


Concept: Relations, Equations and Functions

Name: _____

COMPUTER COMPONENT

Instructions: In  follow the **Content Menu** path:

Graphing > Relations, Equations, and Functions



Work through all Sub Lessons of the following Lessons **in order**:

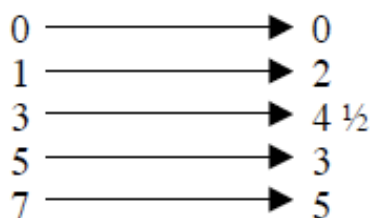
- *In This Topic*
- *Relations*
- *Functions*
- *Vertical Line Test*
- *Function Notation*
- *Patterns to Words to Equations*



As you work through the computer exercises, you will be prompted to make notes in your notebook/math journal.

NOTES

- In mathematics, a ***relation is a set of ordered pairs.***
- It shows how ***numbers are related.***
- These sets of ordered pairs can be drawn on a ***graph*** or listed in a ***table.***
- Another way to display the ordered pairs is by using a ***mapping*** (*draw one below*)



- The **DOMAIN** of a relation is the set of all ***first*** numbers of the ordered pairs.
- The **RANGE** of a relation is the set of all ***second*** numbers of the ***ordered pairs.***
- A ***function*** is a relation in which each element (***number***) of the ***domain*** is mapped to exactly ***one*** element (***number***) of the ***range.***
- A useful test we can use on a graph to see if the graph is a function is called the ***Vertical Line*** Test. *Explain, in your own words, how this test works.*

A vertical line that passes over a graph from left to right will never exceed one intersection point with a function.

- (a) How do we read $f(x)$ if we are saying it out loud? **“f of x”**
- (b) What is $f(4)$ asking for? **Substitute the value of 4 within the function’s variable.**
- (c) Design your own “Patterns to Words to Equations” Example (similar to examples 1,2,3,4) (***Answers will vary***)

OFF COMPUTER EXERCISES

1. The following shows how grass growth in millimeters (G) is related to rainfall in millimeters (R).

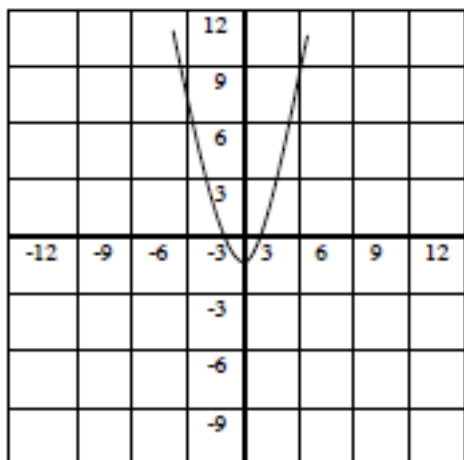
G	R	Ordered Pair (G,R)
1	5	(1, 5)
2	6	(2, 6)
3	7	(3, 7)
4	8	(4, 8)

- (a) Fill in the ordered pairs in the chart.
- (b) Place the results from the chart into a mapping.
- 1 \longrightarrow 5
- 2 \longrightarrow 6
- 3 \longrightarrow 7
- 4 \longrightarrow 8
- (c) *The Domain of the Relation is (1, 2, 3, 4, 5, ...n)*
- (d) *The Range of the Relation is (5, 6, 7, 8, 9,... n + 4)*
- (e) ***Predict*** how many millimeters of rain are needed for the grass to grow 5 millimeters. ***9mm of rain would need to fall***

2. Note the following chart:

x	y	Ordered Pair (x,y)
-3	9	(-3, 9)
-2	4	(-2, 4)
-1	1	(-1, 1)
0	0	(0, 0)
1	1	(1, 1)
2	4	(2, 4)

- (a) The equation rule for this relation is $y = x^2$. *Fill in the y column.*
- (b) Fill in the ordered pair column.
- (c) *The Domain is (...-3, -2, -1, 0, 1, 2, 3, ...x)*
- (d) *The Range is (...9, 4, 1, 0, 1, 4, 9, ...x²)*
- (e) Graph this relation here.



3. Examine the charts below and decide whether the relation is a *function* or a *non-function*. (Drawing a mapping in this exercise may help you.)

(a)

x	y	(x,y)
1	4	(1,4)
5	7	(5,7)
-1	5	(-1,5)
5	2	(5,2)
0	0	(0,0)

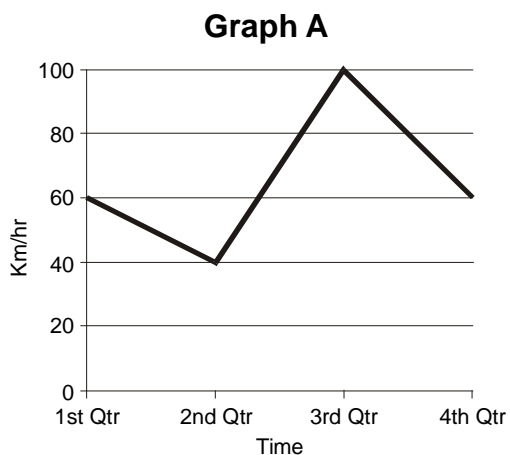
Non-Function

(b)

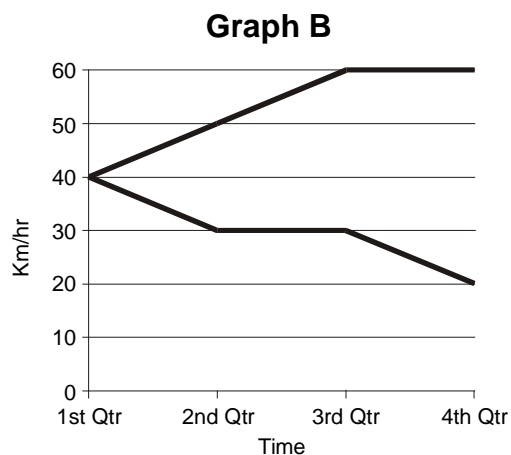
S	T	(S,T)
0	6	(0,6)
2	4	(2,4)
4	2	(4,2)
-2	4	(-2,4)

Function

4. Determine from these graphs if the relations are functions or non-functions.



Function



Non-Function

5. Given the equation rule $y = 4x + 1$ and the x values,

x	y
-2	-7
-1	-3
0	1
1	5
2	9

(a) Fill in the y values on the chart.

(b) Give the equation $y = 4x + 1$ in function notation. $f(x) = 4x + 1$

(c) What is $f(4)$ asking for? $f(4) = 4(4) + 1$

(d) Find $f(4)$. $f(4) = 17$

6. (a) Find the pattern and give the equation formed from the function below.

x	y	y + 3
-4	8	11
-1	2	5
0	0	3
2	-4	-1
4	-8	-5

Equation- $f(x) = -2x$

(b) Note the pattern. *Write it in words. Write the equation using function notation.*

Multiply the values in the x column by -2 to calculate the corresponding value of y.

(c) Create a third column on the right side of the chart above.

Add 3 to each y value and place this new value in the third column.

(d) Find the equation for the new y values. $y = -2x + 3$

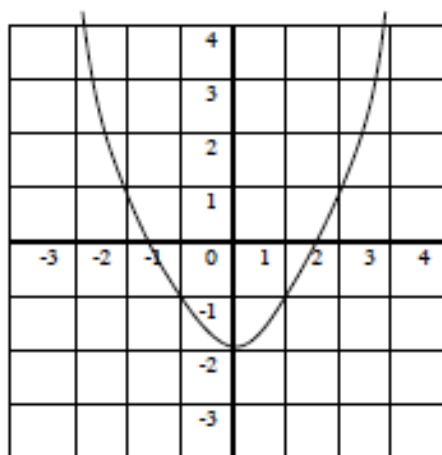
(e) Write this new equation in function notation. $f(x) = -2x + 3$

5. Given the equation rule $y = x^2 - 2$,

(a) Fill in the y column and the ordered pair column in the chart.

x	y	(x,y)
-3	7	(-3, 7)
-2	2	(-2, 2)
-1	-1	(-1, -1)
0	-2	(0, -2)
1	-1	(1, -1)
2	2	(2, 2)
3	7	(3, 7)

(b) Graph this relation on the graph below.



(c) Is this relation a function? *Why or why not?* ***This is a function, as every x value has a distinct y value.***

(d) Find $f(2.5)$ $f(2.5) = 4.25$