1. Using the vertical line test, determine if the graph above shows a relation, a function, both a relation and a function, or neither a relation nor a function.
   - [ ] A. neither a relation nor a function
   - [ ] B. relation only
   - [ ] C. both a relation and a function
   - [ ] D. function only

2. Which of these graphs represents a function?
3. Which of these tables represents a function?

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
<th>x</th>
<th>f(x)</th>
<th>x</th>
<th>f(x)</th>
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<th>f(x)</th>
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<td>-2</td>
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<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>8</td>
<td>4</td>
<td>1</td>
<td>1.7</td>
<td>0</td>
<td>-2</td>
</tr>
</tbody>
</table>

- A. W
- B. Y
- C. Z
- D. X
4. Which of these graphs represents a function?

![Graphs W, X, Y, Z]

- A. Z
- B. W
- C. X
- D. Y

5. Which of the following relations describes a function?

- A. \{ (0, 0), (0, 2), (2, 0), (2, 2) \}
- B. \{ (2, 2), (2, 3), (3, 2), (3, 3) \}
- C. \{ (2, -1), (2, 1), (3, -1), (3, 1) \}
- D. \{ (-2, -3), (-3, -2), (2, 3), (3, 2) \}
6. Do the ordered pairs below represent a relation, a function, both a relation and a function, or neither a relation nor a function?

\((-2,-1)\), \((1,-4)\), \((7,-10)\), \((8,-11)\)

- [ ] A. neither a relation nor a function
- [ ] B. both a relation and a function
- [ ] C. relation only
- [ ] D. function only

7. Determine whether this picture is an example of a function, relation, function and relation, or neither relation nor function.

- [ ] A. function and relation
- [ ] B. function only
- [ ] C. relation only
- [ ] D. neither function nor relation
8. Which relation diagram represents a function?

- A. Z
- B. X
- C. W
- D. Y

9. Which of the following relations describes a function?

- A. \{ (2, 2), (3, 2), (4, 2), (5, 2) \}
- B. \{ (-2, 0), (0, -2), (0, 2), (2, 0) \}
- C. \{ (0, 0), (2, -2), (2, 2), (3, 3) \}
- D. \{ (2, 3), (2, 4), (2, 5), (2, 6) \}
10. Which of these graphs represents a function?

- A. Y
- B. X
- C. Z
- D. W
11. Which relation diagram represents a function?

- W.
- X.
- Y.
- Z.

12. Which of the following relations describes a function?

- A. \{ (0, 0), (1, -1), (1, 1), (2, 2) \}
- B. \{ (-2, 2), (-1, -1), (-1, 1), (0, 0) \}
- C. \{ (-1, 0), (0, 1), (1, 0), (0, -1) \}
- D. \{ (-2, 2), (-1, 1), (1, 1), (2, 2) \}
13. Which of these mappings is a function?

- W.
- X.
- Y.
- Z.

14. Which of these graphs represents a function?

- A. X
15. Which of these mappings is a function?

A. W
B. Y
C. X
D. Z

16. Which of the following represents a relation and not a function?

A. | x  | 10 | -6 | 10 | 1 |
   | y  | 34 | 32 | 40 | 34 |
B. | x  | 10 | -6 | -2 | 1 |
   | y  | 34 | 32 | 40 | 34 |
C. | x  | 10 | -6 | 6  | 12 |
   | y  | 34 | 32 | 40 | 34 |
D. | x  | 6  | -6 | 12 | -10 |
   | y  | 34 | 32 | 40 | 34 |
17. Think about the vertical line test and answer the following question. Would a vertical line be a relation, a function, both a relation and a function, or neither a relation nor a function?

- A. function only
- B. both a relation and a function
- C. neither a relation nor a function
- D. relation only

18. Which of the following graphs is not a function?

- A. Y
- B. W
- C. Z
- D. X
19. Which of these t-tables represents a function?

<table>
<thead>
<tr>
<th></th>
<th>f(x)</th>
<th></th>
<th>f(x)</th>
<th></th>
<th>f(x)</th>
<th></th>
<th>f(x)</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>2</td>
<td>8</td>
<td>-2</td>
<td>1</td>
</tr>
</tbody>
</table>

- A. X
- B. Z
- C. Y
- D. W

20. Which of the following relations describes a function?

- A. \{ (-3, 9), (-2, 4), (2, 4), (3, 9) \}
- B. \{ (2, -2), (0, 0), (2, 2), (3, 3) \}
- C. \{ (-2, 0), (0, 2), (2, 0), (0, -2) \}
- D. \{ (9, -3), (4, -2), (4, 2), (9, 3) \}
21. Which of the following graphs is not a function?

- W.
- X.
- Y.
- Z.

- A. W, X, Y and Z
- B. Z
- C. Y and Z
- D. X and Y
22. Which relation diagram represents a function?

A. Y
B. W
C. Z
D. X
23. Determine whether this picture is an example of a function, relation, function and relation, or neither relation nor function.

- A. neither function nor relation
- B. relation only
- C. function only
- D. function and relation

24. Do the ordered pairs below represent a relation, a function, both a relation and a function, or neither a relation nor a function?

\((-4,-3)\), \((1,-8)\), \((-4,-14)\), \((9,-16)\)

- A. function only
- B. both a relation and a function
- C. neither a relation nor a function
- D. relation only
25. Which of these t-tables represents a function?

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
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<th>f(x)</th>
<th>x</th>
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</tr>
</thead>
<tbody>
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<td>-1</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

- A. Y
- B. Z
- C. X
- D. W

Answers

1. B
2. D
3. B
4. D
5. D
6. B
7. C
8. C
9. A
10. A
11. A
12. D
13. B
14. D
15. D
16. A
17. D
18. C
19. C
20. A
21. B
22. D
23. B
Explanations

1. A relation is a set of one or more ordered pairs.

A function is a relation in which each element of the domain is paired with EXACTLY one element of the range.

The Vertical Line Test: Given the graph of a relation, if a vertical line can be drawn that crosses the graph in more than one place, then the relation is not a function.

The graph does not pass the vertical line test; therefore, the graph is not a function, and it is a relation only.

2. Use the vertical line test to determine if the graphs represent a function.

The only graph given that passes the vertical line test is Y.

3. A function maps each domain element to only one range element.

The t-table Y is the only table that does not show a domain element paired with two or more range elements.

4. Use the vertical line test to determine if the graphs represent a function.

The only graph given that passes the vertical line test is Y.

5. A function is a set of ordered pairs such that for each domain element there is only one range element.

The set of ordered pairs \{ (-2, -3), (-3, -2), (2, 3), (3, 2) \} is the only set that does not pair a domain element with two or more range elements.

6. A relation is a set of one or more ordered pairs.

A function is a relation in which each element of the domain is paired with EXACTLY one element of the range.

In this case, there is one y-coordinate for every x-coordinate.

The vertical line test can be used to determine this.

Therefore, it is both a relation and a function.

7. A relation is a set of one or more ordered pairs.

A function is a relation in which each element of the domain is paired with EXACTLY one element of the range.

The Vertical-Line Test: Given the graph of a relation, if a vertical line can be drawn that does not cross the graph in more than one place, it is a function.
Any vertical line drawn where \( x > -4 \) will cross the graph in more than one place.

Therefore, the graph is not a function, it is a **relation only**.

8. For a relation to be a function, each input value can only correspond to one output value. The relation diagram where each input value has exactly one arrow drawn to an output value will represent a function.

Therefore, diagram **W** represents a function.

9. A function is a set of ordered pairs such that for each domain element there is only one range element.

The set of ordered pairs \( \{ (2, 2), (3, 2), (4, 2), (5, 2) \} \) is the only set that does not pair a domain element with two or more range elements.

10. Use the vertical line test to determine if the graphs represent a function.

The only graph given that passes the vertical line test is **Y**.

11. For a relation to be a function, each input value can only correspond to one output value. The relation diagram where each input value has exactly one arrow drawn to an output value will represent a function.

Therefore, diagram **W** represents a function.

12. A function is a set of ordered pairs such that for each domain element there is only one range element.

The set of ordered pairs \( \{ (-2, 2), (-1, 1), (1, 1), (2, 2) \} \) is the only set that does not pair a domain element with two or more range elements.

13. A function maps each domain element to only one range element.

The only mapping that does not map a domain element to two or more range elements is **Z**.

14. Use the vertical line test to determine if the graphs represent a function.

The only graph given that passes the vertical line test is **Z**.

15. A function maps each domain element to only one range element.

The only mapping that does not map a domain element to two or more range elements is **Z**.

16. A **relation** is a set of one or more ordered pairs.

A **function** is a relation in which each element of the domain is paired with EXACTLY one element of the range.

In the table below, there are two \( y \)-coordinates for the \( x \)-coordinate -10. Therefore, it is a relation only and not a function.

<table>
<thead>
<tr>
<th>( x )</th>
<th>-10</th>
<th>-6</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>34</td>
<td>32</td>
<td>40</td>
</tr>
</tbody>
</table>
17. A relation is a set of one or more ordered pairs.

A function is a relation in which each element of the domain is paired with EXACTLY one element of the range.

The Vertical-Line Test: Given the graph of a relation, if a vertical line can be drawn that does not cross any of the graphs in more than one place, it is a function.

If the relation being tested is a vertical line, then any $x$ in the domain of the relation (which there would be only one) will correspond with every $y$ of the range (an infinite number of points).

So, a vertical line can be drawn that crosses the graph in more than one place (the vertical line itself).

Therefore, a vertical line is not a function, and it is a relation only.

18. A relation is a set of one or more ordered pairs.

A function is a relation in which each element of the domain is paired with EXACTLY one element of the range.

The Vertical Line Test: Given the graph of a relation, if a vertical line can be drawn that crosses the graph in more than one place, then the relation is not a function.

Therefore, graph Z is not a function.

19. A function maps each domain element to only one range element.

The t-table Y is the only table that does not show a domain element paired with two or more range elements.

20. A function is a set of ordered pairs such that for each domain element there is only one range element.

The set of ordered pairs \{ (-3, 9), (-2, 4), (2, 4), (3, 9) \} is the only set that does not pair a domain element with two or more range elements.

21. A relation is a set of one or more ordered pairs.

A function is a relation in which each element of the domain is paired with EXACTLY one element of the range.

The Vertical-Line Test: Given the graph of a relation, if a vertical line can be drawn that does not cross any of the graphs in more than one place, it is a function.

Therefore, Z is not a function.

22. For a relation to be a function, each input value can only correspond to one output value. The relation diagram where each input value has exactly one arrow drawn to an output value will represent a function.

Therefore, diagram X represents a function.
23. A relation is a set of one or more ordered pairs.

A function is a relation in which each element of the domain is paired with EXACTLY one element of the range.

The Vertical Line Test: Given the graph of a relation, if a vertical line can be drawn that crosses the graph in more than one place, then the relation is not a function.

Since the graph does not pass the vertical line test, it is not a function, it is a relation only.

24. A relation is a set of one or more ordered pairs.

A function is a relation in which each element of the domain is paired with EXACTLY one element of the range.

There are two y-coordinates (range element) when \( x = -4 \).

Therefore, it is a relation only.

25. A function maps each domain element to only one range element.

The t-table Y is the only table that does not show a domain element paired with two or more range elements.