Name: _____ Date: _____

FUNCTION NOTATION
N-GEN MATH® ALGEBRA I

*Since functions are rules that convert **inputs** (typically x-values) into **outputs** (typically y-values), it makes sense that they have their own **notation** to indicate what the rule is, what the input is, and what the output is. In the first exercise, you will learn how to interpret this notation.*

***Exercise* #1:** For each of the following functions, find the outputs for the given inputs.

(a) $f(x)=3x+7$

$f(2)=$

$f(-3)=$

(b) $g(x)=\dfrac{x-6}{2}$

$g(20)=$

$g(0)=$

(c) $h(x)=\sqrt{2x+9}$

$h(8)=$

$h(0)=$

Function notation can be confusing because it appears like multiplication due to the parentheses. Yet, there is no multiplication involved. The notation serves two purposes: (1) to tell us what the algebraic rule is and (2) to specify an output for a given input.

FUNCTION NOTATION

$$y=f(x)$$

output rule input

***Exercise* #2:** A function is defined using the following formula, $f(x)=\dfrac{x}{3}+7$.

(a) Explain what the function rule does to convert the input into an output.

(b) Evaluate $f(6)$ and $f(-9)$.

(c) What two coordinate points would lie on the graph of this function based on your answers to (b)?

(d) If $g(x)=2f(x)-1$ then what is $g(6)$? Show the work that leads to your answer.

(e) Find the value of the input for which $f(x)=12$. Show your work.

Functions can come in many forms other than equations. Function notation still remains the same, even if there is no equation involved.

***Exercise* #3:** Boiling water at 212 degrees Fahrenheit is left in a room that is at 65 degrees Fahrenheit. Temperature readings are taken each hour and are given in the table below. In this scenario, the temperature, *T*, is a function of the number of hours, *h*.

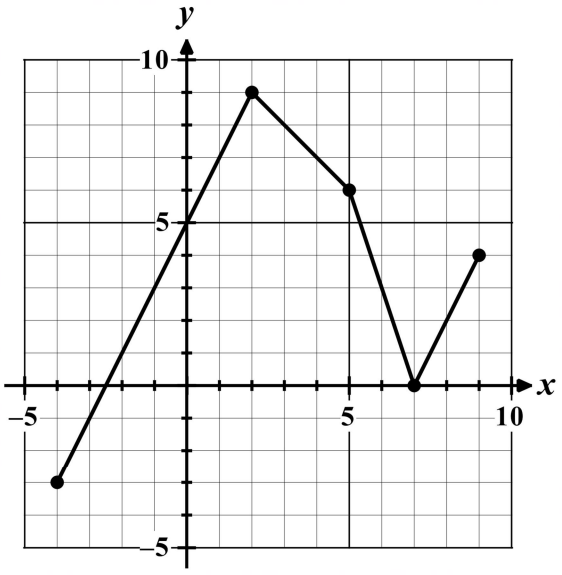
h (hours)	0	1	2	3	4	5	6	7	8
$T(h)$ (°F)	212	141	104	85	76	70	68	66	65

(a) Evaluate $T(2)$ and $T(6)$.

(b) For what value of *h* is $T(h)=76$?

(c) Find the value of $T(8)-T(0)$. Using proper units, give an interpretation of this answer in the context of the problem.

***Exercise* #4:** The function $y=f(x)$ is defined by the graph shown below. Answer the following questions based on this graph.



(a) Evaluate each of the following:

$f(2)=$ $f(5)=$

$f(-3)=$ $f(7)=$

(b) Solve each of the following for all values of the input, *x*, that make them true.

$f(x)=3$ $f(x)=7$

(c) State sets, using set-builder or interval notation, for the domain and range of this function.

Domain: _____ Range: _____

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FUNCTION NOTATION
N-GEN MATH® ALGEBRA I HOMEWORK

FLUENCY

1. Given the function f defined by the formula $f(x) = 2x + 1$ find the following:

   (a) $f(4)$ (b) $f(-5)$ (c) $f(0)$ (d) $f\left(\frac{1}{2}\right)$

2. Given the function g defined by the formula $g(x) = \frac{x-5}{2}$ find the following:

   (a) $g(9)$ (b) $g(0)$ (c) $g(3)$ (d) $g(17)$

3. Given the function f defined by the formula $f(x) = x^2 - 4$ find the following:

   (a) $f(3)$ (b) $f(-4)$ (c) $f(0)$ (d) $f(-2)$

4. If the function $f(x)$ is defined by $f(x) = \frac{x}{2} - 6$ then which of the following is the value of $f(10)$?

   (1) -1 (3) 14

   (2) 2 (4) 7

   _____

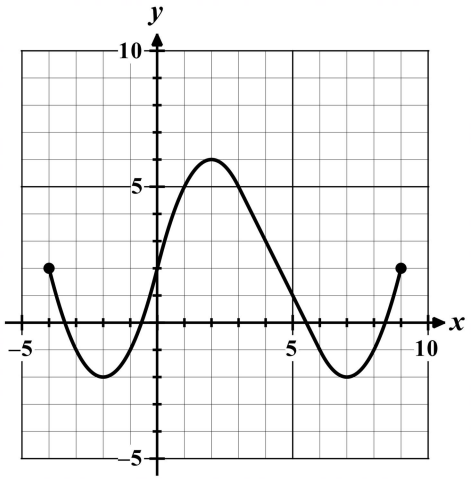
5. If the function $f(x) = 2x - 3$ and $g(x) = \frac{3}{2}x + 1$ then which of the following is a true statement?

   (1) $f(0) > g(0)$ (3) $f(8) = g(8)$

   (2) $f(2) = g(2)$ (4) $g(4) < f(4)$

   _____

6. Based on the graph of the function $y = g(x)$ shown below, answer the following questions.



(a) Evaluate each of the following. Illustrate with a point on the graph.

$g(-4) =$ $g(5) =$

$g(3) =$ $g(8) =$

(b) For what values of the input is $g(x) = -1$?

(c) State sets, using set-builder or interval notation, for the domain and range of the function.

Domain: _____ Range: _____

APPLICATIONS

7. Physics students drop a ball from the top of a 100-foot-high building and model its height above the ground as a function of time with the equation $h(t) = 100 - 16t^2$. The height, *h*, is measured in feet and time, *t*, is measured in seconds.

(a) Find the value of $h(0)$. Include proper units. What does this output represent? Reread the problem if necessary.

(b) Calculate $h(2)$. Does our equation predict that the ball has hit the ground at 2 seconds? Explain.

REASONING

8. If you knew that $f(-4) = 8$, then what (x, y) coordinate point must lie on the graph of $y = f(x)$? Explain.

9. A function $f(x)$ is defined using the set of coordinate pairs $\{(-3, 8), (2, 5), (7, -1), (11, 3)\}$. Explain why is it impossible to give a value for $f(-1)$?