CP PCFU: Adding and Subtracting Rational Expressions (E6/E7) Name:_____

Solutions and explanations for the progress check:

1. $\frac{3x}{2x+3}+\frac{x-5}{4x} = \frac{12x^2}{4x(2x+3)}+\frac{2x^2-7x-15}{4x(2x+3)} = \frac{14x^2-7x-15}{4x(2x+3)}$

The two expressions do not have a common denominator. So the first thing I had to do was to figure out the smallest common denominator that 2x+3 and 4x could both go into. I realized 2x +3 was not factorable. This meant that I could simply multiply the existing denominators together to get the LCD. Given the LCD = 4x(2x+3), I needed to find new equivalent expressions with this denominator. So….

$\frac{3x}{2x+3}\cdot\frac{4x}{4x} = \frac{3x\cdot 4x}{4x(2x+3)} = \frac{12x^2}{4x(2x+3)}$ and $\frac{x-5}{4x}\cdot\frac{2x+3}{2x+3} = \frac{(x-5)(2x+3)}{4x(2x+3)} = \frac{2x^2+3x-10x-15}{4x(2x+3)} = \frac{2x^2-7x-15}{4x(2x+3)}$.

Once I got them with common denominators, all I had to do was add the numerators together. To check to see if I could reduce this, I had to try to factor the numerator. I could not find any factors using a GCF or the diamond method that would work, so I knew that this answer was as reduced as possible.

Restrictions: $x \neq \frac{-3}{2}, 0$

I determined my restrictions by figuring out what would make the denominator equal to zero. Since we cannot divide by zero, our restrictions are at those x-values. I did this by setting each factor in the LCD equal to zero and solving for x.

$$4x = 0 \qquad 2x+3=0$$
$$x = 0 \qquad 2x = -3$$
$$x = \frac{-3}{2}$$

2. $\frac{3x-1}{4x}-\frac{x-5}{4x} = \frac{(3x-1)-(x-5)}{4x} = \frac{3x-1-x+5}{4x} = \frac{2x+4}{4x} = \frac{\cancel{2}(x+2)}{\cancel{2}(2x)} = \frac{x+2}{2x}$

The denominators were already alike so I could just jump right in and start combining them. Here the problem is subtraction so I used parentheses to help me to remember that the negative sign applies to both of the terms in the second numerator. I distributed the negative by changing positive x to negative x and negative 5 into positive 5. Then I combined like terms. Since the numerator and denominator had all even terms, I knew I needed to reduce. I factored out a two in the top and bottom and then divided to get a reduced answer. Tah Dah.

Restrictions: $x \neq 0$

I determined my restrictions by figuring out what would make the denominator equal to zero. Since we cannot divide by zero, our restrictions are at those x-values. I did this by setting the denominator equal to zero and solving for x.

$$4x = 0$$
$$x = 0$$

Additional Practice on back ---->

1. Find the least common denominator for each pair of denominators.

   a) $3x$ and $x-5$

   b) $3x$ and x^2

   c) $x-5$ and x^2-25

2. Rewrite each fraction with the new denominator indicated.

   a) $\frac{4x}{3} = \frac{\quad}{3(x+1)}$

   b) $\frac{(x-2)}{5x} = \frac{\quad}{5x^2}$

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

3. Combine these expressions by filling in the missing parts.

   a) $\frac{7}{x-2} + \frac{5x}{x+1} = \frac{\quad}{(x-2)(x+1)} + \frac{\quad}{(x-2)(x+1)} = \frac{\quad}{(x-2)(x+1)}$

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

   c) $\frac{6x}{x+2} + \frac{4}{x-2} = \frac{\quad}{\quad} + \frac{\quad}{\quad} = \frac{\quad}{\quad}$

   *Can you simplify the answer to part c any further??? $= \frac{\quad}{\quad}$