1. Add and Subtract Rational Expressions with a Common Denominator

Recall that when adding and subtracting fractions with a common denominator, simply add or subtract the numerators and keep the denominator the same, then simplify.

1. If subtraction, **distribute** the negative to **all terms** in the second numerator, then add the numerators.
2. Keep the common denominator.
3. **Simplify** the result if possible.

**Example 1** Add or subtract as indicated.

a. \[ \frac{5}{x^2} - \frac{3}{x^2} \]

b. \[ \frac{3}{y+6} - \frac{1}{y+6} \]

c. \[ \frac{3x-1}{x^2+5x-6} - \frac{2x-7}{x^2+5x-6} \]

d. \[ \frac{x^2-5x-6}{(x+2)(x+5)} + \frac{9x+1}{(x+2)(x+5)} \]

e. \[ \frac{6n+5}{n^2+4n-21} - \frac{5n-2}{n^2+4n-21} \]
2. Find the LCD

1. **Factor each denominator completely.** Any multiple factors should be expressed with exponents.
2. **List all** the different factors that appear in **any** of the denominators. Write each factor to the **largest exponent** that it appears in **any one** of the factorizations.
3. This is the LCD.

**Example 2**  Find the LCD.

a. \[ \frac{m^3}{6n^2} + \frac{m^4}{12n^4} \]

b. \[ \frac{4}{x} - \frac{3x}{x + 2} \]

c. \[ \frac{1}{5x^2 - 20x} - \frac{2x^2 - 9}{x^2 - 8x + 16} \]

d. \[ \frac{3n}{n^2 - 3n - 10} + \frac{9n^2}{n^2 - 7n + 10} \]

e. \[ \frac{5}{a - 9} + \frac{4a}{a + 9} \]