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

$$y = f\ (x)$$

Output → y Rule ← x Input

***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.

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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*.

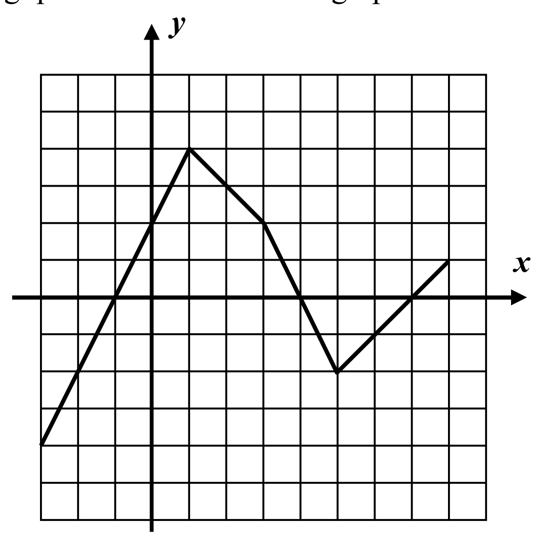
h (hours)	0	1	2	3	4	5	6	7	8
$T(h)$ $({}^\circ F)$	212	141	104	85	76	70	68	66	65

(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* #4:** 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:

$f(1)=$ $\qquad$ $f(5)=$

$f(-3)=$ $\qquad$ $f(0)=$

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

$f(x)=0$ $\qquad$ $f(x)=2$

(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

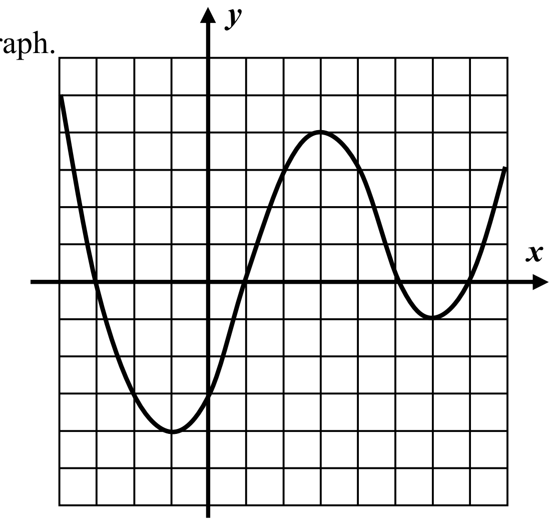
5. If the function $f(x)=2x-3$ and $g(x)=\frac{3}{2}x+1$ then which of the following is a true statement?

(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.



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

$g(3) =$ $g(7) =$

(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

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 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

8. 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.

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