

CHAPTER
11**Project**
Population Explosion**Activity 1: Population Predictions** *Use with Lesson 11-3*

Research data about a population that interests you. You can use your county, state, or city population or a wildlife population.

1. Gather data from at least 6 years. Make a table showing each year and the population for that year.
2. Predict the population for the next 10 years by looking at your table. Then make a scatter plot. Write an equation for a trend line, and use it to check your prediction.
3. You can often model population data with exponential functions. Find the growth or decay rate for each year by computing the ratio $r = \frac{\text{new population}}{\text{previous population}}$.

4. Use your answers to Problem 3 and the exponential growth function $y = a(1 + r)^t$ or the exponential decay function $y = a(1 - r)^t$ to make a table and a graph. Check whether this model seems appropriate for your data. Try other growth or decay rates to refine your model. Make a prediction about the population over the next 10 years.
5. Compare the linear model and the exponential model. Explain which one you think is a better predictor for your population.

CHAPTER **Project**

11 *Population Explosion* continued

Activity 2: As the Pendulum Swings *Use with Lesson 11-5*

1. Tie a piece of string to an object, such as a washer, and tie the other end to a fixed point where the washer can swing freely. Measure and record the length of the string (cm) and time (s) for 10 complete swings of the pendulum. Divide the total time by 10 to get the average time for 1 swing.
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2. Repeat Step 1 for six different string lengths. Make a table of your data.

3. Using the horizontal axis for the length of the string x and the vertical axis for the time for one complete swing y , plot your data.

4. Describe your graph.
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5. The function that models the motion of a pendulum is $t = 2\pi \sqrt{\frac{\ell}{980}}$, where t is the time in seconds and ℓ is the length in centimeters. Does this function model your data? If not, what are some possible reasons?
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