

SC Algebra 1
8.2 Division Properties of Exponents

Warm Up

Which value of n makes each statement true?

1. $8x^n(6x^5) = 48x^8$ $n=3$

2. $(x^n)^2 = x^{12}$ $n=6$

3. $(6x^2y^3)^3 = nx^6y^9$ $n=216$

Power Rules Quick Review:

base $\nearrow$ exponent $x^5 = x \cdot x \cdot x \cdot x \cdot x$

Product = $x^3 \cdot x^4 = (x \cdot x \cdot x) \cdot (x \cdot x \cdot x \cdot x)$

Power of a Power $x^7(x^5)^2 = x^{10}$

Power of Product $(2x^2m^3)^5 = 32x^{10}m^{15}$

Quotient Rule:

"To multiply or divide are opposites, that's a fact! So, if to multiply you add the exponents, then to divide you must subtract."

Example 1:

Simplify each expression. Assume the denominator does not equal zero.

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

$$\frac{r^5}{r^4} = r$$

$$\frac{b^5c^7}{b^2c^1} = b^3c^6$$

$$\frac{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2}}{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2}} = 2^2$$

$$\frac{x^3y^7z}{xy^5}$$

$$x^2y^2z$$

$$\frac{x^3 \cdot y^7 \cdot z}{x \cdot y^5}$$

$$\frac{a^2b^9cd^4}{b^8cd}$$

$$a^2bd^3$$

$$\frac{q^5st^7}{q^3t^4}$$

$$q^2st^3$$

How can I meet today's standards?

I can apply the division properties of exponents when **dividing monomials** and when raising a **quotient to a power**.

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Power of a Quotient Rule:

"Kind of like an exponent tower, the top and bottom must be raised to the same power."

Example 2:

Simplify each expression.

$$\left(\frac{2}{5}\right)^3 = \frac{2^3}{5^3} = \frac{8}{125}$$

$$\left(\frac{p}{q}\right)^2 = \frac{p^2}{q^2}$$

$$\frac{5a^3}{6^3}$$

$$\left(\frac{5a^2}{6}\right)^3$$

$$\frac{125a^6}{216}$$

$$\left(\frac{3xz^4}{2y^3}\right)^2$$

$$\frac{9x^2z^8}{4}$$

$$\left(\frac{x^4y}{xyz}\right)^2$$

$$\frac{x^8y^2}{x^2y^2z^2}$$

$$\frac{x^6}{z^2}$$

$$\left(\frac{5j^3l^2}{7k^5}\right)^4$$

$$\frac{625j^{12}l^8}{2401k^{20}}$$