

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) _____

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 _____
= _____

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

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

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

b. $\left(-\frac{4}{w}\right)^3 = \frac{(-4)^3}{w^3} = \frac{-64}{w^3}$

✓ 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. $\left(\frac{5}{t}\right)^4$

Your Notes

Example 3 Use properties of exponents

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

Solution

$$\left(\frac{2y^7}{y^5}\right)^3 = \underline{\hspace{2cm}} \text{ property}$$

$$= \underline{\hspace{2cm}} \text{ property}$$

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✓ **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