

2.9 Functions

Standard:

F.IF.1



Old Substitution

If $x=3$, what is y ?

$$\begin{aligned} \textcircled{1} \quad y &= x+3 \\ y &= (3)+3 \\ &= 6 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad y &= x^2+x-8 \\ y &= (3)^2+(3)-8 \\ &= 4 \end{aligned}$$

If $y=5$, what is x ?

$$\begin{aligned} \textcircled{3} \quad y &= 5x-5 \\ (5) &= 5x-5 \\ 5 &= 5x-5 \\ 5+5 &= 5x-\cancel{5}+\cancel{5} \\ 10 &= 5x \\ 2 &= x \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad y &= \frac{2}{3}x+10 \\ (5) &= \frac{2}{3}x+10 \\ 5 &= \frac{2}{3}x+10 \\ \left(\frac{3}{2}\right) \cdot 5 &= \frac{2}{3}x \left(\frac{3}{2}\right) \\ -\frac{15}{2} &= x \end{aligned}$$

still old...

Complete the table using $y=2x+5$.

$$\begin{aligned} \text{When } x=3: \\ y &= 2x+5 \\ y &= 2(2)+5 \\ &= 9 \end{aligned}$$

$$\begin{aligned} \text{When } y=13 \\ y &= 2x+5 \\ 13 &= 2x+5 \\ 13-5 &= 2x+\cancel{5}-\cancel{5} \\ 8 &= 2x \\ 4 &= x. \end{aligned}$$

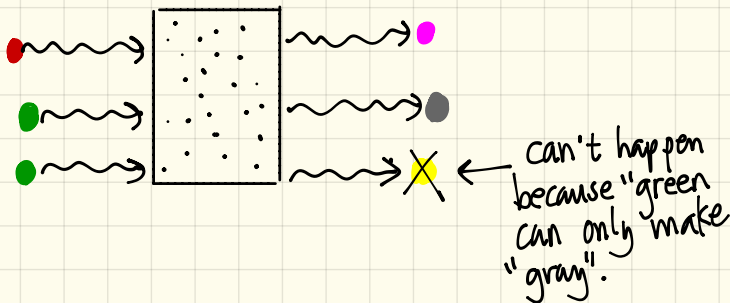
x	y
2	?=9
?=4	13
?=7	19
9	?=23

New Functions

What is a function?

A function is a rule that relates an input to only one corresponding output.

Think about it like a machine:



Folding Activity

Take out a piece of paper. Fold it in half & record the number of sections. Repeat until you can't fold anymore.

Example) 1 fold creates 2 sections.

Solution:

- 1 fold creates 2 sections
- 2 folds creates 4 sections
- 3 folds creates 8 sections
- 4 folds creates 16 sections
- 5 folds creates 32 sections.

Conclusion This folding activity represents a function because each input corresponds to exactly one output.

Let's discuss real world function examples. Let x be independent variable & y be dependent variable of examples

1. When you use a vending machine, you push a certain button (x), and a certain snack comes out (y).
2. Exchanging American dollars (x) for British pounds (y)

Examples of real world examples not of functions

1. You are ordering a gift (x) online and at checkout you are presented with different shipping options (y).
(y) is not dependent on (x).

Determine whether each is a function.

TRICK "It's all about the x !"

- Place your hand over all the y -values and only analyze the x -values. If the x -values do not repeat, it's automatically a function.
- If x -values do repeat, make sure those x -values go to the exact same y -value. If they do, it's a function. If they do not correspond to the same y -value, it is NOT a function.

[Example 1] Determine whether it's a function or not a function.

a)

x	5	8	-3	5	10
y	-3	7	-3	-3	10

Function

b)

x	-1	0	15	-3	0
y	-3	7	8	5	-7

Not A Function
The x-value 0 has different outputs.

c)

x	-7	9	8	-1	0
y	5	5	5	5	5

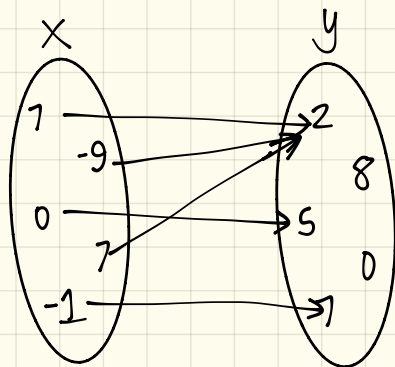
Function

d)

x	-7	-7	-7	-7	-7
y	9	5	7	-10	0

Not A Function
The x-value -7 has different outputs.

e)

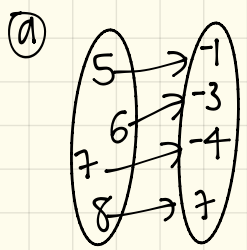


Function

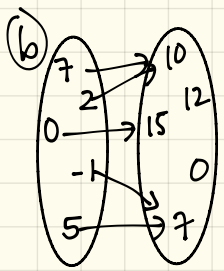
[Example 2] Which of the following relations is a function & which is NOT a function?

- (a) $\{(5,8), (10,2), (5,11), (-10,0), (7,2)\}$ Not a function The x-value 5 has 2 different outputs
- (b) $\{(2,3), (-1,0), (0,0), (2,3)\}$ Function

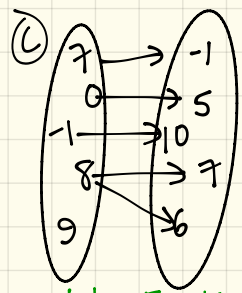
[Example 3] Which mappings are a functions & which is NOT a function?



Function



Function



Not a Function
The x-value 8 has two outputs.

Vertical Line Test

To determine if a graph is a function, at any point of the graph, when drawing a straight vertical line on the graph, it should NOT hit 2 different y-values.

[Examples] Determine whether each is a function or not.

