Solve Rational Equations with Integer Denominators

Recall that when solving equations containing rational numbers, it is much simpler to multiply both sides of the equation by the LCD to clear the denominators.

Example 1  Solve.

a. \( \frac{x}{9} - \frac{x}{8} = 1 \)  
   
\( \frac{n-2}{12} = \frac{1}{4} - \frac{n-5}{3} \)

Solve Rational Equations Where a Variable Appears in the Denominator.

1. Find the LCD of all denominators in the equation.
2. Multiply every term on both sides of the equation by the LCD.
3. Simplify each term by eliminating common factors. All denominators should now be 1.
4. Solve the resulting equation.
5. Check answers for any that would result in a zero denominator. These are not solutions.

Example 2  Solve.

a. \( \frac{4 - 6}{x} = \frac{19}{5} \)  
   
\( \frac{x + 3}{x - 3} + \frac{3}{2} = \frac{3}{x - 3} \)

c. \( \frac{3}{x + 3} + \frac{5}{x + 4} = \frac{12x + 7}{x^2 + 7x + 12} \)
   
\( \frac{2n}{n^2 - 25} - \frac{3}{n - 5} = \frac{2}{n + 5} \)