

FUNCTIONS AND RELATIONS

Relation: a pairing of input values with output values

set of ordered pairs. (coordinates)

Function: a special relation where each input is paired with only one output

x-values cannot repeat w/ different y-values

Function or Not??

MAPPING

A) $\{(1,2), (3,5), (1,4), (2,8)\}$
Not a Function
 1 is paired w/ 2 + 4

C)
Not a Function
 7 is paired w/ 1 + 8

D)
Function

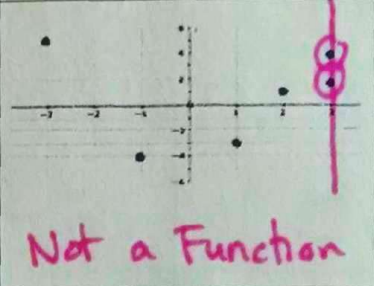
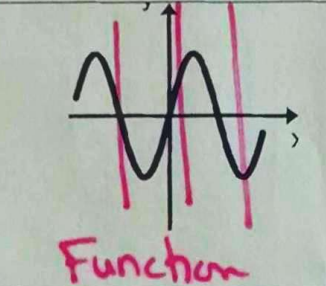
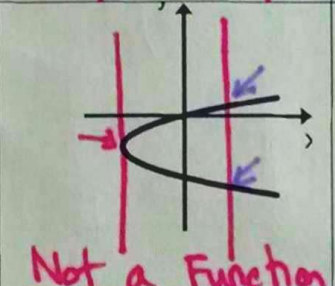
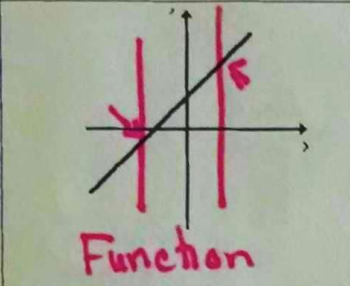
E)

x	y
2	5
3	8
3	9
4	10

x	y
2	5
3	6
2	5
4	2

Not a Function

Vertical Line Test



Domain: the set of all possible input values

Range: the set of all possible output values

D I X	Domain	R O Y	Range										
<table border="1" style="display: inline-table;"> <thead> <tr><th>x</th><th>y</th></tr> </thead> <tbody> <tr><td>2</td><td>5</td></tr> <tr><td>3</td><td>8</td></tr> <tr><td>3</td><td>9</td></tr> <tr><td>4</td><td>10</td></tr> </tbody> </table>	x	y	2	5	3	8	3	9	4	10	 discrete		
x	y												
2	5												
3	8												
3	9												
4	10												
Domain: $\{2, 3, 4\}$ Range: $\{5, 8, 9, 10\}$	Domain: \mathbb{R} Range: $y \geq 2$	Domain: $\{-3 < x < 3\}$ Range: $\{-2 < y < 4\}$	Domain: $\{x \geq -5\}$ Range: $\{-2 \leq y \leq 5\}$										

Set and Interval Notation

Set notation

Discrete Data: (individual points, count)

- List all the inputs or outputs inside {Squiggly Brackets}

x	y
3	-2
6	1
12	6

$$D: \{3, 6, 12\}$$

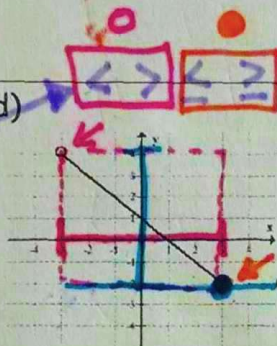
$$R: \{-2, 1, 6\}$$

Continuous Data: (connected)

- Use inequalities inside { } and define the variable {x | ...}

$$\{x \mid -3 < x \leq 3\}$$

$$\{y \mid -2 \leq y < 4\}$$



Interval notation

Cannot use Interval Notation for Discrete Data

Continuous Data: (connected)

- Write the starting and ending point separated by a comma, using (or [.

Parentheses

Point is NOT in D/R

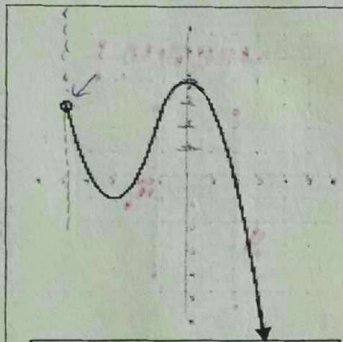
○ (open circle)
+∞, -∞

$$D: (-3, 3] \quad R: [-2, 4)$$

Bracket

point IS in D/R

● (closed circle)



Set Notation:

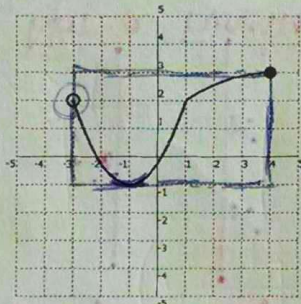
$$D: x > -5$$

$$R: y \leq 4$$

Interval Notation:

$$D: (-5, \infty)$$

$$R: (-\infty, 4]$$



Set Notation:

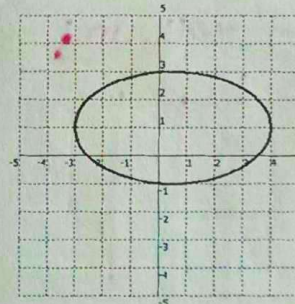
$$D: -3 < x \leq 4$$

$$R: -1 \leq y \leq 3$$

Interval Notation:

$$D: (-3, 4]$$

$$R: [-1, 3]$$



Set Notation:

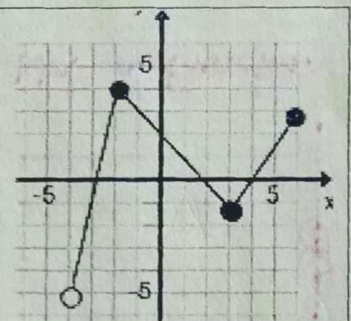
$$D: -3 \leq x \leq 4$$

$$R: -1 \leq y \leq 3$$

Interval Notation:

$$D: [-3, 4]$$

$$R: [-1, 3]$$



Set Notation:

$$D: -4 < x \leq 6$$

$$R: -5 \leq y \leq 4$$

Interval Notation:

$$D: (-4, 6]$$

$$R: (-5, 4]$$

Evaluate: $g(0)$, $g\left(\frac{1}{2}\right)$, and $g(-2)$.

A) $g(x) = -3x^2$

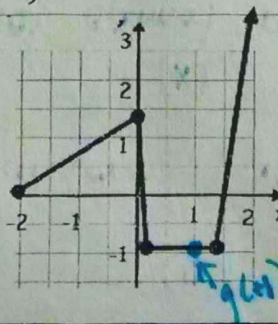
$$g(0) = -3(0)^2 = 0$$

$$g\left(\frac{1}{2}\right) = -3\left(\frac{1}{2}\right)^2 = -\frac{3}{4}$$

$$g(-2) = -3(-2)^2 = -12$$

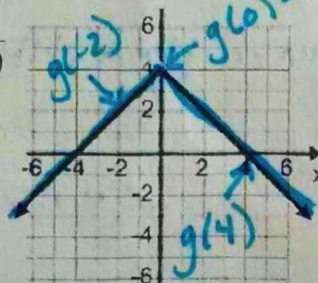
$(-2, -12)$

B)



$g(-2) = 1$
 $g(1) = 1$
 $g(2) = 3$

C)



$g(0) = 6$
Find y when $x = 0$
 $g(-2) = 2$
 $g(4) = 0$

GLUE HERE

Set and Interval Notation

Complete the table by graphing, writing in set notation and/or writing in interval notation.

	Set Notation	Graph	Interval Notation
1	$x > 2$		$(2, \infty)$
2	$x \leq 4$		$(-\infty, 4]$
3	$x \geq -1$ $-1 \leq x$		$[-1, \infty)$
4	$x > 2$ or $x < -1$		$(-\infty, -1) \cup (2, \infty)$
5	$x > -2$ and $x < 3$		$(-2, 3)$ $(-\infty, 3) \cap (-2, \infty)$
6	$-1 < x \leq 4$		$(-\infty, 4] \cap (-1, \infty)$
7	$x \leq 0$ or $x > 4$		$(-\infty, 0] \cup (4, \infty)$
8	$x > -2$		$(-2, \infty)$
9	$x \leq -3$ or $x > 4$		$(-\infty, -3] \cup (4, \infty)$
10	$x > -3$ AND $x \leq 4$ $-3 < x \leq 4$		$(-3, 4]$ $(-\infty, 4] \cap (-3, \infty)$
11	$-2 \leq x \leq 5$		$[-2, 5]$
12	$x > 0$		$(0, \infty)$
13	$-2 < x < 3$		$(-2, 3)$
14	$-2 < x < 3$		
15	$x > 2$		