

# Relations And Functions Worksheet Answer Key PDF

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## Part 1: Building a Foundation

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### What is a function?

undefined. A) A set of ordered pairs where each input is related to multiple outputs.

**undefined. B) A set of ordered pairs where each input is related to exactly one output. ✓**

undefined. C) A graph that forms a circle.

undefined. D) A mathematical operation involving addition.

A function is a set of ordered pairs where each input is related to exactly one output.

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undefined. D) A mathematical operation involving addition.

A function is a set of ordered pairs where each input is related to exactly one output.

### Which of the following are characteristics of a function? (Select all that apply)

**undefined. A) Each input has exactly one output. ✓**

undefined. B) It can have multiple outputs for a single input.

**undefined. C) It passes the vertical line test. ✓**

**undefined. D) It can be represented by a set of ordered pairs. ✓**

Characteristics of a function include that each input has exactly one output and it passes the vertical line test.

### Which of the following are characteristics of a function? (Select all that apply)

**undefined. A) Each input has exactly one output. ✓**

undefined. B) It can have multiple outputs for a single input.

**undefined. C) It passes the vertical line test. ✓**

**undefined. D) It can be represented by a set of ordered pairs. ✓**

A function has characteristics such as each input having exactly one output and passing the vertical line test.

**Define the domain and range of a function in your own words.**

**The domain of a function is the set of all possible input values, while the range is the set of all possible output values.**

**Define the domain and range of a function in your own words.**

**The domain is the set of all possible inputs, while the range is the set of all possible outputs.**

**List two types of functions and provide a brief description of each.**

1. Type of function 1

**Linear function: A function that graphs to a straight line.**

2. Type of function 2

**Quadratic function: A function that graphs to a parabola.**

Examples include linear functions, which have a constant rate of change, and quadratic functions, which have a variable rate of change represented by a parabola.

## **Part 2: Understanding and Interpretation**

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**Which statements about the vertical line test are true? (Select all that apply)**

**undefined. A) It is used to determine if a graph represents a function. ✓**

undefined. B) It involves drawing horizontal lines across the graph.

**undefined. C) If a vertical line intersects the graph more than once, it is not a function. ✓**

undefined. D) It can be used to determine the range of a function.

The vertical line test is used to determine if a graph represents a function; if a vertical line intersects the graph more than once, it is not a function.

**Which statements about the vertical line test are true? (Select all that apply)**

undefined. **A) It is used to determine if a graph represents a function. ✓**

undefined. B) It involves drawing horizontal lines across the graph.

undefined. **C) If a vertical line intersects the graph more than once, it is not a function. ✓**

undefined. D) It can be used to determine the range of a function.

The vertical line test helps determine if a graph represents a function based on its intersections.

**Explain why the relation  $\{(2, 3), (2, 4), (3, 5)\}$  is not a function.**

**This relation is not a function because the input 2 is associated with two different outputs (3 and 4).**

**Explain why the relation  $\{(2, 3), (2, 4), (3, 5)\}$  is not a function.**

**The relation is not a function because the input '2' is associated with two different outputs, '3' and '4'.**

### Part 3: Application and Analysis

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**Given the function  $f(x) = 2x + 3$ , what is  $f(4)$ ?**

undefined. A) 8

undefined. **B) 11 ✓**

undefined. C) 10

undefined. D) 7

To find  $f(4)$ , substitute 4 into the function to get  $2(4) + 3 = 11$ .

**Given the function  $f(x) = 2x + 3$ , what is  $f(4)$ ?**

undefined. A) 8

undefined. **B) 11 ✓**

undefined. C) 10

undefined. D) 7

To find  $f(4)$ , substitute 4 into the function and simplify.

**Which of the following are linear functions? (Select all that apply)**

undefined. A)  $f(x) = 3x + 2$  ✓

undefined. B)  $f(x) = x^2 + 5$

undefined. C)  $f(x) = 7 - x$  ✓

undefined. D)  $f(x) = 2^x$

Linear functions include  $f(x) = 3x + 2$  and  $f(x) = 7 - x$ .

**Which of the following are linear functions? (Select all that apply)**

undefined. A)  $f(x) = 3x + 2$  ✓

undefined. B)  $f(x) = x^2 + 5$

undefined. C)  $f(x) = 7 - x$  ✓

undefined. D)  $f(x) = 2^x$

Linear functions have a constant rate of change and can be represented by a straight line.

**Calculate the range of the function  $f(x) = x^2$  for the domain  $\{1, 2, 3\}$ .**

**The range is  $\{1, 4, 9\}$  since  $f(1) = 1$ ,  $f(2) = 4$ , and  $f(3) = 9$ .**

**Calculate the range of the function  $f(x) = x^2$  for the domain  $\{1, 2, 3\}$ .**

**The range is the set of outputs obtained by evaluating the function at the given domain values.**

**Which of the following statements is true about inverse functions?**

undefined. A) An inverse function always exists for every function.

undefined. B) **The inverse of a function is found by swapping the domain and range.** ✓

undefined. C) Inverse functions are always linear.

undefined. D) The inverse of a function is found by adding a constant to the function.

An inverse function is found by swapping the domain and range of the original function.

**Analyze the following functions and determine which have inverses. (Select all that apply)**

undefined. A)  $f(x) = x + 3$  ✓

undefined. B)  $f(x) = x^2$

undefined. C)  $f(x) = 1/x$  ✓

undefined. D)  $f(x) = x^3$  ✓

A function has an inverse if it is one-to-one, meaning it passes the horizontal line test.

**Describe how you would determine if a given function has an inverse.**

To determine if a function has an inverse, check if it is one-to-one and passes the horizontal line test.

## Part 4: Evaluation and Creation

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**Which of the following statements is true about inverse functions?**

undefined. A) An inverse function always exists for every function.

undefined. B) **The inverse of a function is found by swapping the domain and range.** ✓

undefined. C) Inverse functions are always linear.

undefined. D) The inverse of a function is found by adding a constant to the function.

The inverse of a function is found by swapping the domain and range.

**Analyze the following functions and determine which have inverses. (Select all that apply)**

undefined. A)  $f(x) = x + 3$  ✓

undefined. B)  $f(x) = x^2$

undefined. C)  $f(x) = 1/x$  ✓

undefined. D)  $f(x) = x^3$  ✓

Functions that have inverses include  $f(x) = x + 3$ ,  $f(x) = 1/x$ , and  $f(x) = x^3$ .

Describe how you would determine if a given function has an inverse.

To determine if a function has an inverse, check if it is one-to-one, meaning each output is produced by exactly one input.

Which of the following functions is most likely to model exponential growth?

undefined. A)  $f(x) = 3x + 2$

undefined. B)  $f(x) = 2^x$  ✓

undefined. C)  $f(x) = x^2 + 5$

undefined. D)  $f(x) = 7 - x$

The function  $f(x) = 2^x$  is most likely to model exponential growth.

Which of the following functions is most likely to model exponential growth?

undefined. A)  $f(x) = 3x + 2$

undefined. B)  $f(x) = 2^x$  ✓

undefined. C)  $f(x) = x^2 + 5$

undefined. D)  $f(x) = 7 - x$

Exponential growth is typically modeled by functions that increase rapidly, such as  $f(x) = 2^x$ .

Evaluate the following scenarios and identify which could be modeled by a quadratic function. (Select all that apply)

undefined. A) The path of a projectile. ✓

undefined. B) The depreciation of a car's value over time.

undefined. C) The growth of bacteria in a lab experiment.

undefined. D) The area of a square as its side length increases. ✓

The scenarios that could be modeled by a quadratic function include the path of a projectile and the area of a square as its side length increases.

Evaluate the following scenarios and identify which could be modeled by a quadratic function. (Select all that apply)

undefined. A) The path of a projectile. ✓

undefined. B) The depreciation of a car's value over time.

undefined. C) The growth of bacteria in a lab experiment.

**undefined. D) The area of a square as its side length increases. ✓**

Quadratic functions can model scenarios like projectile motion and area calculations.

**Create a real-world scenario where a function could be used to model the situation. Describe the function and explain why it is appropriate.**

**An example could be modeling the cost of a phone plan as a function of the number of minutes used, which is appropriate because it shows a direct relationship.**

**Create a real-world scenario where a function could be used to model the situation. Describe the function and explain why it is appropriate.**

**A real-world scenario could involve population growth, modeled by an exponential function.**