LESSON 8-8

Success for English Language Learners

Solving Radical Equations and Inequalities

Steps for Success

Step I Make sure students understand the important concepts of the lesson by discussing the following.

- Have students discuss the definition of *radical equation* by breaking it into parts. Remind students that sometimes they may generate an extraneous solution, which is a solution that will not make the equation true. Review how the root "extra" is contained within *extraneous*.
- Emphasize to students the connection between quadratic and radical equations. Tell students that they can solve a radical equation by raising both sides to a power.

Step II Teach the lesson.

- Have students make sure they understand the steps required to solve a radical equation. To isolate the radical means to get it on one side by itself. To raise both sides of the equation to the power equal to the index of the radical requires that students understand the vocabulary words *index* and *radical*.
- Post a list of the steps required to solve a radical equation for reference and work through a simple example with students. As you teach the lesson, point out the steps as you solve the equations.

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

- Point out that Example 1 in the student textbook is supported by Problem 1 on the worksheet. Point out that sometimes you have to cube both sides of the equation if the cube root is involved.
- Point out that Example 2 in the student textbook is supported by Problem 2 on the worksheet. Point out that following the three steps required to solve the radical equation will work with a radical on both sides of the equation.

Making Connections

- To make sure that students understand that radical equations can be solved in a manner similar to other equations, emphasize that they need to follow the order of operations at each step, just as they did with linear, quadratic, exponential, and logarithmic equations.
- Remind students that with all equations they should check their solutions in the original equation to make sure they make the original equation true.

Name ______________________________ Date __________ Class __________

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Solving Radical Equations and Inequalities

Problem 1

Solve each equation.

How can you isolate the radical?

What power do you need to raise both sides to?

How can you simplify and solve?

$5\sqrt[3]{4x + 3} = 15$ → $\sqrt[3]{4x + 3} = 3$ → $4x + 3 = 27$

Divide by 5.

Cube both sides.

Subtract 3. Divide by 4.

Problem 2

Solve $\sqrt{35x} = 5\sqrt{x + 2}$.

How can you isolate the radical?

How can you simplify?

How can you solve?

$\sqrt{35x} = 5\sqrt{x + 2}$ → $35x = 25(x + 2)$ → $35x = 25x + 50$

Square both sides.

Distribute 25.

Subtract 25*x* from both sides. Divide both sides by 10.

Think and Discuss

1. How do you know what power to raise both sides of the equation to?

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2. How do you check the solution of an equation?

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3. How do you solve an equation containing radicals on both sides of the equal sign?

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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 $0 \le t \le 83\frac{1}{3}$. 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.