Essential Question  What is a function?

1 EXPLORATION: Describing a Function

Work with a partner. Functions can be described in many ways.

- by an equation
- by an input-output table
- using words
- by a graph
- as a set of ordered pairs

a. Explain why the graph shown represents a function.

b. Describe the function in two other ways.

2 EXPLORATION: Identifying Functions

Work with a partner. Determine whether each relation represents a function. Explain your reasoning.

a. | Input, \( x \) | 0 | 1 | 2 | 3 | 4 |
   | Output, \( y \) | 8 | 8 | 8 | 8 | 8 |

b. | Input, \( x \) | 8 | 8 | 8 | 8 | 8 |
   | Output, \( y \) | 0 | 1 | 2 | 3 | 4 |


**3.1 Functions (continued)**

**2 EXPLORATION:** Identifying Functions (continued)

- **c. Input, x  Output, y**
  
<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

- **d.**

- **e.** \((-2, 5), (-1, 8), (0, 6), (1, 6), (2, 7)\)
- **f.** \((-2, 0), (-1, 0), (-1, 1), (0, 1), (1, 2), (2, 2)\)

- **g.** Each radio frequency \(x\) in a listening area has exactly one radio station \(y\).

- **h.** The same television station \(x\) can be found on more than one channel \(y\).

- **i.** \(x = 2\)

- **j.** \(y = 2x + 3\)

**Communicate Your Answer**

3. What is a function? Give examples of relations, other than those in Explorations 1 and 2, that (a) are functions and (b) are not functions.
In your own words, write the meaning of each vocabulary term.

relation

function

domain

range

independent variable

dependent variable

Notes:
Core Concepts

Vertical Line Test

Words A graph represent a function when no vertical line passes through more than one point on the graph.

Examples  

<table>
<thead>
<tr>
<th></th>
<th>Function</th>
<th>Not a function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Graph" /></td>
<td><img src="image2" alt="Graph" /></td>
<td></td>
</tr>
</tbody>
</table>

Notes:

The Domain and Range of a Function

The **domain** of a function is the set of all possible input values.

The **range** of a function is the set of all possible output values.

Notes:
3.1 Notetaking with Vocabulary (continued)

Extra Practice

In Exercises 1 and 2, determine whether the relation is a function. Explain.

1. | Input, x | −2 | 0 | 1 | −2 |
   | Output, y | 4 | 5 | 4 | 5 |

2. (0, 3), (1, 1), (2, 1), (3, 0)

In Exercises 3 and 4, determine whether the graph represents a function. Explain.

3. [Graph of a discrete set of points]

4. [Graph of a parabola]

In Exercises 5 and 6, find the domain and range of the function represented by the graph.

5. [Graph of a discrete set of points]

6. [Graph of a discrete set of points]

7. The function \( y = 12x \) represents the number \( y \) of pages of text a computer printer can print in \( x \) minutes.
   
   a. Identify the independent and dependent variables.

   b. The domain is 1, 2, 3, and 4. What is the range?