How Fast is the U.S. Population Growing?

Student Worksheet

Name _____

Class _____

In this activity, you will explore:

- trends in population data
- modeling data with exponential functions
- making conjectures from data

Directions

1. Open the document *PTE-NumOps-USPopulation_EN.tns* on your TI-Nspire™ math and science learning handheld, and follow along with your teacher to work through the activity.

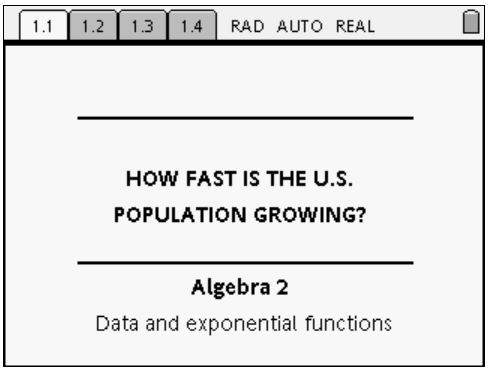

Figure 1

- Use this document as a reference and to record your answers.

2. Read page 1.2 to familiarize yourself with the activity.

3. Look at the data in the spreadsheet on page 1.3 (Figure 2). Describe any trends you see in the data.

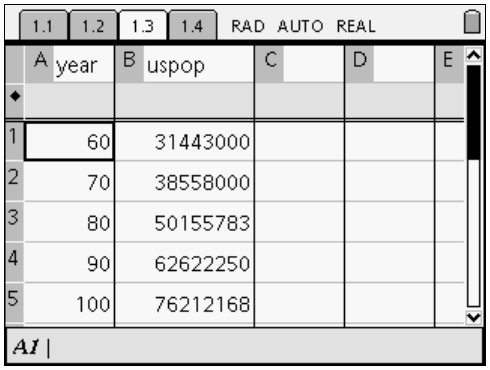

Figure 2

Create a Scatter Plot

4. On page 1.4, follow your teacher's directions to make a scatter plot of this data.

- The year (after 1800) will be plotted on the horizontal axis and the population on the vertical axis. When you have finished, it should resemble the one shown in Figure 3.

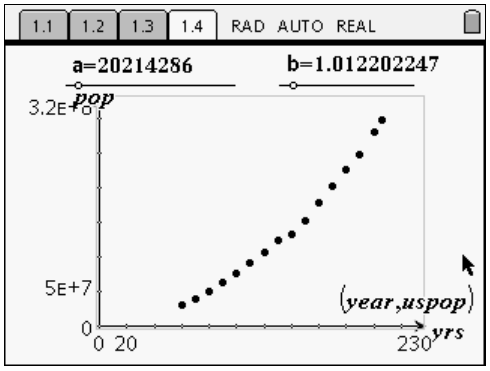

Figure 3

5. Listen as your teacher tells you how to perform the rest of this activity.

You will be modeling the data with exponential functions of the form $y = a \cdot b^x$, first by dragging the sliders located at the top of the screen (this will be f1), and then by performing an exponential regression of the data (this will be f2).

You will also place points on the graphs of these two functions, which you can drag along the function, viewing its coordinates.

6. Before moving to the exercises, first sketch a curve of best fit through the points on the scatter plot shown in Figure 3 on the previous page, and record your functions f1 and f2 in the appropriate space below.

f1(x) = _____ f2(x) = _____

Exercises

7. Compare your equations for f1 and f2. Describe any similarities and/or differences you see.

8. Consider the function f2. By what percent does the population of the United States increase each year according to this exponential model? Explain.

9. Consider the function f1. What does the variable a represent in this real-world context? What is the value of a according to this model? Does this seem reasonable? Explain.

10. Predict the U.S. population in the year 2020 algebraically using both f1 and f2. Show your work. Grab and drag the points on the two different equations to confirm your results.

11. Estimate the United States population in the year the Declaration of Independence was signed (1776), again using both f1 and f2. Show your work. Grab and drag the points to confirm your results. You may have to adjust your window settings.

