Properties of Functions

Domain and Range

Domain - the set of first elements in a relation

X - values

Range - the set of second elements in a relation
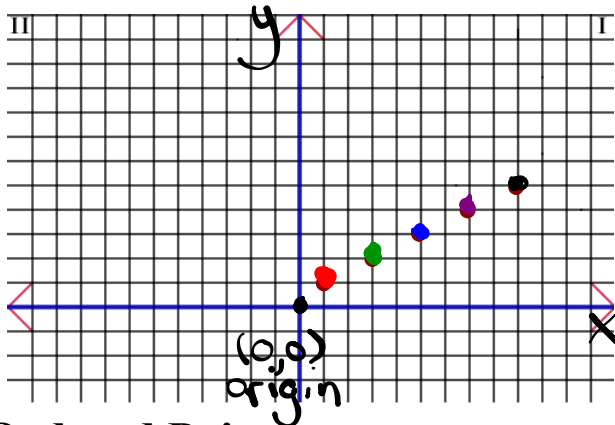
y-values

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

x ...... y

First   **Second**

(Sport, Equipment)

ordered pair
(x,y)

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

y

II   I

$(0,0)$
origin

Ordered Pairs:

left if x
is negative

down if y
is negative

$$(\; x \; , \; y \;)$$

right if x
is positive

up if y
is positive

1st 2nd 1st 2nd 1st 2nd 1st 2nd 1st 2nd

$$\{ \; (1,1) \; , \; (3, 2) \; , \; (5, 3) \; , \; (7, 4) \; , \; (9, 5) \; \}$$

Domain x-values	The set of first elements: { 1, 3, 5, 7, 9}
Range y-values	The set of second elements: { 1, 2, 3, 4, 5}

Function or Nonfunction

A relation where each element in the first set is associated with <u>one and only one</u> element in the second set. (x's do not repeat)

repitition in the x-values

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

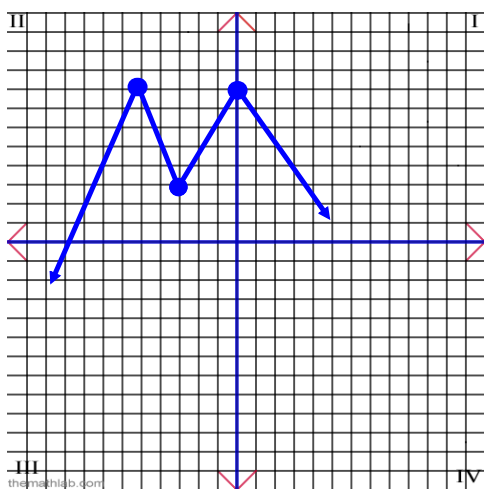**Function or Nonfunction**

Function or Nonfunction

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

repitition in x-values

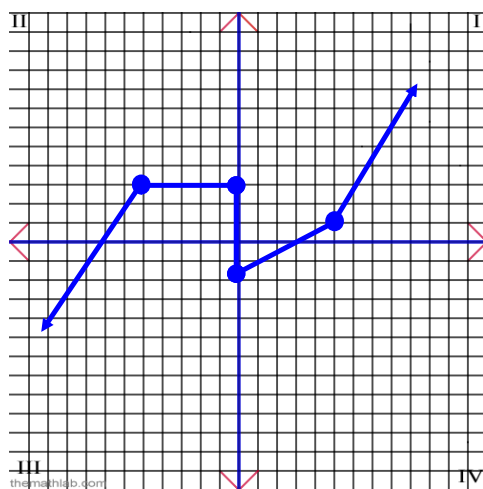# Function or Nonfunction

Use the vertical line test!!
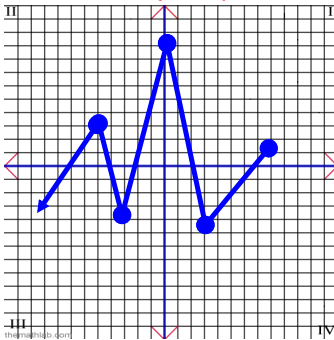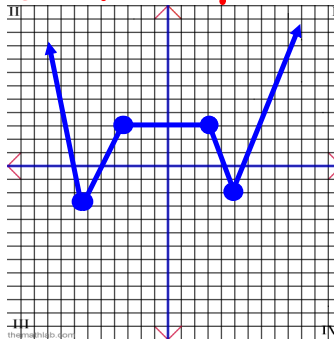
Pass the VLT → Function
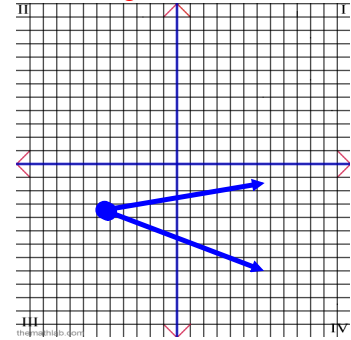Fails the VLT → Nonfunction
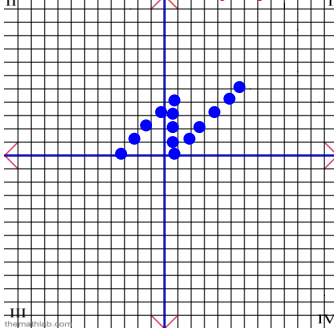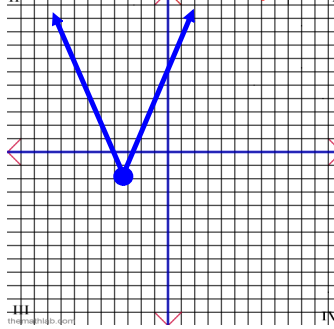
Function

Nonfunction

Function or Nonfunction

function

function

nonfunction

nonfunction

function

nonfunction

has this number of days

x

y

No repitition
in x-values

January

February

March

April

28

30

31
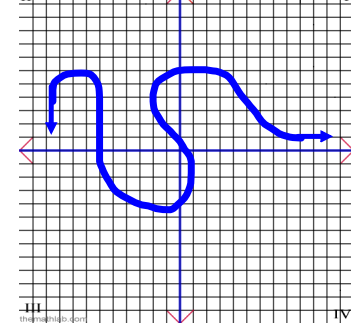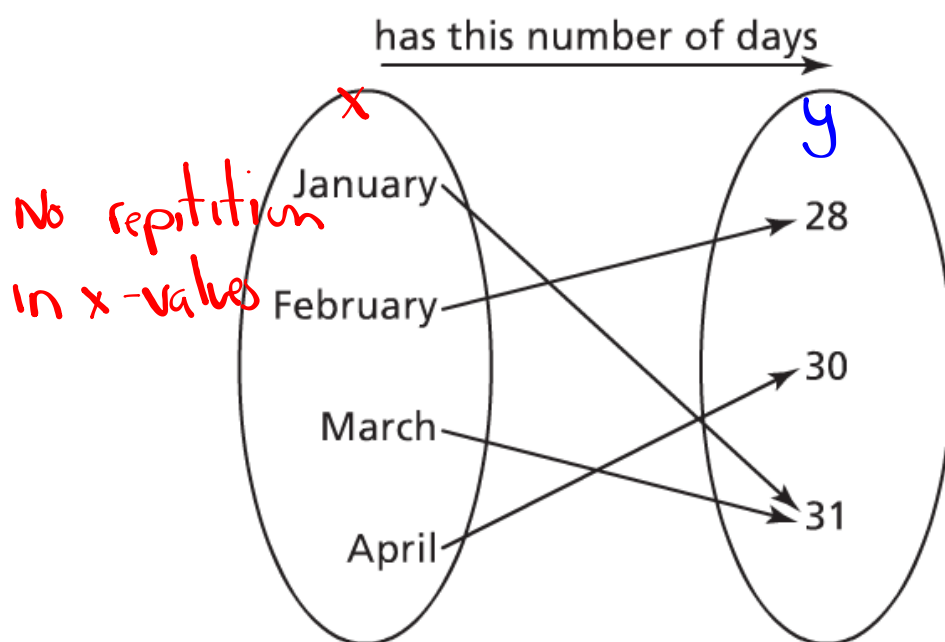
Function or Nonfunction

Independent/Dependent

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

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

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.

$\times$ y

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

$$y = 12x$$

$$P = 12h$$

$$\boxed{P(h) = 12h}$$ function notation

Gross Pay (P) is a function of time (t)

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

Let's write the function notation

$$P(h) = 12h$$

What is the person's pay after 20 hours? $h = 20$

$$P(h) = 12h$$

$$P(20) = 12(20)$$

$$P(20) = \$240.00$$

$$(20, 240)$$

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

x *y*

no repitition

a) State the domain & Range. D: $\{1,2,3,4,5,6\}$

R: $\{1.27, 2.54, 3.81, 5.08, 6.35, 7.62\}$

b) Is this relation a function?

Yes because the x-values do not repeat.

c) State the dependent and independent variables.

independent : number of marbles (n)
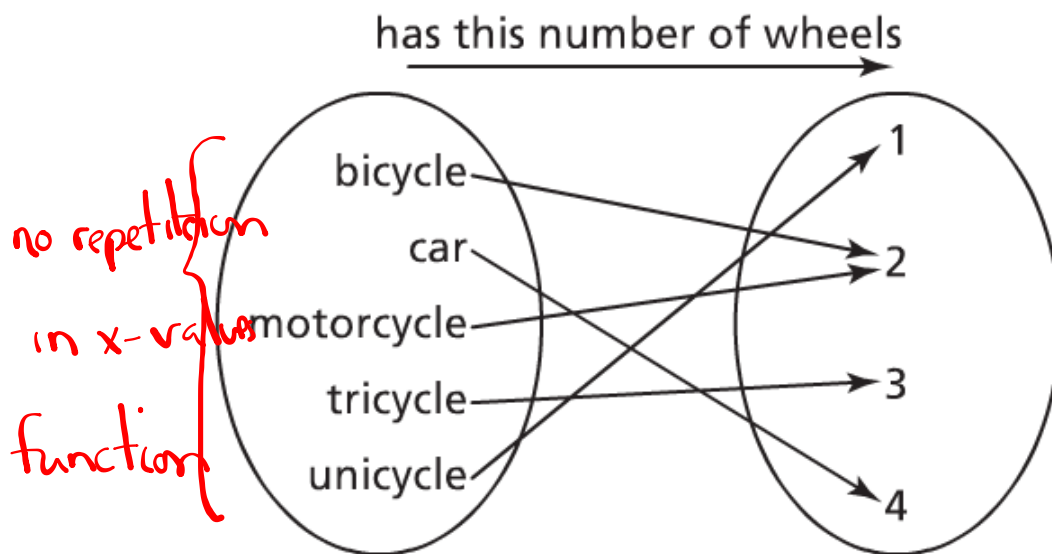dependent : mass of marbles (m) measured in grams.

d) Write the function notation.

$y = 1.27 x$

$m(n) = 1.27 n$

Solution:

a) Domain: {1, 2, 3, 4, 5, 6}
   Range: {1.27, 2.54, 3.81, 5.08, 6.35, 7.62 }

b) Function

c)   Independent - Number of marbles
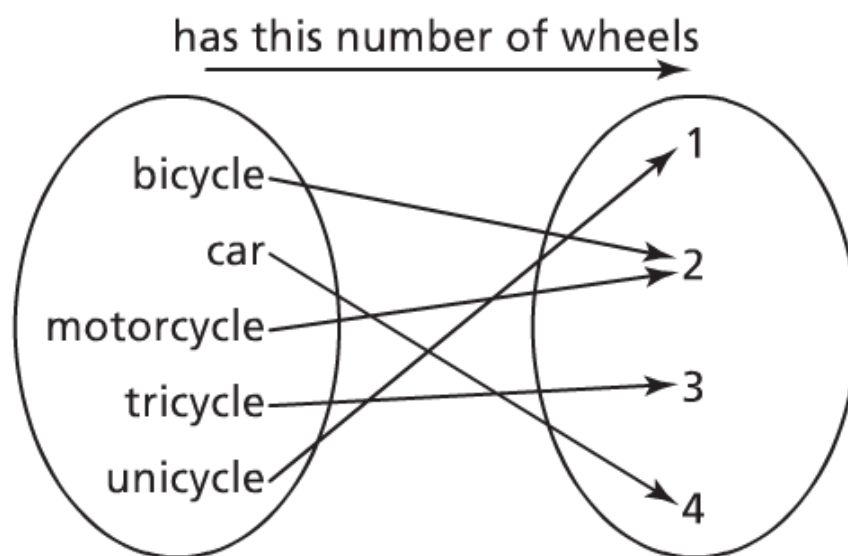   Dependent - Mass of marbles

d) M(n) = 1.27n

has this number of wheels

no repetition
in x-values
function

bicycle
car
motorcycle
tricycle
unicycle

1
2
3
4

| **Domain** | The first set of elements:
{bicycle, car, motorcycle, tricycle, unicycle} |
| **Range** | The second set of elements:
{1, 2, 3, 4} |

has this number of wheels

bicycle

car

motorcycle

tricycle

unicycle

1

2

3

4

Function or Nonfunction

Homework

Page 270 #4,5,8,9