Math 8
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Unit 4 –Functions

Date: _____

Functions and Relations

Terms to Know:

- Relation: Any set of input that has an output.
- Function: A relation such that every single input has exactly one output.

The notation of a function is important in higher mathematics such as calculus and in areas which use mathematics such as physics.

domain: set of all input values (x coordinates)
range: set of all output values (y coordinates)

Here are a few examples:

- Input the number of seconds after the starting gun in a race to get an output of the number of meters the runner has covered.

Race Chart

Number of Seconds (input)	1	4	7	8
Meters Covered (output)	5	20	35	40

D: {1, 4, 7, 8} R: {5, 20, 35, 40}

- $y = x - 6$, where x is the place holder (also called a variable) for the input and y is the place holder for the output.

Function: $y = x - 6$

x (input)	-3	0	7	8
y (output)	-9	-6	1	2

D {-3, 0, 7, 8} R: {-9, -6, 1, 2}

- The rule about only **one output** each time is crucial and must not be violated.

Not a Function

input	3	2	0	3
output	4	-1	2	-3

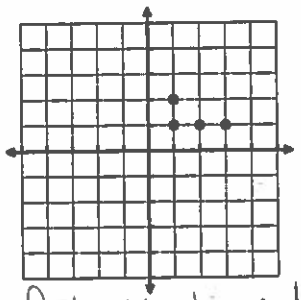
Why is this not a function? input value of 3 was assigned two different outputs

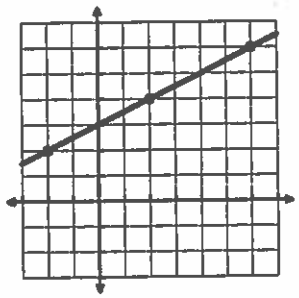
How do I determine if a relation is a function?

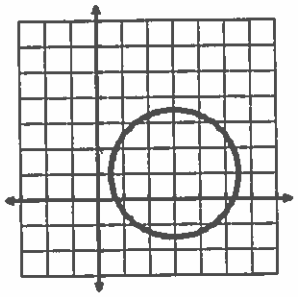
- Each input must have exactly one output.
- Look at the graph....The vertical line test: **No** vertical line can pass through two or more ~~points~~ points on the graph.

Examples: Are these relations functions?

1. {(3,2),(4,3),(5,4),(6,5)} yes each input has exactly one output

2. 
no - fails vertical line test

3. 
yes - passes the vertical line test

4. 

Function Notation:

- Function notation is a way to name a function. It is pronounced "f of x".
- f(x) is a fancy way of writing "y" in an equation.
  - Example: f(x) = 2x + 4 is the same as y = 2x + 4

Function Notation	x-y Notation
$f(x) = 5x + 2$	$y = 5x + 2$
$f(x) = -3x - 7$	$y = -3x - 7$

Evaluation Functions:

- Evaluate $f(x) = x^2 - 2x + 3$, when $x = -3$ and $x = 4$.

$f(-3) = (-3)^2 - 2(-3) + 3$
$= 9 + 6 + 3$
$= 18$

$f(4) = (4)^2 - 2(4) + 3$
$= 16 - 8 + 3$
$= 11$