Name: ___________________________________ Date: _________________

FUNCTION NOTATION
COMMON CORE ALGEBRA II

Functions are fundamental tools that convert inputs, values of the independent variable, to outputs, values of the dependent variable. There is a special notation that is commonly used to show this conversion process. The first exercise will illustrate this notation in the context of formulas.

***Exercise* #1:** Evaluate each of the following given the function definitions and input values.

(a) $f(x) = 5x - 2$

$f(3) =$

$f(-2) =$

(b) $g(x) = x^2 + 4$

$g(3) =$

$g(0) =$

(c) $h(x) = 2^x$

$h(3) =$

$h(-2) =$

Although this notation could be confused with multiplication, the context will make it clear that it is not. The idea of function notation is summarized below.

FUNCTION NOTATION

$$y = f\ (x)$$

Output → y Rule ← Input

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* #2:** 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*.

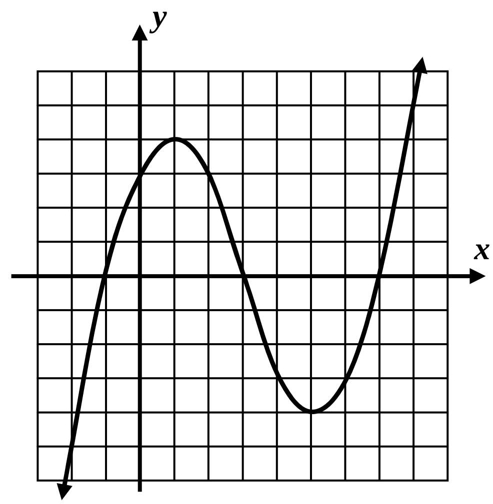
h (hours)	0	1	2	3	4	5	6	7	8
$T(h)$ $(^\circ F)$	212	141	104	85	76	70	68	66	65

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

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

(c) Between what two consecutive hours will $T(h) = 100$?

***Exercise* #3:** The function $y = f(x)$ is defined by the graph shown below. Answer the following questions based on this graph.



(a) Evaluate $f(-1)$, $f(1)$, and $f(5)$.

(b) Evaluate $f(0)$. What special feature on a graph does $f(0)$ always correspond to?

(c) What values of x solve the equation $f(x) = 0$? What special features on a graph does the set of x-values that solve $f(x) = 0$ correspond to?

(d) Between what two consecutive integers does the largest solution to $f(x) = 3$ lie?

***Exercise* #4:** For a function $y = g(x)$ it is known that $g(-2) = 7$. Which of the following points must lie on the graph of $g(x)$?

(1) $(7, -2)$ (3) $(0, 7)$

(2) $(-2, 7)$ (4) $(-2, 0)$

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***Exercise* #5:** Physics students drop a ball from the top of a 50 foot high building and model its height as a function of time with the equation $h(t) = 50 - 16t^2$. Using **TABLES** on your calculator, determine, to the nearest *tenth* of a second, when the ball hits the ground. Provide tabular outputs to support your answer.

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FUNCTION NOTATION
COMMON CORE ALGEBRA II HOMEWORK

FLUENCY

1. Without using your calculator, evaluate each of the following given the function definitions and input values.

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

$f(-4)=$

$f(2)=$

(b) $g(x)=3x^2$

$g(2)=$

$g(-3)=$

(c) $h(x)=\sqrt{x-5}$

$h(41)=$

$h(14)=$

2. Using **STORE** on your calculator, evaluate each of the following more complex functions.

(a) $f(x)=\dfrac{3x^2-5}{4x+10}$

$f(-5)=$

$f(0)=$

(b) $g(x)=\dfrac{\sqrt{25-x^2}}{x}$

$g(4)=$

$g(-3)=$

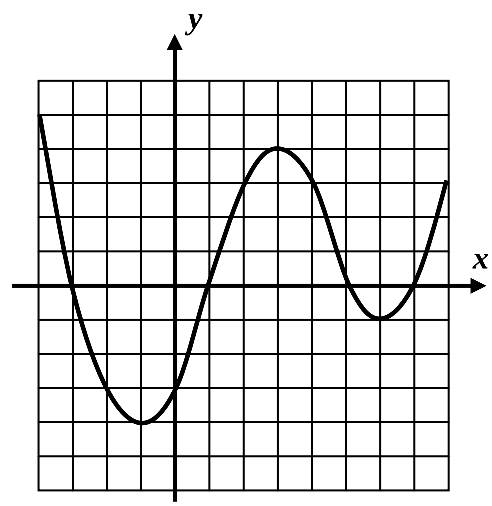
(c) $h(x)=30(1.2)^x$

$h(3)=$

$h(0)=$

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

(a) Evaluate $g(-2)$, $g(0)$, $g(3)$ and $g(7)$.



(b) What values of x solve the equation $g(x)=0$

(c) Graph the horizontal line $y=2$ on the grid above and label.

(d) How many values of x solve the equation $g(x)=2$?

Applications

4. Ian invested \$2500 in an investment vehicle that is guaranteed to earn 4% interest compounded yearly. The amount of money, *A*, in his account as a function of the number of years, *t*, since creating the account is given by the equation $A(t)=2500(1.04)^t$.

(a) Evaluate $A(0)$ and $A(10)$.

(b) What do the two values that you found in part (a) represent?

(c) Using tables on your calculator, determine, to the nearest whole year, the value of *t* that solves the equation $A(t)=5000$. Justify your answer with numerical evidence.

(d) What does the value of *t* that you found in part (c) represent about Ian's investment?

5. A ball is shot from an air-cannon at an angle of 45° with the horizon. It travels along a path given by the equation $h(d)=-\frac{1}{50}d^2+d$, where *h* represents the ball's height above the ground and *d* represents the distance the ball has traveled horizontally. Using your calculator to generate a table of values, graph this function for all values of *d* on the interval $0\le d\le 50$. Look at the table to properly scale the *y*-axis.

What is the maximum height that the ball reaches? At what value of *d* does it reach this height?