

Exponential Growth And Decay Worksheet

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Part 1: Building a Foundation

Which of the following is the base of the natural logarithm used in exponential growth and decay formulas?

Hint: Think about the mathematical constant that is commonly used in natural logarithms.

- A) 2
- B) 3.14
- C) 2.718
- D) 10

Which of the following are components of the exponential growth formula $N(t) = N_0 \times e^{kt}$?

Hint: Consider the elements that make up the formula for exponential growth.

- A) Initial quantity (N_0)
- B) Growth rate constant (k)
- C) Time (t)
- D) Base of the natural logarithm (e)

Explain in your own words what exponential decay means and provide a real-world example.

Hint: Think about processes that decrease over time.

List the formulas for: Exponential Growth, Exponential Decay.

Hint: Recall the standard forms of these formulas.

1. Exponential Growth

2. Exponential Decay

Part 2: comprehension and Application

What does the growth rate constant (k) determine in an exponential growth scenario?

Hint: Consider how the growth rate affects the overall growth.

- A) The initial quantity
- B) The speed of growth
- C) The time it takes to reach half the initial value
- D) The final quantity

Which of the following scenarios can be modeled using exponential decay?

Hint: Think about processes that decrease over time.

- A) Population growth in a city
- B) Radioactive decay of a substance
- C) Cooling of a hot object
- D) Accumulation of interest in a bank account

Calculate the amount of a radioactive substance remaining after 10 years if its half-life is 5 years and the initial amount is 100 grams.

Hint: Use the half-life formula to determine the remaining amount.

If a population of bacteria doubles every 3 hours, what is the doubling time in terms of the growth rate constant (k)?

Hint: Consider the relationship between doubling time and growth rate.

- A) $\ln(2)/3$
- B) $3 \times \ln(2)$
- C) $3/\ln(2)$
- D) $\ln(3)$

Part 3: Analysis, Evaluation, and Creation

What is the relationship between the doubling time and the growth rate constant in exponential growth?

Hint: Think about how these two concepts interact.

- A) Directly proportional
- B) Inversely proportional
- C) No relationship
- D) Equal

Analyze the following scenarios and identify which involve exponential growth:

Hint: Consider the nature of each scenario.

- A) A car depreciating in value
- B) A virus spreading in a population
- C) A plant growing in height
- D) Water evaporating from a pond

Compare and contrast exponential growth and decay, highlighting their key differences and similarities.

Hint: Think about the characteristics of each process.

Which factor is most critical in determining whether a process is modeled by exponential growth or decay?

Hint: Consider the role of the rate constant.

- A) Initial quantity
- B) Rate constant sign
- C) Time period
- D) Base of the natural logarithm

Design a real-world scenario where exponential growth or decay could be applied. Describe the situation, identify the variables involved, and explain how you would model it mathematically.

Hint: Think about a situation that involves growth or decay over time.