

## Section 8-6 Solving Rational Equations

When solving an equation involving one rational expression equal to another, we multiply through by the lowest common denominator. You have to state the restrictions for these problems.

Solve:

$$\frac{x}{x+3} = \frac{6}{x-1}$$

~~$x \neq -3, 1$~~

$$x(x-1) = 6(x+3)$$

$$x^2 - x = 6x + 18$$

$$x^2 - 7x - 18 = 0$$

$$(x+2)(x-9) = 0$$

$x = 2, 9$

You must check the solutions to make sure they are true.

Mar 29-2:18 PM

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Sometimes solving rational equations introduces extraneous solutions (a solution to the resulting equation that is not a true solution to the original equation). This is why you must check your answers.

Solve:

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

$$x(x-2) - 8 = 2(x+2)$$

$$x^2 - 2x - 8 = 2x + 4$$

$$x^2 - 4x - 12 = 0$$

State any restrictions.  
 $x \neq \pm 2$

$$x^2 - 4x - 12 = 0$$

$$(x+2)(x-6) = 0$$

~~$x = 6, -2$~~

$$\frac{2n+1}{3n+4} = \frac{2n-8}{3n+8}$$

$$(2n+1)(3n+8) = (3n+4)(2n-8)$$

$$6n^2 + 19n + 8 = 6n^2 - 16n - 32$$

$$+ 16n - 8$$

$$\frac{35n}{35} = \frac{-40}{35} = -\frac{8}{7}$$

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

$$2x - 1(x+3) = x$$

$$2x - x - 3 = x$$

$$-x - 3 = x$$

$$-3 = 2x$$

$$-3 \cdot 0$$

∅

Solve:

$$\frac{x}{x+1} + \frac{3}{x+4} = \frac{x+3}{x+4}$$

$$x(x+4) + 3(x+1) = (x+3)(x+4)$$

$$x^2 + 4x + 3x + 3 = x^2 + 4x + 3$$

$$7x + 3 = x^2 + 4x + 3$$

$$3x = x^2$$

$$x = 0$$

Mar 30-10:14 AM

Apr 17-10:48 AM

Hwk: pg. 546-547  
 #8 - 24 (4th), 30 - 34  
 evens, 38, 42, 44 - 52  
 evens

Mar 30-12:53 PM

When solving an inequality, we will need to consider two cases: one when the denominator is positive and one where it is negative (flip the sign).

Solve:

$$\frac{4x}{x-3} \leq 6$$

Case 1:  $x - 3 > 0$  (positive) Case 2:  $x - 3 < 0$  (negative)

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#33.

$$\frac{2x+1}{x-2} > 4$$

Case 1: Case 2:

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#35.

$$\frac{x+1}{x} \leq \frac{1}{2}$$

Case 1: Case 2:

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Hwk: pg. 518  
 30-36 evens, #56

Mar 29-2:18 PM