

Method: Addition and subtraction with like denominators

To add or subtract when denominators are the same, add or subtract the numerators and keep the same denominator.

$$\frac{A}{C} + \frac{B}{C} = \frac{A+B}{C} \text{ and } \frac{A}{C} - \frac{B}{C} = \frac{A-B}{C}, \text{ where } C \neq 0$$

Example 1: Add or subtract

a.) $\frac{5}{3a} + \frac{7}{3a}$

b.) $\frac{a-5b}{a+b} + \frac{a+7b}{a+b}$

c.) $\frac{4y+2}{y-2} - \frac{y-3}{y-2}$

Method: The Least Common Multiple

To find the least common multiple (LCM) of two or more expressions, find the prime factorization of each expression and form a product that contains each factor the greatest number of times that it occurs in any one prime factorization.

Example 2: Find the LCM

a.) $24x^2y$ and $9xy^4$

b.) $t^2 - 25$ and $t^2 - 10t + 25$

Method: To add or subtract rational expressions

- 1.) Determine the least common denominator (LCD) by finding the least common multiple of the denominators.
- 2.) Rewrite each of the original rational expressions, as needed, in an equivalent form that has the LCD.
- 3.) Add or subtract the resulting rational expressions, as indicated.
- 4.) Simplify the result, if possible, and list any restrictions on the domain of the functions.

Example 3: Add or subtract. Always simplify if possible.

a.) $\frac{a+3}{a-5} + \frac{a-2}{a+4}$

$$\text{b.) } \frac{a+3}{5a+25} - \frac{a-1}{3a+15}$$

$$\text{c.) } \frac{7}{3y^2+y-4} + \frac{9y+2}{3y^2-2y-8}$$

$$d.) \frac{m-3n}{m^3-n^3} - \frac{2n}{n^3-m^3}$$

$$e.) \frac{-2}{y+2} + \frac{5}{y-2} + \frac{y+3}{y^2-4}$$

$$\text{f.) } \frac{5x}{x^2 - 6x + 8} - \frac{3x}{x^2 - x - 12}$$

$$\text{g.) } \frac{x-1}{x^2-1} - \frac{x}{x-2} + \frac{x^2+2}{x^2-x-2}$$