Name: _____   Date: _____

THE DOMAIN AND RANGE OF A FUNCTION
## COMMON CORE ALGEBRA II

Because functions convert values of inputs into value of outputs, it is natural to talk about the sets that represent these inputs and outputs. The **set of inputs** that result in an output is called **the domain** of the function. The **set of outputs** is called **the range**.

Exercise #1: Consider the function that has as its inputs the months of the year and as its outputs the number of days in each month. In this case, the number of days is a function of the month of the year. Assume this function is restricted to non-leap years.

(a) Write, in roster form, the set that represents this function's domain.

(b) Write, in roster form, the set that represents this function's range.

Exercise #2: State the range of the function $f(n) = 2n+1$ if its domain is the set $\{1, 3, 5\}$. Show the domain and range in the mapping diagram below.

Domain of f 　　　　　　 Range of f

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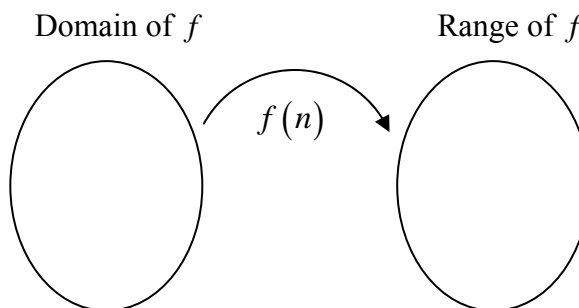
Exercise #3: The function $y = g(x)$ is completely defined by the graph shown below. Answer the following questions based on this graph.

(a) Determine the minimum and maximum x-values represented on this graph.

(b) Determine the minimum and maximum y-values represented on this graph.

(c) State the domain and range of this function using set builder notation.
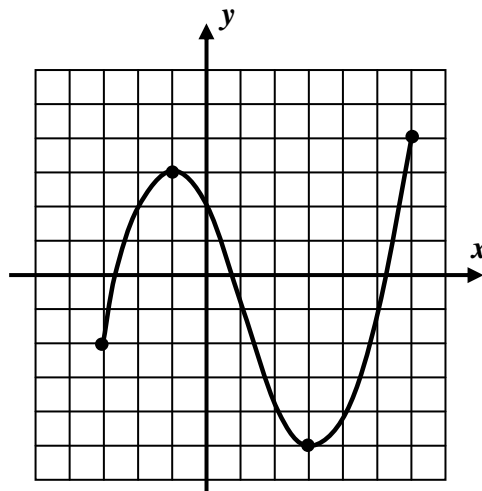
Some functions, defined with graphs or equations, have domains and ranges that stretch out to infinity. Consider the following exercise in which a standard parabola is graphed.

Exercise #4: The function $f(x) = x^2 - 2x - 3$ is graphed on the grid below. Which of the following represent its domain and range written in interval notation?

(1) Domain: $[-2, 4]$ (3) Domain: $(-\infty, \infty)$

   Range: $[-4, 6]$ Range: $[-4, \infty)$

(2) Domain: $[-2, 4]$ (4) Domain: $(-2, 4)$

   Range: $(-4, \infty)$ Range: $(-4, 6)$

$y = f(x)$
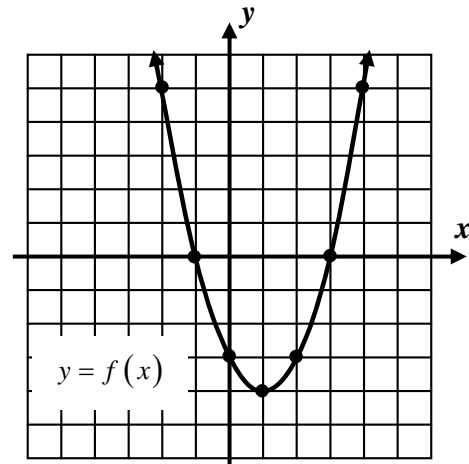
For most functions defined by an algebraic formula, the domain consists of the set of all real numbers, given the concise symbol $\mathbb{R}$. Sometimes, though, there are restrictions placed on the domain of a function by the structure of its formula. Two basic restrictions will be illustrated in the next few exercises.

Exercise #5: The function $f(x) = \dfrac{2x+1}{x-4}$ has outputs given by the following calculator table.

(a) Evaluate $f(1)$ and $f(6)$ from the table.

(b) Why does the calculator give an ERROR at $x = 4$?

(c) Are there any values except $x = 4$ that are not in the domain of f? Explain.

x	$f(x)$
1	-1
2	-2.5
3	-7
4	Error
5	11
6	6.5
7	5

Exercise #6: Which of the following values of x would not be in the domain of the function $y = \sqrt{x+4}$? Explain your answer.

(1) $x = 0$ (3) $x = -3$

(2) $x = 5$ (4) $x = -8$

THE DOMAIN AND RANGE OF A FUNCTION
COMMON CORE ALGEBRA II HOMEWORK

FLUENCY

1. A function is given by the set of ordered pairs $\{(2,5),(4,9),(6,13),(8,17)\}$. Write its domain and range in roster form.

   Domain: Range:

2. The function $h(x) = x^2 + 5$ maps the domain given by the set $\{-2, -1, 0, 1, 2\}$. Which of the following sets represents the range of $h(x)$?

   (1) $\{0, 6, 10, 12\}$ (3) $\{5, 6, 9\}$

   (2) $\{5, 6, 7\}$ (4) $\{1, 4, 5, 6, 9\}$ _____

3. Which of the following values of x would *not* be in the domain of the function defined by $f(x) = \dfrac{x-2}{x+3}$?

   (1) $x = -3$ (3) $x = 3$

   (2) $x = 2$ (4) $x = -2$ _____

4. Determine any values of x that do not lie in the domain of the function $f(x) = \dfrac{3x+2}{2x-10}$. Justify your response.

5. Which of the following values of x *does* lie in the domain of the function defined by $g(x) = \sqrt{2x-7}$?

   (1) $x = 0$ (3) $x = 3$

   (2) $x = 2$ (4) $x = 5$ _____

6. Which of the following would represent the domain of the function $y = \sqrt{6-2x}$?

   (1) $\{x : x > 3\}$ (3) $\{x : x \le 3\}$

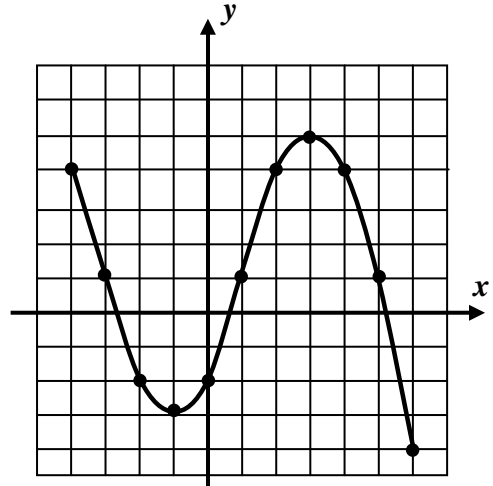   (2) $\{x : x < 3\}$ (4) $\{x : x \ge 3\}$ _____

7. The function $y = f(x)$ is completely defined by the graph shown below.

(a) Evaluate $f(-4)$, $f(3)$, and $f(6)$.

(b) Draw a rectangle that whose vertices are $(-4, 5)$, $(6, 5)$, $(6, -4)$, and $(-4, -4)$.

(c) State the domain and range of this function using interval notation.

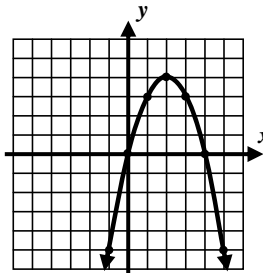Domain: Range:

8. Which of the following represents the range of the quadratic function shown in the graph below?

(1) $(4, \infty)$ (3) $(-\infty, 4)$

(2) $(-\infty, 4]$ (4) $[4, \infty)$

_____

APPLICATIONS

9. A child starts a piggy bank with $2. Each day, the child receives 25 cents at the end of the day and puts it in the bank. If A represents the amount of money and d stands for the number of days then $A(d) = 2 + 0.25d$ gives the amount of money in the bank as a function of days (think about this formula).

(a) Evaluate $A(1)$, $A(7)$, and $A(30)$.   (b) For what value of d will $A(d) = \$10.50$.

(c) Explain why the domain does not contain the value $d = 2.5$.   (d) Explain why the range does not include the value $A = \$3.10$.