

12-7

NAME _____ DATE _____

Mixed Expressions and Complex Fractions

(Pages 690–695)

A **mixed expression** is an algebraic expression that contains a monomial and a rational expression. Simplifying a mixed expression is similar to the process used in rewriting a mixed number as an improper fraction.

Simplifying a Complex Fraction

Any complex fraction $\frac{\frac{a}{b}}{\frac{c}{d}}$, where $b \neq 0$, $c \neq 0$, and $d \neq 0$, can be expressed as $\frac{ad}{bc}$.

EXAMPLE

Simplify $\frac{3 + \frac{6}{x}}{x + 2}$.

$$\frac{3 + \frac{6}{x}}{x + 2} = \frac{\frac{3(x)}{x} + \frac{6}{x}}{x + 2}$$

The LCD of the numerator is x .

$$= \frac{\frac{3x + 6}{x}}{x + 2}$$

Add to simplify the numerator.

$$= \frac{3x + 6}{x} \cdot \frac{4}{x + 2}$$

Multiply by the reciprocal of the divisor.

$$= \frac{3(x + 2)}{x} \cdot \frac{4}{x + 2}$$

Factor to simplify before multiplying.

$$= \frac{\overset{1}{\cancel{3(x + 2)}}}{x} \cdot \frac{4}{\underset{1}{\cancel{x + 2}}}$$

Divide by the common factor of $x + 2$.

$$= \frac{12}{x}$$

Multiply.

PRACTICE

Write each mixed expression as a rational expression.

1. $x - \frac{4}{x}$

2. $4 - \frac{2}{x + 7}$

3. $9 - \frac{n + 4}{n - 1}$

4. $3 + \frac{x + 5}{x^2 - 25}$

Simplify.

5. $\frac{\frac{a}{b}}{\frac{2a}{b^5}}$

6. $\frac{\frac{xyz}{x^2}}{\frac{y^5z}{x^4}}$

7. $\frac{m + \frac{5}{m}}{\frac{m + 7}{m}}$

8. $\frac{t + \frac{3}{t - 2}}{2 + \frac{4}{t - 2}}$



9. **Standardized Test Practice** Simplify $\frac{\frac{x}{x + 2}}{\frac{1}{x - 5}}$.

A $\frac{x + 1}{2x - 3}$

B $\frac{x^2 - 5x}{x + 2}$

C $\frac{x}{x^2 - 3x - 10}$

D $\frac{2x - 5}{x + 3}$

Answers: 1. $x^2 - 4$ 2. $\frac{x}{4x + 26}$ 3. $\frac{n - 1}{8n - 13}$ 4. $\frac{3x - 5}{14}$ 5. $\frac{2}{b^4}$ 6. $\frac{y^3}{x^3}$ 7. $\frac{m + 7}{m^5 + 5}$ 8. $\frac{t^2 - 2t + 3}{t^2 - 2t + 3}$ 9. B