Chapter 3
Graphing Linear functions:

Vocabulary:

Relation: Pairs inputs with outputs

Function: A relation that pairs each input with exactly one output.

Domain: Input values

Range: Output Values

EXAMPLE 1 Determining Whether Relations Are Functions

Determine whether each relation is a function. Explain.

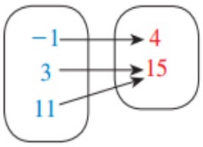
a. $(-2, 2), (-1, 2), (0, 2), (1, 0), (2, 0)$

b. $(4, 0), (8, 7), (6, 4), (4, 3), (5, 2)$

c.

Input, x	-2	-1	0	0	1	2
Output, y	3	4	5	6	7	8

d. Input, x Output, y



SOLUTION

a. Every input has exactly one output.

▶ So, the relation is a function.

b. The input 4 has two outputs, 0 and 3.

▶ So, the relation is *not* a function.

c. The input 0 has two outputs, 5 and 6.

▶ So, the relation is *not* a function.

d. Every input has exactly one output.

▶ So, the relation is a function.

Determine whether the relation is a function. Explain.

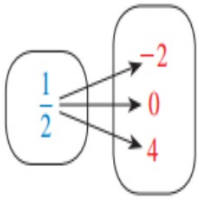
1. $(-5, 0), (0, 0), (5, 0), (5, 10)$

2. $(-4, 8), (-1, 2), (2, -4), (5, -10)$

3.

Input, x	Output, y
2	2.6
4	5.2
6	7.8

4. Input, x Output, y

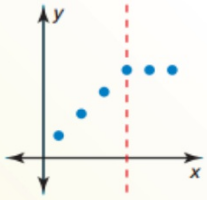


1. not a function; The input 5 has two outputs, 0 and 10.
2. function; Every input has exactly one output.
3. function; Every input has exactly one output.
4. not a function; The input $\frac{1}{2}$ has three outputs, -2, 0, and 4.

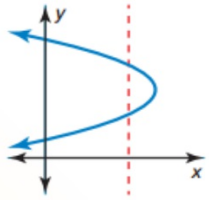
Vertical Line Test

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

Examples Function



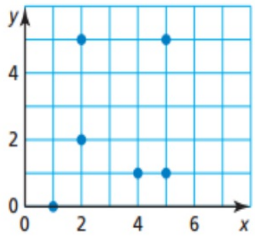
Not a function



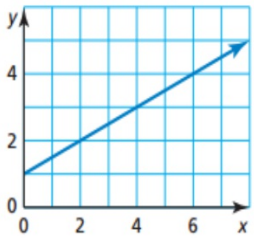
EXAMPLE 2 Using the Vertical Line Test

Determine whether each graph represents a function. Explain.

a.



b.



SOLUTION

a. You can draw a vertical line through (2, 2) and (2, 5).

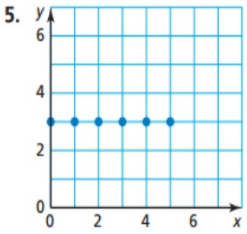
▶ So, the graph does *not* represent a function.

b. No vertical line can be drawn through more than one point on the graph.

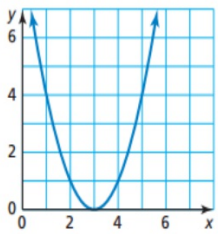
▶ So, the graph represents a function.

Determine whether the graph represents a function. Explain.

5.



6.



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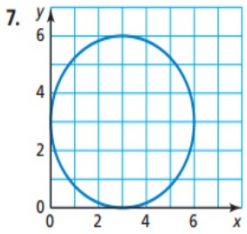
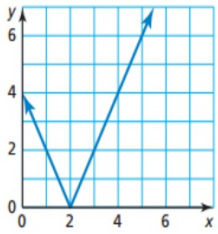


8.



5. function; No vertical line can be drawn through more than one point on the graph.

6. function; No vertical line can be drawn through more than one point on the graph.

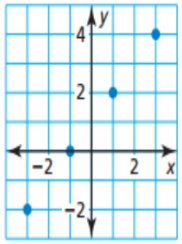
7. not a function; A vertical line can be drawn through more than one point on the graph at several places, such as (3, 0) and (3, 6).

8. function; No vertical line can be drawn through more than one point on the graph.

EXAMPLE 3 Finding the Domain and Range from a Graph

Find the domain and range of the function represented by the graph.

a.



b.