Topic 4.5 Solving Rational Equations

Essential Question:

How can you solve rational equations and identify extraneous solutions?

Critique & Explain

Complete online.

CONCEPT Summary

WORDS

A rational equation is an equation that contains a rational expression. To solve, identify the domain for the variable. Then multiply both sides of the equation by a common denominator and solve. An extraneous solution is a solution that is not valid because that value is excluded from the domain of the original equation.

ALGEBRA

$\frac{1}{x} + \frac{2}{x} = \frac{1}{6}$ Domain: $x \neq 0$

$6x\left(\frac{1}{x} + \frac{2}{x}\right) = 6x\left(\frac{1}{6}\right)$

$6 + 12 = x$

$18 = x$

The domain includes $x = 18$, so the solution to the equation is 18.

$\frac{x^2 + 4}{x - 1} = \frac{5}{x - 1}$ Domain: $x \neq 1$

$(x - 1)\left(\frac{x^2 + 4}{x - 1}\right) = (x - 1)\left(\frac{5}{x - 1}\right)$

$x^2 + 4 = 5$

$x^2 = 1$

$x = \pm 1$

The domain does not include $x = 1$, so 1 is an extraneous solution. It does include $x = -1$, so the solution to the equation is -1.

Q: How can you determine if a solution is in the domain?

Notes:

Examples & Questions

Examples 1

Q: Why do you have to confirm that the solution is valid in the original equation?
Q: Why do you multiply both sides of the equation by the common denominator?

Examples 2

Q: Is there another way to solve this problem? Explain.
Q: How could you solve this equation without multiplying both sides by 6x?

Examples 3

Q: How do you now that the common denominator $(x-5)(x-3)$ will divide out $x^2-8x+15$?
Q: Are all values that make the value of the denominator 0 extraneous solutions?
Q: How can you use a graph to verify your solutions?

Examples 4

Q: How can you determine values that cannot be solutions to the equation without solving?
Q: Do you have to multiply both sides of the equation by the least common denominator to eliminate the fractions?

Examples 5

Q: What does each side of he equation represent?
Q: Why is the 1 added to $\frac{16}{5+c}$ rather than $\frac{6}{5-c}$?
Q: Would *c=-25* be an extraneous solution if you were solving the problem without context?

Practice and Problem Solving

Complete MathXL for School: Practice and Problem Solving (online)
Complete MathXL for School: Enrichment (online)

Challenge: #8,13, 30,33 – key will be posted in Power School Learning.

Lesson Quiz 4.5