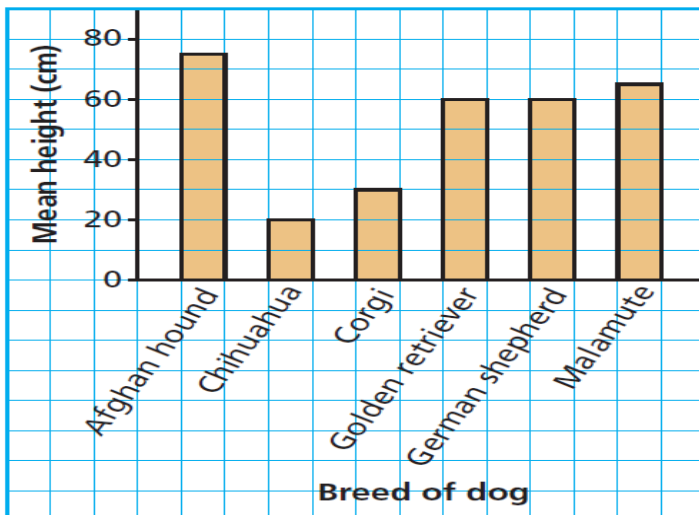


## WARM UP...Representing a Relation Given as a Bar Graph

Different breeds of dogs can be associated with their mean heights. Consider the relation represented by this graph.

Mean Heights of Different Breeds of Dogs



EXERCISE: Represent the relation...

- a) as a table
- b) as an arrow diagram

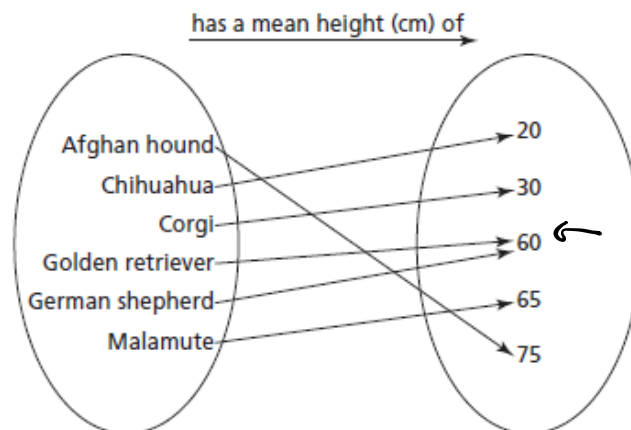
SOLUTIONS...

a) as a table

In the table, write the breeds of dogs in the first column and the mean heights in centimetres in the second column.

Breed of Dog	Mean Height (cm)
Afghan hound	75
Chihuahua	20
Corgi	30
Golden retriever	60
German shepherd	60
Malamute	65

b) In the arrow diagram, write the breeds of dogs in the first set and the mean heights in centimetres in the second set.



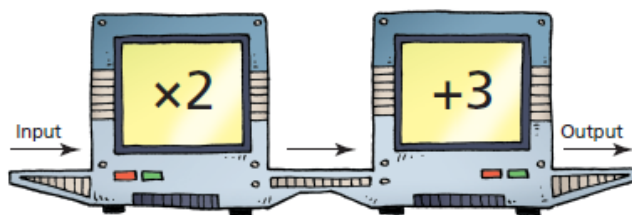


## 5.2 Properties of Functions



**LESSON FOCUS** Develop the concept of a function.

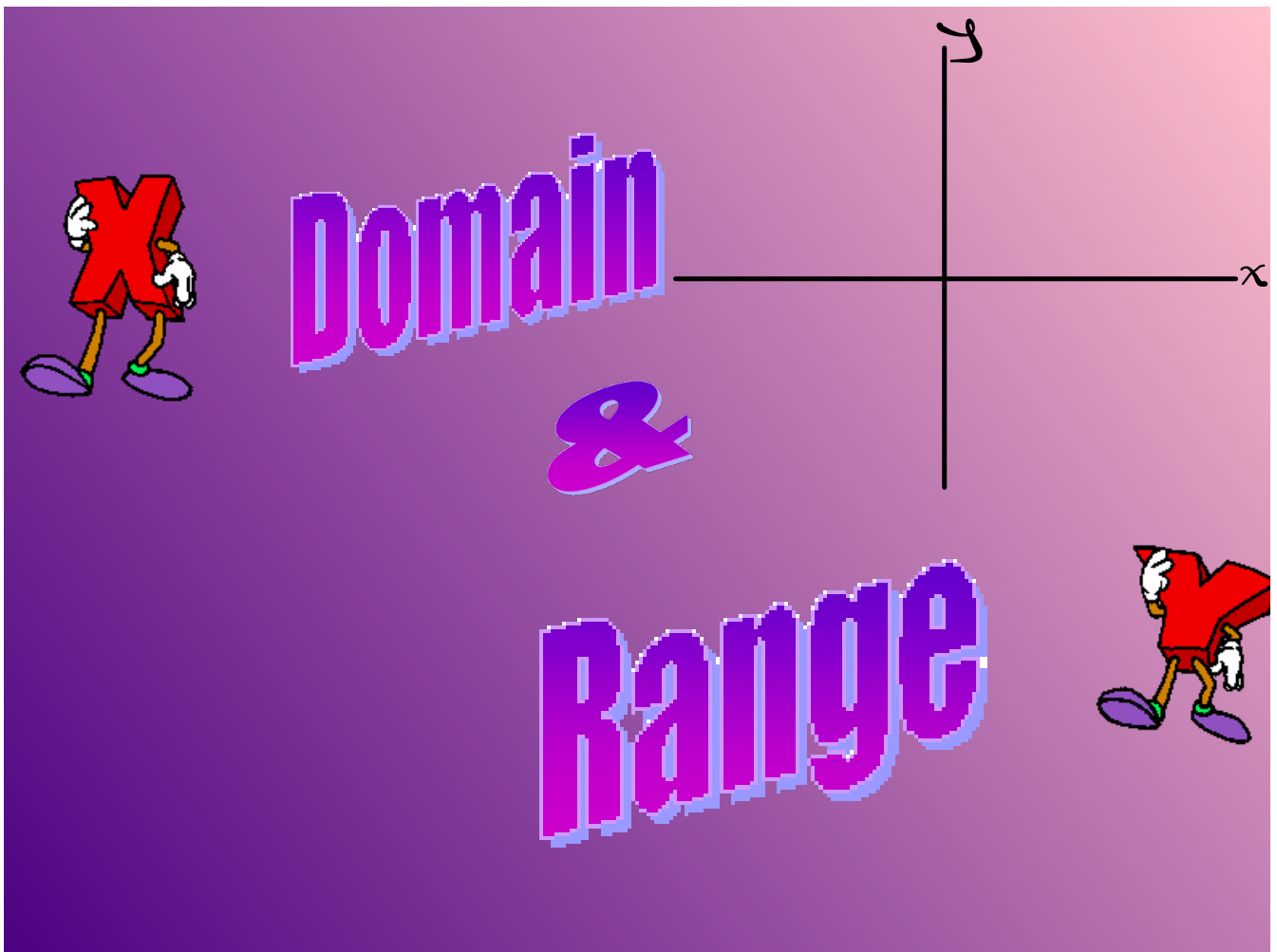
### Make Connections



Input	Output
1	5
2	7
	9
4	
	13



What is the rule for the Input/Output machine above?  
 Which numbers would complete this table for the machine?





# Domain & Range



**Domain** - the set of first elements in a relation  
(independant variable)  
 $x$

**Range** - the set of second elements in a relation  
(dependant variable)  
 $y$

# EXAMPLE...

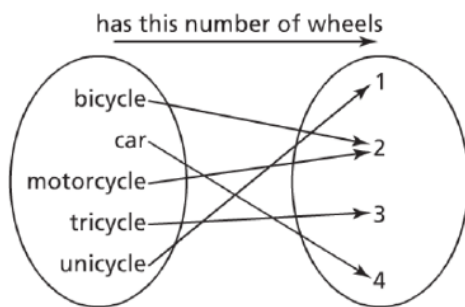
Sport	Equipment
badminton	shuttlecock
badminton	racquet
hockey	puck
hockey	stick
tennis	ball
tennis	racquet
soccer	ball



<b>Domain</b>	The set of first elements: { badminton, hockey, tennis, soccer }
<b>Range</b>	The set of second elements: { shuttlecock, racquet, puck, stick, ball }

}

## EXAMPLE... Arrow Diagram



**Domain?**  
**Range?**

D: { bicycle, car, motor, tri, uni }  
R: { 1, 2, 3, 4 }      { }

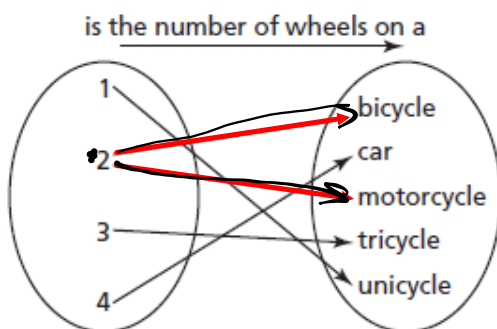
## Properties of Functions

**Function - is a special relation where...**

- each element in the domain is associated with exactly one element in the range
- each value of x has "one and only one" y value.

**A function is a "well-behaved" relation !!!**

**EXAMPLE...** This relation associates a number with a vehicle with that number of wheels.



What is the domain?

$\{1, 2, 3, 4\}$

What is the range?

$\{bi, car, motor, tri, uni\}$

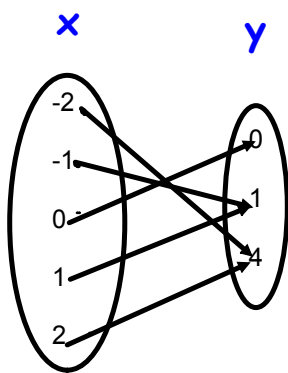
Is this relation a function?

No



## 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)

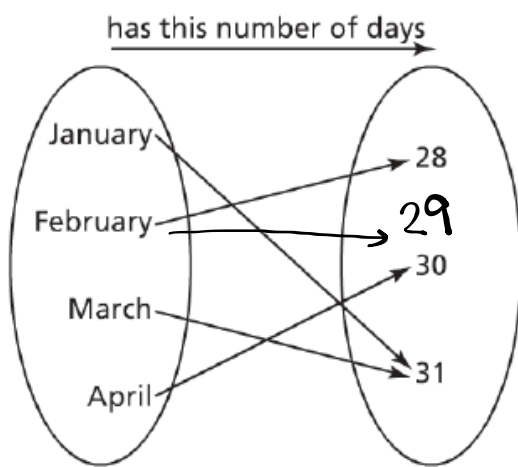


Function or Not a function  
that is the question?



Function.

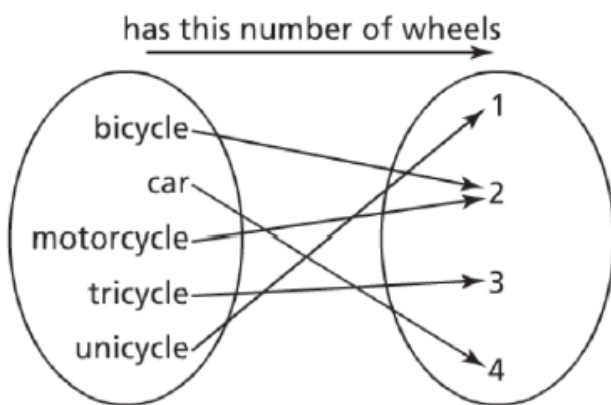
# YOUR TURN...



Function or Not a function  
that is the question?



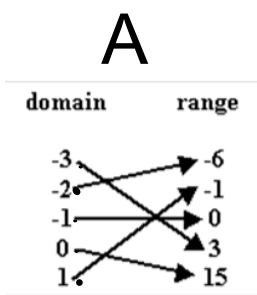
# YOUR TURN...



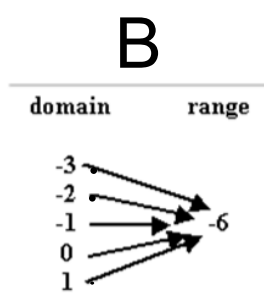
Function or Not a function  
that is the question?



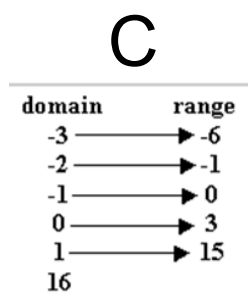
Would any of these be functions???



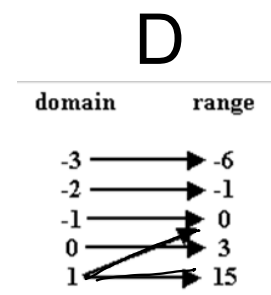
F



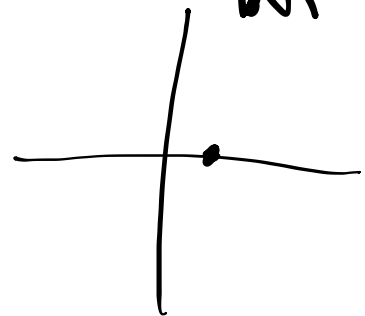
F



F



NF



- 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 or Not a function  
that is the question?



## What about a table?

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

Function or Not a function  
that is the question?



NF

What about a set of ordered pairs?

$\{ \overset{\uparrow}{\textcircled{2}}, 5), (3, 7), (4, 7), \overset{\uparrow}{\textcircled{2}}, 6), (8, 0) \}$

Function or Not a function  
that is the question?

NF



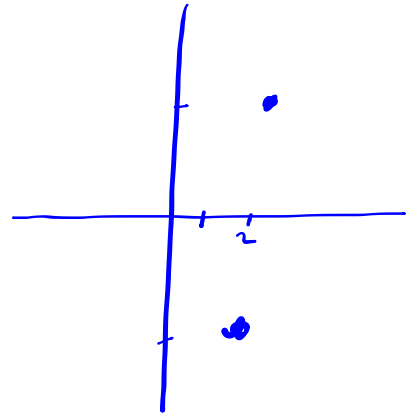
## LET'S TRY THIS ONE...

- State the domain and range of the following relation. Is the relation a function? or **NF**

$\{(2, -3), (4, 6), (3, -1), (6, 6), (2, 3)\}$

Domain:  $\{2, 3, 4, 6\}$

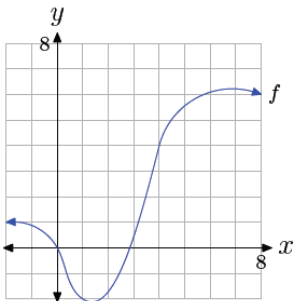
Range:  $\{-3, -1, 3, 6\}$





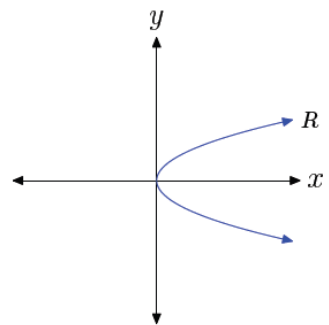
What if we are provided a graph?

Would this be a function?



*Function*

How about this one?

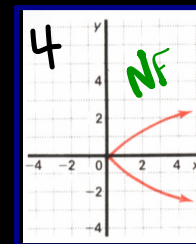
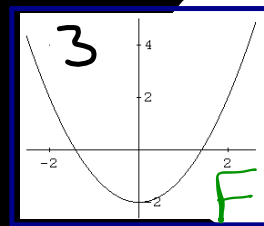
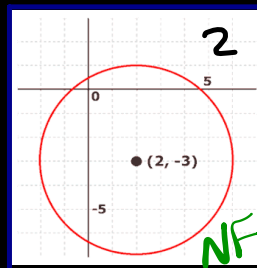
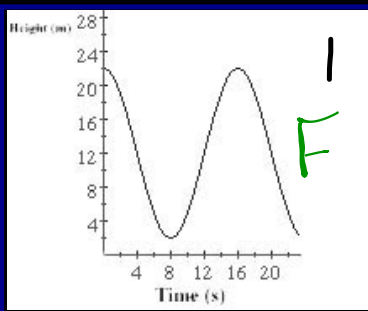


See any quick way to determine if a graph is a function?



**The Vertical Line Test.** If any vertical line cuts the graph of a relation more than once, then the relation is **NOT** a function.

# Functions VS ~~Non-Function~~ Relations



Move the magnify glass to identify the functions

## **PRACTICE PROBLEMS...**

p. 270: #1 - 5, 8, 10, 11

## Attachments

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Worksheet - Function Notation.pdf