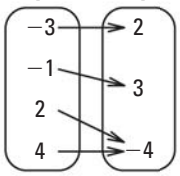
FUNCTIONS A **function** is a relation for which each input has exactly one output. If any input of a relation has more than one output, the relation is *not* a function.

EXAMPLE 2 Identify functions

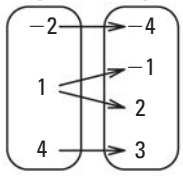
Tell whether the relation is a function. Explain.

AVOID ERRORS
A relation can map more than one input onto the same output and still be a function.

a. Input Output



b. Input Output



Solution

a. The relation *is* a function because each input is mapped onto exactly one output.

b. The relation *is not* a function because the input 1 is mapped onto both −1 and 2.

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GUIDED PRACTICE for Examples 1 and 2

1. Consider the relation given by the ordered pairs (−4, 3), (−2, 1), (0, 3), (1, −2), and (−2, −4).
   a. Identify the domain and range.
   b. Represent the relation using a table and a mapping diagram.
2. Tell whether the relation is a function. *Explain.*

x	−2	−1	0	1	3
y	−4	−4	−4	−4	−4

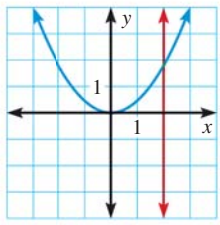
VERTICAL LINE TEST You can use the graph of a relation to determine whether it is a function by applying the *vertical line test*.

KEY CONCEPT *For Your Notebook*

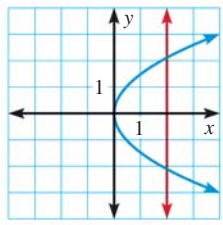
Vertical Line Test

A relation is a function if and only if no vertical line intersects the graph of the relation at more than one point.

Function



Not a function



REVIEW LOGICAL STATEMENTS
For help with "if and only if" statements, see p. 1002.