# 7.5 Rational Equations

Wednesday, May 11, 2016 9:43 AM

**Pre-Calculus 11**
**7.5 Solving Rational Equations**
**Name: _____**

To solve an equation with rational coefficients, the fractions can be cancelled by multiplying both sides of the equation by a common denominator.

$\frac{x}{12} - \frac{2}{3} = \frac{1}{4}$ lcd: 12 $12\left(\frac{x}{12} - \frac{2}{3} = \frac{1}{4}\right)$

$\frac{x}{12} - \frac{8}{12} = \frac{3}{12}$ cancel the denominator $x - 8 = 3$

$x = 11$

**To solve a rational equation:**

1. Identify the non-permissible values of the variable.
2. Solve the equation
3. Check to see if the solution is permissible. If it is not, the solution is an extraneous root.

**Example 1:** Solve each equation.

a. $\frac{1}{2x} - \frac{2}{5} = \frac{1}{10x}$ NPV's $x \neq 0$ lcd: $10x$

$\frac{5}{10x} - \frac{4x}{10x} = \frac{1}{10x}$

$5 - 4x = 1$

$-4x = -4$

$-4 \quad -4$

$x = 1$

b. $6 = \frac{5}{x} + \frac{6}{x^2}$ NPV's $x \neq 0$ lcd: $x^2$

$6x^2 = 5x + 6$

$6x^2 - 5x - 6 = 0$

$6x^2 - 9x + 4x - 6 = 0$

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

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

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

ac <= -36, -9, +4

YOU TRY

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

NPV's $x \neq -2, 3$

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

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

$-3x+9 = 2x^2+4x$

$ac = -18$: $9, -2$

$0 = 2x^2+7x-9$

$0 = 2x^2+9x-2x-9$

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

$0 = (2x+9)(x-1)$

$x = -\frac{9}{2}$ ✓ $x = 1$ ✓

p 583 #3ac, 4b, 5b, 6a, 7ac, 9bd, 10ac, 13, 15ac

Quiz Tuesday 7.3/7.4

d. $\frac{7x-15}{x^2-9} = \frac{x-2}{x-3}$

NPV's $x \neq \pm 3$

$\frac{7x-15}{(x+3)(x-3)} = \frac{(x-2)(x+3)}{(x-3)(x+3)}$

$7x-15 = x^2+x-6$

$0 = x^2-6x+9$

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

$x = 3$ problem! extraneous root! ∴ no solution.

e. $\frac{x+1}{x+6}+\frac{x-2}{x+4} = \frac{11x+32}{x^2+10x+24}$

NPV's. $x \neq -6$, $x \neq -4$

$(x+6)(x+4)\left(\frac{x+1}{x+6}+\frac{x-2}{x+4}\right) = \left(\frac{11x+32}{(x+6)(x+4)}\right)(x+6)(x+4)$

$(x+1)(x+4)+(x-2)(x+6) = 11x+32$

$x^2+5x+4+x^2+4x-12 = 11x+32$

$2x^2-2x-40 = 0$

$2(x^2-x-20) = 0$

$2(x-5)(x+4) = 0$

$x = 5$ or $x = -4$ reject! extraneous root