There are two ways we will use to solve rational equations. The first way is to get the same denominator on both sides of the equation.

Example 1- Solve $\frac{3x}{x+1} + \frac{6}{2x} = \frac{7}{x}$

Step 1- Get the denominators the same on both sides

We can actually reduce the second fraction, and equations becomes

3 <i>x</i>	+ <u>-</u> =	_ 7
$\overline{x+1}$	\overline{x}	\overline{x}

We need to make this equation look like ??? ???

$\overline{x(x+1)}$	$-\overline{x(x+1)}$

Let's multiply our fractions to make it happen!

$$\frac{3x}{x+1} \cdot \frac{x}{x} + \frac{3}{x} \cdot \frac{x+1}{x+1} = \frac{7}{x} \cdot \frac{x+1}{x+1}$$

$$\frac{3x^2}{x(x+1)} + \frac{3x+3}{x(x+1)} = \frac{7x+7}{x(x+1)}$$

$$\frac{3x^2}{x(x+1)} + \frac{3x+3}{x(x+1)} = \frac{7x+7}{x(x+1)}$$
Denominators are now the same on both sides of the equation

Step 2- Drop the denominators

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

Step 3- Solve

$$3x^{2} + 3x + 3 = 7x + 7$$

$$3x^{2} - 4x - 4 = 0$$

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

$$3x + 2 = 0 x - 2 = 0$$

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

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

Step 4- Check solutions

Look at the denominators of the original problem. Are any of the solutions we got in Step 3 not allowed to be in the domain because they make the denominator equal 0?

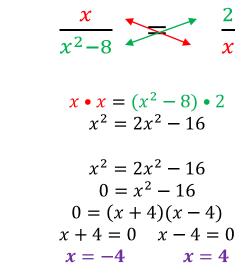
We are OK. Our denominators were x + 1 and x. That means for the domain, $x \neq 1$ and $\neq 0$. Since our answers do not cause a problem, they are both allowed to remain as solutions. If a solution from Step 3 is not allowed in the domain, you have to eliminate it from your final answer.

$$x = -\frac{2}{3}, 2$$

Another way to solve rational equations is to cross-multiply. This is possible when you have single fractions on both sides of the equation.

Example 2- Solve $\frac{x}{x^2-8} = \frac{2}{x}$

Step 1- Cross multiply



Step 2- Solve

Step 3- Check solutions

Look at the denominators of the original problem. Are any of the solutions we got in Step 2 not allowed to be in the domain because they make the denominator equal 0?

We are OK. Our denominators were $(x^2 - 8)$ and x. That means for the domain, $x \neq \pm \sqrt{8}$ and $x \neq 0$. Since our answers do not cause a problem, they are both allowed to remain as solutions. If a solution from Step 2 is not allowed in the domain, you have to eliminate it from your final answer.

$$\left(\begin{array}{c} x = \pm 4 \end{array}\right)$$

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