Coordinate Algebra

3.1a Representing Relations and Functions

NOTES

- **Vocabulary:**
  - *Relation* – a pairing between two sets of numbers (inputs & outputs)
  - *Domain* – set of all possible values of the first variable (x) of the function
  - *Range* – a set of all possible values of the second variable (y) of the function
  - *Function* – a pairing between two sets of numbers such that each value of the first set is paired with exactly one value of the second set

- **Example:** **Representing Relations:** **RELATIONS ARE REPRESENTED IN SEVERAL WAYS**

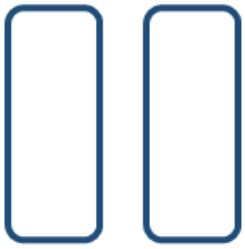
1. A relation is given below. Write the relation numerically using a table and mapping diagram. Then, represent the relation as a graph.

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

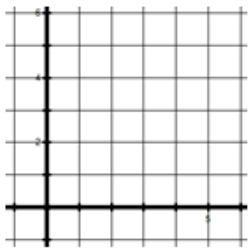
TABLE

x	y

MAPPING DIAGRAM



GRAPH



What is a function?

- **HOW DO YOU DETERMINE WHETHER A RELATION IS A FUNCTION?**
  - *Numerically:* look to verify that each input (x-value) has one and only one output
  - *Graphically:* Vertical Line Test (no vertical line can pass through your graph more than once

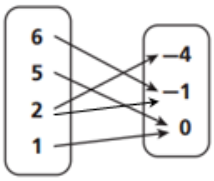
- **Examples:** Determine whether each relation is a function.

2. $\{(4,12),(5,18),(7,12),(8,19)\}$

3.

x	3	4	7	3	10
y	5	6	-8	0	7

4.



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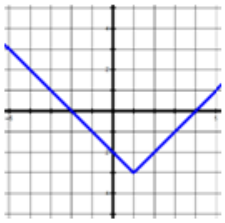

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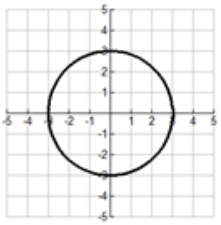
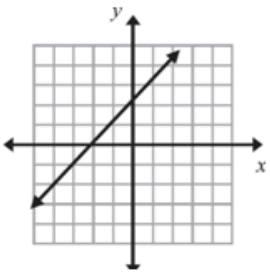


- **Examples:** Find the domain and range of each relation.

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

8.



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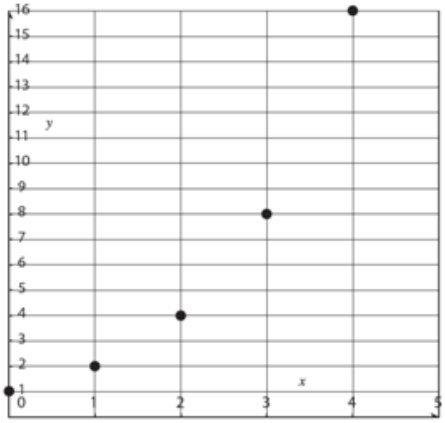

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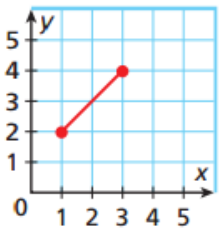

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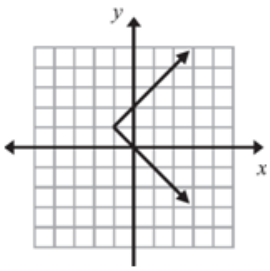


- **FUNCTION NOTATION:** a fancy way of writing *y*...

$y = 3x + 4 \longrightarrow f(x) = 3x + 4$ we read: "*f* of *x*"

We could also use... $g(x)$, $j(x)$, $h(x)$, $k(x)$, etc.

- **Example:** Evaluating functions.

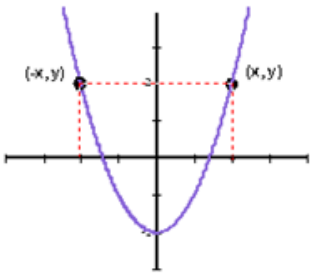
12. $f(x) = 2x + 5$

x	$2(x) + 5$	$f(x)$
2		
3		
-1		

13. Use $g(x) = 4x - 1$ to find $g(-2)$ and $g(0)$.

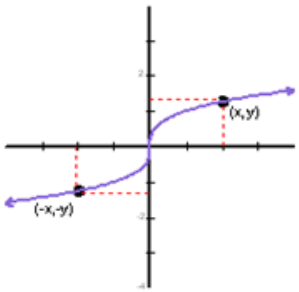
14. For the function $g(x) = \frac{1}{3}x - 2$, find the value of *x* so that $g(x) = 4$ and $g(x) = -4$.

- **Even, Odd, or Neither?**



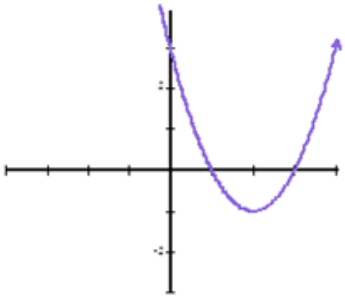
Symmetric to x-axis

EVEN



Symmetric to origin

ODD



Symmetric to x = 2

NEITHER

- **Test for EVEN and ODD Functions:**

A function value f is ***EVEN*** if, for each x in the domain of f, $f(-x) = f(x)$.

A function value f is ***ODD*** if, for each x in the domain of f, $f(-x) = -f(x)$.