Gold Seal Lesson:

Copernicus Education Gateway

Author(s): **Ben Lindeman**			*Lesson Title:* **Population Growth**			
Grade Span			***ICLE Application Model***			
K-4	***5-8***	***9-12*** ***XX***	***A***	***B***	***C***	***D*** ***X***

Instructional Focus:

Algebraic Concepts and Relationships
Students use algebraic methods to investigate, model, and interpret patterns and functions involving numbers, shapes, data, and graphs in a problem-solving situation. Students evaluate and communicate the reasoning used in solving these problems.

Statistics and Probability
Students use statistics and probability to analyze given situations and the results of experiments. Students communicate the reasoning used in arriving at a conclusion.

Tools and Technology
Students use appropriate tools and technologies to model, measure, and apply the results in a problem-solving situation. Students communicate the reasoning used in solving these problems.

Reading
Students read a variety of grade level materials, applying strategies appropriate to various situations

Writing
Students write for a variety of purposes and audiences with sophistication and complexity appropriate to the grade level.

Performance Task

Note to the teacher: **The Microsoft Encarta Encyclopedia or its equivalent is necessary for this task.**

The main purpose of the United States Census, which is taken every 10 years, is to establish the population figure for the United States. In addition to the population figure, however, the census has always asked other questions to get a demographic profile of the population. For this task, pretend that you are a free lance writer who has been asked to prepare a story on the U.S. census. Your story is to include a history and description of the United States census, including the purpose and how the census has changed over the years. Then, you are to select three states and locate a graph of its population growth since the first census or the first year that it had a census taken (It may not have been a state when the U.S. census began.). This can be found in the Microsoft Encarta Encyclopedia or an equivalent source provided by your teacher. You are to compare and contrast the growth graphs of the three states, using mathematically correct terminology. Using data from the graphs for the past two censuses, predict, using the exponential growth function, what the population will be in each of the states when the next census is taken. Include your work and your prediction in the story. Conclude your story with an explanation as to why you think the three states have the growth pattern indicated in the graphs.

ICLE Essential Skills

Perform ***operations with signed*** (positive and negative) ***numbers***, including decimals, ratios, percents, and fractions. (m1)
Know the ***equation of a line*** and interpret graphically using the slope-intercept form (i.e., y = mx+b), and the point-slope form (i.e., y-b = m(x-a)). (m45)
Know how to graphically sketch ***basic conic sections*** (e.g., circles and parabolas) using their equations, and graphically solve systems of equations. (m86)
Understand the concept ***recurrence relations*** and how they are applicable to such things as compound interest and annuity. (m61)
Summarize, synthesize and organize information while reading. (ela24)
Know how to find and read information from a variety of electronic sources. (ela28)
Engage a reader's interest in an analytical or interpretive piece of writing. (ela93)
Understand the nature of informational and/or technical texts. (ela71)
Understand the nature and purpose of and be able to word process a variety of formats including essays, business letters, memos, instructions, policy statements, technical proposals, user manuals, lab reports, etc. (ela30)

Scoring Guide:

4 The student completes the task independently. He/she demonstrates good research skills in obtaining necessary information for the story. The student's story is accurate, interesting, and shows mastery of the English language, including grammar, spelling, and punctuation. The student is able to access the information regarding the population growth of three states over time. His/her explanation of the growth curves is accurate and understandable. The student demonstrates knowledge of the exponential growth function and is able to predict the population as required.

3 The student needs some assistance to complete the task. He/she has minor difficulty doing the necessary research for the story. The student's story is accurate and relatively interesting. He/she, however, makes some minor grammatical errors, indicating that he/she does not have a total command of the English language. The student is able to access the information regarding the population growth of three states over time. His/her explanation of the growth curves is accurate, but not clearly explained. The student demonstrates knowledge of the exponential growth function, but has some minor difficulty predicting the population as required.

2 The student needs considerable assistance to complete the task. He/she has significant difficulty doing the necessary research for the story. The student's story lacks accuracy and only mildly interesting. Several grammatical errors occur in the writing, indicating that he/she little command of the English language. With assistance, the student is able to access the information regarding the population growth of three states over time, but has difficulty explaining the growth curve in writing. The student demonstrates only a little knowledge of the exponential growth function and is unable to make the population prediction required.

1 The student does not complete the entire task. He/she is unable to access the information needed for the story, demonstrating little research skills. His/her story is vague, uninteresting, and inaccurate. It is obvious from the writing that the student has little command of English grammar. What little he/she does write contains many grammatical errors. The student does not obtain the necessary information regarding the population growth of three states over time, and, therefore, is unable to explain the growth curve. The student demonstrates no knowledge of the exponential growth function and is unable to make any population prediction as required.

Keywords

English Language Arts	Mathematics	Science
Reading Comprehension In Context Independent Reading Research Technology	**Algebra** Computation Exponential Patterns Functions Graphs Growth and decay Linear Patterns Math in Daily Life Patterns Problem Solving	**Earth Science**
Writing Technology Word Processing	**Geometry**	**Life Science**
Communications	**Statistics** Charts Data Analysis Data Display Graphs	**Chemistry**

	Inference Prediction Problem Solving Statistics in Daily Life Tables Technology Integration	
Literature	**Calculus**	**Physics**
Other	**Trigonometry**	**Other**
	Other	