

Unit 4 **L2 Functions Vs. Relations**

Definition:
A relation is a rule which takes an input and may/or may not produce **multiple** outputs.

Notation:
Relation: $y = 2x + 1$
Read it "f of x": the brackets here DO NOT MEAN MULTIPLY!!
Function: $f(x) = 2x + 1$
Ex 1: find $f(7) =$
 $=$
find $f(-5) =$
 $=$

A function is a special relation where every input has **at most** one output.

Consider 2 machines. **Machine A:**

Buttons Push **IN** to order Drink Comes **OUT**

A FUNCTIONING MACHINE

Vertical line test (VLT)

Machine B:

Buttons Push **IN** to order Drink Comes **OUT**

A Not FUNCTIONING MACHINE

Vertical line test (VLT)

(1) Mapping Diagram

Function _____

X-values
Independent Input
Source
Antecedent
Domain

Y-values
Dependent Output
Target
Image
Range

(2) Table of Values

Function _____

x	y
0	3
1	4
3	6
5	8

Each x value has only **ONE** y value.

Function _____

x	y
1	0
2	1
4	3
4	5

An x value has **MORE THAN ONE** y value

(3) Graph - Vertical Line Test (VLT)

Function _____

A vertical line touches the curve at **ONLY 1** spot at a time

Function _____

A vertical line touches **MORE THAN 1** spot at a time.

Ex 2: Evaluate the following functions

a) $f(x) = 3x + 5$ find $f(3)$

b) $g(x) = x^2 + 1$ find $g(6)$

c) $h(x) = (x-2)(x-5)$ find $h(6)$

Example 3

Consider the function f represented on the right. Determine if the following statements are true or false.

a) $f(0) = 1$ _____ b) 3 is the image of 2 _____
c) 3 is the antecedent of 8 _____ d) $f(4)$ does not exist _____
e) $f(x) = x^2 - 1$ _____

Example 4

Find the rule of the functions with the following graphs.

a) $f = \{(0, 0), (1, 1), (2, 4), (3, 9)\}$. _____ b) $g = \{(0, 0), (1, 2), (2, 4), (3, 6)\}$. _____
c) $h = \{(0, 1), (1, 3), (2, 5), (3, 7)\}$. _____ d) $u = \{(0, 1), (1, 2), (2, 5), (3, 10)\}$. _____

Practice:
4.2 # 1