I. PRACTICE MAKING LEAST COMMON DENOMINATOR:

To Find the Least Common Denominator of Rational Expressions
1. Factor each denominator completely. Any factors that occur more than once should be expressed as powers. For example, $(x-3)(x-3)$ should be expressed as $(x-3)^2$
2. List all different factors (other than 1) that appear in any of the denominators. When the same factor appears in more than one denominator, write that factor with the highest power that appears.
3. The least common denominator is the product of all the factors listed in step 2.

Example 4 Find the LCD.

$$\frac{5}{x} - \frac{7y}{x+3}$$

Solution: The factors in the denominators are x and (x+3).
Note that the x in the second denominator, x+3, *is a term, not a factor.*
LCD = x (x+3)

Example 5 Find the LCD.

$$\frac{7}{3x^2-6x} + \frac{x^2}{x^2-4x+4}$$

Solution: Factor both denominators.

$$\frac{7}{3x^2-6x} + \frac{x^2}{x^2-4x+4} = \frac{7}{3x(x-2)} + \frac{x^2}{(x-2)(x-2)} = \frac{7}{3x(x-2)} + \frac{x^2}{(x-2)^2}$$

The factors in the denominators are 3, x, and (x-2).
List the highest powers of each of these factors.
LCD $= 3 \cdot x \cdot (x-2)^2 = 3x(x-2)^2$

You Practice: Find the sum of the following rational expressions.

(a) $\frac{x^2-3}{x^2+2x-8} + \frac{1}{x^2+3x-10}$

(b) $\frac{1}{4x+11} + \frac{x}{16x^2-121}$

II. Practice Simplifying Rational Expressions

(a) $\dfrac{11x + 2}{x^2 - 1} + \dfrac{4x^2 - 7x}{x^2 - x}$

(b) $\dfrac{(y^2 - 9)}{(y^2 - 3y)} \bullet \dfrac{y}{(y^2 + 9y + 18)}$

(c) $\dfrac{x^2 + 3x - 4}{x^2 + x - 2} - \dfrac{x^2 + 5x + 6}{x^3 - 2x^2 - 8x}$

(d) $\dfrac{x^2 + 4x + 3}{2x^2 - x - 10} \bullet \dfrac{2x^2 + 4x^3}{x^2 + 3x} \bullet \dfrac{x}{x^2 + 3x + 2}$

(e) $\dfrac{2x}{x^2 - 49} + \dfrac{1}{x + 7}$

(f) $\dfrac{x^2 - 1}{x + 2} \div \dfrac{2x + 2}{3x + 6}$

(g) $\dfrac{\dfrac{2}{x^2 - x - 6}}{\dfrac{x + 1}{x^2 - 4}}$