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Formalizing Relations and Functions

Unit 4 Lesson 6

FORMALIZING RELATIONS AND FUNCTIONS

Students will be able to:

Write the domain and range of relations and identify whether the relation is function or not

Key Vocabulary:

- Relation
- Function
- Domain and Range
- Vertical line test



FORMALIZING RELATIONS AND FUNCTIONS

Relation definition

A relation between two sets is a collection of ordered pairs containing one object from each set. If the object x is from the first set and object y is from the second set, then the objects are related if (x,y) is in the relation. It is represented by \mathbf{R} .

Domain:

The domain of a relation \mathbf{R} is the set of all x -values if the relation is represented as a set of ordered pairs.

Range:

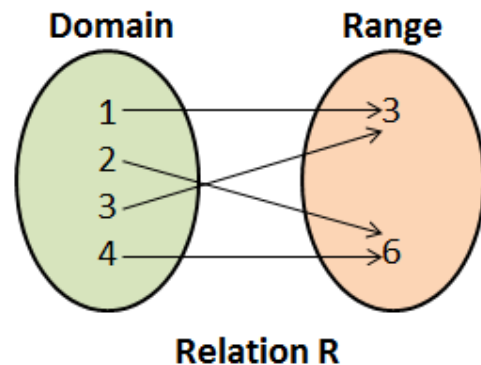
The range of a relation \mathbf{R} is the set of all y -values if the relation is represented as a set of ordered pairs.

FORMALIZING RELATIONS AND FUNCTIONS

Relation as a Function

A relation is function if each value in the domain of the relation is associated/paired with exactly one value in the range of the relation.

Mapping diagram:



$$\text{Relation } R = \{(1,3), (2,6), (3,3), (4,6)\}$$

The relation R is a function since each value in domain is associated with only one value in range.

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Problem 1: Identify the domain and range of the relation given below. Represent the relation with a mapping diagram. Is the relation a function?

$$R = \{(-2,1), (0,2), (1,1), (2,3)\}$$

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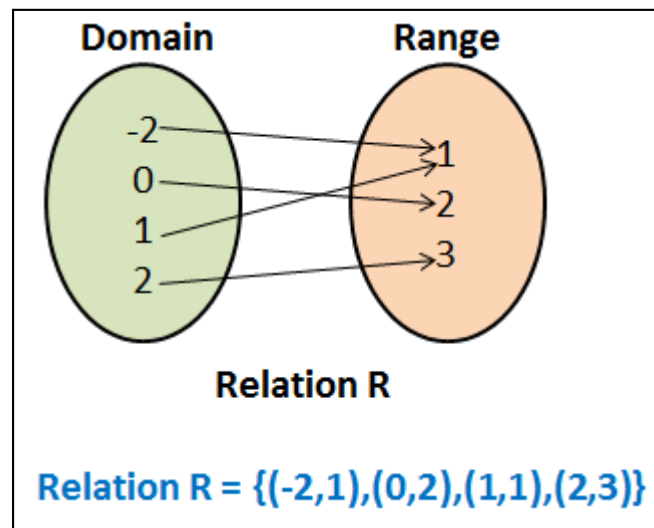
Problem 1: Identify the domain and range of the relation given below. Represent the relation with a mapping diagram. Is the relation a function?

$$R = \{(-2,1),(0,2),(1,1),(2,3)\}$$

Domain: $\{-2,0,1,2\}$

Range: $\{1,2,3\}$

Since each value in the domain is associated with only one value in domain, so the relation **R** is a function.



Mapping Diagram

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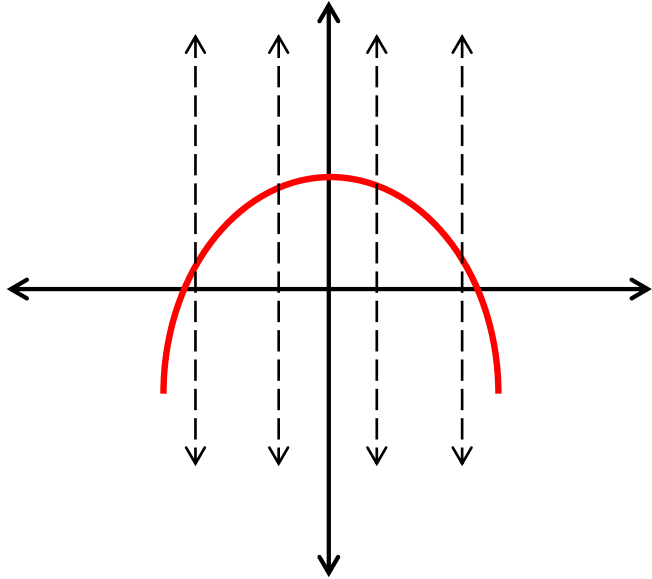
Vertical Line Test

If we are given the graph of a relation, we can tell whether the relation is a function or not by using a vertical line test on the graph. The rule is:

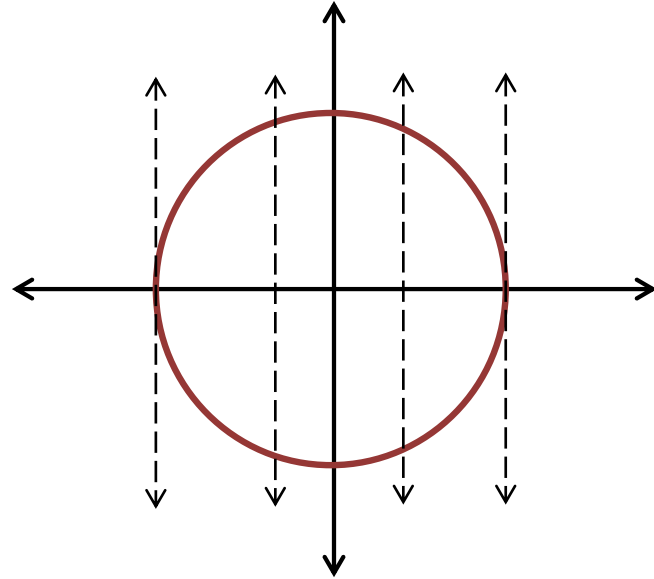
“Draw vertical lines (parallel to the y -axis) passing through the graph. If any vertical line passes through more than 1 point on the graph at the same time, then the relation is a function.”

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Vertical Line Test



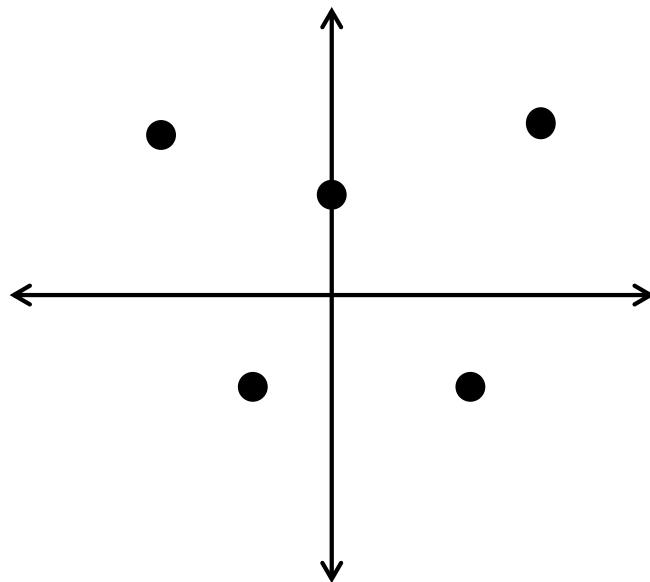
It is a Function



It is not a Function

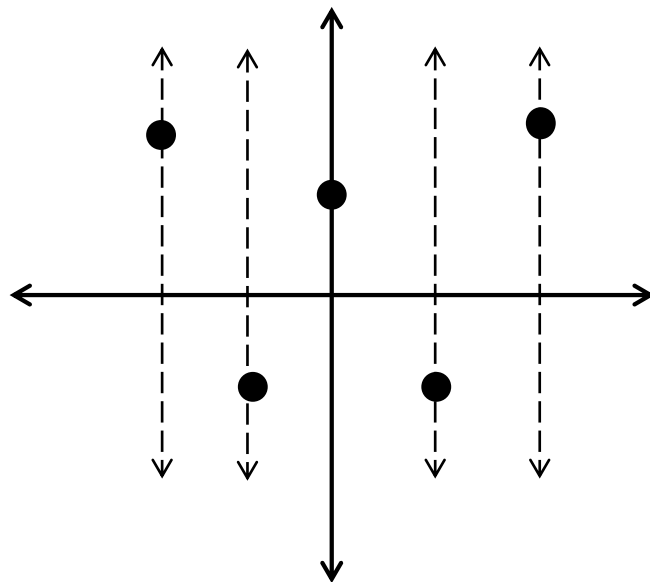
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Problem 2: Use the vertical line test to determine whether the relation represented by the graph is a function or not.



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Since the vertical line test is passed, the graph represents a **function**.