

Simplifying Rational Expressions

Example:

$$\frac{x^5}{x^2} = \frac{x \cdot x \cdot x \cdot x \cdot x}{x \cdot x} = \frac{\cancel{x} \cdot \cancel{x} \cdot x \cdot x \cdot x}{\cancel{x} \cdot \cancel{x}} = x^3$$

Write each problem as a multiplication/division problem (as done above) and then simplify.

| Problem | Written out as mult/div. Prob. | Simplified |
|-------------------|--------------------------------|------------|
| $\frac{x^8}{x^3}$ | | |
| $\frac{x^7}{x^5}$ | | |
| $\frac{x^3}{x}$ | | |

Important Division notes:

You can only “make ones” with common **FACTORS** of the numerator and denominator. Factors are numbers or expressions that are **MULTIPLIED** together to make a numerator or denominator.

Examples:

A. $\frac{x(x+3)}{x+3}$

B. $\frac{8x}{4(x+3)}$

C. $\frac{x}{x+3}$

D. $\frac{30xy^2}{6x^5y}$

NOTES: Simplify each expression.

1. $\frac{5a^4}{a^2}$

2. $\frac{x^2y^3}{x^5}$

3. $\frac{x^4y^7}{6x^{10}}$

4. $\frac{-25b^4}{5b^8}$

5. $\frac{5(a+2)^4}{10(a+2)^3}$

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

You practice now!! Simplify each expression.

1. $\frac{x(x+5)(x-3)}{x-3}$

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

3. $\frac{24x^3y^5}{6x^5y^2}$

4. $\frac{x(x-5)(x+13)(2x-4)}{(x-3)(x-5)(2x-4)}$

5. $\frac{200x^{15}y^5}{5x^3y^5}$

6. $\frac{-24b^8}{12b^{10}}$

What about negative exponents?

What does it mean when you see x^{-1} ?

Find these values on your calculator. Write them as fractions, not decimals.

$2^{-1} = \underline{\hspace{2cm}}$

$3^{-1} = \underline{\hspace{2cm}}$

x^{-1} is the same as $\underline{\hspace{2cm}}$

Negative exponents are usually used when you don't want fractions in your answers.

Complete the chart.

| Problem | Written out as mult/div. Prob. | Simplified | Simplified without fractions |
|-------------------|--------------------------------|------------|------------------------------|
| $\frac{x^2}{x^7}$ | | | |
| $\frac{x^3}{x^5}$ | | | |
| $\frac{x^2}{x^5}$ | | | |

Write without negative exponents.

$\frac{1}{5^{-2}}$

$\frac{x^3}{6x^{-3}}$

$\frac{x^3}{x^{-5}}$

$(5xy^3)^{-2}$

$\frac{x^3}{(6x)^{-3}}$

$\frac{x^2y^4}{2x^{-8}y^{-1}}$

One more note: Remember....Anything to the zero power is $\underline{\hspace{2cm}}$

A. x^0

B. 2^0

C. $(xyz^2)^0$

D. 1254^0