

# Complex Fractions

## Objective 1: Rational Expression Review

**Examples:** Perform the indicated operation. Write your answer in simplest form.

a)  $\frac{3}{27r^3+8} \div \frac{18}{9r^2+12r+4}$

b)  $\frac{2}{4m^2+19m-30} - \frac{3}{16m^2-25}$

**Practice:** Perform the indicated operation. Write your answer in simplest form.

$$1. \frac{8x^2 - 14x + 5}{64x^3 - 125} \cdot \frac{16x^4 + 20x^3 + 25x^2}{2x^2 + x - 1}$$

$$2. \frac{ax + bx + a + b}{a^2 + 2ab + b^2} \div \frac{x^2 - 1}{x^2 - 2x + 1}$$

$$3. \frac{a+3}{a^2+7a+12} + \frac{a}{a^2-16}$$

$$4. \frac{n-4}{2n-7} - \frac{10-n^2}{2n^2-5n-7}$$

## Objective 2: Complex Fractions and Their Numerators and Denominators

**Examples:** Identify the numerator and denominator of each complex fraction.

Complex Fraction	Numerator	Denominator
$\frac{\frac{2}{3x}}{5+x}$		
$\frac{4 - \frac{x}{x+y}}{\frac{x-y}{x^2-y^2}}$		

**Practice:** Identify the numerator and denominator of each complex fraction.

1. 
$$\frac{\frac{b-1}{2b+3}}{4-b}$$
                      Numerator                      Denominator

2. 
$$\frac{\frac{15}{8}}{\frac{5}{r-4}}$$
                      Numerator                      Denominator

3. 
$$\frac{\frac{\frac{u-1}{u-2} + \frac{u-6}{u^2-4}}{9}}{u+2}$$
                      Numerator                      Denominator

4. 
$$\frac{\frac{\frac{2z^2}{4z-1} - \frac{z-2z^2}{2+3z}}{\frac{z}{2+3z} + 5}}$$
                      Numerator                      Denominator

### Objective 3: Simplifying Complex Fractions Using Division

**Examples:** Simplify the complex fraction

$$\text{a) } \frac{\frac{2}{x+3}}{\frac{1}{2x+6}}$$

$$\text{b) } \frac{\frac{1}{3} + \frac{1}{2x}}{\frac{1}{2} - \frac{1}{x}}$$

**Practice:** Simplify the complex fraction using division.

$$1. \frac{3 + \frac{1}{x}}{9 - \frac{1}{x}}$$

$$2. \frac{\frac{4}{4-x} + \frac{5}{x-4}}{\frac{2}{x} + \frac{2}{x-4}}$$

$$3. \frac{\frac{h-3}{h} + \frac{8}{h-1}}{\frac{h+1}{h} + \frac{h+1}{h-1}}$$

$$4. \frac{\frac{12}{p+3} + \frac{8}{p+6}}{\frac{5p+24}{p^2+9p+18}}$$

## Objective 4: Simplifying Complex Fractions Using the LCD

**Examples:** Simplify the complex fraction.

$$\text{a) } \frac{\frac{2}{3x} - \frac{1}{6}}{\frac{1}{4} - \frac{1}{x}}$$

$$\text{b) } \frac{1 + \frac{4}{x-3}}{\frac{x}{x-3} + \frac{2}{x^2-9}}$$

**Practice:** Simplify the complex fraction using the LCD.

$$1. \frac{\frac{2}{a} + \frac{1}{a^2}}{\frac{4}{a^2} - \frac{1}{a}}$$

$$2. \frac{\frac{1}{8} + \frac{5}{6}}{\frac{7}{3} - \frac{9}{4}}$$

$$3. \frac{1 - \frac{9}{x}}{x + \frac{5}{9x}}$$

$$4. \frac{\frac{15}{t^2 - 64} + \frac{t}{t + 8}}{1 + \frac{5}{t - 8}}$$