

18 Relations and Functions

Review It!

When you work with relations and functions, remember these words:

relation a set of ordered pairs

function a relation in which each first value is paired with one and only one second value

vertical line test for functions a vertical line crosses only one point on the graph

ordered pair a pair of numbers that can be graphed as a point on a coordinate plane

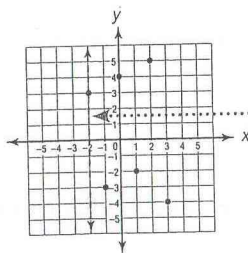
The vertical line test is an easy way to determine whether the graph of a relation shows a function. The graph below shows this relation.

$$\{(-2, 3), (-1, -3), (0, 4), (1, -2), (2, 5), (3, -4)\}$$

Step 1 Draw a vertical line through each point.

Each vertical line crosses the graph only _____ time(s).

There is only one second value for each first value.



REMEMBER Vertical is up and down.

So, the graph shows a _____.

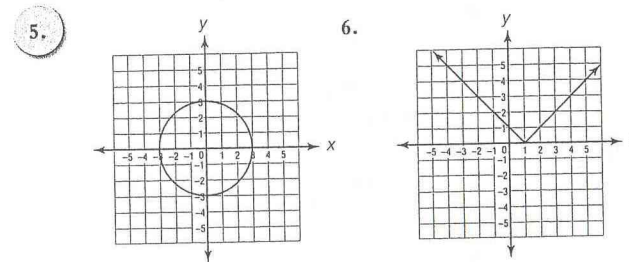
Try It!

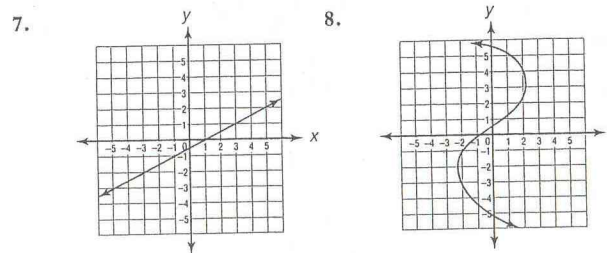
Decide whether each relation is a function. Write *yes* or *no*.



1. $\{(1, 4), (2, 9), (3, 11), (4, -2)\}$ 2. $\{(-1, 3), (-1, 2), (-1, 1), (-1, 6)\}$

3. $\{(0, 2), (1, 3), (1, -2), (2, 3)\}$ 4. $\{(1, 1), (2, 1), (3, 1), (4, 1)\}$





1.
Are any *x*-values the same or are they all different?
the same, or all different?

3.
Are any *x*-values the same or are they all different?
the same, or all different?

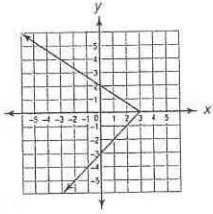
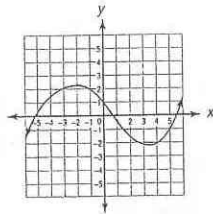
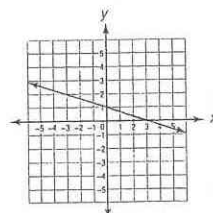
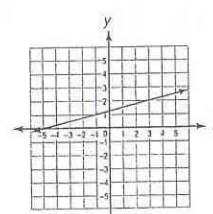
5.
What type of line should you draw? vertical, or horizontal?

Algebra

On Your Own!

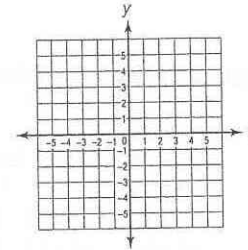
Circle the best answer for each question.

- Which relation is a function?
 - $\{(1, 1), (2, 2), (3, 3), (4, 4)\}$
 - $\{(1, 1), (1, 2), (3, 3), (4, 4)\}$
 - $\{(1, 1), (2, 2), (2, 3), (4, 4)\}$
 - $\{(1, 1), (2, 2), (3, 3), (3, 4)\}$
- Which relation is a function?
 - $\{(-1, -2), (-1, 2), (2, -2)\}$
 - $\{(-1, 2), (1, -2), (2, 1)\}$
 - $\{(-1, 2), (-1, -2), (-1, 1)\}$
 - $\{(-1, 1), (-1, -1), (-1, 2)\}$
- Which relation is NOT a function?
 - $\{(-5, 1), (-4, 2), (-3, -2), (-2, -1)\}$
 - $\{(5, 1), (6, -2), (7, 1), (8, -2)\}$
 - $\{(5, 1), (5, -2), (6, 2), (7, 3)\}$
 - $\{(5, 1), (-2, 5), (6, 2), (7, 3)\}$
- Which relation is NOT a function?
 - $\{(-2, 5), (-4, 6), (-5, -2)\}$
 - $\{(-2, 5), (-1, 4), (0, 4), (1, 4)\}$
 - $\{(-2, 5), (1, 5), (2, 5), (3, 5)\}$
 - $\{(-2, 5), (1, 5), (-2, 2), (1, 7)\}$

- Which graph does NOT show a function?
 - 
 - 
 - 
 - 

- Graph the ordered pairs on the coordinate grid.

$\{(-5, -4), (-4, -4), (-3, -4), (-2, -4), (-1, -4), (0, 0), (1, 4), (2, 4), (3, 4), (4, 4), (5, 4)\}$



Is the relation a function?

- Name an ordered pair that would make the relation NOT a function.

Math Words

Fill in the blanks.

- A test that shows whether the graph of a relation is a function is the _____ test.
- Any group of ordered pairs is a _____.
- A relation in which each first value is paired with one and only one second value is a _____.