

## 7.7 Simplifying Complex Fractions DAY ONE

A rational expression whose numerator, denominator, or both contain one or more rational expressions is called a complex rational expression or a complex fractions.

$$\frac{\frac{x}{y+2}}{7+\frac{1}{y}}$$

$$\left(7 + \frac{1}{y}\right)$$

Our goal in this section is to simplify complex fractions like the one on the left. A *complex fraction is simplified when it is in the form P divided by Q, where P and Q are polynomials that have no common factors.*

### OBJECTIVE 1: Simplifying Complex Fractions: METHOD ONE

#### Simplifying a Complex Fraction: Method 1

- Step 1. Simplify the numerator and the denominator of the complex fraction so that each is a single fraction.
- Step 2. Perform the indicated division by multiplying the numerator of the complex fraction by the reciprocal of the denominator of the complex fraction.
- Step 3. Simplify if possible.

Example 1: Simplify each complex fraction.

a)  $\frac{\frac{2x}{27y^2}}{\frac{6x^2}{9}}$

*Handwritten work:*  $\frac{2x}{27y^2} \cdot \frac{9}{6x^2} = \frac{2x \cdot 9}{27y^2 \cdot 6x^2} = \frac{18x}{162x^2y^2} = \frac{1}{9xy^2}$

$\frac{1}{9xy^2}$

b)  $\frac{\frac{5x}{x+2}}{\frac{10}{x-2}}$

*Handwritten work:*  $\frac{5x}{x+2} \cdot \frac{x-2}{10} = \frac{5x(x-2)}{10(x+2)} = \frac{x(x-2)}{2(x+2)}$

$\frac{x(x-2)}{2(x+2)}$

c)  $\frac{\frac{x}{y^2} + \frac{y}{y}}{\frac{y}{x^2} + \frac{x}{x}}$

*Handwritten work:*  $\frac{\frac{x+y}{y^2}}{\frac{y+x}{x^2}} = \frac{x+y}{y^2} \cdot \frac{x^2}{x+y} = \frac{x^2}{y^2}$

$\frac{x^2}{y^2}$

Practice 1:

$$a) \frac{\frac{5k}{36m}}{\frac{15k}{9}}$$

$$\frac{\cancel{5k} \rightarrow 9^1}{\cancel{36m} \rightarrow \cancel{15k}} \cdot \frac{4}{3}$$

$$\boxed{\frac{1}{12m}}$$

$$b) \frac{\frac{8x}{x-4}}{\frac{3}{x+4}}$$

$$\frac{8x}{x-4} \cdot \frac{x+4}{3}$$

$$\boxed{\frac{8x(x+4)}{3(x-4)}}$$

$$c) \frac{\frac{5}{a} + \frac{b}{a^2}}{\frac{5a}{b^2} + \frac{4}{b}}$$

LCM:  $a^2$

$$\frac{\frac{5a+b}{a^2}}{\frac{5ab+4b^2}{b^2}}$$

LCM:  $b^2$

$$\frac{5ab}{a^2} \cdot \frac{b^2}{5ab}$$

$$\boxed{\frac{b^2}{a^2}}$$

✓ CONCEPT CHECK

Which of the following are equivalent to  $\frac{5}{\frac{y}{\frac{2}{z}}}$ ?

a.  $\frac{5}{y} \div \frac{2}{z}$

b.  $\frac{5}{y} \cdot \frac{z}{2}$

c.  $\frac{5}{y} \div \frac{z}{2}$

$$\frac{5}{y} \cdot \frac{z}{2}$$

7.7 DAY ONE HW: pg. 504

1 - 33 (o), 51, 53, 55