<u>Objective</u>: Solve rational equations algebraically.

<u>Concept</u>

<u>Rational Equation</u>: an equation that involves at least one rational expression (the variable is in at least one denominator).

Example

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

Rational equations can have <u>extraneous solutions</u>: solutions that **are excluded** values of the expressions in the equation. For a rational equation, extraneous solutions are values that create a 0 in one or more denominator. Extraneous solutions are not included in the final solution set.

For $\frac{3x}{x+1} = \frac{2}{x-2} + \frac{x-4}{x^2-x-2}$, a solution of -1 or 2 would be extraneous and would not be included in the final solution set.

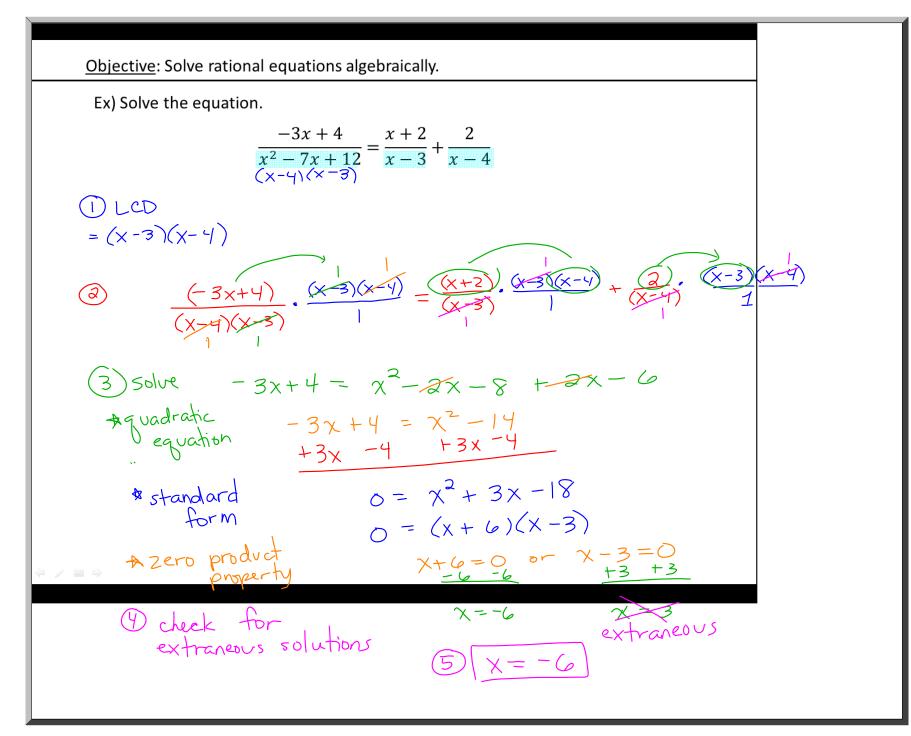
Objective: Solve rational equations algebraically.

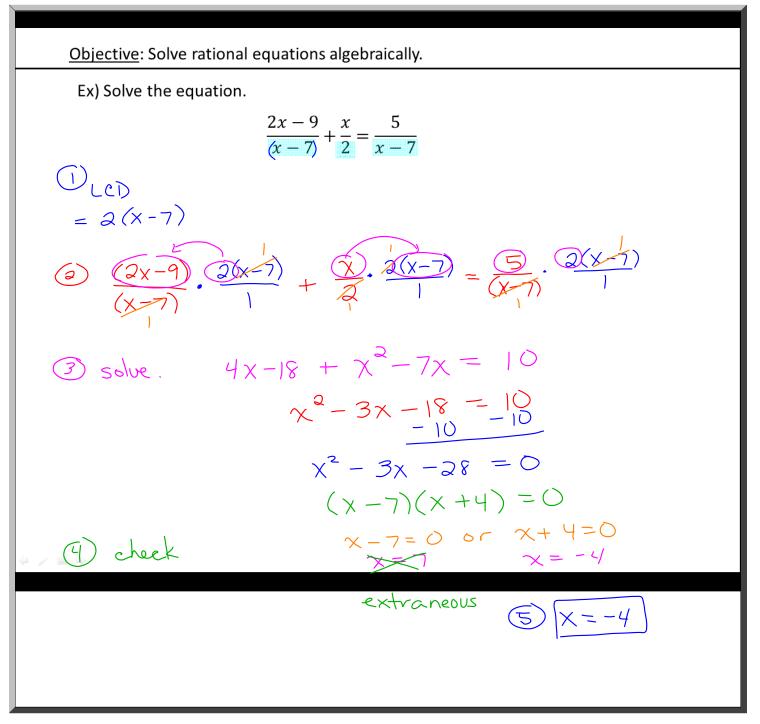
Steps to Solve a Rational Equation

- 1. Find the LCD (lowest common denominator).
- 2. Multiply <u>every</u> term by the LCD to clear the denominators (use the multiplication property of equality).
- 3. Solve the resulting equation.
- 4. Check for Extraneous Solutions

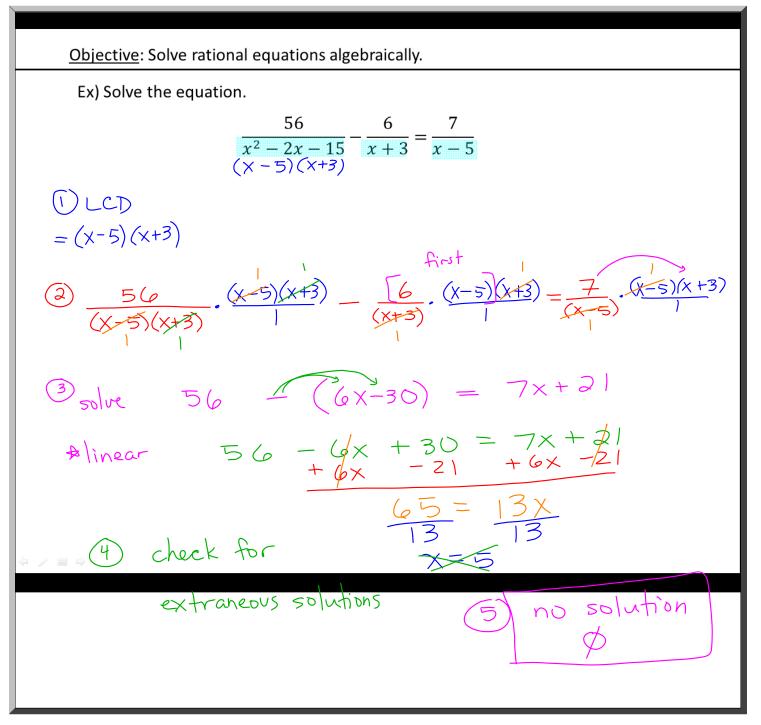
(excluded values; solutions that make the denominator equal to 0).

5. State the final solution set.





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Objective: Solve rational equations algebraically.

<u>Closure</u>

Jasmine solved a rational equation. Her work is shown. Did Jasmine state the solution correctly? Explain your reasoning.

$$\frac{x}{x+2} + \frac{3}{x} = \frac{-2}{x+2} \qquad LCD = x(x+2)$$

$$\frac{x}{(x+2)} \cdot \frac{x(x+2)}{1} + \frac{3}{x} \cdot \frac{x(x+2)}{1} = \frac{-2}{(x+2)} \cdot \frac{x(x+2)}{1}$$

$$x \cdot x + 3(x + 2) = -2x$$

$$x^{2} + 3x + 6 = -2x$$

$$x^{2} + 5x + 6 = 0$$

$$(x + 2)(x + 3) = 0$$

$$x + 2 = 0 \quad x + 3 = 0$$

$$x = -2 \quad x = -3$$

solution : x = -3, -2

Jasmine did not state the solution correctly. The solution of -2 is extraneous because it creates a 0 in two denominators. The correct solution is x = -3.

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