

INTRODUCTION TO FUNCTIONS N-GEN MATH[®] ALGEBRA I



The concept of a **function** is extremely important in Algebra I and in other areas of math.

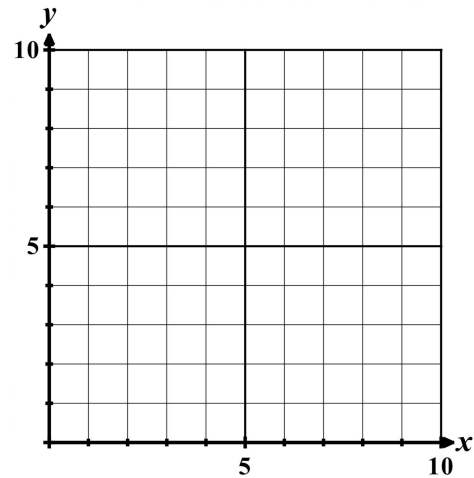
THE DEFINITION OF A FUNCTION

A **function** is a clearly defined **rule** that converts (or maps) an **input** from one **set**, known as the **domain**, into **exactly one output** from another **set**, known as the **range**. These rules often come in the form of: (1) equations, (2) graphs, (3) tables, (4) ordered pairs, and (5) verbal descriptions.

Exercise #1: Consider the function rule given in verbal form: divide the input by two and then add three to get the output. The **domain** (or **input set**) for this function is $\{0, 2, 4, 6, 8, 10\}$.

- (a) Give a **set** in **roster form** that represents the **range** of this function (the outputs). Show how each input is mapped to an output.
- (c) Create a graph of this function using the ordered pairs from (b).

- (b) Translate your inputs and outputs from (a) into **coordinate pairs**. For functions, the **input** is the **x-coordinate**, and the **output** is the **y-coordinate**.



Exercise #2: Graphs are an excellent way to show a function rule. The graph below shows a relationship that is a function. Answer the questions based on the graph.

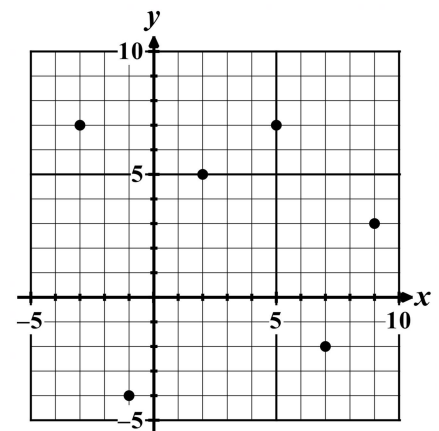
- (a) State the outputs for each of the following inputs to the function.

input = -1 output = _____

input = 5 output = _____

input = 9 output = _____

- (b) Can two different inputs have the same output?



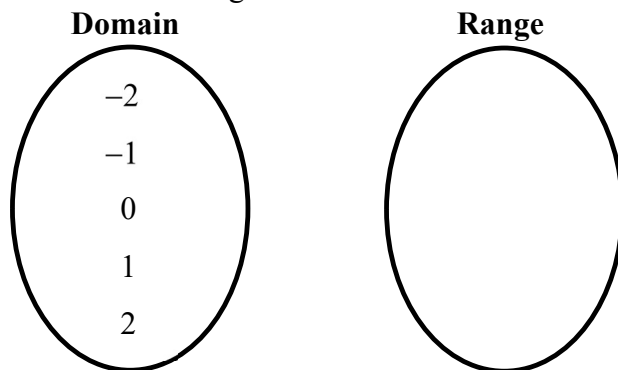
- (c) If the point $(2, -4)$ was added to this graph, it would no longer be a function. Why? Look carefully at the definition of a function.



Function rules often take the form of **equations** involving **two variables**. Almost always, these equations are **solved** for the **output variable** in terms of the **input variable**.

Exercise #3: The equation $y = x^2$ gives a function rule where the output, y , can be calculated for a given value of the input, x .

- (a) If the domain is the set $\{-2, -1, 0, 1, 2\}$, find the set that represents the range of this function.
- (b) Create a **mapping diagram** below showing how each member of the domain gets mapped to a member of the range.



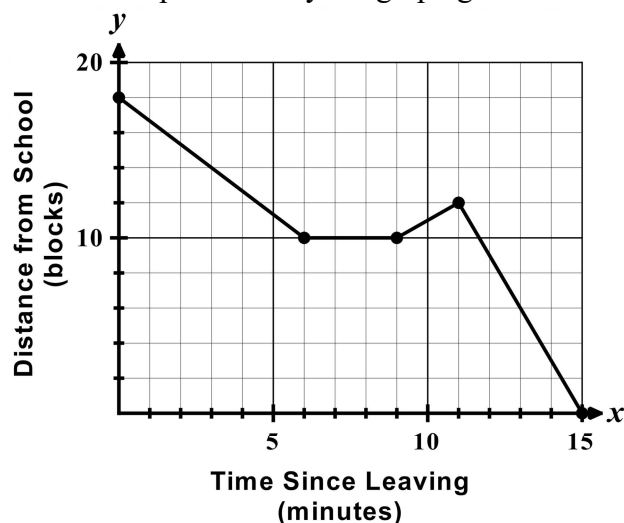
Exercise #4: The equation $y = 5x - 3$ represents a function where the variable y is a function of the variable x . The domain of this function is the set $\{-2, 0, 3, 7\}$.

- (a) Give a set that represents the range of this function.
- (b) Represent this function as a set of coordinate pairs.

Functions are useful to show relationships in the real-world. They can model important relationships.

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

- (a) How far does Charlene start off from school?
- (b) How long does it take Charlene to get to school?
- (c) For the domain interval $[6, 9]$, what is true about the outputs to the function? What does this tell you about Charlene's motion?



INTRODUCTION TO FUNCTIONS
N-GEN MATH[®] ALGEBRA I HOMEWORK

FLUENCY

1. Which of the following is true about the relationship between the inputs and outputs of a function?
- (1) each output value has only a single input value
(2) each input value has only a single output value
(3) each input value has multiple output values
(4) each output value has multiple input values _____
2. The set of inputs for a particular function is known as
- (1) the function's inset (3) the function's mapping
(2) the function's range (4) the function's domain _____
3. A function is defined using the formula $y = \frac{1}{3}x + 5$. If the domain of the function is $\{-12, 9, 18\}$, then which of the following is *not* an element of the function's range?
- (1) 1 (3) 9
(2) 8 (4) 11 _____
4. A function is defined using the set of ordered pairs: $\{(-4, 8), (-1, 2), (3, -4), (6, -1), (9, 6)\}$. Which of the following is the output when the input is -1 ?
- (1) 9 (3) 6
(2) 2 (4) -4 _____
5. Which choice below, if added to the function from the last problem (#4), would cause it to no longer be a function?
- (1) $(3, 5)$ (3) $(14, -1)$
(2) $(0, 10)$ (4) $(5, 7)$ _____
6. A function is given by the rule $y = (x - 5)^2$. Which input value below would have the same output value as that of an input of $x = 8$?
- (1) -8 (3) 5
(2) 2 (4) 11 _____



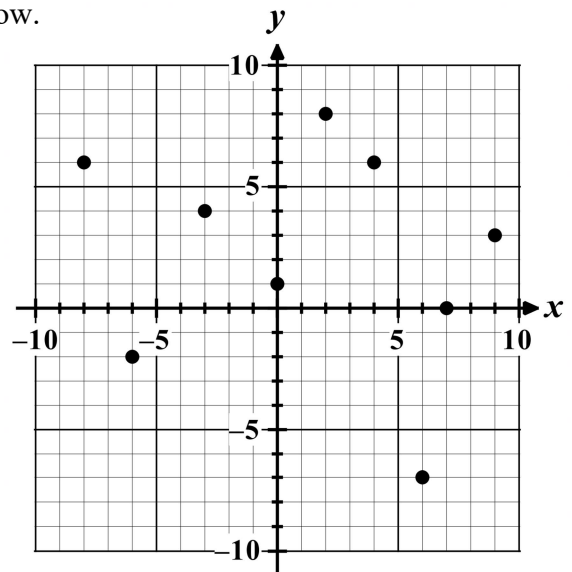
7. A function is given by the graph of coordinate pairs shown below.

(a) Give the output value below for each given input value.

input = -3 output = _____

input = 0 output = _____

input = 6 output = _____



(b) Give sets, in roster form, for both the domain and range of this function.

Domain:

Range:

(c) There are two inputs that have the same output. Which are they and what is their common output?

(d) Create an ordered pair that if added to the graph would make it no longer be a function. Justify your choice by explaining why the graph is no longer that of a function.

APPLICATIONS

8. A fundraiser at school is selling brownies for \$0.75 each. The students running the fundraiser have 40 brownies they can sell. They create the following equation to calculate how much total money they have raised as a function of the number of brownies they sold.

$$m = 0.75n$$

- (a) When the input to this function is 23, the output is 17.25. What does this tell you? (b) What is the largest number in the range of this function? Explain how you found your answer.

REASONING

9. Why can't the value 2 be a member of the range of the function in the last problem?

