

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## INTRODUCTION TO FUNCTIONS ALGEBRA 2 WITH TRIGONOMETRY

Most higher level mathematics is built upon the concept of a function. Like most of the important concepts in mathematics, the definition of a function is simple to the point of being easily overlooked. Make sure to know the following definition:

**DEFINITION:** A **function** is any “rule” that assigns exactly one output value ( $y$ -value) for each input value ( $x$ -value). These rules can be expressed in different ways, the most common being equations, graphs, and tables of values. We call the input variable **independent** and output variable **dependent**.

**Exercise #1:** An internet music service offers a plan whereby users pay a flat monthly fee of \$5 and can then download songs for 10 cents each.

(a) What are the independent and dependent variables in this scenario?

Independent:

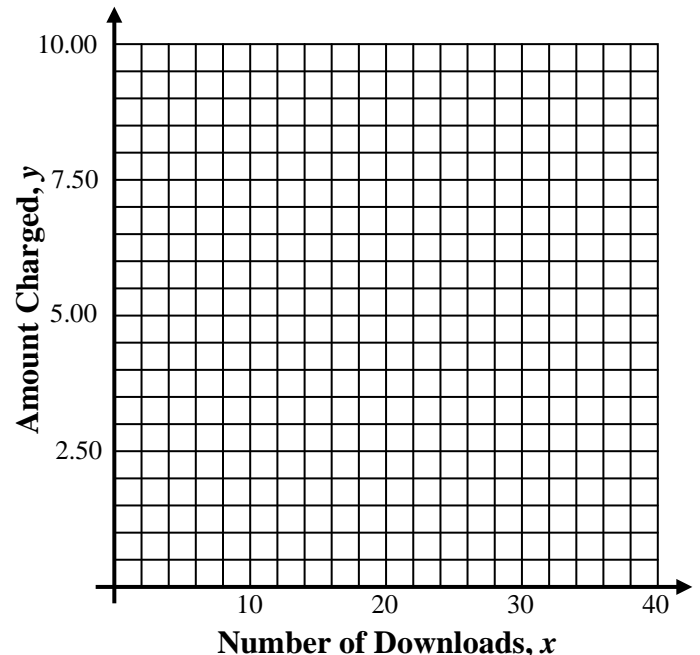
Dependent:

(b) Fill in the table below for a variety of independent values:

Number of downloads, $x$	0	5	10	20
Amount Charged, $y$				

(c) Let the number of downloads be represented by the variable  $x$  and the amount charged be represented by the variable  $y$ , write an equation that models  $y$  as a function of  $x$ .

(d) Based on the equation you found in part (c), produce a graph of this function for all values of  $x$  on the interval  $0 \leq x \leq 40$ . Use your calculator to generate additional coordinate pairs to the ones you found in part (b).



**Exercise #2:** One of the following graphs shows a relationship where  $y$  is a function of  $x$  and one does not.

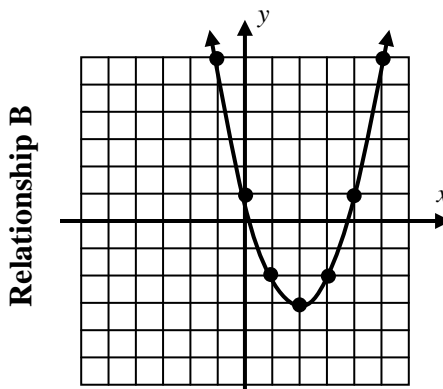
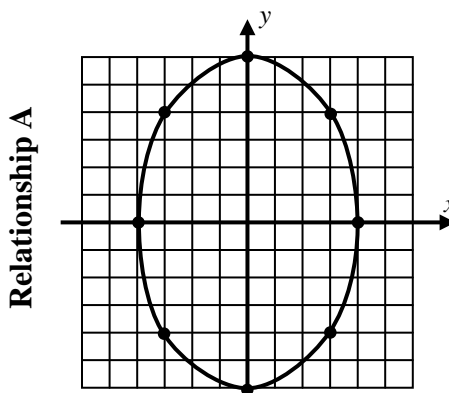
(a) Draw the vertical line whose equation is  $x = 3$  on both graphs.

(b) Give all output values for each graph at an input of 3.

Relationship A:

Relationship B:

(c) Explain which of these relationships is a function and why.



**Exercise #3:** The graph of the function  $y = x^2 - 4x + 1$  is shown below.

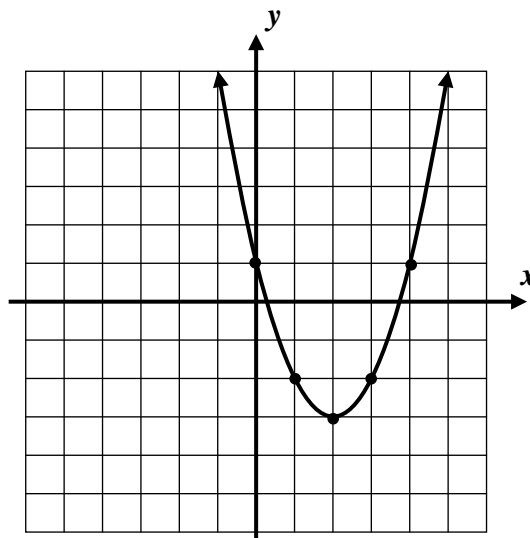
(a) State this function's  $y$ -intercept.

(b) Between what two consecutive integers does the larger  $x$ -intercept lie?

(c) Draw the horizontal line  $y = -2$  on this graph.

(d) Using these two graphs, find all values of  $x$  that solve the equation below:

$$x^2 - 4x + 1 = -2$$



(e) Verify that these values of  $x$  are solutions by using **STORE** on your graphing calculator.



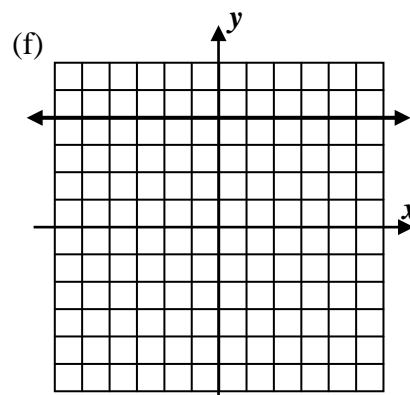
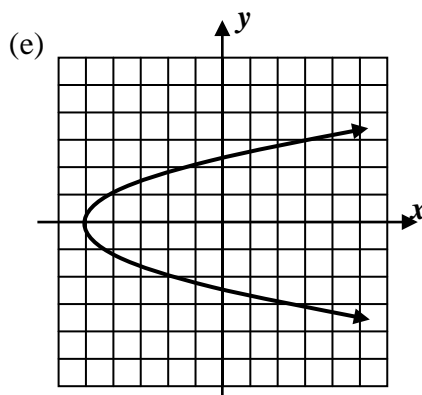
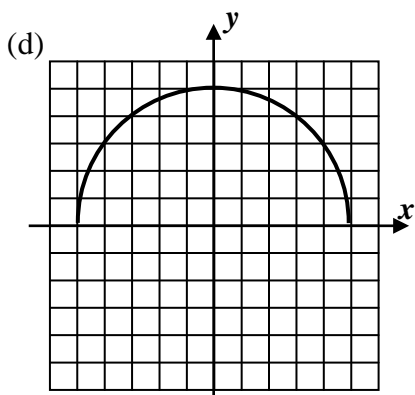
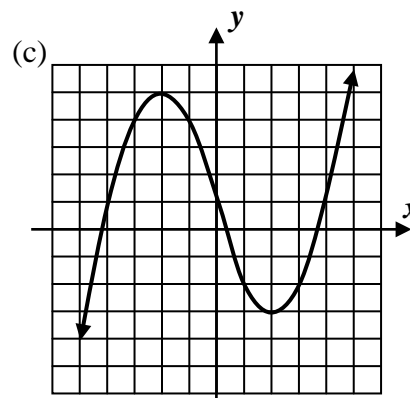
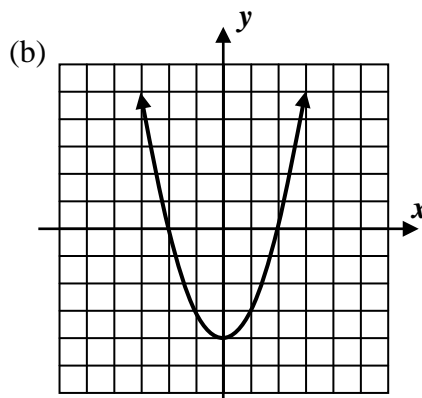
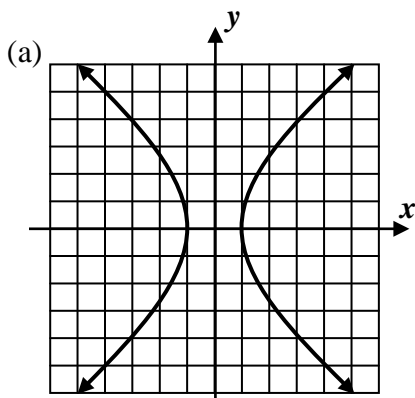
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## INTRODUCTION TO FUNCTIONS ALGEBRA 2 WITH TRIGONOMETRY - HOMEWORK

### SKILLS

1. Determine for each of the following graphed relationships whether  $y$  is a function of  $x$  using the Vertical Line Test.



2. What are the outputs for an input of  $x = 5$  given functions defined by the following formulas:

(a)  $y = 3x - 4$

(b)  $y = 50 - 2x^2$

(c)  $y = 2^x$



## APPLICATIONS

3. Evin is walking home from the museum. She starts 38 blocks from home and walks 2 blocks each minute. Evin's distance from home is a function of the number of minutes she has been walking.

(a) Which variable is independent and which variable is dependent in this scenario?

(b) Fill in the table below for a variety of time values.

Time, $t$ , in minutes	0	1	5	10
Distance from home, $D$ , in blocks				

(c) Determine an equation relating the distance,  $D$ , that Evin is from home as a function of the number of minute,  $t$ , that she has been walking.

(d) Determine the number of minutes,  $t$ , that it takes for Evin to reach home.

## REASONING

4. In one of the following tables, the variable  $y$  is a function of the variable  $x$ . Explain which relationship is a function and why the other is not.

$x$	$y$
-2	11
0	7
2	11
4	23
6	43

Relationship #1

$x$	$y$
0	0
1	-1
1	1
4	-2
4	2

Relationship #2

