Solving Rational Equations (Single Variable)

Level 1 - Solve rational equations with monomial denominators
Level 2 - Solve rational equations with binomial denominators

A rational expression is one that has variables in the denominator of a fraction. A rational equation is an equation that includes one or more rational expressions.

To solve rational equations, we eliminate the denominators by multiplying both sides by the **least common denominator (LCD)**. This makes the equation easier to solve.
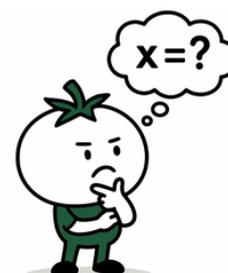
When denominators are binomials, the LCD may include entire factors, not just variables. Be careful to multiply the entire equation by the full LCD.

Finally, always check for extraneous (not allowed) solutions.

Example #1	Example #2	Example #3	Example #4
$\dfrac{5}{x} = 10$	$\dfrac{4}{3x} + \dfrac{1}{x} = \dfrac{1}{3}$	$\dfrac{x+1}{x-2} = 3$	$\dfrac{2}{x-3} = \dfrac{4}{x+2}$
$\dfrac{5}{x} \cdot x = 10 \cdot x$ $5 = 10x$ $\boxed{x = \dfrac{1}{2}}$	$\dfrac{4}{3x} \cdot 3x + \dfrac{1}{x} \cdot 3x = \dfrac{1}{3} \cdot 3x$ $4 + 3 = x$ $\boxed{x = 7}$	$\dfrac{x+1}{x-2}(x-2) = 3(x-2)$ $x + 1 = 3x - 2$ $-2x = -3$ $\boxed{x = \dfrac{3}{2}}$	$\dfrac{2}{x-3}(x-3)(x+2) = \dfrac{4}{x+2}(x-3)(x+2)$ $2(x+2) = 4(x-3)$ $2x + 4 = 4x - 12$ $-2x = -16$ $\boxed{x = 8}$

Remember:
- Always find the LCD before clearing denominators.
- Any value that makes a denominator zero is not allowed as a solution.
- Insert your answer back into the original equation to confirm it's valid.