Graphing Exponential Equations Worksheet

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Part 1: Foundational Knowledge

What is the general form of an exponential equation?

Hint: Think about the structure of exponential functions.

- ◯ A) y = mx + b
- ◯ B) y = a * b^x
- ◯ C) y = ax^2 + bx + c
- ◯ D) y = 1/x

Which of the following are components of an exponential function? (Select all that apply)

Hint: Consider the elements that define an exponential function.

- ☐ A) Base b
- ☐ B) Coefficient a
- ☐ C) Exponent x
- ☐ D) Slope m

Explain what happens to the graph of an exponential function when the base b is greater than 1.

Hint: Consider the direction and shape of the graph.

Identify the effects of the following transformations on the graph of y = 2^x:

Hint: Consider how shifts affect the graph's position.

1. Vertical shift: y = 2^x + 3

2. Horizontal shift: y = 2^(x-2)

Part 2: Comprehension

What is the y-intercept of the exponential function y = 3 * 2^x?

Hint: Evaluate the function at x = 0.

- ◯ A) 0
- ◯ B) 1
- ◯ C) 2
- ◯ D) 3

Which of the following graphs represent exponential decay? (Select all that apply)

Hint: Look for graphs that decrease as x increases.

- ☐ A) y = 0.5^x
- ☐ B) y = 2^{-x}
- ☐ C) y = 3^x
- ☐ D) y = 4^{0.5x}

Describe how the graph of y = 5 * (0.8)^x differs from the graph of y = 5 * (1.2)^x.

Hint: Consider the growth and decay characteristics of each graph.

Part 3: Application and Analysis

If a population of bacteria doubles every hour, which equation models this growth if the initial population is 100?

Hint: Think about the formula for exponential growth.

- ◯ A) y = 100 * 2^x
- ◯ B) y = 100 * x^2
- ◯ C) y = 100 * 0.5^x
- ◯ D) y = 100 + 2x

Which transformations would you apply to the graph of y = 2^x to obtain y = -2^{(x+1)} + 3? (Select all that apply)

Hint: Consider how each transformation affects the graph.

- ☐ A) Reflect over the x-axis
- ☐ B) Shift left by 1 unit
- ☐ C) Shift up by 3 units
- ☐ D) Shift right by 1 unit

Given the function y = 4 * 3^x, predict the value of y when x = 2 and explain your reasoning.

Hint: Substitute x = 2 into the function.

Which of the following statements best describes the asymptotic behavior of the graph y = 2^{-x}?

Hint: Consider what happens to the graph as x approaches infinity.

- ◯ A) It approaches the y-axis.
- ◯ B) It approaches the x-axis.
- ◯ C) It approaches a vertical line.
- ◯ D) It approaches a horizontal line at y = 2.

Analyze the graph of y = 3 * (0.5)^x. Which of the following are true? (Select all that apply)

Hint: Look for characteristics of the graph.

- [ ] A) The graph represents exponential growth.
- [ ] B) The graph represents exponential decay.
- [ ] C) The y-intercept is 3.
- [ ] D) The graph has a horizontal asymptote at y = 0.

Compare and contrast the graphs of y = 2^x and y = 2^{-x}. Discuss their key differences in terms of growth and decay.

Hint: Think about the direction of the graphs and their behavior.

Part 4: Evaluation and Creation

Which scenario is best modeled by an exponential decay function?

Hint: Consider situations where quantities decrease over time.

- ◯ A) The height of a ball thrown into the air.
- ◯ B) The cooling of a hot object over time.
- ◯ C) The growth of a tree over years.
- ◯ D) The distance traveled by a car moving at constant speed.

Evaluate the function y = 5 * 2^x for x = -1, 0, 1. Which of the following are correct values? (Select all that apply)

Hint: Substitute the values of x into the function.

- [ ] A) y = 2.5 when x = -1
- [ ] B) y = 5 when x = 0
- [ ] C) y = 10 when x = 1

- [ ] D) y = 20 when x = 2

Design a real-world problem that can be modeled using an exponential function. Describe the scenario, define the variables, and write the exponential equation that represents the situation.

Hint: Think about situations involving growth or decay.