Name: Key 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 and only one output.

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 on the graph.

You try these: Are these relations functions?

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

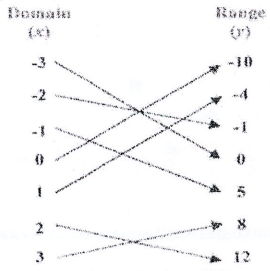
Yes. No x-values repeat

2.

input	8	2	0	2
output	-2	-1	0	1

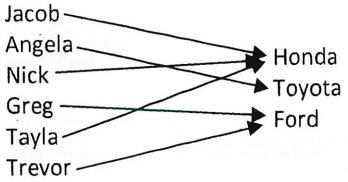
No. The input repeats and the output doesn't.

3.



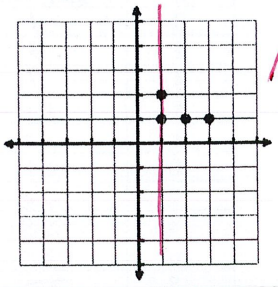
Yes. No domain values repeat.

4.



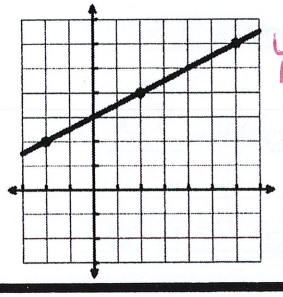
Yes. No domain values repeat

5.



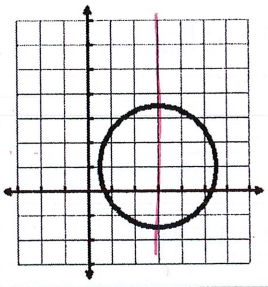
No

6.



Yes

7.



No

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

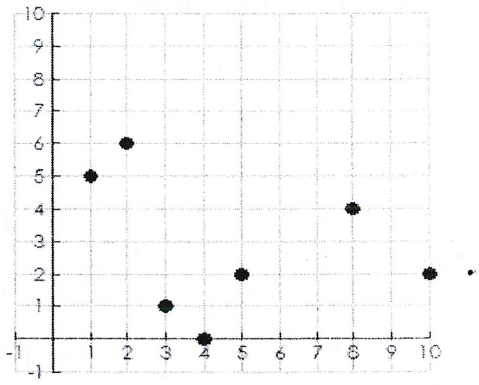
Evaluating Functions:

8. Given $f(x) = 2x + 3$, find $f(-2)$ $f(-2) = 2(-2) + 3$ $= -4 + 3$ $= -1$ $(-2, -1)$	9. Given $f(x) = 32(2)^x$, find $f(3)$ $f(3) = 32(2)^3$ $= 32(8)$ $= 256$ $(3, 256)$	10. Given $f(x) = x^2 - 2x + 3$, find $f(-3)$ $f(-3) = (-3)^2 - 2(-3) + 3$ $= 9 + 6 + 3$ $= 18$ $(-3, 18)$	11. Given $f(x) = 3^x + 1$, find $f(3)$ $f(3) = 3^3 + 1$ $f(3) = 27 + 1$ $= 28$ $(3, 28)$
8. Given $f(x) = -5x + 1$, find $f(-3)$ $f(-3) = -5(-3) + 1$ $= 15 + 1$ $= 16$ $(-3, 16)$	9. Given $f(x) = 7(4)^x$, find $f(2)$ $f(2) = 7(4)^2$ $= 7(16)$ $= 112$ $(2, 112)$	10. Given $f(x) = x^2 + 5x - 6$, find $f(-2)$ $f(-2) = (-2)^2 + 5(-2) - 6$ $= 4 - 10 - 6$ $= -12$ $(-2, -12)$	11. Given $f(x) = 3^{x-2}$, find $f(4)$ $f(4) = 3^{(4)-2}$ $= 3^2$ $= 9$ $(4, 9)$

Find the indicated values by using the graph.

1. $h(2) =$ 6
2. $h(4) =$ 0
3. $h(1) =$ 5
4. $h(5) =$ 2
5. $h($ 8 $) = 4$
6. $h($ 3 $) = 1$
7. *What are the values for* $h($_____$) = 2$?

h(5) and h(10)



Find the indicated values by using the table.

8. $g(10) =$ 21
9. $g(6) =$ 13
10. $g(0) =$ 1
11. $g(22) =$ 45
12. $g($ 10 $) = 21$
13. $g($ 16 $) = 33$

x	g(x) = 2x + 1
0	1
2	5
4	9
6	13
8	17
10	21
12	25
14	29
16	33
18	37
20	41