Name: ______________________________________ Date: _____________

PC: Geometic Approach to Absolute Value Ms. Loughran

Do Now:

1. Represent the solution to each of the following in the designated notation.

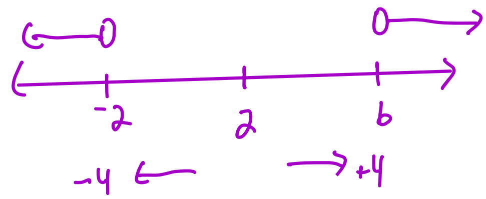
a. $|4 - 2x| > 8$ **(Interval)**

$|2x-4| > 8$

$2|x-2| > 8$

$|x-2| > 4$

x's distance from 2 > 4



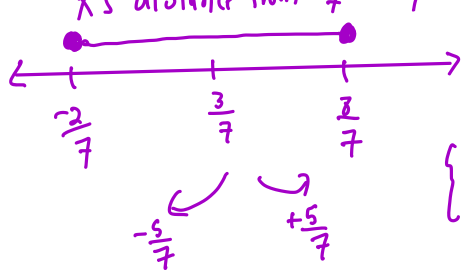
$(-\infty, -2) \cup (6, \infty)$

b. $|7x - 3| \leq 5$ ~~**(Interval)**~~ set builder

$7\left|x - \frac{3}{7}\right| \leq 5$

$\left|x - \frac{3}{7}\right| \leq \frac{5}{7}$

x's distance from $\frac{3}{7} \leq \frac{5}{7}$



$\{x \mid -\frac{2}{7} \leq x \leq \frac{8}{7}\}$

Name:______________________________________ Date:_______
PC: Review of Functions Ms. Loughran

A **relation** is a relationship between sets of information. It is any collection of ordered pairs. If we denote the ordered pairs in a relation by (x, y) then the set of x-values (or inputs) is the **domain** and the set of all y-values (or outputs) is the **range**.

Ways to represent a relation:

(1) By listing ordered pairs as coordinates or in a table

Examples:

D: {1, 3, 5, 7, 9}
R: {2, 4, 6, 8, 10}

(A) { (1,2), (3,4), (5,6), (7, 8), (9,10)}

Function

(B)

STUDENT	SCORE
Mary	87
Joe	94
Peter	82

(2) By specifying a rule

Examples:

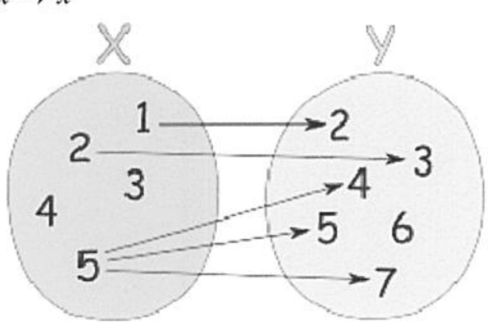
(A) $\{(x, y) \mid y = \sqrt{x-1}\}$

(B) $y = 4x - 5$

(3) By specifying a mapping

Examples:

(A) $x \to x^2$



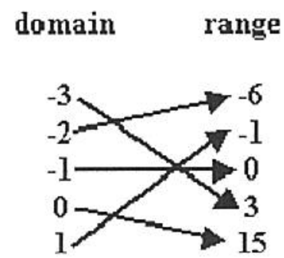
Not a function

(B)

A **function** is a "well behaved" relation. A **function** is a relation in which each element of the domain corresponds to exactly one element of the range. That is, no two ordered pairs have the same first element.

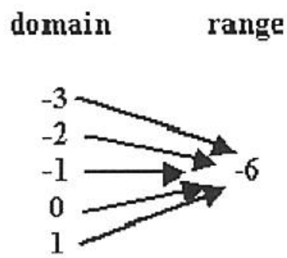
Determine whether or not the following relations are functions.

A



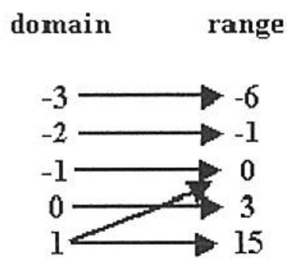
Yes

B



Yes

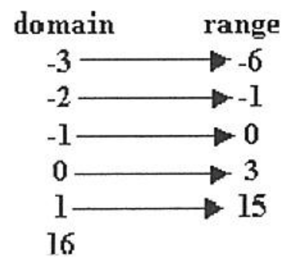
C



No, b/c 1 is repeating

(1, 0)
(1, 15)

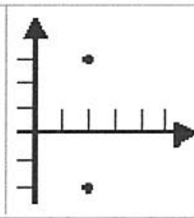
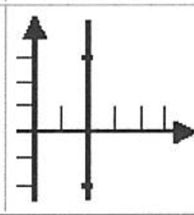
D



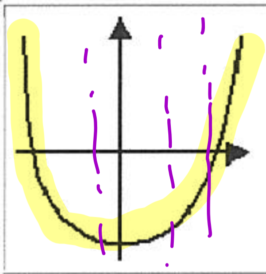
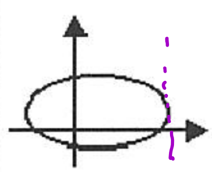
No b/c not every input has an output

The "Vertical Line Test"

Looking at this function stuff graphically, what if we had the relation that consists of a set containing just two points: {(2, 3), (2, –2)}? We already know that this is not a function, since x = 2 goes to each of y = 3 and y = –2.

If we graph this relation, it looks like:	
Notice that you can draw a vertical line through the two points, like this:	

This characteristic of non-functions was noticed by I-don't-know-who, and was codified in "The Vertical Line Test": Given the graph of a relation, if you can draw a vertical line that crosses the graph in more than one place, then the relation is not a function. Here are a couple examples:

	This graph shows a function, because there is no vertical line that will cross this graph twice.
	This graph does not show a function, because any number of vertical lines will intersect this oval twice. For instance, the y-axis intersects (crosses) the line twice.

Practice Questions

1. Which of the relations below is a function?

Choose:

- {(1,1), (2,1), (3,1), (4,1), (5,1)}
- {(2,1), (2,2), (2,3), (2,4), (2,5)}
- {(0,2), (0,3), (0,4), (0,5), (0,6)}

x's values repeat

2. Given the relation $A = \{(5,2), (7,4), (9,10), (x, 5)\}$. Which of the following values for x will make relation A a function?

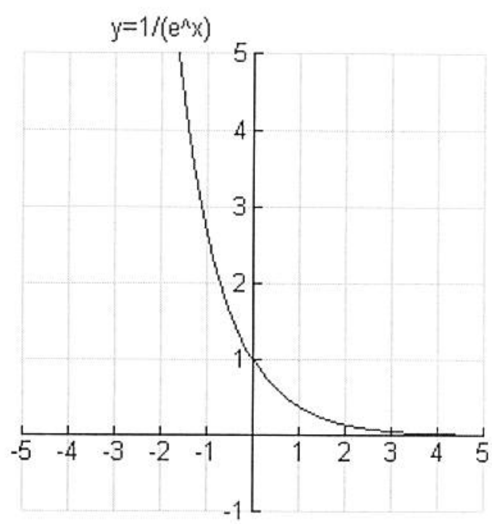
Choose:

- 7
- 9
- 4

3. The graph of a relation is shown at the right. Is this relation a function?

Choose:

- Yes
- No
- Cannot be determined from a graph



4.

Is the relation depicted in the chart below a function?

X	0	1	3	5	3	9
Y	8	9	10	6	10	7

same y-value

Choose:

- ● Yes
- ○ No
- ○ Cannot be determined from a chart

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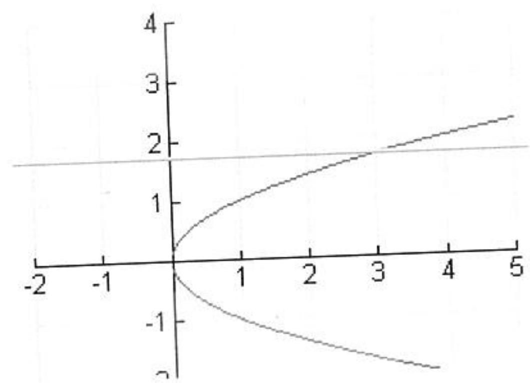
5. The graph of a relation is shown at the right.
Is the relation is a function?

Choose:

- ○ Yes
- ● No
- ○ Cannot be determined from a graph



6.

Which of the following relations is a function?

Choose:

- ○ $x^2 + y^2 = 16$ circle
- ○ $y = \pm\sqrt{x+4}$
- ● $y = |x+1| + 5$

$x^2 + y^2 = 16$

$y^2 = 16 - x^2$

$y = \pm\sqrt{16 - x^2}$

if $x=3$ $y=\pm\sqrt{16-3^2}$ $y=\pm\sqrt{7}$ $(3,\sqrt{7}),(3,-\sqrt{7})$

Functions

Name:________________________________

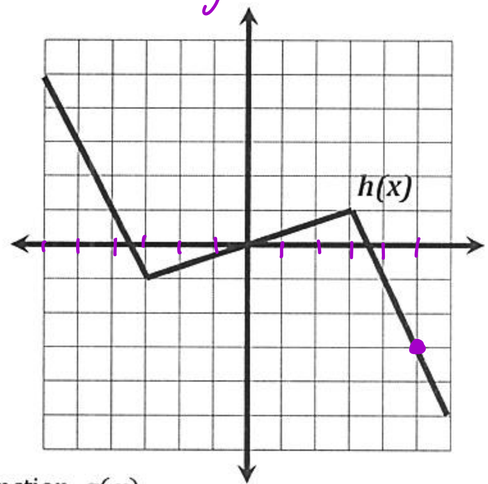
Answer #1-2 using the graph of $h(x)$.

→ * means what is the y value when $x=5$

1. Find the following function values.

a) $h(-3)=$ $\underline{-1}$ b) $h(5)=$ $\underline{-3}$

c) $h(-6)=$ ____ d) $h(4)=$ ____



2. Find the value(s) of x where the function has the indicated value.

a) $h(x)=3$ b) $h(x)=1$

c) $h(x)=0$ d) $h(x)=-3$

3. Evaluate or solve using the table below representing the function $g(x)$.

x	-4	-2	-1	3	7	9	12	13
y	8	7	10	12	-4	-9	0	3

a) $g(-4)$ $=8$ b) $g(12)$ 0

c) $g(x)=10$ $x=-1$ d) $g(0)$ not defined

e) $g(x)=7$ $x=-2$ f) $g(x)=-1$

4. Use the functions below to answer the following questions.

$$f(x)=2x-3 \qquad g(x)=x^2-4x+1 \qquad h(x)=\frac{2x}{x+5}$$

a) $h(-7)$ $=\frac{2(-7)}{-7+5}=\frac{-14}{-2}=7$ b) $f(-5)$ $=2(-5)-3=-13$ c) $h(0)$ $=\frac{2(0)}{0+5}=\frac{0}{5}=0$

d) $g(-2)$ e) $h(-5)$ $=\frac{2(-5)}{-5+5}$ undefined f) $g(3)$

g) $f(a)$ $=2a-3$ h) $g(x^2)$ $=(x^2)^2-4x^2+1$ x^4-4x^2+1 i) $h(-c)$ $=\frac{2(-c)}{-c+5}=\frac{-2c}{-c+5}$

j) $f(x-2)$ k) $h(3x)$ l) $g(x+3)$

* these are just the solution sets in interval notation. Remember the geometric approach has $\underline{\underline{3}}$ pieces to it.
① sentence
② graph
③ solution

Homework 10-03

Practice

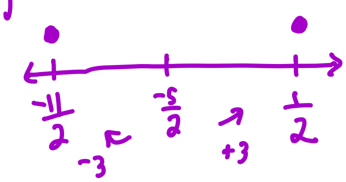
Solve each equation or inequality using the geometric definition of absolute value. When applicable, write solutions in interval notation.

1. $|x| \le 7$ $[-7,7]$
2. $|t| \ge 5$
3. $|y-5| = 3$ $\{2,8\}$
4. $|t-3| < 4$
5. $|5-y| > 3$ $(-\infty,2) \cup (8,\infty)$
6. $|x+8| \ge 3$
7. $|x+1| \le 5$ $[-6,4]$
8. $|3x-7| \le 4$
9. $|5y+2| \ge 8$ $(-\infty,-2] \cup [\frac{6}{5},\infty)$
10. $|4-2t| > 6$
11. $|10+4s| < 6$ $(-4,-1)$
12. $|7m+11| = 3$
13. $|4-5n| \le 8$ $[-\frac{4}{5}, \frac{12}{5}]$
14. $\left|\frac{1}{2}x - \frac{3}{4}\right| < 2$
15. $\left|\frac{1}{3}y + \frac{5}{6}\right| = 1$ $\{-\frac{11}{2}, \frac{1}{2}\}$
16. $|x+4| < -1$ no solution

$\frac{1}{3}\left|y+\frac{5}{2}\right| = 1$

$\left|y+\frac{5}{2}\right| = 3$

y's distance from $-\frac{5}{2} = 3$



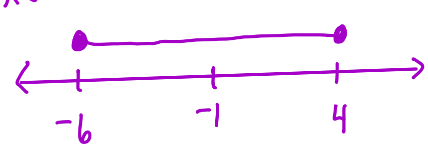
Note:

For all real numbers x and a: $|a-x| = |x-a|$

7. $|x+1| \le 5$

IN $[-6,4]$

x's distance from $-1 \le 5$



SB: $\{x \mid -6 \le x \le 4\}$

11. $|10+4s| < 6$

$(-4,-1)$

$|4s+10| < 6$

$4\left|s+\frac{10}{4}\right| < 6$

$\left|s+\frac{10}{4}\right| < \frac{6}{4}$

s's distance from $-\frac{10}{4} < \frac{6}{4}$