

Math 2
Unit 4 – Radical & Rational Functions
Lesson 5 → Rational Equations

Name _____
 Date _____ Pd _____

- **Recall:** A rational function is a function that can be written as the ratio of two polynomials where the denominator does not equal zero: $f(x) = \frac{p(x)}{q(x)}$ where $q(x) \neq 0$
- When solving rational equations with variables in the denominator, you must check the solution to be sure the denominator will not equal zero. **The solution will be eliminated if the denominator is zero.**

Examples: Solve for x.

<p>1. $\frac{6}{x} = \frac{3}{7}$</p> <p>$\frac{3x}{3} = \frac{42}{3}$</p> <p>$x = 14$</p> <p>x = _____</p>	<p>2. $\frac{4}{(x-7)} = \frac{6}{x}$</p> <p>$6(x-7) = 4x$</p> <p>$6x - 42 = 4x$</p> <p>$-6x \quad -6x$</p> <p>$-42 = -2x$</p> <p>$\frac{-42}{-2} = \frac{-2x}{-2}$</p> <p>$x = 21$</p> <p>x = _____</p>
<p>3. $\frac{-5}{(x+4)} = \frac{1}{(x+4)}$</p> <p>$-5(x+4) = 1(x+4)$</p> <p>$-5x - 20 = x + 4$</p> <p>$-6x - 20 = 4$</p> <p>$\frac{-6x}{-6} = \frac{24}{-6}$</p> <p>$x = -4$</p> <p><i>extraneous</i></p> <p>x = _____</p>	<p>4. $\frac{4}{(x+5)} = \frac{x}{6}$</p> <p>$24 = x^2 + 5x$</p> <p>$-24 \quad -24$</p> <p>$0 = x^2 + 5x - 24$</p> <p>$(x+8)(x-3)$</p> <p>$x = -8 \quad x = 3$</p> <p>x = _____</p>
<p>5. $\frac{3}{3} \cdot \frac{(x-4)}{4} + \frac{x}{3} \cdot \frac{4}{4} = \frac{6}{1} \cdot \frac{12}{12}$</p> <p>$\frac{3x-12}{12} + \frac{4x}{12} = \frac{72}{12}$</p> <p>$3x - 12 + 4x = 72$</p> <p>$7x - 12 = 72$</p> <p>$+12 \quad +12$</p> <p>$7x = 84$</p> <p>$x = 12$</p> <p><i>3 terms... can't just cross multiply</i></p> <p>x = _____</p>	<p>$\frac{(x+1)}{(x+1)} \cdot \frac{3}{2x} - \frac{2x}{x+1} = \frac{2x}{2x} - \frac{2}{1} \cdot \frac{2x(x+1)}{2x(x+1)}$</p> <p><i>LCD: $2x(x+1)$</i></p> <p>$\frac{3x+3}{2x(x+1)} - \frac{4x^2}{2x(x+1)} = \frac{-4x(x+1)}{2x(x+1)}$</p> <p>$3x+3 - 4x^2 = -4x^2 - 4x$</p> <p>$-3x \quad +4x^2 \quad +4x^2 \quad -3x$</p> <p>$3 = -7x$</p> <p>$x = -\frac{3}{7}$</p> <p>x = _____</p>

➤ Solve for x:

<p>1. $\frac{3}{x} = \frac{2}{x+4}$</p> <p>$2x = 3x + 12$ $-3x \quad -3x$ $-x = 12$ $\frac{-x}{-1} = \frac{12}{-1}$</p> <p>$x = -12$</p>	<p>2. $\frac{x+1}{2x+5} = \frac{2}{x}$</p> <p>$x(x+1) = 2(2x+5)$ $x^2 + x = 4x + 10$ $-4x \quad -4x \quad -10$ -10 $x^2 - 3x - 10 = 0$ $(x-5)(x+2) = 0$ $x = 5 \quad x = -2$</p> <p>$x =$ _____</p>
<p>3. $\frac{3}{x+2} + \frac{5}{x+2} = \frac{4}{x+2}$ LCD: $x+2$</p> <p>$3 + 5(x+2) = 4$ $3 + 5x + 10 = 4$ $13 + 5x = 4$ $-13 \quad -13$ $5x = -9$ $\frac{5x}{5} = \frac{-9}{5}$ $x = -9/5$</p> <p>$x =$ _____</p>	<p>4. $\frac{18}{18} \cdot \frac{6}{x-3} = \frac{x}{18} \cdot \frac{(x-3)}{(x-3)}$ LCD: $18(x-3)$</p> <p>$\frac{108}{18(x-3)} = \frac{x^2 - 3x}{18(x-3)}$ $108 = x^2 - 3x$ $-108 \quad -108$ $0 = x^2 - 3x - 108$ $0 = (x-12)(x+9)$ $x = 12, -9$</p> <p>$x =$ _____</p>
<p>5. $\frac{x}{x} \cdot \frac{5x}{x+2} + \frac{2}{x} = \frac{5}{x} \cdot \frac{x(x+2)}{x(x+2)}$ LCD: $x(x+2)$</p> <p>$5x^2 + 2x + 4 = 5x(x+2)$ $5x^2 + 2x + 4 = 5x^2 + 10x$ $-5x^2 \quad -2x \quad -5x^2 \quad -10x$ $4 = 8x$ $\frac{4}{8} = \frac{8x}{8}$ $x = 1/2$ ✓</p> <p>$x =$ _____</p>	<p>6. $\frac{2}{2} \cdot \frac{(2x-3)}{7} - \frac{x}{2} = \frac{x+3}{14}$ LCD: 14</p> <p>$4x - 6 - 7x = x + 3$ $-3x - 6 = x + 3$ $-x \quad -x$ $-4x - 6 = 3$ $+6 \quad +6$ $-4x = 9$ $\frac{-4x}{-4} = \frac{9}{-4}$ $x = -9/4$ ✓</p> <p>$x =$ _____</p>