

Relations and Functions: Guided Notes

Student Name: _____

Class: _____

Date: _____

Understanding Relations and Functions

What is a Relation?

A relation is a set of ordered pairs that connects inputs (x-values) to outputs (y-values).

Key Definitions:

- **Input (Domain):** The set of all possible x-values
- **Output (Range):** The set of all possible y-values
- **Ordered Pair:** (x, y) representation of a relationship

What Makes a Function?

A function is a special type of relation where:

- Each input (x-value) has EXACTLY ONE output (y-value)
- No input can map to multiple different outputs

Vertical Line Test

- If a vertical line can cross the graph at more than one point, it is NOT a function
- A function allows only ONE point of intersection for any vertical line

Method 1: Mapping Diagram

- Check if each input arrow connects to ONLY ONE output
- No input can have multiple output connections

Method 2: Table of Values

- Verify no x-value appears more than once
- Each x-value must have a unique y-value

Method 3: Graphical Approach

- Use the Vertical Line Test
- If no vertical line crosses the graph at more than one point, it's a function

Mild Level Problems

1. Determine if the following relation is a function: $\{(1,2), (2,3), (3,4), (1,5)\}$

2. Examine the graph and identify if it represents a function.

Medium Level Problems

1. Create a mapping diagram that represents a function with 4 inputs and 4 outputs.

2. Analyze a table of values and explain why it may or may not be a function.

Spicy Level Problems

1. Design a real-world scenario that demonstrates a function, explaining why it meets function criteria.

2. Compare and contrast a relation and a function, providing specific mathematical examples to illustrate the differences.

