

2-1

Reteaching

Relations and Functions

- A **relation** is a set of ordered pairs.
- The **domain** is the set of the first numbers in each pair, or the x -values.
- The **range** is the set of the second numbers in each pair, or the y -values.
- A relation is a **function** if each input value x corresponds to exactly one output value y . In a set of ordered pairs for a function, an x -value cannot be repeated with two or more different y -values.

Problem

Roll a number cube to find six ordered pairs. Determine whether the set of ordered pairs is a function. Find the domain and range.

Roll a number cube six times to get the x -values of the six ordered pairs. Roll it six more times to get the y -values of the ordered pairs.

$\{(6, 1), (2, 1), (5, 4), (2, 2), (1, 4), (4, 2)\}$ Write the ordered pairs.

$\{(6, 1), (\textcircled{2}), 1), (5, 4), (\textcircled{2}), 2), (1, 4), (4, 2)\}$ Circle any x -values that repeat with different y -values to determine whether the relation is a function.

The x -value 2 is repeated with two different y -values so the relation is not a function.

The domain is the set of first numbers in each pair: $\{1, 2, 4, 5, 6\}$.

The range is the set of second numbers in each pair: $\{1, 2, 4\}$.

Exercises

Roll a number cube to find the indicated number of ordered pairs. Determine whether each set of ordered pairs is a function. Find the domain and range of each relation.

1. 5 ordered pairs 2. 4 ordered pairs 3. 6 ordered pairs 4. 8 ordered pairs

Check students' work.

Determine whether each relation is a function. Explain your answer. Find the domain and range of each relation.

5. $\{(1, 2), (1, 3), (1, 4), (1, 5), (1, 6)\}$

No; the x -value 1 is repeated with different y -values; domain: $\{1\}$; range: $\{2, 3, 4, 5, 6\}$

7. $\{(A, B), (C, D), (E, F), (G, H)\}$

Yes; no x -value is repeated; domain: $\{A, C, E, G\}$; range: $\{B, D, F, H\}$

9. $\{(0, 0)\}$

Yes; no x -value is repeated; domain: $\{0\}$; range: $\{0\}$

6. $\{(0, -1), (1, 2), (-1, -1), (-2, 5), (2, 9)\}$

Yes; no x -value is repeated; domain: $\{-2, -1, 0, 1, 2\}$; range: $\{-1, 2, 5, 9\}$

8. $\{(I, M), (N, P), (I, T), (I, P)\}$

No; the x -value I is repeated with different y -values; domain: $\{I, N\}$; range: $\{M, P, T\}$

10. $\left\{\left(\frac{1}{2}, 3\right), (0.5, 4), (2, 1)\right\}$

No; the x -value $\frac{1}{2} = 0.5$ is repeated with different y -values; domain: $\left\{\frac{1}{2}, 2\right\}$; range: $\{1, 3, 4\}$

2-1 Reteaching (continued)

Relations and Functions

You can write a rule for a function using function notation. Function notation makes it easier to identify the input and output for a particular function, and to compare two or more functions.

	Example	Independent Variable (input)	Dependent Variable (output)
Function Rule	$y = 3x - 5$	x	y
To write the function rule using function notation, replace y with $f(x)$ (read $f(x)$ as "f of x").	$f(x) = 3x - 5$	x	$f(x)$
The function, f evaluated at 2 or $f(2)$.	$f(2) = 3(2) - 5$ $= 6 - 5$ $= 1$	2	1

Problem

What is the value of the function for the given value of x ? Write the input, x , and the output, $f(x)$, as an ordered pair.

$$f(x) = 4x - 2 \text{ for } x = -3$$

$$f(-3) = 4(-3) - 2 \quad \text{Replace } x \text{ with } -3.$$

$$f(-3) = -14 \quad \text{Simplify.}$$

$$(-3, -14) \quad \text{Write the input and output as an ordered pair.}$$

Exercises

Evaluate each function for the given value of x , and write the input and the output as an ordered pair.

11. $f(x) = 3x - 7$ for $x = 6$ **(6, 11)**

12. $g(x) = 9x - 5$ for $x = 3$ **(3, 22)**

13. $h(x) = 12x$ for $x = 4$ **(4, 48)**

14. $t(x) = 8x - 5$ for $x = 7$ **(7, 51)**