Simplifying Algebraic Expressions using Exponent Rules

Learning Goal:

By the end of today, I will be able to simplify a complex algebraic expression to a simpler form

Feb 23-9:05 AM

Today we will combine all of the exponent rules that we reviewed in the last few classes.

Simplifying expressions means combining all terms, cancelling tops and bottoms, and multiplying or dividing coefficients as needed.

Mar 24-9:11 AM

Summary of Exponent Rules

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$\left(a^m\right)^n = a^{m\times n}$$

$$(ab)^m = a^m b^m \qquad \left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

$$a^0 = 1 \qquad a^{-n} = \frac{1}{a^n}$$

$$\sqrt[n]{a} = a^{\frac{1}{n}}$$

Dec 3-2:27 PM

SIMPLIFY THE FOLLOWING ALGEBRAIC EXPRESSION

use as many steps as necessary...keep your work organized and legible

$$\frac{(2x^{-3}y^2)^3}{(x^3y^{-4})^2} = \frac{(2)^3(x^{-3})^3(y^2)^3}{(x^3)^2(y^{-4})^2}$$

I used the product-of-powers rule to raise each factor in the numerator to the third power and to square each factor in the denominator. Then I multiplied exponents.

$$= \frac{8x^{-9}y^6}{x^6y^{-8}}$$

$$= 8x^{-9-6}y^{6-(-8)}$$

$$= 8x^{-15}y^{14}$$

$$= \frac{8y^{14}}{x^{15}}$$

I simplified the whole expression by subtracting exponents of terms with the same base.

One of the powers had a negative exponent. To write it with positive exponents, I used its reciprocal.

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Answer this question two ways...

a) Evaluate the expression $\dfrac{(x^{2n+1})(x^{3n-1})}{x^{2n-5}}$ for $x = -3$, $n = 2$

This is how it looks when you **substitute first.**

$= -177\,147$

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b) Evaluate the expression $\dfrac{(x^{2n+1})(x^{3n-1})}{x^{2n-5}}$ for $x = -3$, $n = 2$

Here's how it works when you **simplify first**, then substitute.

$= -177\,147$

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Simplify:

$$\left(\frac{\sqrt[5]{x^8}}{\sqrt{x^3}}\right)^3$$

HINTS/solution

$$= \left(\frac{x^{\frac{8}{5}}}{x^{\frac{3}{2}}}\right)^3$$

$$= \left(x^{\frac{8}{5}-\frac{3}{2}}\right)^3$$

$$= \left(x^{\frac{16}{10}-\frac{15}{10}}\right)^3$$

$$= \left(x^{\frac{1}{10}}\right)^3$$

$$= x^{\frac{3}{10}}$$

$$= \sqrt[10]{x^3}$$

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Simplify:

$$\frac{\left(27a^{-3}b^{12}\right)^{\frac{1}{3}}}{\left(16a^{-8}b^{12}\right)^{\frac{1}{2}}}$$

Oct 31-1:43 PM

PRACTICE IS GOOD
FOR SKILL BUILDING

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