LESSON 8-7

Success for English Language Learners

Radical Functions

Steps for Success

Step I Use the following ideas to help students understand the lesson examples.

- Have students discuss the definition of the vocabulary words *radical function* and *square root function* by dividing them into parts. Have them compare the English phrases and definitions to those in their native languages.
- Emphasize to students that every positive perfect square number has both a positive root and a negative root.

Step II Teach the lesson.

- Note that just as students examined the values in transformations of exponential and logarithmic functions, they need to carefully examine the values in the transformed functions to see how they are altered from the original.
- Make sure that students see that they can graph a radical inequality in a fashion similar to how they graph a radical function. Remind students to examine the type of inequality sign to see if they need a dashed or solid curve.

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

- Point out that Example 2 in the student textbook is supported by Problem 1 on the worksheet. Tell students that they need to examine the original function and the transformation carefully to see how the function has changed.
- Point out that Example 3 in the student textbook is supported by Problem 2 on the worksheet. Emphasize to students that each way that the transformation is different from the original function will determine the shape of the transformation on the graph.

Making Connections

- To make sure that students understand transformations, ask them to brainstorm the types of things they could do that would transform their lives. For example, they might grow taller or move away from home to college. These things might be transformations in their lives.

Name ____ Date ___________ Class ____________

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Problem 1

Using the graph of $f(x) = \sqrt{x}$ as a guide, describe the transformation and graph each function.

Compare each graph to the original function.

$f(x) = \sqrt{x}$

Vertical stretch by 3. → $g(x) = 3\sqrt{x}$

Shift 2 units down. → $g(x) = \sqrt{x} - 2$

Problem 2

Using the graph of $f(x) = \sqrt{x}$ as a guide, describe the transformation and graph each function.

Compare each graph to the original function.

$f(x) = \sqrt{x}$

Vertical stretch by 2. Shift 3 units left. → $g(x) = 2\sqrt{x + 3}$

Reflect across *y*-axis. Shift 2 units down. → $g(x) = \sqrt{-x} - 2$

Think and Discuss

1. How do you know when a radical function is stretched?

____

2. How do you know when a radical function is shifted up or down?

____

3. How do you know when a radical function is reflected across the *y*-axis?

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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.