

Lesson 1.2 Objective: SWBAT determine if a relation is a function and evaluate them.

Kickoff

1) What do you think a function is? *Linear function*

X-values don't repeat

2) What does it mean to evaluate something?

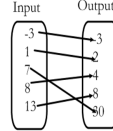
to answer it. plug in the given #!

A **relation** is a set of ordered pairs. The set of all first coordinates (inputs) is called the **domain**, and the set of all second coordinates (outputs) is called the **range**. If every element in the domain corresponds to exactly one element in the range, then the relation is a **function**.
X's don't repeat

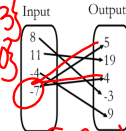
A relation can be expressed as a set of ordered pairs, a table, a graph an equation or a verbal description.

Determine whether each relation below represents a function or not, and give the domain and range.

1. **Function.**



D ⊆ {-3, 1, 7, 8, 13}
R ⊆ {2, 4, 8, 10}



NOT

D ⊆ {8, 11, 11, 11, 11}
R ⊆ {5, 19, 4, -3, 0}

Types of Functions

One to One- *every element in the range corresponds to exactly one element in the domain.*

** X's and y's don't repeat.*

Onto- *when its image equals the range (all y values are used)*



Determine whether each relation below represents a function or not, and give the domain and range.

4. $\{(7,1), (3,-5), (0,-5)\}$ **Function** $\{1, -5\}$
D ⊆ {7, 3, 0} *Onto*

5. $\{(-3,0), (8,1), (-3,0), (2,1)\}$ **Function** $\{0, 1\}$
D ⊆ {-3, 8, 2} *Onto*

To determine whether or not an equation defines y as a function of x, solve the equation for y to determine whether or not every input corresponds to exactly one output.

6. $x^2 + y = 7$
 $-x^2 - x^2$
 $y = -x^2 + 7$
Quadratic Function
 $y = 1^2 + 7 = 6$

7. $x + y^2 = 5$
 $-x - x$
 $\sqrt{y^2} = \sqrt{-x+5}$
 $y = \pm\sqrt{-x+5}$
 $y = \pm\sqrt{4} = \pm 2$
NOT

8. $2x + 4y = 8$
 $-2x - 2x$
 $4y = -2x + 8$
 $y = -\frac{1}{2}x + 2$
Linear Function

Determine if each of the following relations are functions and state their domain and range.

9.

x	F(x)
-6	13
-4	18
-2	25
0	34
2	45
4	58

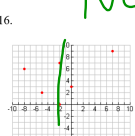
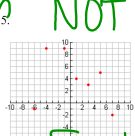
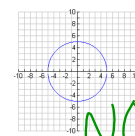
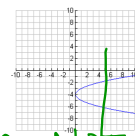
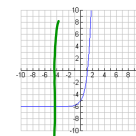
10.

x	F(x)
-7	9
-3	11
-1	-8
6	8
-3	19
-9	-10

NOT

Function
D ⊆ {-6, -4, -2, 0, 2}
R ⊆ {13, 18, 25, 34, 45, 58}

11. 12. 13.



Vertical line test

Piecewise Function: a function that is defined by two or more equations on specified regions of the domain.

To evaluate a piecewise function, you need to be careful about the specified domain!

17. For the function $f(x) = \begin{cases} x^2 - 5, & \text{if } x \leq 0 \\ x + 3, & \text{if } x > 0 \end{cases}$ determine each of the following:

a) $f(-1)$ $f(-1)^2 - 5 = 1 - 5 = -4$
 b) $f(0)$ $0^2 - 5 = -5$
 c) $f(2)$ $2 + 3 = 5$

18. From the graph to the right, determine:

a) $f(-1)$ 1
 b) $f(0)$ 0
 c) $f(2)$ 3

19. Evaluate each of the following functions at the specified value.

$g(x) = x^2 - 2x + 1$ $h(x) = \sqrt{x + 8} + 2$ $f(x) = \frac{1}{x^2 - 9}$

a) $f(0)$ $f(0) = \frac{1}{0^2 - 9} = \frac{1}{-9} = -\frac{1}{9}$
 b) $h(-8)$ $h(-8) = \sqrt{-8 + 8} + 2 = \sqrt{0} + 2 = 2$
 c) $g(-2)$ $g(-2) = (-2)^2 - 2(-2) + 1 = 4 + 4 + 1 = 9$

20. From the graph to the right, determine:

a) $f(-2)$ 2
 b) $f(0)$ -2
 c) $f(1)$ -8

21) From the graph below determine:

a) $f(-2)$ 0
 b) $f(3)$ 0
 c) $f(0)$ -2
 d) $f(1)$ -3

Practice:

1) Is the graph to the right a function? If not, state what you would change to make it a function.

NO, the x values repeat and it doesn't pass the vertical line test. To make it a function, move the points!

Determine if each of the following are a function.

2) $x^2 + y^2 = 49$ $\sqrt{y^2} = \sqrt{x^2 + 49}$ $y = \pm \sqrt{x^2 + 49}$ NO (circle)

3) $\{(0, 4), (9, 4), (6, 1), (2, 2)\}$ Yes!

4)

Input	Output
1	2
3	6
5	14
9	19
25	

yes!

Evaluate each of the following functions at the specified value.

5) $f(x) = \begin{cases} x + 1, & \text{if } x < 0 \\ -x + 1, & \text{if } 0 \leq x \leq 2 \\ x - 1, & \text{if } x > 2 \end{cases}$

a) $f(-1)$ $-1 + 1 = 0$
 b) $f(0)$ $-0 + 1 = 1$
 c) $f(2)$ $2 - 1 = 1$

6) $q(t) = \frac{2t^2 + 3}{t^2}$

(a) $q(2)$ $\frac{2(2)^2 + 3}{2^2} = \frac{11}{4}$
 (b) $q(0)$ Undefined
 (c) $q(-x)$ $\frac{2(-x)^2 + 3}{-x^2}$

7)

a) $f(0)$ 1
 b) $f(2)$ 1
 c) $f(-1)$ 0
 d) $f(1)$ 2