

# Relations and Functions

## Algebra 1 • Section 4.1

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 12

### Quick Review and Helpful Hints

A function pairs each input with exactly one output. Pay attention to what the input means, what rule is being applied, and whether the question asks for a value, a rule, a domain, or an interpretation.

▷ **Example:** For  $f(x) = 2x + 5$ , find  $f(4)$ .

**Work:** Replace  $x$  with 4:  $f(4) = 2(4) + 5 = 13$ .

★ **Answer:** 13

### ◆ Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

1. Is  $\{(1, 4), (2, 5), (3, 6)\}$  a function? \_\_\_\_\_

6. Does  $x = 5$  define  $y$  as a function of  $x$ ? \_\_\_\_\_

2. Is  $\{(2, 7), (2, 9), (4, 1)\}$  a function? \_\_\_\_\_

7. Complete the pair for  $y = x^2 - 1$  when  $x = 4$ . \_\_\_\_\_

3. Find the domain of  $\{(-1, 3), (0, 5), (4, 8)\}$ . \_\_\_\_\_

8. If a table has inputs 0, 1, 2 and outputs 6, 6, 6, is it a function? \_\_\_\_\_

4. Find the range of  $\{(-1, 3), (0, 5), (4, 8)\}$ . \_\_\_\_\_

9. Find the range of  $y = 3x$  for domain  $\{-2, 0, 5\}$ . \_\_\_\_\_

5. Does  $y = 2x + 1$  define  $y$  as a function of  $x$ ? \_\_\_\_\_

10. Which input breaks a function:  $(1, 2), (3, 4), (1, 5), (6, 7)$ ? \_\_\_\_\_

### ◆ Word Problems

11. A vending machine code gives one snack for each code. Is snack a function of code? \_\_\_\_\_

12. A student's name may match several students in a school. Is student ID a function of first name? \_\_\_\_\_



## Answer Keys

- |                                              |                                               |
|----------------------------------------------|-----------------------------------------------|
| 1. <input type="text" value="Yes"/>          | 7. <input type="text" value="(4, 15)"/>       |
| 2. <input type="text" value="No"/>           | 8. <input type="text" value="Yes"/>           |
| 3. <input type="text" value="{ -1, 0, 4 }"/> | 9. <input type="text" value="{ -6, 0, 15 }"/> |
| 4. <input type="text" value="{ 3, 5, 8 }"/>  | 10. <input type="text" value="1"/>            |
| 5. <input type="text" value="Yes"/>          | 11. <input type="text" value="Yes"/>          |
| 6. <input type="text" value="No"/>           | 12. <input type="text" value="No"/>           |

### Step-by-Step Explanations

- Look at the inputs: 1, 2, 3 each show up once, so nobody's confused about its output.
- Poor 2 wants to be both 7 and 9 at once. An input can only pick one output.
- Domain is the input crowd, so just collect every  $x$ -coordinate you see.
- Range is what comes back out, so scoop up all the  $y$ -coordinates.
- Feed in any  $x$ , double it, add 1, and you land on exactly one answer. That's a function.
- This is a vertical line where  $x = 5$  pairs with endless  $y$ 's. One input, way too many outputs.
- Drop 4 in for  $x$ :  $4^2 - 1$  gives 15, so 4 travels to 15.
- Repeated outputs are totally fine. Trouble only happens when one input wants two different outputs.
- Run each input through the rule, multiplying by 3, and collect what pops out.
- Notice 1 appears twice pointing at 2 and 5. An input can't pick two outputs.
- Punch a code, get one snack, every time. One input, one output is exactly the function rule.
- Lots of kids share a first name, so that one input can't decide on a single ID.



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