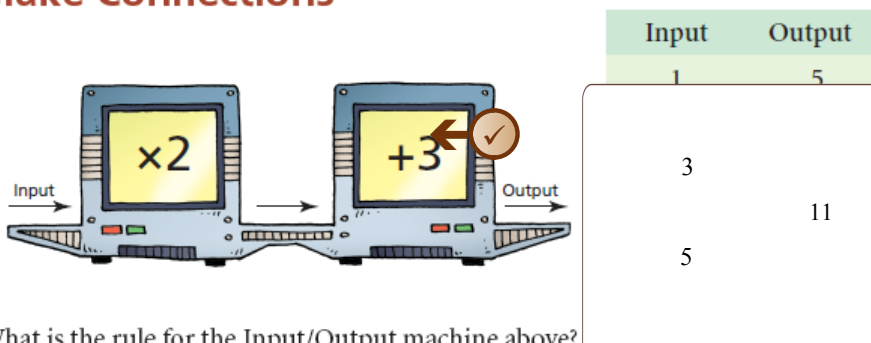


## 5.2 Properties of Functions

### LESSON FOCUS

Develop the concept of a function.

### Make Connections



What is the rule for the Input/Output machine above?

Which numbers would complete this table for the machine?

Remember

# Independent / Dependent

## Dependent

- a variable whose value is determined by the value of another (independent) variable.

## Independent

- a variable whose value is not determined by the value of another variable, and whose value determines the value of another (dependent) variable

Complete the chart for  $y = \frac{-2x+5}{1}$

Independent x	dependent y
0	+5
1	+3
2	+1
3	

$$y = -2(x) + 5$$

$$x = 0$$

$$y = -2(0) + 5$$

$$= +5$$

$$x = 1$$

$$y = -2(1) + 5$$

$$= -2 + 5$$

$$= +3$$

$$y = -2(x) + 5$$

$$x = 2$$

$$(-2)(2) + 5$$

$$-4 + 5$$

Complete the chart for  $y = \frac{18x}{6}$

hint  
x should count by 6

x	y
0	0
6	18
12	36

Same as  $y = \frac{3x}{1}$

x	y
0	0
1	3
2	6
3	9
4	12
5	15
6	18

Write an equation for the chart

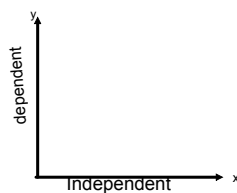
**Independent Variable**

- Hours do not depend on the person's pay.

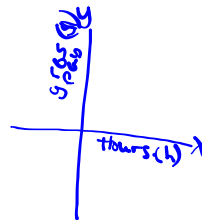
**Dependent Variable**

- A person's pay often depends on the number of hours worked.

Hours Worked, $h$	Gross Pay, $P$ (\$)
1	12
2	24
3	36
4	48
5	60



When graphing always



**Try This!!**

dependent variable =  $\frac{\text{change of dep}}{\text{change of indep}}$  "x" + value at zero

change in independent

change in dependent

Independent Number of Marbles, $n$	dependent Mass of Marbles, $m$ (g)
0	0
1	1.27
2	2.54
3	3.81
4	5.08
5	6.35
6	7.62

- State the domain & Range.
- Is this relation a function?
- State the dependent and independent variables.
- Write the function notation.

Domain  $\{1, 2, 3, 4, 5, 6\}$

Range  $\{1.27, 2.54, 3.81, 5.08, 6.35, 7.62\}$

b) Relating the amount of marble to the mass of of the amount.

c) The independent variable is  $n$ , the number of marbles. The dependent variable is  $m$ , the mass of marbles.

## Solution:

- a) **Domain:**  $\{ 1, 2, 3, 4, 5 \}$   
**Range:**  $\{ 1.75, 3.50, 5.25, 7.00, 8.75 \}$
- b) **Function**
- c) **Independent - number of tickets**  
**Dependent - Cost**
- d)  $C(n) = 1.75n$

Recall from last day



## Domain & Range



**Domain**

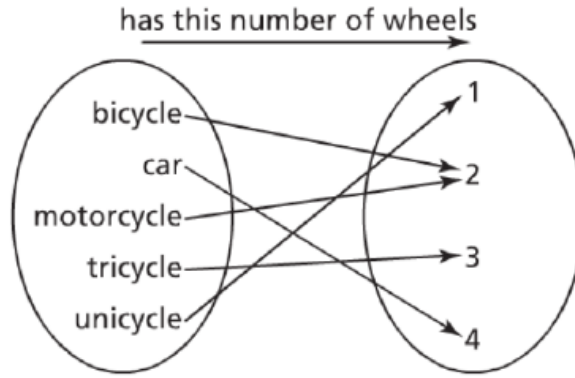
- the set of first elements in a relation

**Range**

- the set of second elements in a relation

Input	Output
1	5
2	7
	9
4	
	13

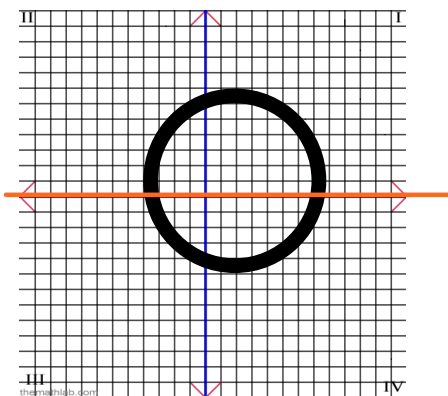
# Recall from last day



<b>Domain</b>	The first set of elements: {bicycle, car, motorcycle, tricycle, unicycle}
<b>Range</b>	The second set of elements: {1, 2, 3, 4}

## Recall from last day

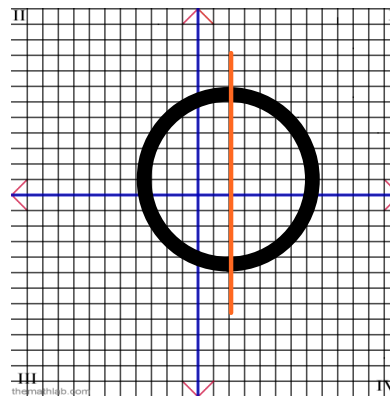
**Domain**



The **domain** represents all the values of x.

**X is the independent Variable**

**Range**

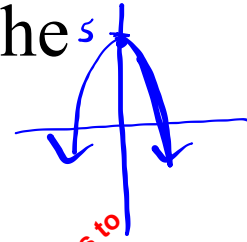


The **range** represents all the values of y.

**Y is the dependent Variable**



How do you state the range?



$$\{y \mid y \leq 5, y \in \mathbb{R}\}$$

$$\{y \mid -5 \leq y \leq 8, y \in \mathbb{I}\}$$

$\{x \mid \text{smallest to left} \leq x \leq \text{biggest right value}, x \in \text{Number system}\}$   
 $\{y \mid \text{smallest bottom} \leq y \leq \text{biggest height}, y \in \text{Number system}\}$

**MATH 10**

**FUNCTIONS**

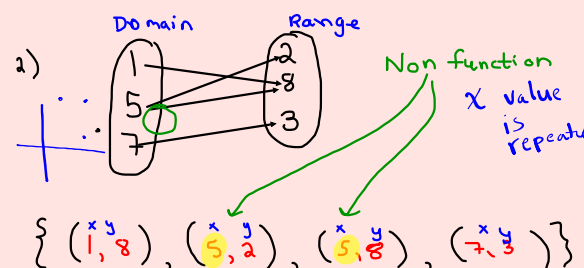
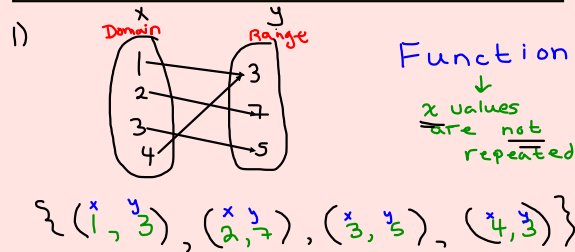
1min



**Relations VS Functions**

- a relation is where a pattern/relationship exists between the independent variable (x) and the dependent variable (y).

\*  
- a function is a special relationship where...  
Study "each x has one and only one y value".



# Function or Nonfunction

**Function:**  
 A relation where each element in the first set is associated with one and only one element in the second set.

Function

## Functions

- How can I tell from a set of points/table?

"an x value has more than one y value"

- a function is a relation in which no two ordered pairs have the same first coordinate.

x	y
3	5
7	11
8	15
9	22

Function means  $\rightarrow x$  cannot repeat  $\rightarrow y$  can

Function or Not a function that is the question?

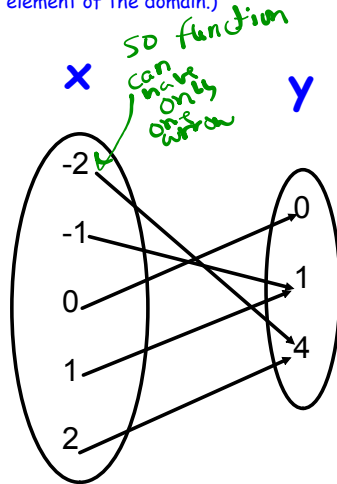




## Arrow Diagrams

Function:

For every first element there is one and only one second element. (Only one arrow starts from each element of the domain.)



Function or Not a function that is the question?



$(-2, 4)$ ,  $(-1, 1)$   $(0, 0)$   $(1, 1)$   $(2, 4)$

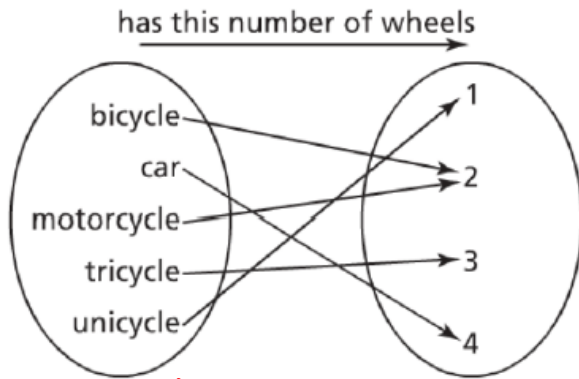


x	y
Sport	Equipment
badminton	shuttlecock
badminton	racquet
hockey	puck
hockey	stick
tennis	ball
tennis	racquet
soccer	ball

Not a function  
Repeat

Function or Not a function that is the question?





Function or Not a function that is the question?

Function

↳ No x has 2 arrows off it



Repeated

↓

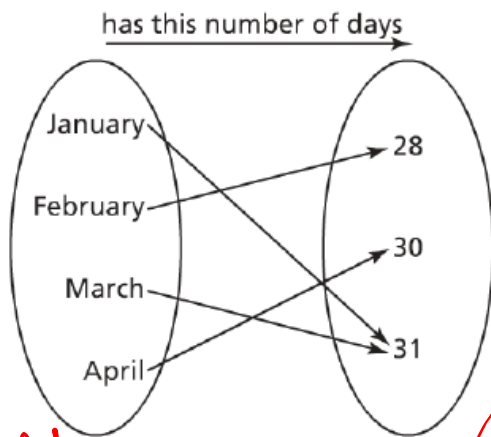
{ (2, 5), (3, 7), (4, 2), (2, 6), (8, 0) }

↓

So Not a function

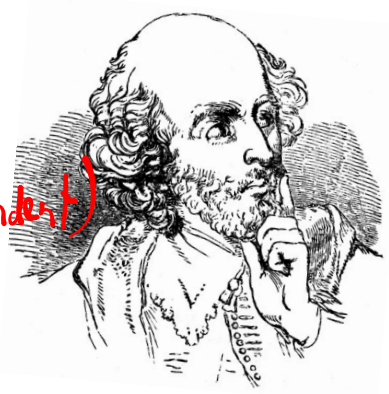
Function or Not a function that is the question?





Function or Not a function that is the question?

No repeats in 'x' (independent)  
So a function



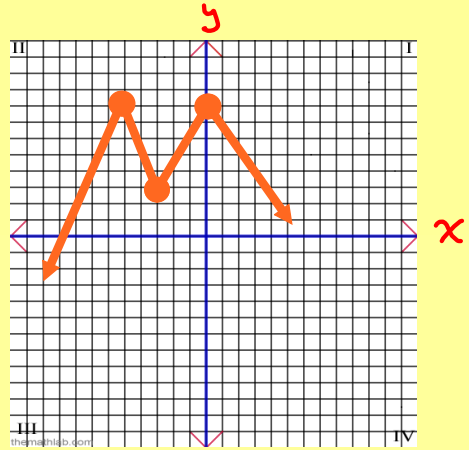
# Function or Nonfunction



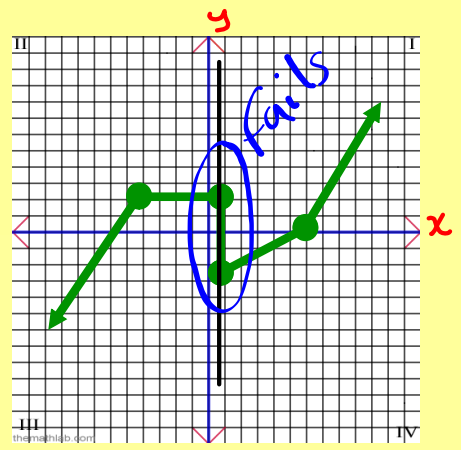
\*\* To determine whether or not a graph is a function or nonfunction, we use what is called the vertical line test!!

\*\* If the line crosses the graph more than once at any particular location, then it is not a function.

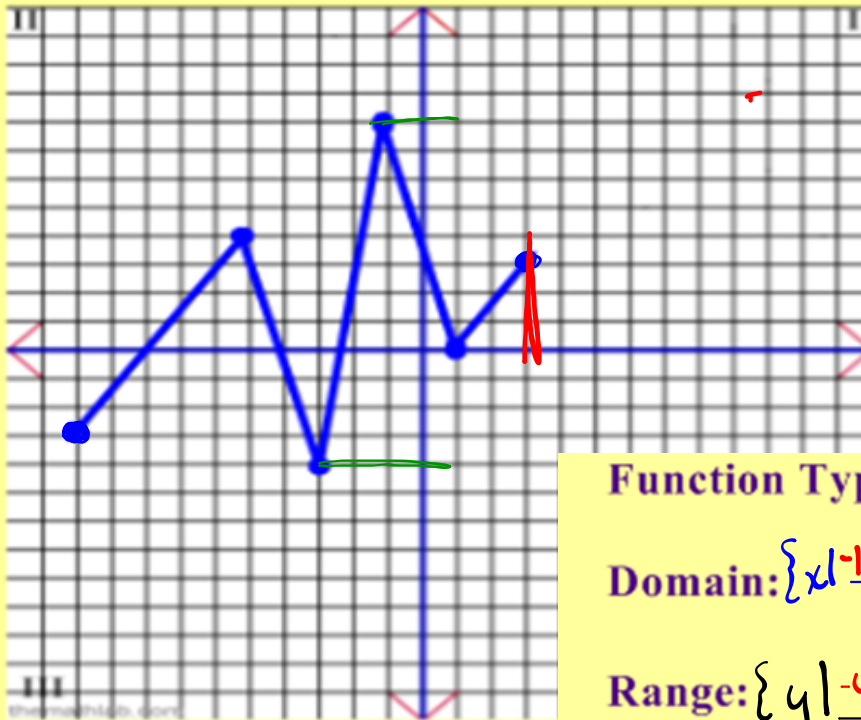
Function



Nonfunction



**\*\* State whether the graph is a function or nonfunction, as well as stating the domain & range!!**

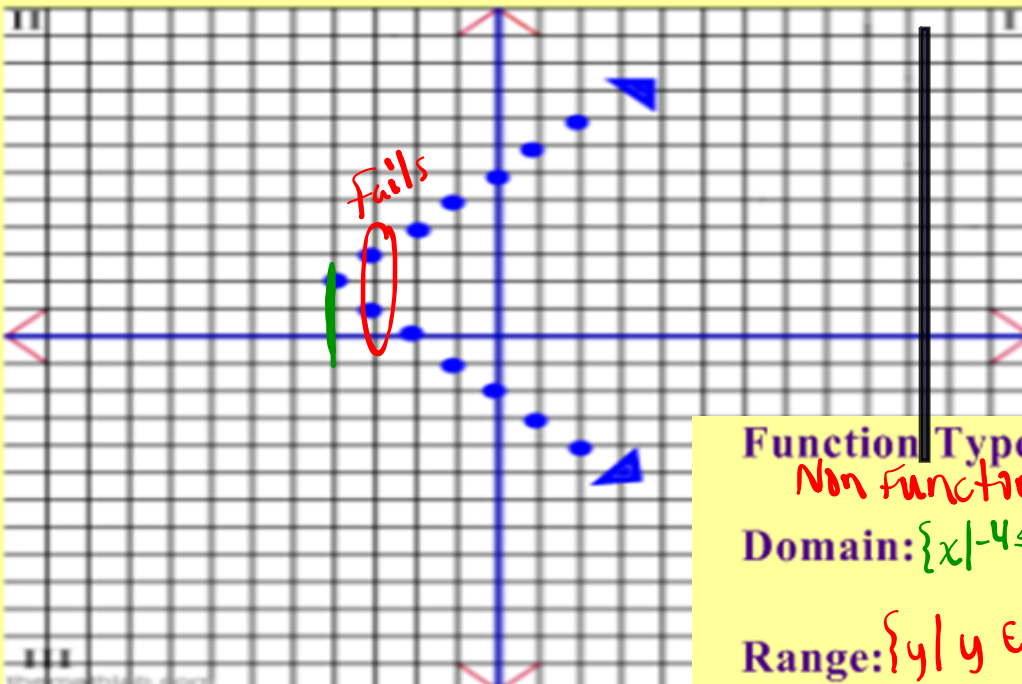


Function Type: *Function*

Domain:  $\{x | -10 \leq x \leq 7, x \in \mathbb{R}\}$

Range:  $\{y | -4 \leq y \leq 8, y \in \mathbb{R}\}$

**\* State whether the graph is a function or nonfunction, as well as stating the domain & range!!**



*Fails*

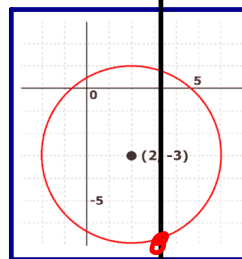
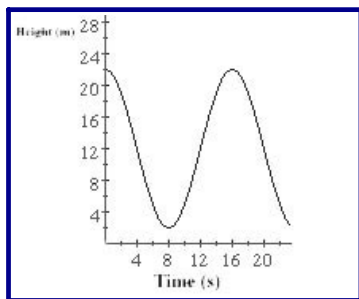
Function Type:

*Non function*

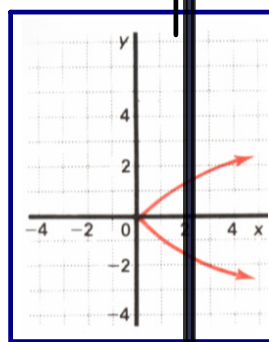
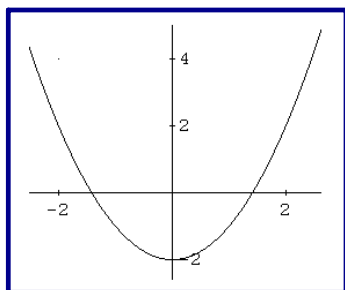
Domain:  $\{x | -4 \leq x, x \in \mathbb{I}\}$

Range:  $\{y | y \in \mathbb{I}\}$

Use the Vertical Line Test to see if the graph is a function



F



Graphs  
are so EASY



