Name: ______________________________________ Date: ___________________

INTRODUCTION TO FUNCTIONS
COMMON CORE ALGEBRA I

The concept of the **function** ranks near the top of the list in terms of important Algebra concepts. Almost all of higher-level mathematical modeling is based on the concept. Like most important ideas in math, it is relatively simple:

THE DEFINITION OF A FUNCTION

A **function** is a clearly defined **rule** that converts an **input** into **at most one output**. These rules often come in the form of: (1) equations, (2) graphs, (3) tables, and (4) verbal descriptions.

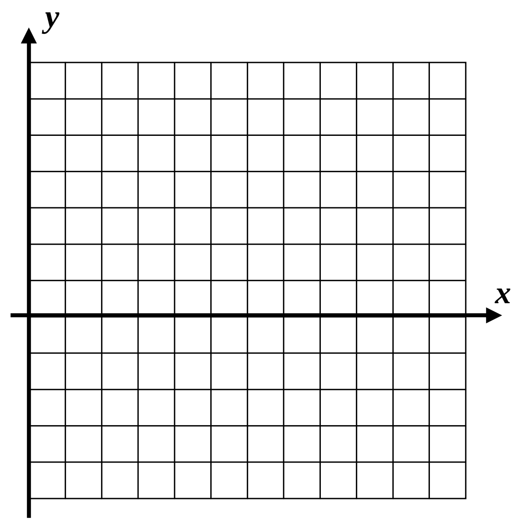
***Exercise* #1:** Consider the function rule: multiply the input by two and then subtract one to get the output.

(a) Fill in the table below for inputs and outputs. Inputs are often designated by *x* and outputs by *y*.

Input x	Calculation	Output y
0		
1		
2		
3		

(b) Write an equation that gives this rule in symbolic form.

(c) Graph the function rule on the graph paper shown below. Use your table in (a) to help.



***Exercise* #2:** In the function rule from #1, what input would be needed to produce an output of 17? Why is it harder to find an input when you have an output than finding an output when you have an input?

***Exercise* #3:** A function rule takes an input, *n*, and converts it into an output, *y*, by increasing one half of the input by 10. Determine the output for this rule when the input is 50 and then write an equation for the rule.

***Exercise* #4:** Function rules do not always have to be numerical in nature, they simply have to return a single output for a given input. The table below gives a rule that takes as an input a neighborhood child and gives as an output the month he or she was born in.

Child	Birth Month
Max	January
Evin	April
Zeke	May
Rosie	February
Niko	May

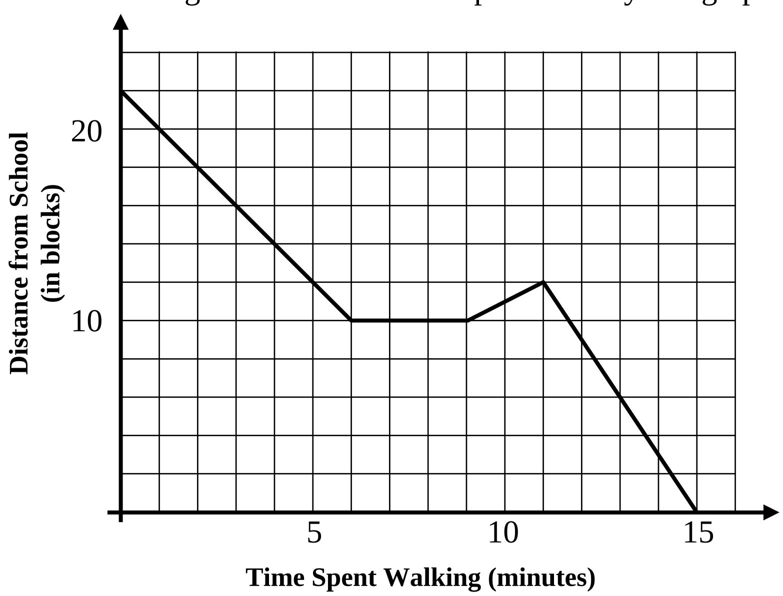
(a) Why can we consider this rule a function?

(b) What is the output when the input is Rosie?

(c) Find all inputs that give an output of May. Why does this *not* violate the definition of a function even though there are two answers?

Functions are useful because they can often be used to **model** things that are happening in the real world. The next exercises illustrates a function given only in graphical form.

***Exercise* #5:** Charlene heads out to school by foot on a fine spring day. Her distance from school, in blocks, is given as a function of the time, in minutes, she has been walking. This function is represented by the graph given below.



(a) How far does Charlene start off from school?

(b) What is her distance from school after she has been walking for 4 minutes?

(c) After walking for six minutes, Charlene stops to look for her subway pass. How long does she stop for?

(d) Charlene then walks to a subway station before heading to school on the subway (a local). How many blocks did she walk to the subway?

(e) How long did it take for her to get to school once she got on the train?

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INTRODUCTION TO FUNCTIONS
COMMON CORE ALGEBRA I HOMEWORK

FLUENCY

1. Decide whether each of the following relations is a function. Explain your answer.

Input	Outputs	Function?
(a) States	Capitals	
(b) States	Cities	
(c) Families	Pets	
(d) Families	Last names	

2. In each of the following examples, use an input-output chart to decide if the following relation is a function.

(a) Consider the following relation: multiply the input by five and then subtract seven to get the output.

Input x	Calculation	Output y
-3		
0		
6		

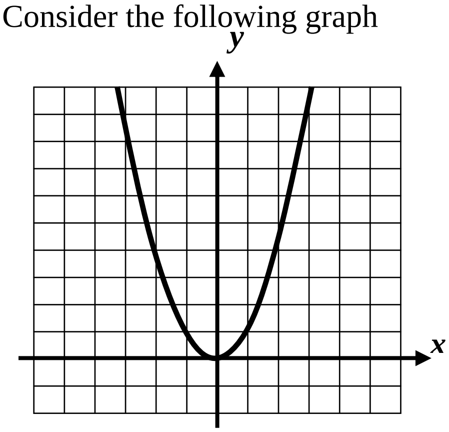
Function? Yes/No

(b) Consider the following table;

Input x	Calculation	Output y
-2	None	4
3	None	3
3	None	2

Function? Yes/No

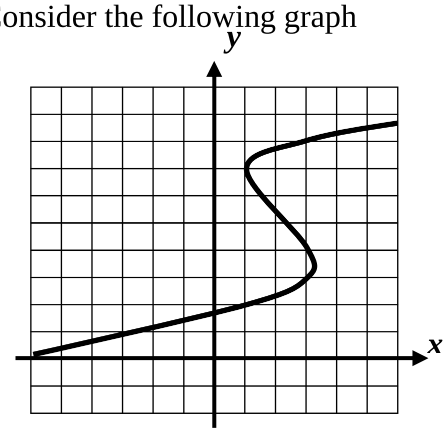
(c) Consider the following graph



Input x	Calculation	Output(s) y
-2	None	
1	None	
2	None	

Function? Yes/No

(d) Consider the following graph

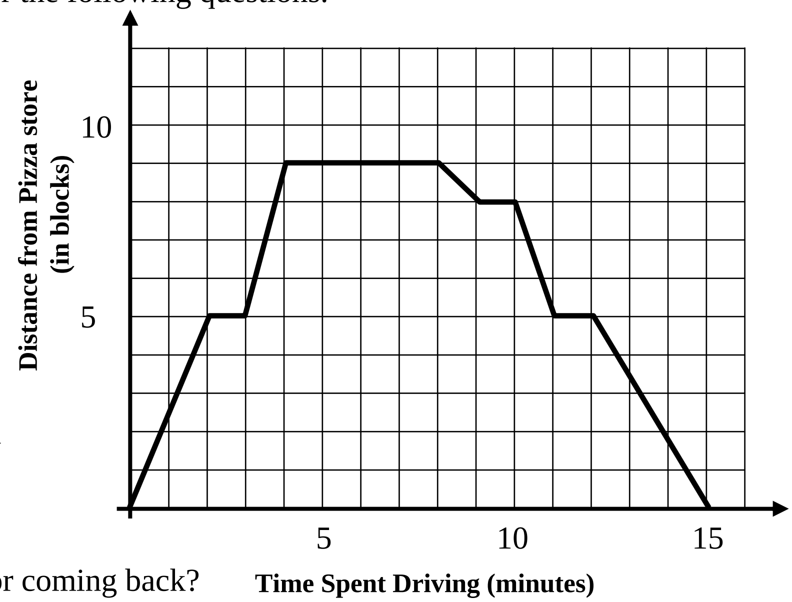


Input x	Calculation	Output(s) y
-3	None	
1	None	
3	None	

Function? Yes/No

APPLICATIONS

3. Andrew has a new job at the local pizza store as a delivery boy. The following graph shows one of his deliveries he made. Analyze the graph and answer the following questions.



(a) How long was the entire trip?

(b) If he arrived at the house after 4 minutes, how far away was the house from the pizza place?

(c) Why might Andrew have stopped 3 times for 1 minute?

(d) Was Andrew's trip longer going to the house or coming back?

REASONING

4. Given the following scenario, graph a function that would map Liza's distance away from her house according to the time elapsed.

Liza has a few items she needs to pick up from a grocery store 8 blocks away. Liza travels as a constant rate of 2 blocks per minute when not stopped at a light. On her way to the grocery store she doesn't hit any red lights and the trip takes her 4 minutes. She spends 8 minutes in the grocery store and then starts to head home. When she's halfway home she hits a red light that lasts 3 minutes. After the light ends, she then drives the second half of the way home.