

Name: _____

Date: _____ # _____

Section 8-6 Solving Rational Equations

Learning Goal: To understand how to solve rational equations; to understand how to use rational equations to solve problems.

Essential Questions: Are two quantities inversely proportional if an increase in one corresponds to a decrease in the other?
What kinds of asymptotes are possible for a rational function?
Are a rational expression and its simplified form equivalent?

Warm Up:

1. What is the LCM of $8x - 24$ and $2(x^2 - 6x + 9)$?

2. What is the sum $\frac{x}{x+3} + \frac{7x+6}{x^2+x-6}$ in simplest form? State any restrictions on the variable.

3. What is the difference $\frac{x+2}{x^2+4x-5} - \frac{3}{x^2+6x+5}$ in simplest form? State any restrictions on the variable.

4. Solve each equation. Check your answers.

a) $-3(x-4) = 2(x+8)$

b) $\frac{x}{2} + \frac{x}{3} = 15$

Vocabulary:

Rational equation: contains at least one rational expression.

Note: To solve an equation containing rational expressions, first multiply each side by the LCD of the rational expressions. (This might introduce extraneous solutions)

Rational Equation	Not a Rational Equation
$\frac{x}{x+1} + \frac{x}{x-1} = \frac{2}{x^2-1}$	$x + \frac{1}{2} = \frac{2}{3}$

Recall: Extraneous solution: is a solution of the derived equation, but not a solution of the original equation. You must check all solutions in the original equation to confirm that they are a solution.

Solving a Rational Equation

What are the solutions of the rational equation?

$$\frac{x}{x-3} + \frac{x}{x+3} = \frac{2}{x^2-9}$$

1. Factor the denominators to find the LCD.	
2. Multiply each side by the LCD to clear denominators.	
3. Simplify and solve .	
4. Check whether your solutions are <i>extraneous</i> . Use the original equation!	
5. Write the solutions.	

You Try:

What are the solutions of the rational equation?

1.
$$\frac{4}{x} + \frac{5}{2} = -\frac{11}{x}$$

2.
$$\frac{3}{x} - \frac{1}{2} = \frac{12}{x}$$

$$3. \quad \frac{x-1}{x^2+3x+2} + \frac{2x}{x+2} = \frac{x-1}{x+1}$$

$$4. \quad \frac{x-1}{x+2} = \frac{x^2+2x-3}{x+2}$$

5.
$$\frac{5x}{x-2} = 7 + \frac{10}{x-2}$$

6.
$$\frac{5x}{x+1} = 4 - \frac{5}{x+1}$$

7.
$$\frac{4x+1}{x+1} = \frac{12}{x^2-1} + 3$$

8.
$$\frac{3x-2}{x-2} = \frac{6}{x^2-4} + 1$$

9. $\frac{2}{x^2-x} = \frac{1}{x-1}$

10. $\frac{3}{x^2+4x} = \frac{1}{x+4}$

11. $\frac{x}{x+1} + \frac{3}{x+4} = \frac{x+3}{x+4}$

Closure: Which methods can be used to solve a rational equation?

Assignment: section 8.6 # 8,10,12,24,27,28,29,33,43,47,48,50,51,52 (14 problems)