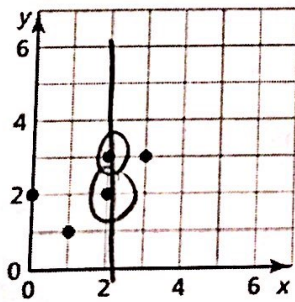
Yes, every input has exactly one output

D:  $\{-2, -1, 0, 1, 2\}$     R:  $\{0, 1, 2\}$

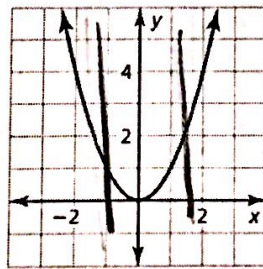
Notes:

We can use the vertical line test to determine if a graph is a function.

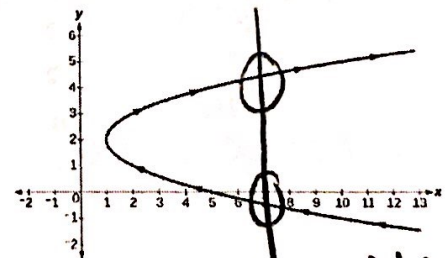
Examples:



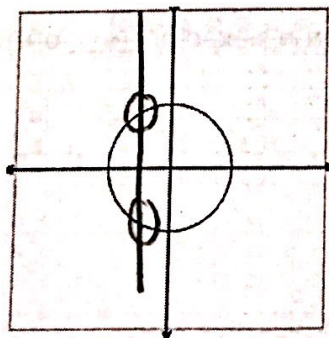
NO



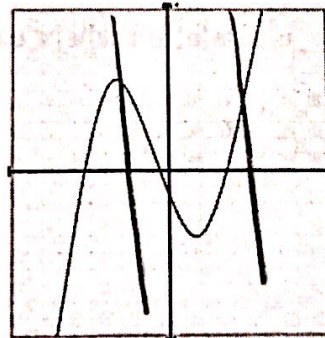
YES



NO



NO



YES

Name: \_\_\_\_\_ Hour: \_\_\_\_\_ Date: \_\_\_\_\_

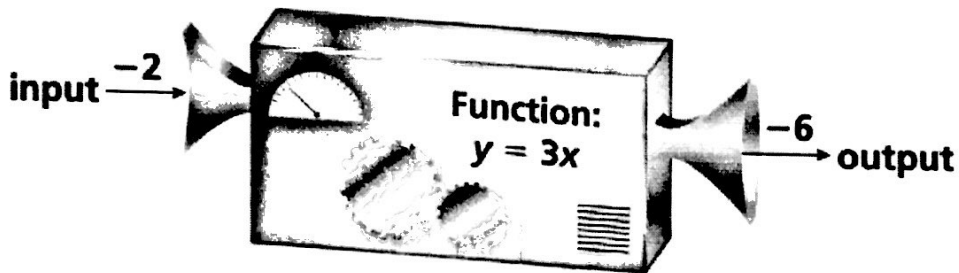
**Exploration #2: Work with a partner.**

1. What do you know about the *domain* of a function?
2. What do you know about the *range* of a function?

Notes:

The domain of a function is the set of all possible input values.

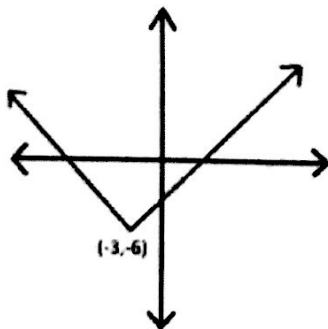
The range of a function is the set of all possible output values.



**Example #2:** Identify the domain and range for each relation in Example #1.

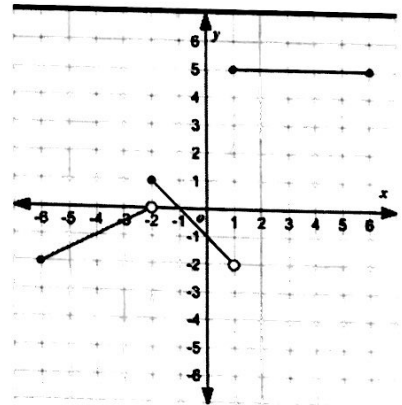
**CHALLENGE:** Identify the domain and range for the following.

1.



D:  $(-\infty, \infty)$  R:  $[-6, \infty)$

2.



D:  $[-6, 6]$  R:  $[-2, 1] \cup \{5\}$

Exploration #3: Work with a partner.

1. What are some characteristics of a linear function?

Notes: A linear function is a function that can be written in the form:

$$y = mx + b$$

$\leftarrow$  independent variable      slope       $\rightarrow$  dependent variable  
 $\rightarrow$  y-intercept

Example #3: Tell whether the function is linear. Then evaluate the function for the given value of x.

1.  $f(x) = 6x + 10; f(-3)$

Yes, linear

$$f(-3) = 6(-3) + 10$$

$$= -18 + 10$$

$$= \boxed{-8}$$

2.  $f(x) = 2x^2 + 4x - 1; f(-1)$

NO, not linear

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

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

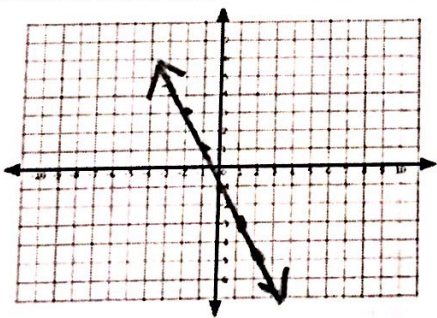
$$= 2 - 4 - 1$$

$$= \boxed{-3}$$

Example #4: Graph the following equations by using a table of values.

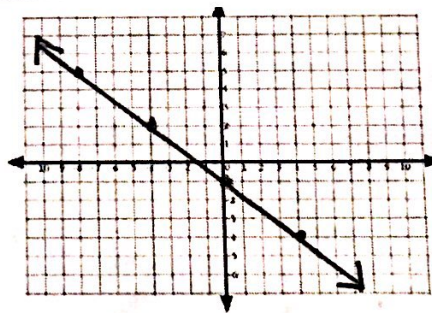
1.  $y = -2x - 1$

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



2.  $y = -\frac{3}{4}x - 1$

x	-8	-4	0	4	8
y	5	2	-1	-4	-7

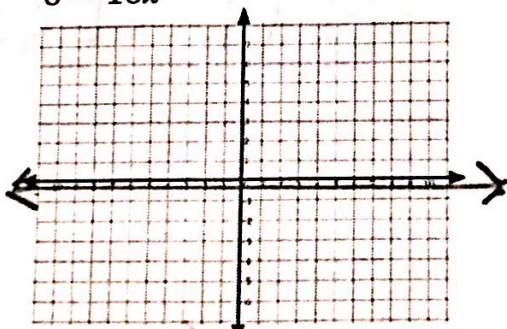


CHALLENGE: Graph the following equations using any method.

1.  $-8 = 16x$

$-8 = 16x$

$-\frac{1}{2} = x$



2.  $3x + 9y = 6$

$9y = -3x + 6$

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

