Name: ____________________________________ Date: __________________

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

$f(2)=$

$f(-3)=$

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

$g(20)=$

$g(0)=$

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

$h(4)=$

$h(0)=$

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

$$\underset{\text{Output}}{y} = \underset{\text{Rule}}{f}\ \underset{\text{Input}}{(x)}$$

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

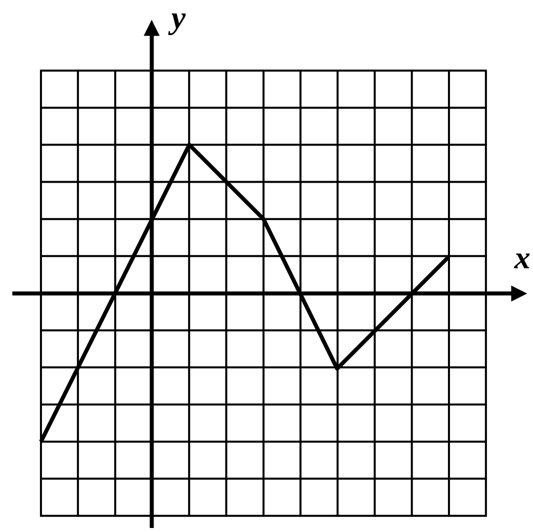
h (hours)	0	1	2	3	4	5	6	7	8
$T(h)$ $({}^\circ F)$	212	141	104	85	76	70	68	66	65

(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?

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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

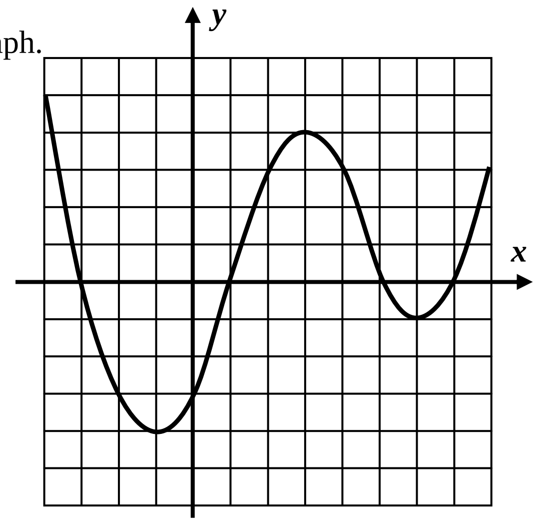
5. If the function $f(x)=2x-3$ and $g(x)=\frac{3}{2}x+1$ then which of the following is a true statement?

(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.



$g(-2) =$ $\qquad\qquad$ $g(0) =$

$g(3) =$ $\qquad\qquad$ $g(7) =$

(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 measures 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.