

FUNCTION NOTATION COMMON CORE ALGEBRA I



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

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

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

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

(c) $h(x) = \sqrt{2x+1}$

$f(2) =$

$g(20) =$

$h(4) =$

$f(-3) =$

$g(0) =$

$h(0) =$

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

FUNCTION NOTATION

$$\begin{array}{ccccccc} & & & y & = & f & (x) \\ & & & \uparrow & & \uparrow & \\ \text{Output} & \text{---} & & & & \text{Rule} & \text{---} & \text{Input} \end{array}$$

Exercise #2: Given the function $f(x) = \frac{x}{3} + 7$ do the following.

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

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

(c) Find the input for which $f(x) = 13$. Show the work that leads to your answer.

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



Recall that function rules commonly come in one of three forms: (1) equations (as in Exercise #1), (2) graphs, and (3) tables. The next few exercises will illustrate function notation with these three forms.

Exercise #3: Boiling water at 212 degrees Fahrenheit is left in a room that is at 65 degrees Fahrenheit and begins to cool. 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
$T(h)$ ($^{\circ}F$)	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) Between what two consecutive hours will $T(h) = 100$? Explain how you arrived at your answer.

Exercise #3: The function $y = f(x)$ is defined by the graph shown below. It is known as **piecewise linear** because it is made up of **straight line segments**. Answer the following questions based on this graph.

(a) Evaluate each of the following:

$$f(1) =$$

$$f(5) =$$

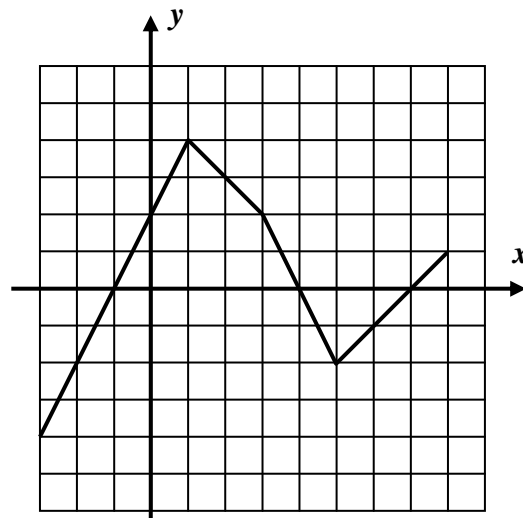
$$f(-3) =$$

$$f(0) =$$

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

$$f(x) = 0$$

$$f(x) = 2$$



(c) What is the largest output achieved by the function? At what x -value is it hit?



Name: _____

Date: _____

FUNCTION NOTATION
COMMON CORE 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.

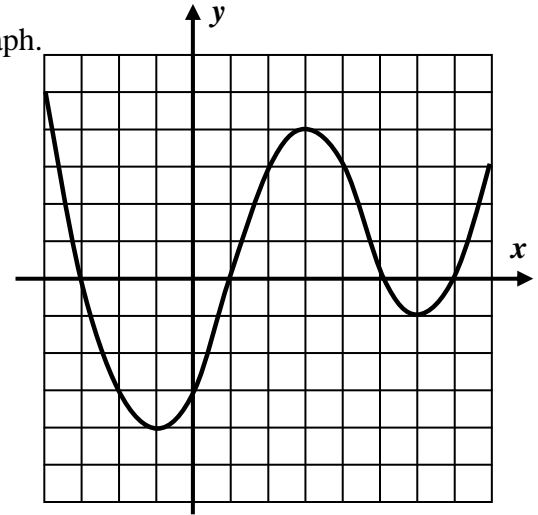
(a) Evaluate each of the following. Illustrate with a point on the graph.

$$g(-2) =$$

$$g(0) =$$

$$g(3) =$$

$$g(7) =$$



(b) What values of x solve the equation $g(x) = 0$? These are called the **zeroes of the function**

(c) How many values of x solve the equation $g(x) = 2$? How can you illustrate your answer on the graph? Remember, we are not looking for the exact x -values, only **how many solutions**.

APPLICATIONS

6. 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. Be careful with all calculations in this problems and remember to do the exponent (squaring) first.

(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

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

