

# Relations and Functions



CH. 2

# Warm-Up



1. Evaluate the expression for the given set of values of  $x$ .  
 $2x + 3 \quad \{-2, -1, 0, 1, 2\}$
2. Plot the following set of ordered pairs on the coordinate plane.  
 $(-2, -1) (-1, 1) (0, 3) (1, 5) (2, 7)$
3. Evaluate the following expressions
  - a.  $-(4)^2 + 3(4) - 5$
  - b.  $5(-3)^2 - 6(-3) + 4$
  - c.  $7(3)^2 - 4(3) - 37$

# Relations



- Relations: A relation between two variables  $x$  and  $y$  is the set of ordered pairs.
- Domain: The  $x$ -values are the inputs or the domain.
- Range: The  $y$ -values are the outputs or the range.

# Functions



A relation between  $x$  and  $y$  is a **function** of  $x$  if each value of  $x$  corresponds to *exactly* one value of  $y$ .

(The  $x$ 's cannot repeat)

# Four Ways to Represent a Relation/Function



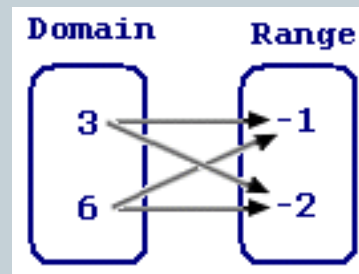
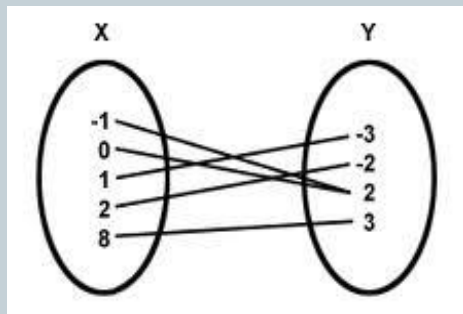
## 1. Ordered Pairs

$\{(1,2) (2,3) (4,3) (5,6)\}$

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

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

## 2. Mapping Diagrams





### 3. Table of Values

x	y
-3	-5
2	5
4	9

x	y
4	2
4	-2
9	3
9	-3

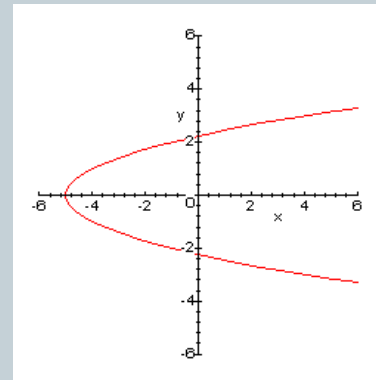
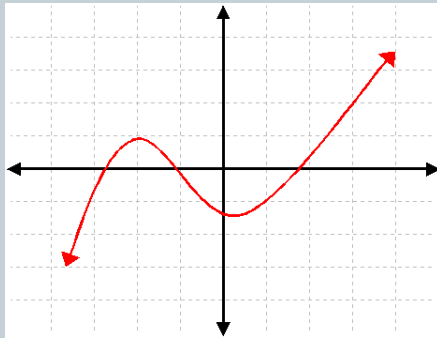
### 4. Graphs/Equations

We will use the vertical line test to determine if a graph is a function or not. (See next slide)

# Vertical Line Test



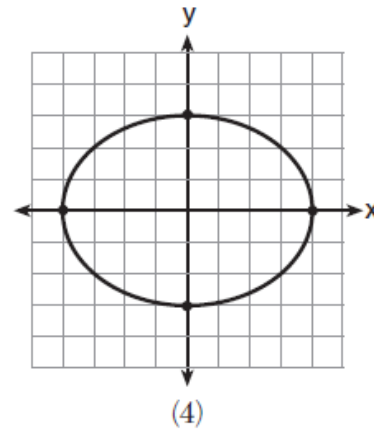
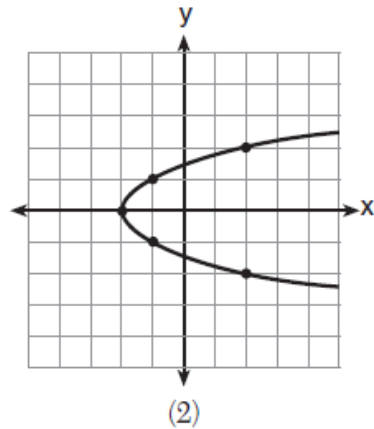
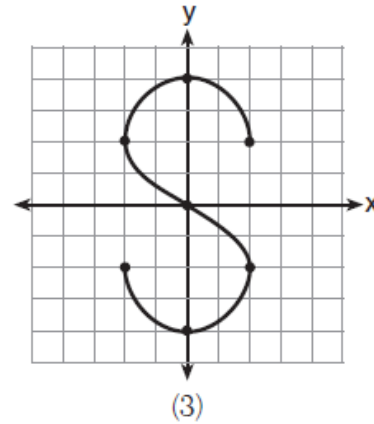
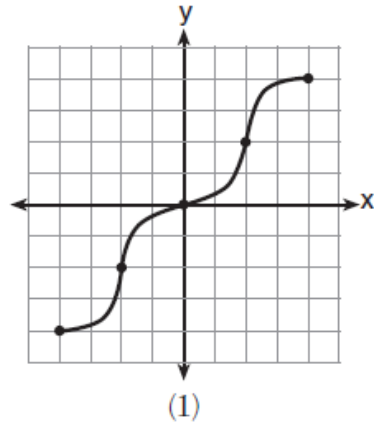
If no vertical line intersects a given graph in more than one point, then the graph is the graph of a function.



# Function or Relation?



9 Which graph represents a function?





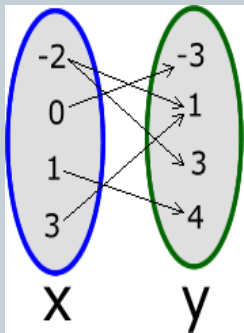
# You Try!!



For each of the following state whether it is a function or not. Also, state its domain and range.

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

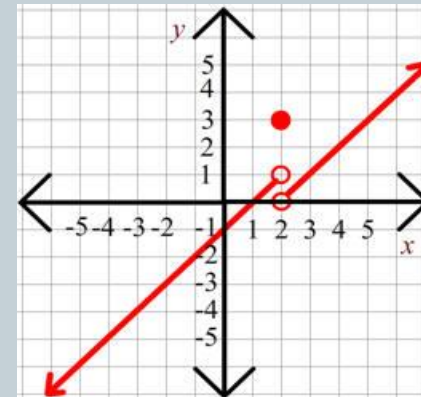
2.



3.

x	y
-2	2
-1	1
1	1
2	2

4.



# Function Notation



Equations of functions can be written in function notation. Shown below are equations of functions and there equivalent in function notation.

$$y = 2x + 3$$

$$f(x) = 2x + 3$$

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

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

$$y = 3x^4 - 7$$

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

# Function Notation



Evaluate the following functions.

1.  $f(x) = 2x + 3$ , find  $f(3)$

2.  $g(x) = 2x^2 - 4x - 4$ , find  $g(-4)$

3.  $h(x) = -3x^2 + 8x + 12$ , find  $h(2)$