

Key Concepts: Division of Rational Expression
Complex Rational Expressions

Division of rational expressions

$$\frac{\frac{A}{B}}{\frac{C}{D}} = \frac{A}{B} \div \frac{C}{D} \quad \text{assuming } B \neq 0, C \neq 0, \text{ and } D \neq 0$$

$$= \frac{A}{B} \times \frac{D}{C}$$

Example 1

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

Complex Fractions

A **complex** fraction is any fraction whose numerator *or* denominator contains another fraction.

Simplifying complex rational expressions – Strategy A

1. Simplify (add and/or subtract, as necessary) the expressions in the numerator and denominator.
2. Reciprocate the expression in the denominator and multiply with the expression in the numerator.
3. Simplify the remaining expression.

Example 2

Completely simplify $f(x) = \frac{\frac{2}{x+3} - \frac{4}{x-1}}{\frac{x+2}{x+3}}$. Verify the simplified formula for $x = -1$.

Example 3

Completely simplify $\frac{\frac{3}{y^2 - 4} - \frac{y}{4 - y^2}}{\frac{y}{y - 2} - \frac{3}{2 - y}}$. Verify the simplified formula for $y = 3$.

Example 4

Completely simplify $\frac{\frac{2}{t+h} - \frac{2}{t}}{h}$.

Example 5

Completely simplify $\frac{\frac{2}{x+1} + \frac{4}{(x+1)^2}}{\frac{2}{(x+1)(x-2)}}$. Verify your formula when $x = 1$.

Example 6

Completely simplify $\frac{\frac{1}{x-4} + \frac{1}{x+4}}{1 - \frac{1}{x+4}}$