8.2 Apply Exponent Properties Involving Quotients

Goal • Use properties of exponents involving quotients.

Your Notes

QUOTIENT OF POWERS PROPERTY

Let a be a nonzero real number, and let m and n be positive integers such that $m > n$.

Words: To divide powers having the same base, _____ the exponents.

Algebra: $\frac{a^m}{a^n} = a^{____}$, $a \neq 0$

Example: $\frac{4^7}{4^2} = 4^{____} = 4^{__}$

Example 1 ***Use the quotient of powers property***

Simplify the expression.

a. $\frac{6^{12}}{6^5} = 6^{____} = 6^{__}$

b. $\frac{(-2)^7}{(-2)^4} = (-2)^{____} = (-2)^{__}$

When simplifying powers with numerical bases only, write your answers using exponents.

c. $\frac{4^2 \cdot 4^8}{4^4} = \frac{4^{__}}{4^4}$

$= 4^{____}$

$= ____$

d. $\frac{1}{y^9} \cdot y^{12} = \frac{y^{12}}{y^9}$

$= y^{____}$

$= ____$

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Your Notes

POWER OF A QUOTIENT PROPERTY

Let a and b be real numbers with $b \neq 0$, and let m be a positive integer.

Words: To find a power of a quotient, find the power of the _____ and the power of the _____ and divide.

Algebra: $\left(\frac{a}{b}\right)^m =$ ____, $b \neq 0$ **Example:** $\left(\frac{4}{7}\right)^3 =$ ____

When simplifying powers with numerical and variable bases, evaluate the numerical power.

Example 2 ***Use the power of a quotient property***

Simplify the expression.

a. $\left(\frac{r}{s}\right)^5 =$ ____

b. $\left(-\frac{4}{w}\right)^3 = \left(\quad\right)^3 =$ ____ $=$ ____ $=$ ____ $=$ ____

✔ ***Checkpoint*** **Simplify the expression.**

1. $\frac{(-8)^8}{(-8)^5}$	**2.** $\frac{3^5 \cdot 3^4}{3^3}$
3. $\left(-\frac{r}{3}\right)^2$	**4.** $\left(\frac{5}{t}\right)^4$

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Your Notes

Example 3 ***Use properties of exponents***

Simplify $\left(\frac{2y^7}{y^5}\right)^3$.

Solution

$\left(\frac{2y^7}{y^5}\right)^3 =$ _____ _____ **property**

$=$ _____ _____ **property**

$=$ _____ _____ **property**

$=$ _____ _____ **property**

✔ ***Checkpoint*** **Simplify the expression.**

5. $\left(\frac{7y^3z}{y}\right)^2$	**6.** $\frac{2s^4}{t} \cdot \left(\frac{2t}{s}\right)^3$
7. $\left(\frac{6m^3n^2}{3mn}\right)^3$	**8.** $\frac{4a}{b^2} \cdot \left(\frac{2a^2b^3}{a}\right)^4$

Homework

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