LESSON 8-5

Success for English Language Learners

Solving Rational Equations and Inequalities

Steps for Success

Step I Introduce the lesson using the following procedures.

- Discuss the definition of *rational equation* by breaking it into two parts: *rational* and *equation*. Students should understand that in the context of mathematics, *rational* describes a number that can be written as the quotient of two other numbers. Students should also understand that an equation is a statement that two expressions are equal to one another, which is normally shown with an equal sign.
- Have students use a similar method to the one shown above to understand the vocabulary term *rational inequality*.

Step II Teach the lesson.

- Point out that students solve other types of equations using similar methods.
- To emphasize the meaning of *extraneous* within the term *extraneous solution,* write the word "extra" and then add "neous" to it. Tell students that an extraneous solution is "extra," but not a solution of the original equation.

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. Remind students that to solve a rational equation, they may want to multiply each term of the equation by the least common denominator.
- Point out that Example 4 in the student textbook is supported by Problem 2 on the worksheet. Make sure students understand that they need to first combine Jason and Lacy's rates of work in order to find how long it would take Lacy to clean the tank by herself.

Making Connections

- Brainstorm with students to make a short list of common formulas that they use in math and science. Write each formula as a rational equation. For example, $d = rt$ can be rewritten as $t = \frac{d}{r}$.

Name _____ Date _____ Class _____

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Problem 1

Solve the equation $x + \frac{8}{x} = 6$.

How can you solve the equation?

$x + \frac{8}{x} = 6$ — Multiply by the LCD, x.

$x = 2$ or $x = 4$

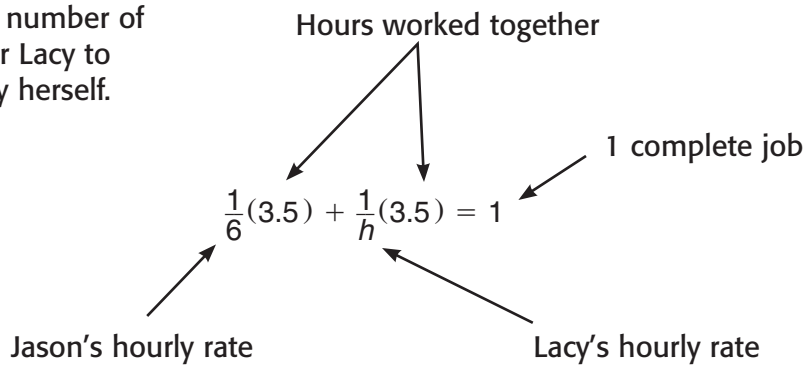
$2 + \frac{8}{2} = 4 + \frac{8}{4} = 6$ — Substitute solutions into the original equation to see if they make it true.

How do you know if the solutions are extraneous?

Problem 2

Jason can clean a large tank at the aquarium in about 6 hours. When Jason and Lacy work together, they can clean the tank in about 3.5 hours. About how long would it take Lacy to clean the tank if she works by herself?

h represents the number of hours needed for Lacy to clean the tank by herself.



Think and Discuss

1. How do you solve a rational equation?

_____

2. How do you know that you have an extraneous solution?

_____

3. How do you know how to combine rates in Example 4?

_____

Lesson 7-5

1. Use the properties of logarithms or use the base of the logarithm as the base for both sides.
2. If the bases are equal, the exponents must be equal.
3. The Order of Operations says do exponents first.

Lesson 7-6

1. Operators work on an irrational number the same way that they work on any other number.
2. If you had to give a value of *e*, you would have to round it.
3. The Order of Operations says do exponents first.

Lesson 7-7

1. It is of the form $f(x) = a^x + k$.
2. It is of the form $f(x) = a^{(x + k)}$.
3. If it is of the form $f(x) = a \cdot b^x$, it is a vertical transformation. If it is of the form $f(x) = b^{(a \cdot x)}$, it is a horizontal transformation.

Lesson 7-8

1. It has a constant ratio of *y*-values for equally spaced *x*-values.
2. If the ratios are close to constant, an exponential function may be appropriate.
3. You would use an exponential regression.

CHAPTER 8

Lesson 8-1

1. A graph of direction variation passes through the origin.
2. Direct variation is a function in the form $y = kx$, in which *y* varies directly as *x*.
3. Inverse variation is a function in the form $y = \frac{k}{x}$, in which *y* varies inversely as *x*.

Lesson 8-2

1. You can apply the Quotient of Powers Property to subtract exponents that are being divided.
2. Factoring out -1 will give you an expression in which x^2 is positive. You may be able to factor the expression with x^2 and then divide out common factors.
3. When you have a result that has division by 0, it is considered undefined.

Lesson 8-3

1. You know an *x*-value is undefined when it equals 0.
2. Add or subtract the numerators, but leave the denominators as the same.
3. The least common multiple is the smallest amount divisible by each expression.

Lesson 8-4

1. You know a rational function is translated to the left by the value of *h* in $f(x) = \frac{1}{x - 3}$.
2. You know the vertical asymptote at the line $x = h$ in the form $f(x) = \frac{a}{x - h} + k$.
3. You know the horizontal asymptote at the line $y = k$ in the form $f(x) = \frac{a}{x - h} + k$.

Lesson 8-5

1. You can multiply by the LCD. Then simplify.
2. Check solutions in the equation to make sure that they make it true.
3. Jason and Lacy have separate rates and rates that involve working together. You can add their rates of working together to find Lacy's separate rate.