

Algebra 2 8.1
Simplify rational expressions
Simplify complex fractions

rational
simplify (a fraction)
GCF
Is it ever OK to divide by zero?
complex fraction
whiteboards

Whiteboards
Easter Eggs

$$3. \quad \frac{\frac{10y^2 + 15y}{5y} - \frac{5y}{5y}}{\frac{35y^2 - 5y}{5y}} = \frac{5y(2y + 3)}{5y(7y - 1)}$$

$$= \frac{2y + 3}{7y - 1}$$

Answer when undefined only if they ask (for now...)

Guided Practice

Simplify each expression.

3A. $\frac{(xz - 4z)}{z^2(4 - x)}$ ~~$\frac{z(x-4)}{-z^2(x-4)}$~~

~~$\frac{3}{a^{-3}}$~~

$$\frac{1}{-z} = -\frac{1}{z}$$

► **Guided Practice**

4A. $\frac{12c^3d^2}{21ab} \cdot \frac{14a^2b}{8c^2d}$

4B. $\frac{6xy}{15ab^2} \cdot \frac{21a^3}{18x^4y}$

$$\begin{array}{r} \cancel{3 \cdot 2 \cdot 2 \cdot c \cdot c \cdot c \cdot d \cdot d} \cdot \cancel{2 \cdot 7 \cdot a \cdot a \cdot b} \\ \cancel{3 \cdot 7 \cdot a \cdot b} \cdot \cancel{2 \cdot 2 \cdot 2 \cdot c \cdot c \cdot d} \\ \hline acd \\ \hline 1 \end{array}$$

$$4C. \frac{16mt^2}{21a^4b^3} \div \frac{24m^3}{7a^2b^2}$$

$$4D. \frac{12x^4y^2}{40a^4b^4} \div \frac{6x^2y^4}{16a^2x}$$

$$\frac{\cancel{2} \cancel{2} \cancel{2} \cancel{t} \cancel{t}}{\cancel{3} \cancel{7} \cancel{4} \cancel{a} \cancel{a} \cancel{a} \cancel{a} \cancel{b} \cancel{b} \cancel{b}} \cdot \frac{\cancel{7} \cancel{a} \cancel{a} \cancel{b} \cancel{b}}{\cancel{2} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{7} \cancel{m} \cancel{m} \cancel{m}}$$

$$\frac{2t^2}{9a^2m^2}$$

$$\begin{array}{c} -8 \quad 64 \\ \times \\ -8 \end{array}$$

Example 5 Polynomials in the Numerator and Denominator

$$\begin{array}{c} -16 \\ \times \\ -8 \end{array}$$

Simplify each expression.

$$\begin{array}{c} 6 \\ \times \\ 3 \end{array}$$

a. $\frac{x^2 - 6x - 16}{x^2 - 16x + 64} \cdot \frac{x - 8}{x^2 + 5x + 6}$

$$\frac{(x-8)(x+2)(x-8)}{(x+8)(x-8)(x+3)(x+2)} = \frac{1}{x+3}$$

b. $\frac{x^2 - 16}{12y + 36} \div \frac{x^2 - 12x + 32}{y^2 - 3y - 18}$

Guided Practice

5A. $\frac{8x - 20}{x^2 + 2x - 35} \cdot \frac{x^2 - 7x + 10}{4x^2 - 16}$

5B. $\frac{x^2 - 9x + 20}{x^2 + 10x + 21} \div \frac{x^2 - x - 12}{6x + 42}$

$$\frac{1}{4} \div \frac{3}{8}$$

Multiply by recip (why does that work?)

Example 6 Simplify Complex Fractions

Simplify each expression.

a. $\frac{\frac{a+b}{4}}{\frac{a^2+b^2}{4}}$

$$\frac{a+b}{\cancel{4}} \cdot \frac{\cancel{4}}{a^2+b^2}$$

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

$$b. \frac{x^2}{x^2 - y^2} - \frac{y-x}{4x} \quad \begin{matrix} -1 & -1 \\ \underline{y-x} & \underline{y-x} \end{matrix}$$

$$\frac{x \cdot x}{(x+y)(x-y)} \cdot \frac{-1(x+y)}{4x} = \frac{-x}{4(x-y)}$$

Guided Practice

Simplify each expression.

6A.
$$\frac{\frac{(x-2)^2}{2(x^2-5x+4)}}{\frac{x^2-4}{4x-10}}$$

6B. $\frac{\frac{x^2 - y^2}{y^2 - 49}}{\frac{y - x}{y + 7}}$

