**Barron’s Let’s Review Regents – Algebra I**

# Chapter 10: Functions

## 10.1 Describing Functions

A *function* is like a machine that converts numbers into other numbers. Functions are often named with the letters f, g, and h. If function f converts the number 2 into the number 7, we write f(2) = 7. Functions can be described as an equation, a graph, or a list of ordered pairs.

**What is a Function?**

A function can be thought of as a machine with an “in” slot into which you can put numbers on a card and another “out” slot from which numbers on cards come out.

Representing Functions as a List of Ordered Pairs

One way to know more about the function is if a set is given like this:

The ordered pair (1, 4) in the list indicates that if you put 1 into the “in” slot of the function machine, the number 4 will come out of the “out” slot.

**Domain and Range of a Function Described by a Set of Ordered Pairs**

The function f is defined only for the values 1, 2, 3, 4 and 5. If any other number is put into the “in” slot of this function machine, it will be *undefined*. These seven numbers are said to be in the *domain* of function f. The domain is usually written as a set of values. The domain of function f is {1, 2, 3, 4, 5 }.

The only values that can come out of a function’s “out” slot is called the *range* of the function.

**Domain and Range in Real-World Applications**

In some real-world situations, certain numbers don’t make sense. For example, you can’t buy half of a car or each negative 5 pieces of pizza. When a function is related to a real-world situation, there may be limits on the domain and range.

**When a Set of Ordered Pairs Cannot Describe a Function**

If in a function f, f(2) = 7, this means that any time the number 2 is put into the function machine, the number 7 comes out. There will never be a time that 2 is put in and the number 8 comes out. If it did, we would want to get our function machine repaired.

When a function is described by a list of ordered pairs, no two ordered pairs will have the same first coordinate. If (2, 7) is in the set, there will not be a   
(2, 8) or a (2, 9) or anything else with a 2 as the first coordinate.

A function cannot have different output values for the same input value.

### Check Your Understanding of Section 10.1

1. Multiple-Choice
2. If a function f is defined as f = {(1,2), (2,3), (3,1), (4,4)}, what is f(2)?  
   **(3) 3**
3. If a function g is defined as g = {(1, 4), (3, 2), (4,3), (5, 1) }, what is g(2)?  
   **(4) Undefined**
4. If f(4) = 7, which could not be the definition of the function?  
   **(3) f={(1,3), (4,8), (5,6), (7,4)}**
5. If f = {(1,4), (2,8), (3,7), (4,1)} and g = {(1,5), (2,9), (3,6), (4,2)}, which of the following is true?  
   **(3) f(3) > g(3)**
6. Which of the following *cannot* be the definition of a function?  
   **(1) f = {(1,5), (2,7), (2,8), (4,9)}**
7. What is the domain of the function defined as f = {(1,4), (3,7), (4,8), (5,8)}?  
   **(3) {1, 3, 4, 5}**
8. What is the range of the function defined as   
   f = {(1,4), (3,7), (4,8), (5,8)}?  
   **(4) {4, 7, 8}**
9. If f = {(1,4), (2,3), (3,2), (4,1)} and g = {(1,3), (2,4), (3,1), (4,2)}, what is f(g(1))?  
   **(2) 2**
10. A function g takes as an input a number representing the number of gallons of gasoline purchased and outputs the price of that many gallons of gasoline. What is the domain of this function?  
    **(1) All numbers greater than or equal to zero**
11. A function t takes as input the day of the year in New York and outputs the average temperature for that day. What is a reasonable range for this function?  
    **(1) Numbers between -10 and 100**
12. Show how you arrived at your answers
13. Explain why this is or is not a definition of a function. f = {(3,5), (4,5), (5,5), (6,5)}  
      
    **A function is like a machine that converts numbers into other numbers.   
      
    When a function is described by a list of ordered pairs no two ordered pairs will have the same first coordinate.**  
    **The definition of f qualifies as a function.**
14. If f = {1,4), (2,1), (3,2), (4,3)}, calculate   
    (a) f(1) + f(2); (b) f(1+2); (c) f(f(1)).  
      
    **(a) f(1) + f(2) = 4 + 1 = 5  
    (b) f(1+2) = f(3) = 2  
    (c) f(f(1)) = f(4) = 3**
15. If f = {(1,3), (4, 9), (5,2), (6,8)} and f(a) = 8, what are all possible values for a?  
      
    **a = 6**
16. Is f = {(3,4), (3,5), (4,7), (5,1)} a function? Explain why or why not.  
      
    **When a function is described by a list of ordered pairs no two ordered pairs will have the same first coordinate.**  
    **This is not a function because there are two ordered pairs with the same first coordinate (3). f(3) cannot be both 4 and 5.**
17. William says the range of a function always has the same amount of numbers or more numbers than the domain. Mia says the range of a function can have either the same amount of numbers as the domain or fewer numbers than the domain. Alice says that the range of a function can have more numbers, fewer numbers, or the same amount of numbers as the domain. Which of the three students is correct and why?  
      
    **Mia is correct.**  
    **A function with fewer numbers in the range than the domain:  
    f = {(3,5), (4,5), (5,5), (6,5)}  
    domain: { 3, 4, 5, 6 }  
    range: { 5 }  
      
    A function with the same amount of numbers in the range as in the domain:  
    f = {(3,3), (4,4), (5,5), (6,6)}  
    domain: { 3, 4, 5, 6 }  
    range: { 3, 4, 5, 6 }  
      
    There cannot be a range that has more numbers than are in the domain because:  
      
    When a function is described by a list of ordered pairs no two ordered pairs will have the same first coordinate. Repeated x-values are not permitted for a function.**