

Math 2 – Honors  
 Unit 4 – Radical & Rational Functions  
 Lesson 6 → 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.

1.  $\frac{6}{x} = \frac{3}{7}$

$$\frac{42}{3} = \frac{3x}{3}$$

$$x = 14 \quad \checkmark$$

2.  $\frac{4}{(x-7)} = \frac{6}{x}$

$$4x = 6x - 42$$

$$-6x \quad -6x$$

$$\frac{-4x}{-2} = \frac{-42}{-2}$$

$$x = 21 \quad \checkmark$$

3.  $\frac{-5}{(x+4)} = \frac{1}{(x+4)}$

$$x+4 = -5x-20$$

$$+5x-4 \quad +5x-4$$

$$\frac{6x}{6} = \frac{-24}{6}$$

$$x = -4 \quad \text{⊗}$$

4.  $\frac{4}{(x+5)} = \frac{x}{6}$

$$x^2 + 5x = 24$$

$$x^2 + 5x - 24 = 0$$

$$(x+8)(x-3) = 0$$

$$x = -8 \quad x = 3 \quad \checkmark$$

LCD: 12

$$5. \frac{3}{3} \cdot \frac{(x-4)}{4} + \frac{x}{3} \cdot \frac{4}{4} \cdot \frac{6}{1} \cdot \frac{12}{12}$$

$$\frac{3x-12}{12} + \frac{4x}{12} = \frac{72}{12}$$

$$3x-12+4x=72$$

$$7x-12=72$$

$$+12 +12$$

$$\frac{7x}{7} = \frac{84}{7} \quad x=12$$

LCD:  $2x(x+1)$

$$6. \frac{x+1}{x+1} \cdot \frac{3}{2x} - \frac{2x}{x+1} \cdot \frac{2x}{2x} - \frac{2}{1} \cdot \frac{2x(x+1)}{2x(x+1)}$$

$$3x+3-4x^2 = -4x(x+1)$$

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

$$+4x \quad +4x^2 \quad +4x$$

$$7x+3=0$$

$$7x = -3$$

$$x = -3/7$$



$$\frac{4(x-1)}{4(x-1)} \cdot \frac{6}{x} = \frac{1(x-1)}{4(x-1)} \cdot \frac{9}{x-1} \cdot \frac{4x}{4x} \quad \text{LCD: } 4x(x-1)$$

$$(4x-4)(6) = x^2 - x + 36x$$

$$24x-24 = x^2 - x + 36x$$

$$-24x \quad +24 \quad -24x \quad +24$$

$$0 = x^2 + 11x + 24$$

$$0 = (x+8)(x+3)$$

$$x = -8 \quad x = -3$$

$$8. \frac{x+1}{x+1} \cdot \frac{2x}{x-1} + \frac{x-5}{(x-1)(x+1)} = \frac{1}{1} \cdot \frac{(x-1)(x+1)}{(x-1)(x+1)} (x-1)(x+1)$$

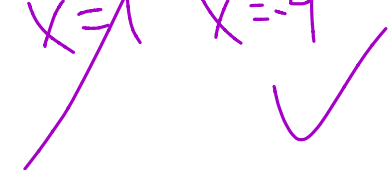
$$2x^2 + 2x + x - 5 = x^2 - 1$$

$$-x^2 \quad +1 \quad -x^2 + 1$$

$$x^2 + 3x - 4 = 0$$

$$(x-1)(x+4) = 0$$

$$x = 1 \quad x = -4$$



Math 2 – Honors  
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➤ Solve for x:

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

2.  $\frac{x+1}{2x+5} = \frac{2}{x}$

3.  $\frac{3}{x+2} + 5 = \frac{4}{x+2}$

4.  $\frac{6}{x-3} = \frac{x}{18}$

$5 \cdot \frac{x}{x} \cdot \frac{5x}{x+2} + \frac{2}{x} \cdot \frac{x+2}{x+2} \stackrel{5}{=} 5 \cdot \frac{x(x+2)}{x+2}$   $x(x+2)$

$$5x^2 + 2x + 4 = 5(x^2 + 2x)$$

$$5x^2 + 2x + 4 = 5x^2 + 10x$$

$$-5x^2 - 10x - 5x^2 - 10x$$

$$-8x + 4 = 0$$

$$\frac{-8x}{-8} = \frac{-4}{8}$$

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

$\frac{2}{2} \cdot \frac{2x-3}{7} - \frac{x}{2} \stackrel{7}{=} \frac{x+3}{14}$

$$4x - 6 - 7x = x + 3$$

$$\begin{matrix} -3 & -x & -x & -3 \end{matrix}$$

$$-4x - 9 = 0$$

$$\frac{-4x}{-4} = \frac{9}{-4}$$

$$x = -\frac{9}{4} \checkmark$$

$$7. \frac{4x}{3x-2} + \frac{2x}{3x+2} = 2 \quad \frac{(3x-2)(3x+2)}$$

$$12x^2 + 8x + 6x^2 - 4x = 2(9x^2 - 4)$$

$$\begin{array}{r} 18x^2 + 4x = 18x^2 - 8 \\ -18x^2 \quad -18x^2 \\ \hline \end{array}$$

$$\frac{4x}{4} = \frac{-8}{4} \quad x = -2$$

$$8. \frac{5}{5-x} - \frac{x^2}{5-x} = -2$$

$$\frac{(x-3)(3x+2)}{x+1} - \frac{x-1}{x-3} = \frac{5}{2}$$

$$(2x-6)(3x+2) - [(2x-2)(x+1)] = (5x-15)(x+1)$$

What mistake am I making?

$$9. \frac{2x-5}{x-2} - 2 = \frac{3}{x+2}$$

$$10. \frac{4}{(x-2)(x-6)} = \frac{x}{x-2} + \frac{1}{x-6}$$