LESSON **9-6**

Success for English Language Learners

Modeling Real-World Data

Steps for Success

Step I Introduce the lesson using the following procedures.

- Have students look at the financial pages of a newspaper. The vast amount of data presented there is used by people trying to find a pattern in the financial markets, i.e., a *model for real-world data*.
- To emphasize the relevance of finding models for real-world data, challenge students to cite an example of real-world data that is random.

Step II Teach the lesson.

- Note that while much real-world data may appear random, there is frequently a pattern behind it, although it may be very complex. Some models used to predict economic behavior may have hundreds of variables.
- To *regress* is to go backward. Previously, students have used a function to draw a graph. Here we are "going backward," using a graph to determine a function.
- Note that the *correlation coefficient* shows how well a model *correlates,* or establishes a relationship between, the two variables in the data set.

Step III Ask English Language Learners to complete the worksheet for this lesson.

- Point out that Example 1C in the student textbook is supported by Problem 1 on the worksheet. Help students understand that collecting data and then organizing it helps them to recognize patterns. This will make it easier for them to make predictions about the data trends. This in turn will help them to make decisions about the future.
- Think and Discuss supports the problems on the worksheet.

Making Connections

- Have students work with small groups or partners to create a situation for a real-world problem or event. Have them tell how they would collect the data and how they would use the function that fit their data. Have students share their observations or ideas with the class. Encourage the class to encompass at least one of each type of function.

Name ______________________ Date ___________ Class ___________

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Problem 1

Use finite differences or ratios to determine which parent function would best model the given data set.

The first and second differences were not constant. What about ratios?

Time	5	6	7	8	9	10
Buffalo	124	150	185	213	261	322

$\frac{150}{124} = 1.210$ $\frac{185}{150} = 1.233$ $\frac{213}{185} = 1.151$ $\frac{261}{213} = 1.225$ $\frac{322}{261} = 1.234$

Rounded to the nearest tenth, these ratios are all 1.2. They are *very* close to constant.

Think and Discuss

1. How would you choose a model if none of the finite differences or ratios was constant?

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2. How can you check if your model is a good fit?

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3. If none of the models in this lesson are a good fit, is the data random?

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Lesson 8-6

1. The radicand is the number under the radical sign.
2. An odd index indicates 1 real root.
3. Use the rule that $\sqrt[n]{a^m} = a^{\frac{m}{n}}$.

Lesson 8-7

1. In the function $f(x) = a\sqrt{\frac{1}{b}(x - h) + k}$, the value of a tells you if the function is stretched or compressed.
2. In the function $f(x) = a\sqrt{\frac{1}{b}(x - h) + k}$, the value of k tells you how the function is shifted up or down.
3. In the function $f(x) = a\sqrt{\frac{1}{b}(x - h) + k}$, if the value of b is less than 0, the function is reflected across the y-axis.

Lesson 8-8

1. Raise a radical equation to the power equal to the index of the radical.
2. Substitute the solution into the original equation to see if it is true.
3. Square both sides of the equation. Then simplify.

CHAPTER 9

Lesson 9-1

1. It has a negative slope because h decreases as t increases.
2. If Kurt was climbing, it would have a positive slope.
3. A reasonable domain would be $0 \leq t \leq 83\frac{1}{3}$. After $83\frac{1}{3}$ seconds, Kurt would be “underground.”

Lesson 9-2

1. It should be solid because the point $(5, 22)$ is included.
2. That should be an open circle because the point is not included.
3. Because each stage of the triathlon begins where the previous stage ended.

Lesson 9-3

1. $m = \frac{3}{2}$
2. A horizontal compression (or stretch) does not affect a point whose x-coordinate is zero.

Lesson 9-4

1. It isn’t used because it converts dollars to euros.
2. D takes euros to dollars, but E needs an input of euros, so $E(D(x))$ doesn’t make sense.

Lesson 9-5

1. If a horizontal line passes through more than 1 point of the graph of a relation, then the inverse is not a function.
2. I could find the inverse of the inverse, since the inverse of the inverse of a relation is the original relation.

Lesson 9-6

1. I would look for the set of finite differences or ratios that was closest to constant. That might provide a good model.
2. If the correlation coefficient is close to 1, the model is a good fit.
3. Not necessarily. Maybe a model we have not studied might work.