

Lesson 5-2

Relations and Functions

Lesson Objectives 1 Identify relations and functions 2 Evaluate functions	NAEP 2005 Strand: Algebra Topic: Patterns, Relations, and Functions Local Standards: _____
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Vocabulary

A function is a relation that assigns exactly one value in the range to each value in the domain.

A relation is a set of ordered pairs (a whole bunch of points)

The domain of a relation is the set of first coordinates of the ordered pairs.

The range of a relation is all the y-values.

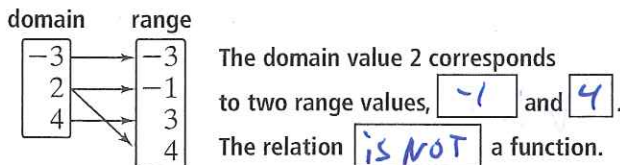
The vertical-line test says that, on the graph of a relation, if any vertical line passes through more than one point on the graph, the relation is not a function.

A function rule is an equation that describes a function

Function notation is a way to write a function using x to represent the inputs and $f(x)$ to represent the outputs.

Example

1 Using a Mapping Diagram Determine whether the relation $\{(4, 3), (2, -1), (-3, -3), (2, 4)\}$ is a function.

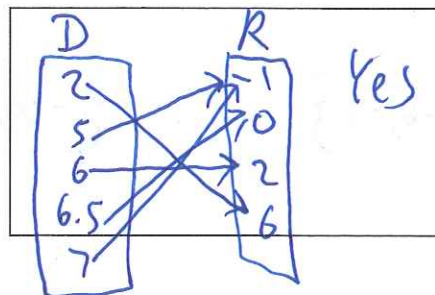
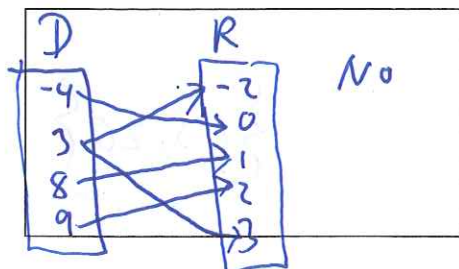


Quick Check

1. Use a mapping diagram to determine whether each relation is a function.

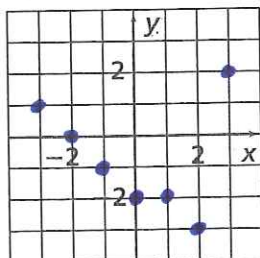
a. $\{(3, -2), (8, 1), (9, 2), (3, 3), (-4, 0)\}$

b. $\{(6.5, 0), (7, -1), (6, 2), (2, 6), (5, -1)\}$



Examples

- ② **Using the Vertical-Line Test** Determine whether the relation $\{(0, -2), (1, -2), (-3, 1), (-2, 0), (-1, -1), (3, 2), (2, -3)\}$ is a function.



Graph the ordered pairs on a coordinate plane

No vertical line passes through more than one point.
The relation **IS** a function.

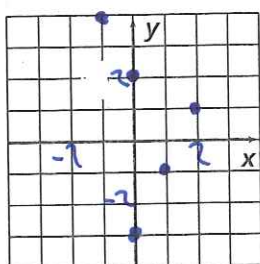
- ③ **Finding the Range** Evaluate the function rule $f(g) = -2g + 4$ to find the range for the domain $\{-1, 3, 5\}$.

$f(g) = -2g + 4$	$f(g) = -2g + 4$	$f(g) = -2g + 4$
$f(-1) = -2(-1) + 4$	$f(3) = -2(3) + 4$	$f(5) = -2(5) + 4$
$f(-1) = 2 + 4$	$f(3) = -6 + 4$	$f(5) = -10 + 4$
$f(-1) = 6$	$f(3) = -2$	$f(5) = -6$

The range is $\{-6, 2, 6\}$.

Quick Check

2. Use the vertical-line test to determine whether the relation $\{(0, 2), (1, -1), (-1, 4), (0, -3), (2, 1)\}$ is a function.



No
Fails VLT

3. Find the range of each function for the domain $\{-2, 0, 5\}$.

a. $f(x) = x - 6$

$\{-8, -6, -1\}$

b. $y = -4x$

$\{-20, 0, 8\}$

c. $g(t) = t^2 + 1$

$\{1, 5, 26\}$