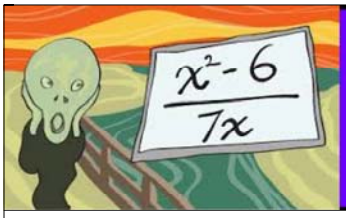

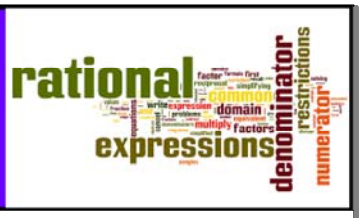

2.5 Solving Rational Equations

Steps:

1. Common Denominator.
2. Drop the denominators and solve the numerators.
3. Verify.
4. NPV's.

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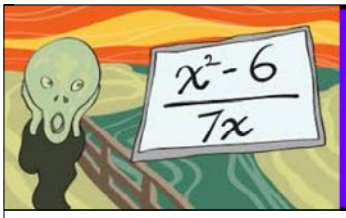

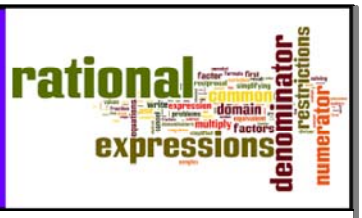

Let's review solving basic algebraic equations...

$2x + 2 = 3x - 4$

$-2x \quad -2x$

$2 = x - 4$

$+4 \quad +4$

$6 = x$

$\frac{x}{4} + 3 = 7$

$-3 \quad -3$

$4 \cdot \frac{x}{4} = 4 \cdot 4$

$x = 16$

$\frac{4}{4} \cdot \frac{m}{3} + \frac{3m}{4} \cdot \frac{3}{3} = \frac{13}{1} \cdot 12$

LCM: 12

$\frac{4m}{12} + \frac{9m}{12} = \frac{156}{12}$

$4m + 9m = 156$

$\frac{13m}{13} = \frac{156}{13}$

$m = 12$

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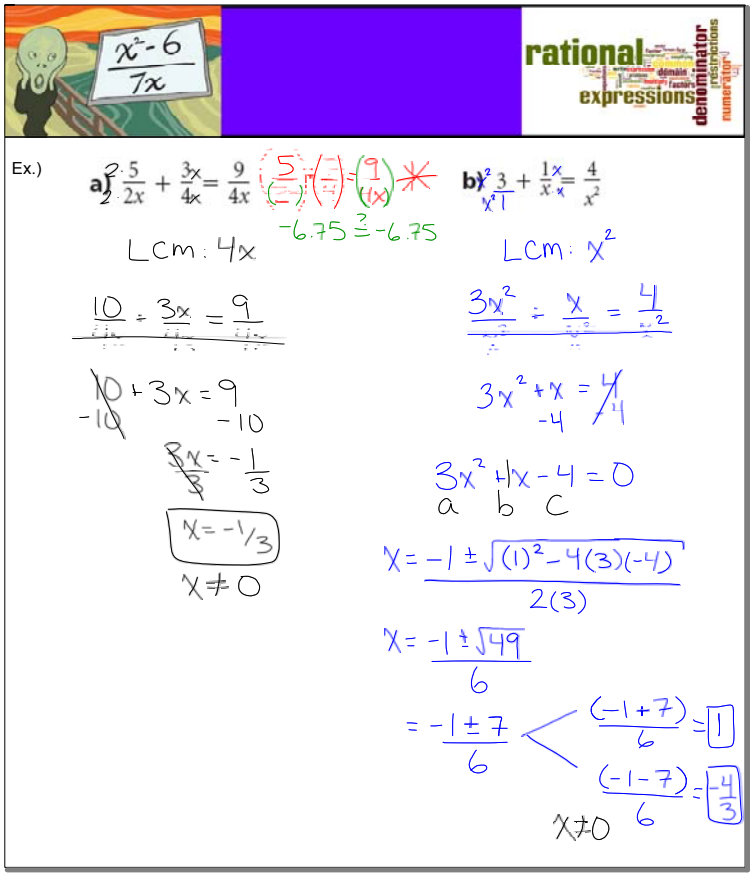

Ex.)

a) $\frac{2}{2}\cdot\frac{5}{2x}+\frac{3x}{4x}=\frac{9}{4x}$ $\left(\frac{5}{(-)}\right)\left(\frac{-}{-}\right)=\left(\frac{9}{(1x)}\right)$ *

$-6.75 \stackrel{?}{=} -6.75$

LCm: $4x$

$\frac{10}{4x}+\frac{3x}{4x}=\frac{9}{4x}$

$10+3x=9$

$-10 \quad -10$

$\frac{3x}{3}=\frac{-1}{3}$

$x=-1/3$

$x\neq 0$

b) $\frac{3}{x^2}+\frac{1x}{x}=\frac{4}{x^2}$

LCm: x^2

$\frac{3x^2}{x^2}+\frac{x}{x^2}=\frac{4}{x^2}$

$3x^2+x=4$

$-4 \quad -4$

$3x^2+1x-4=0$

$a \quad b \quad c$

$x=\frac{-1\pm\sqrt{(1)^2-4(3)(-4)}}{2(3)}$

$x=\frac{-1\pm\sqrt{49}}{6}$

$=\frac{-1\pm 7}{6}$ $\frac{(-1+7)}{6}=\boxed{1}$, $\frac{(-1-7)}{6}=\boxed{-\frac{4}{3}}$

$x\neq 0$

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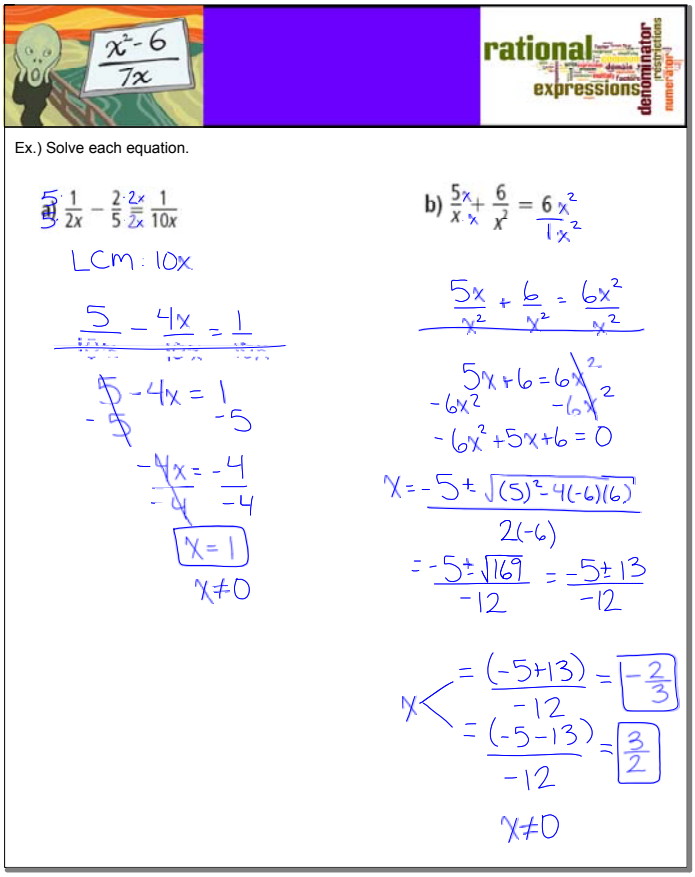

Ex.) Solve each equation.

a) $\frac{1}{2x}-\frac{2}{5}\cdot\frac{2x}{2x}=\frac{1}{10x}$

LCm: $10x$

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

$5-4x=1$

$-5 \quad -5$

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

$\boxed{x=1}$

$x\neq 0$

b) $\frac{5x}{x}+\frac{6}{x^2}=\frac{6x^2}{1x^2}$

$\frac{5x}{x^2}+\frac{6}{x^2}=\frac{6x^2}{x^2}$

$5x+6=6x^2$

$-6x^2 \quad -6x^2$

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

$x=\frac{-5\pm\sqrt{(5)^2-4(-6)(6)}}{2(-6)}$

$=\frac{-5\pm\sqrt{169}}{-12}=\frac{-5\pm 13}{-12}$

$x=\frac{(-5+13)}{-12}=\boxed{-\frac{2}{3}}$, $\frac{(-5-13)}{-12}=\boxed{\frac{3}{2}}$

$x\neq 0$

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Storing 'X' to check your answer...

A graphing calculator can be used to check the solution of a rational equation.

In *Example 1a*, the equation $\frac{5}{2x} + \frac{3}{4} = \frac{9}{4x}$ has solution $x = -\frac{1}{3}$.

To check this solution, use a TI-83 Plus graphing calculator:

Press: (-) 1 ÷ 3 STO▸ X,T,Θ,n ENTER

This sets X equal to $-\frac{1}{3}$.

Enter the expression on the left side of the equation, then press ENTER.

Enter the expression on the right side of the equation, then press ENTER.

```
-1/3→X
          -.3333333333
5/(2*X)+3/4
                 -6.75
9/(4*X)
                 -6.75
```

The left side equals the right side, so the solution is correct.

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Don't forget to factor first, if possible!

Ex.) Solve.

a) $\frac{(x-2)}{(x-2)}\frac{5}{(x+4)} = \frac{3}{(x-2)}\frac{(x+4)}{(x+4)}$

LCM: $(x+4)(x-2)$

$5x-10 = 3x+12$

$5x-10 = 3x+12$

$-3x \quad -3x$

$2x = 22$

$\frac{2}{2}x = \frac{22}{2}$

$x = 11$ $\quad x \neq -4, 2$

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

$(x+1)(x-1)$

LCM: $(x+1)(x-1)$

$3x+1 = -x^2+x$

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

$x^2+2x+1 = 0$

$x = \frac{-2 \pm \sqrt{(2)^2-4(1)(1)}}{2(1)}$

$= \frac{-2 \pm \sqrt{0}}{2} = \frac{-2}{2} = -1$ extraneous

$x \neq \pm 1$

∴ no solution

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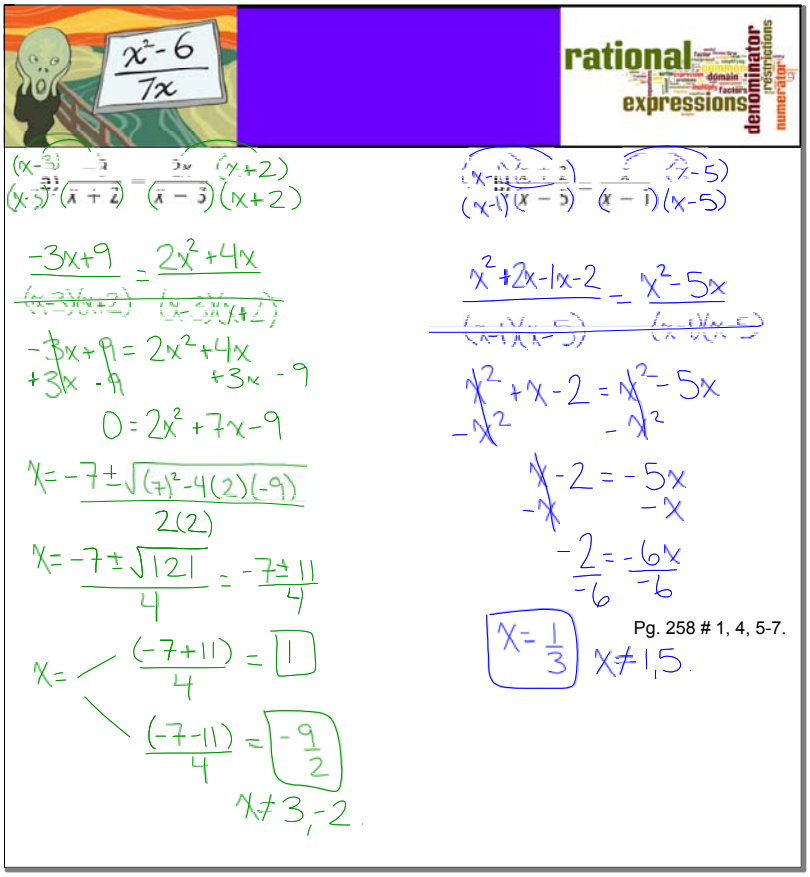

$\frac{3}{(x-5)(x+2)} - \frac{1}{(x+2)} = \frac{3x}{(x-5)(x+2)}$

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

$+3x \quad -9 \quad +3x \quad -9$

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

$x = \frac{-7 \pm \sqrt{(7)^2-4(2)(-9)}}{2(2)}$

$x = \frac{-7 \pm \sqrt{121}}{4} = \frac{-7 \pm 11}{4}$

$x = \frac{(-7+11)}{4} = 1$

$\frac{(-7-11)}{4} = -\frac{9}{2}$

$x \neq 3, -2$

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

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

$-x^2 \quad -x^2$

$x-2 = -5x$

$-x \quad -x$

$\frac{-2}{-6} = \frac{-6x}{-6}$

$x = \frac{1}{3}$ $x \neq 1, 5$

Pg. 258 # 1, 4, 5-7.

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