4-6   Reteaching

Formalizing Relations and Functions

When a relation is represented as a set of ordered pairs, the **domain** of the relation is the set of *x*-values. The **range** is the set of *y*-values.
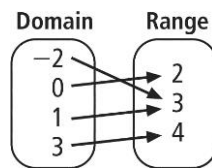
A relation where each value in the domain is paired with just one value in the range is called a **function**.

Problem

Identify the domain and range of the relation {(−2, 3), (0, 2), (1, 3), (3, 4)}. Represent the relation with a mapping diagram. Is the relation a function?

The domain (or *x*-values) is {−2, 0, 1, 3}.

The range (or *y*-values) is {2, 3, 4}.

Notice that each number in the domain is mapped to only one number in the range. This relation **is** a function.

Exercises

Identify the domain and range of each relation. Use a mapping diagram to determine whether the relation is a function.
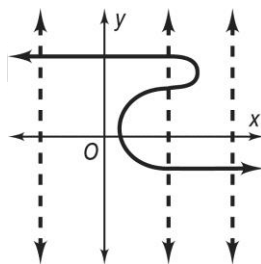
1. {(2, 3), (4, 6), (1, 5), (2, 5), (0, 5)}   **2.** {(3, 4), (5, 4), (7, 4), (8, 4), (10, 4)}

You can determine whether or not a relation is a function by looking at the graph of the relation. If a vertical line is drawn anywhere on the graph and passes through two points of the relation, the relation is not a function. This is called the **vertical line test**.

Problem

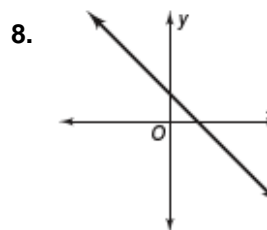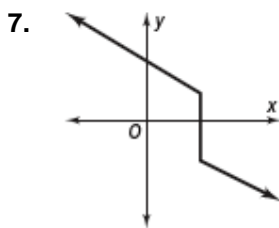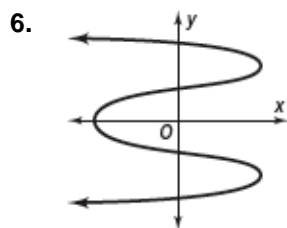Is the relation shown below a function? Use a vertical line test.
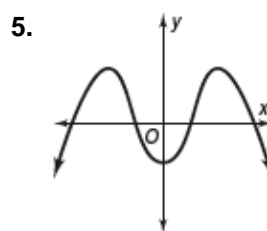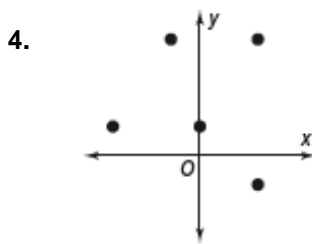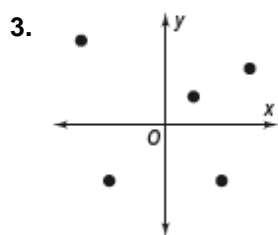
Notice that two of the dashed vertical lines pass through just one point on the graph.

However, one of the dashed vertical lines passes through three points.

The relation is not a function.

Exercises

Use the vertical line test to determine whether the relation is a function.

3.

4.

5.

6.

7.

8.

Evaluate each function rule to find the range for the domain {1, 4, 9}.

9. The function $f(x) = 20 - x$ represents the amount of change you receive after paying for an item that costs x dollars with a \$20 bill.

10. The function $f(x) = x^2$ represents the area of a square with a side length of x.