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Exponential Functions Worksheet Questions and Answers PDF

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Part 1: Building a Foundation

What is the general form of an exponential function?

Hint: Consider the structure of exponential functions.

○ A) f(x) = ax + b
○ **B) f(x) = a * b^x** ✓
○ C) f(x) = a^x + b
○ D) f(x) = a * x^ b

The general form of an exponential function is represented as f(x) = a * b^x.

Which of the following are characteristics of exponential growth functions?

Hint: Think about the behavior of the graph as x increases.

☐ **A) The base b is greater than 1.** ✓
☐ B) The graph decreases as x increases.
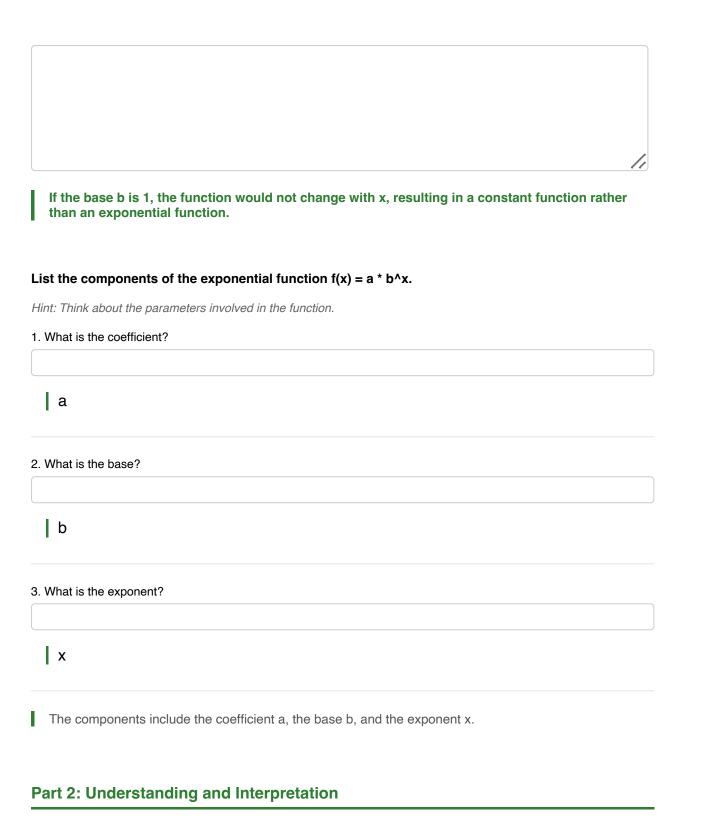☐ **C) The graph has a horizontal asymptote at y = 0.** ✓
☐ **D) The y-intercept is at (0, a).** ✓

Exponential growth functions have a base greater than 1, a horizontal asymptote at y = 0, and a y-intercept at (0, a).

Explain why the base b of an exponential function cannot be 1.

Hint: Consider the implications of having a constant function.

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> **If the base b is 1, the function would not change with x, resulting in a constant function rather than an exponential function.**

List the components of the exponential function f(x) = a * b^x.

Hint: Think about the parameters involved in the function.

1. What is the coefficient?

> a

---

2. What is the base?

> b

---

3. What is the exponent?

> x

> The components include the coefficient a, the base b, and the exponent x.

Part 2: Understanding and Interpretation

What happens to the graph of an exponential function when the base b is between 0 and 1?

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Hint: Consider the direction of the graph as x increases.

○ A) It represents exponential growth.

○ B) It becomes a linear function.

○ **C) It represents exponential decay.** ✓

○ D) It remains constant.

▌ When the base b is between 0 and 1, the graph represents exponential decay.

Which transformations affect the graph of an exponential function f(x) = a * b^x?

Hint: Think about how the graph can be shifted or reflected.

☐ **A) Vertical shift** ✓

☐ **B) Horizontal shift** ✓

☐ **C) Reflection over the x-axis** ✓

☐ D) Rotation around the origin

▌ Transformations include vertical shifts, horizontal shifts, and reflections over the x-axis.

Describe how the graph of f(x) = 2 * 3^x changes if it is transformed to f(x) = 2 * 3^{x-2} + 1.

Hint: Consider the effects of shifting and scaling.

▌ **The graph shifts 2 units to the right and 1 unit up, affecting the position of the horizontal asymptote.**

Part 3: Application and Analysis

If a population of bacteria doubles every hour, which function models this growth?

Hint: Think about the characteristics of exponential growth.

○ **A) f(x) = 100 * 2^x** ✓

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○ B) f(x) = 100 * x^2
○ C) f(x) = 100 * 0.5^x
○ D) f(x) = 100 * x

> The function that models this growth is f(x) = 100 * 2^x, where x represents hours.

In finance, which scenarios can be modeled using exponential functions?

Hint: Consider the nature of interest and asset values.

☐ A) Simple interest
☐ **B) Compound interest ✓**
☐ **C) Loan amortization ✓**
☐ **D) Depreciation of assets ✓**

> Scenarios such as compound interest and depreciation of assets can be modeled using exponential functions.

A certain radioactive substance decays at a rate of 5% per year. Write the exponential decay function representing this scenario.

Hint: Consider the initial amount and the decay rate.

> **The exponential decay function can be written as f(t) = a * (0.95)^ t, where a is the initial amount.**

Which of the following statements about the function f(x) = 3 * (0.5)^x is true?

Hint: Analyze the behavior of the function as x increases.

○ A) It represents exponential growth.
○ **B) It has a y-intercept at (0, 3). ✓**
○ C) It has a horizontal asymptote at y = 3.
○ D) It increases as x increases.

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The function represents exponential decay and has a y-intercept at (0, 3).

Part 4: Evaluation and Creation

Which function best models a scenario where a car's value decreases by 20% each year?

Hint: Think about the characteristics of exponential decay.

○ **A) f(x) = 20000 * 0.8^x ✓**
○ B) f(x) = 20000 * 1.2^x
○ C) f(x) = 20000 * 0.2^x
○ D) f(x) = 20000 * x^0.8

The function that best models this scenario is f(x) = 20000 * 0.8^x.

You are designing a model for predicting the spread of a virus. Which factors should be considered in your exponential function model?

Hint: Think about the variables that influence the spread.

☐ **A) Initial number of cases ✓**
☐ **B) Rate of transmission ✓**
☐ **C) Population density ✓**
☐ D) Recovery rate

Factors to consider include the initial number of cases, rate of transmission, and population density.

Create an exponential function to model a scenario where a new technology's adoption rate is expected to triple every year. Explain your reasoning.

Hint: Consider the initial adoption rate and the growth factor.

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> **An example function could be f(t) = a * 3^ t, where a is the initial adoption rate.**

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