PCFU: Solving Rational Equations (E11) Name: ________________________________
HN

Solve the following rational equations. Make sure to check for extraneous solutions.

1. $\frac{9}{3x^2+7x-6} = \frac{12}{x^2-9}$	The answers is: $x = \frac{-1}{9}$.
To solve this equation, the first thing you must do is to factor the denominators.	$3x^2 + 7x - 6 = (3x-2)(x+3)$ and $x^2 - 9 = (x+3)(x-3)$
Once the denominators are factored, you should establish restrictions to help you determine if there are any extraneous solutions.	$3x - 2 \neq 0$ so $x \neq \frac{2}{3}$; $x + 3 \neq 0$ so $x \neq -3$; $x - 3 \neq 0$ so $x \neq 3$
After determining the restrictions, you should attempt to reduce if possible. Here there is nothing that divides.	$\frac{9}{(3x-2)(x+3)} = \frac{12}{(x+3)(x-3)}$
Now you must determine the least common denominator and multiply both sides of the equation by this expression. LCD/LCM=$(3x-2)(x+3)(x-3)$	$\frac{9\cdot(3x-2)(x+3)(x-3)}{(3x-2)(x+3)} = \frac{12\cdot(3x-2)(x+3)(x-3)}{(x+3)(x-3)}$
Reduce by dividing common factors in the numerator and denominator.	$\frac{9\cdot\cancel{(3x-2)(x+3)}(x-3)}{\cancel{(3x-2)(x+3)}} = \frac{12\cdot(3x-2)\cancel{(x+3)(x-3)}}{\cancel{(x+3)(x-3)}}$
Now you must distribute on both sides to simplify what remains.	$9x - 27 = 36x - 24$
Finish by isolating x on one side. Compare your answer to the restrictions to see if you must disregard a potential solution because it is extraneous. In this case the answer is no so this is the end.	$-27 = 27x - 24$ $-3 = 27x$ $-\frac{3}{27} = x$ $-\frac{1}{9} = x$

Follow Up for Question 1:
Solve using the above method. You must list your restrictions and check for extraneous solutions and show your solutions work by explicitly checking each.

$$\frac{6}{2x^2+2x} = \frac{8}{x^2-4x-5}$$

Factor each denominator here:

Solve here:

Write your LCD/LCM here:

Establish restrictions here:

2. $\frac{2}{x^2-4x}+\frac{3}{x}=1$	The answers are $x=5 \text{ or } x=2$.
To solve this equation, the first thing you must do is to factor the denominators.	$x^2-4x=x(x-4) \text{ and } x \text{ is just } x.$
Once the denominators are factored, you should establish restrictions to help you determine if there are any extraneous solutions.	$x \neq 0 \text{ and } x-4 \neq 0 \text{ so } x \neq 4$
After determining the restrictions, you should attempt to reduce if possible. Here there is nothing that divides.	$\frac{2}{x(x-4)}+\frac{3}{x}=1$
Now you must determine the least common denominator and multiply both sides of the equation by this expression. LCD/LCM=$x(x-4)$	$\frac{2\cdot x(x-4)}{x(x-4)}+\frac{3\cdot x(x-4)}{x}=1\cdot x(x-4)$
Reduce by dividing common factors in the numerator and denominator.	$\frac{2\cdot \cancel{x(x-4)}}{\cancel{x(x-4)}}+\frac{3\cdot \cancel{x}(x-4)}{\cancel{x}}=1\cdot x(x-4)$
Now you must distribute on both sides to simplify what remains.	$2+3(x-4)=x(x-4)$ $2+3x-12=x^2-4x$
Finish by setting one side equal to 0 since this is quadratic. Factor (if possible) and set each factor equal to 0. If you cannot factor, use the quadratic formula to solve. Compare your answer to the restrictions to see if you must disregard a potential solution because it is extraneous. In this case there is no conflict so this is the end.	$3x-10=x^2-4x$ $-10=x^2-7x$ $0=x^2-7x+10$ $0=(x-5)(x-2)$ $x-5=0 \text{ or } x-2=0$ $x=5 \text{ or } x=2$

Follow Up for Question 2:
Solve using the above method. You must list your restrictions and check against them and show your solutions work by writing out the check.

$$\frac{x}{x+1}+\frac{2}{x-5}=\frac{30}{x^2-4x-5}$$

Write your LCD here:

Solve here:

Establish your restrictions here: