

U2

Connecting Graphs and Rational Equations

Lesson 7

Background Skills: Like many other equations, rational equations can be solved both graphically and algebraically. Sometimes solving algebraically results in extraneous roots. When solving graphically, the x-intercepts, or zeros, are the roots of the equation. Graphically, extraneous solutions are not observed.

Recall:

Steps to solve a rational equations.

$$\frac{8}{x^2 - 16} + 1 = \frac{1}{x - 4}$$

1. Factor the denominators and state the non-permissible values
2. Determine the lowest common denominator.
3. Multiply every term, on both sides by the lcd
4. Solve for the variable.
5. Check your solution(s)

Example 1. Solve the rational equation  $x + \frac{6}{x+2} - 5 = 0$  both graphically and algebraically. Verify your solution. What do you notice about the roots of the equations, and the x-intercepts of the graph of the function.

$$x + \frac{6}{x+2} - 5 = 0$$

$$y_1 = x + \frac{6}{x+2} - 5$$

Your Turn: Determine the roots of the equation algebraically.

Determine x-intercepts from the graph.

$$\frac{14}{x} - x + 5 = 0$$

What is the connection between the roots and the x-intercepts.

Example 2: Solve the equation  $\frac{x^2 - 3x - 7}{3 - 2x} = x - 1$  graphically.

Express your answer to the nearest hundredth.

Verify your solution by solving algebraically.

$$\frac{x^2 - 3x - 7}{3 - 2x} = x - 1$$

Your Turn: Solve the equation  $2 - \frac{3x}{2} = \frac{1 + 4x - x^2}{4x + 10}$  graphically.

Express your answer to the nearest hundredth.

Verify your solution by solving algebraically.

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

Example 3: Solve the equation  $\frac{x}{2x+5} + 2x = \frac{8x+15}{4x+10}$  both graphically and algebraically.

$$\frac{x}{2x+5} + 2x = \frac{8x+15}{4x+10}$$

Example 4: Megan and her friends are organizing a fundraiser for a local children's charity. They are asking local businesses to donate a door prize. So far, they have asked 9 businesses and only one has donated a door prize. Their goal was to have three quarters of the businesses donate. If they get every business to donate from now on, how many more businesses do they need to reach their goal?

$$P = \frac{\textit{successes}}{\textit{attempts}}$$

Let  $x$  be the number of businesses they ask from now on.

$$P = \frac{1+x}{9+x}$$

Explain how you can use this equation to solve the problem?

Your Turn: [With a partner, try question #13 on page 467 of your text.](#)



# Homework

1. Assignment Handout:  
"BLM 9-4 Graphs and Rational Equations - Extra Practice"
2. Text Pages 465 - 467, Exercises # 1 - 8, 10, 11, C2



## Attachments

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Translations Assignment 1.doc