Solving Rational Equations

An equation that contains one or more rational expressions is called a **rational equation**.

Learning Targets

I can:

- *determine the non-permissible values for the variable in a rational equation*
- determine the solution to a rational equation algebraically and identify any extraneous roots (**AN6.1**)

One method for solving rational equations is to rewrite the rational expressions in terms of a common denominator. Since the denominator of each expression is the same, the numerators must be equivalent as well. We can then drop the denominator and solve the remaining equation for the variable.

Strategy for Solving Rational Equations

1. Completely factor polynomial denominators.
2. Determine the lowest common denominator.

   Note: Use the LCD to identify the non-permissible values.
3. Rewrite each fraction with the LCD in the denominator. Do not forget to "adjust" the numerators.
4. You may now "drop" the denominators.
5. Solve the resulting linear or quadratic equation.
6. Verify all possible solutions using the original equation in a LS/RS Chart.
7. State the solutions.

Sample Problems

Solve and verify your solutions.

1. $\frac{1}{6a^2} = \frac{1}{3a^2} - \frac{1}{a}$
2. $\frac{4}{y-4} - \frac{3}{y-3} = 1$
3. $\frac{r+5}{r^2-2r} - 1 = \frac{1}{r^2-2r}$
4. $\frac{2}{x+1} = \frac{3}{x} + \frac{1}{x^2+x}$
5. $\frac{5}{x^2-7x+12} = \frac{2}{x-3} + \frac{5}{x-4}$
6. $\frac{x+5}{x^2+x} = \frac{1}{x^2+x} - \frac{x-6}{x+1}$
7. $\frac{x}{5x+5} = \frac{1}{x+2} + \frac{1}{x^2+3x+2}$