7.7 Simplifying Complex Fractions DAY TWO

Yesterday we simplified using METHOD ONE, and today we will learn and apply METHOD TWO! Then you will practice the new method and decide which one you prefer? You should know both!

OBJECTIVE 2: Simplifying Complex Fractions: METHOD TWO

Now we look at another method of simplifying complex fractions. With this method, we will multiply the numerator and the denominator of the complex fraction by the LCD of all fractions in the complex fraction.

Simplifying a Complex Fraction: Method 2

Step 1. Multiply the numerator and the denominator of the complex fraction by the LCD of the fractions in both the numerator and the denominator.

Step 2. Simplify.

Example 2: Simplify each complex fraction.

a) $\dfrac{\dfrac{5x}{x+2}}{\dfrac{10}{x-2}}$ $\dfrac{5x(x-2)}{10(x+2)}$

LCD: $(x+2)(x-2)$ $\boxed{\dfrac{(x-2)x}{2(x+2)}}$

b) $\dfrac{\left(\dfrac{x}{y^2}+\dfrac{1}{y}\right)\cdot x^2 y^2}{\left(\dfrac{y}{x^2}+\dfrac{1}{x}\right)\cdot x^2 y^2}$ $\boxed{\dfrac{x^3+x^2 y}{y^3+xy^2}}$

LCD: $x^2 y^2$ $\boxed{\dfrac{x^2}{y^2}}$ $\dfrac{x^2(x+y)}{y^2(y+x)}$

Practice 2: Use method 2 to simplify.

a) $\dfrac{\dfrac{8x}{x-4}}{\dfrac{3}{x+4}}$ · $\dfrac{(x-4)(x+4)}{(x-4)(x+4)}$

LCD: $(x-4)(x+4)$

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

b) $\dfrac{\dfrac{b}{a^2}+\dfrac{1}{a}}{\dfrac{a}{b^2}+\dfrac{1}{b}}$ · $\dfrac{a^2b^2}{a^2b^2}$

LCD: a^2b^2

$= \dfrac{b^3+ab^2}{a^3+a^2b} = \dfrac{b^2(b+a)}{a^2(a+b)}$

$= \boxed{\dfrac{b^2}{a^2}}$

OBJECTIVE 3: Simplifying Expressions with Negative Exponents

If an expression contains a negative exponent, write the expression as an equivalent expression with positive exponents. Otherwise it is not completely simplified.
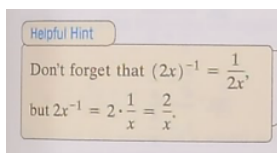
Example 3: Simplify. $\dfrac{x^{-1}+2xy^{-1}}{x^{-2}-x^{-2}y^{-1}}$ $\dfrac{1}{y}$ $\dfrac{1}{x}$

$\boxed{\dfrac{\left(\dfrac{1}{x}+\dfrac{2x}{y}\right)}{\left(\dfrac{1}{x^2}-\dfrac{1}{x^2y}\right)}}$

Practice 3: Simplify: $\dfrac{3x^{-1} + x^{-2}y^{-1}}{y^{-2} + xy^{-1}}$.

$$\dfrac{\dfrac{3}{x} + \dfrac{1}{x^2 y}}{\dfrac{1}{y^2} + \dfrac{x}{y}}$$

Example 4: Simplify: $\dfrac{(2x)^{-1} + 1}{2x^{-1} - 1}$.

Helpful Hint

Don't forget that $(2x)^{-1} = \dfrac{1}{2x}$,

but $2x^{-1} = 2 \cdot \dfrac{1}{x} = \dfrac{2}{x}$.

$$\dfrac{\dfrac{1}{2x} + 1}{\dfrac{2}{x} - 1}$$

Practice 4: $\dfrac{(3x)^{-1} - 2}{5x^{-1} + 2}$.

$$\dfrac{\dfrac{1}{3x} - 2}{\dfrac{5}{x} + 2}$$

✓ Vocabulary, Readiness & Video Check

Complete the steps by writing the simplified complex fraction.

1. $\dfrac{\dfrac{7}{x}}{\dfrac{1}{x} + \dfrac{z}{x}} = \dfrac{x\left(\dfrac{7}{x}\right)}{x\left(\dfrac{1}{x}\right) + x\left(\dfrac{z}{x}\right)} = \dfrac{7}{1 + z}$

2. $\dfrac{\dfrac{x}{4}}{\dfrac{x^2}{2} + \dfrac{1}{4}} = \dfrac{4\left(\dfrac{x}{4}\right)}{4\left(\dfrac{x^2}{2}\right) + 4\left(\dfrac{1}{4}\right)} = \dfrac{x}{2x^2 + 1}$

Write with positive exponents.

3. $x^{-2} = \dfrac{1}{x^2}$

4. $y^{-3} = \dfrac{1}{y^3}$

5. $2x^{-1} = \dfrac{2}{x}$

6. $(2x)^{-1} = \dfrac{1}{2x}$

7. $(9y)^{-1} = \dfrac{1}{9y}$

8. $9y^{-2} = \dfrac{9}{y^2}$

7.7 DAY TWO HW: pg. 504

1 - 33 (o) (METHOD 2), 35 - 49 (o) (ANY METHOD), 57, 61