Piecewise Function Worksheet Questions and Answers PDF

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Part 1: Building a Foundation

What is a piecewise function?

Hint: Think about how functions can be defined in different ways.

- ◯ A function defined by a single equation for all values of x.
- ◯ **A function defined by multiple sub-functions, each applying to a specific interval of the domain.** ✓
- ◯ A function that is always continuous.
- ◯ A function that only applies to integers.

> A piecewise function is defined by multiple sub-functions, each applying to a specific interval of the domain.

What is a piecewise function?

Hint: Think about how the function is defined.

- ◯ A function defined by a single equation for all values of x.
- ◯ **A function defined by multiple sub-functions, each applying to a specific interval of the domain.** ✓
- ◯ A function that is always continuous.
- ◯ A function that only applies to integers.

> A piecewise function is defined by multiple sub-functions, each applying to a specific interval of the domain.

How are the different pieces of a piecewise function typically written?

Hint: Consider the symbols used in mathematics to denote functions.

- ☐ Using parentheses ( )
- ☐ **Using braces { }** ✓

- [ ] Using brackets [ ]
- [ ] Using inequalities

> Different pieces of a piecewise function are typically written using braces { }.

How are the different pieces of a piecewise function typically written?

Hint: Consider the symbols used in mathematics.

- [ ] Using parentheses ( )
- [ ] **Using braces { } ✓**
- [ ] Using brackets [ ]
- [ ] Using inequalities

> Different pieces of a piecewise function are typically written using braces { }.

Describe the notation used for a piecewise function.

Hint: Think about how you would write a piecewise function mathematically.

> **The notation for a piecewise function typically includes a set of conditions and corresponding expressions for each interval.**

Describe the notation used for a piecewise function.

Hint: Think about how each piece is represented.

> **The notation for a piecewise function typically includes a set of conditions for each piece.**

Why might a piecewise function have a point of discontinuity?

Hint: Consider the nature of the transitions between pieces.

- ◯ Because the function is not defined at that point.
- ◯ **Because the function changes from one piece to another at that point. ✓**
- ◯ Because the function is continuous everywhere.
- ◯ Because the function is linear.

> A piecewise function may have a point of discontinuity because the function changes from one piece to another at that point.

Why might a piecewise function have a point of discontinuity?

Hint: Think about the behavior of the function at certain points.

- ◯ Because the function is not defined at that point.
- ◯ **Because the function changes from one piece to another at that point. ✓**
- ◯ Because the function is continuous everywhere.
- ◯ Because the function is linear.

> A piecewise function may have a point of discontinuity because the function changes from one piece to another at that point.

Part 2: Comprehension and Application

Explain how you would evaluate a piecewise function at a given point.

Hint: Think about the steps you would take to find the value of the function.

> **To evaluate a piecewise function at a given point, identify which interval the point falls into and then use the corresponding expression to find the value.**

Explain how you would evaluate a piecewise function at a given point.

Hint: Consider the steps involved in the evaluation.

> **To evaluate a piecewise function at a given point, identify which piece applies to that point and use the corresponding expression.**

Which of the following scenarios could be modeled by a piecewise function?

Hint: Consider situations where different rules apply based on conditions.

- [ ] A car's speed that remains constant.
- [ ] **A store's pricing that changes based on the quantity purchased. ✓**
- [ ] A temperature that remains the same throughout the day.
- [ ] A linear growth of a plant.

> A store's pricing that changes based on the quantity purchased could be modeled by a piecewise function.

Which of the following scenarios could be modeled by a piecewise function?

Hint: Think about situations with different conditions.

- [ ] A car's speed that remains constant.
- [ ] **A store's pricing that changes based on the quantity purchased. ✓**
- [ ] A temperature that remains the same throughout the day.
- [ ] A linear growth of a plant.

> A store's pricing that changes based on the quantity purchased can be modeled by a piecewise function.

Given the piecewise function f(x) = { x^2 for x < 0, 2x + 1 for x ≥ 0 }, evaluate f(-3).

Hint: Determine which piece of the function to use for x = -3.

> **To evaluate f(-3), use the piece x^2 since -3 is less than 0, resulting in f(-3) = 9.**

Given the piecewise function f(x) = { x^2 for x < 0, 2x + 1 for x ≥ 0 }, evaluate f(-3).

Hint: Use the appropriate piece for the given value.

> **To evaluate f(-3), use the piece x^2 since -3 is less than 0.**

Sketch the graph of the piecewise function f(x) = { 3x + 2 for x ≤ 1, -x + 4 for x > 1 }.

Hint: Consider how each piece behaves in its respective interval.

> **The graph consists of a line for x ≤ 1 and another line for x > 1, meeting at the point (1, 5).**

Sketch the graph of the piecewise function f(x) = { 3x + 2 for x ≤ 1, -x + 4 for x > 1 }.

Hint: Consider the behavior of each piece at the boundary.

The graph consists of two linear pieces with a break at x = 1.

Part 3: Analysis, Evaluation, and Creation

Analyze the continuity of the piecewise function f(x) = { x + 1 for x < 0, 2x for x ≥ 0 } at x = 0.

Hint: Consider the limits from both sides of x = 0.

The function is continuous at x = 0 since both pieces meet at the same value, which is 0.

Analyze the continuity of the piecewise function f(x) = { x + 1 for x < 0, 2x for x ≥ 0 } at x = 0.

Hint: Consider the limits from both sides.

To analyze continuity, check if the left-hand limit equals the right-hand limit at x = 0.

Compare the graphs of the piecewise functions f(x) = { x^2 for x < 1, 2x for x ≥ 1 } and g(x) = { x^2 for x < 1, 2x + 1 for x ≥ 1 }.

Hint: Look for differences in the behavior of the functions at x = 1.

The graph of f(x) is continuous at x = 1, while g(x) has a jump discontinuity at that point.

Compare the graphs of the piecewise functions f(x) = { x^2 for x < 1, 2x for x ≥ 1 } and g(x) = { x^2 for x < 1, 2x + 1 for x ≥ 1 }.

Hint: Look for differences in behavior at the boundary.

The graphs differ at x = 1, where f(x) is continuous and g(x) has a jump.

Evaluate the effectiveness of using a piecewise function to model a tax system where different rates apply to different income brackets.

Hint: Consider the advantages and disadvantages.

Using a piecewise function for a tax system allows for clear representation of varying rates.

Evaluate the effectiveness of using a piecewise function to model a tax system where different rates apply to different income brackets.

Hint: Consider the advantages and disadvantages of this approach.

Using a piecewise function for a tax system allows for clear representation of varying rates, but it can complicate calculations.

Create a piecewise function to model a scenario where a parking fee is $5 for the first hour and $3 for each additional hour.

Hint: Define the conditions for each piece.

The piecewise function can be defined as f(x) = { 5 for $0 < x \leq 1$, $5 + 3(x - 1)$ for $x > 1$ }.

Create a piecewise function to model a scenario where a parking fee is $5 for the first hour and $3 for each additional hour.

Hint: Think about how to express the different rates mathematically.

> **The piecewise function can be defined as f(x) = { 5 for 0 < x ≤ 1, 5 + 3(x - 1) for x > 1 }.**

Propose a real-world situation that could be effectively modeled by a piecewise function and justify your choice.

Hint: Think about scenarios with different conditions.

> **A real-world situation could be the pricing of a utility bill that changes based on usage levels.**

Propose a real-world situation that could be effectively modeled by a piecewise function and justify your choice.

Hint: Consider scenarios with varying conditions or rates.

> **A real-world situation could be the pricing of a utility bill where different rates apply based on usage levels.**