

Warm Up**Week 11****Monday - NO SCHOOL****Tuesday**

Write down at least one thing you enjoyed doing over the long weekend.

(must be school appropriate)

8.1-8.2 Quiz

Out of 25 points

A - 22.5

B - 20

C - 17.5

D - 15

8.4 Division Properties of Exponents

Goals: • Use division properties of exponents.

EQ: What are the steps for simplifying exponents when there is division?

DIVISION PROPERTIES OF EXPONENTS

Let a and b be real numbers and let m and n be integers.

Quotient of Powers Property

To divide powers that have the same base, subtract the exponents.

$$\frac{a^m}{a^n} = a^{m-n}, a \neq 0$$

$$\frac{2^7}{2^3} = 2^{7-3} = 2^4 = 16$$

Power of a Quotient Property

To find a power of a quotient, find the power of the numerator and the power of the denominator and divide

$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$$

$$\left(\frac{2}{3}\right)^3 = \frac{2^3}{3^3} = \frac{8}{27}$$

$$x^2 \cdot x^3 = x^5 \quad (x^2)^3 = x^6$$

Example 1: Use the Quotient of Powers Property

Simplify the quotient.

$$\begin{aligned} \text{a. } \frac{8^4}{8^3} &= 8^{4-3} \\ &= 8^1 \\ &= \textcircled{8} \end{aligned}$$

$$\begin{aligned} \text{b. } \frac{x^4}{x^7} &= x^{4-7} \\ &= \frac{x^{-3}}{1} \\ &= \textcircled{\frac{1}{x^3}} \end{aligned}$$

Example 2: Use the Power of a Quotient Property

Simplify the expression.

$$\begin{aligned} \text{a. } \left(\frac{4}{5}\right)^2 &= \frac{4^2}{5^2} \\ &= \textcircled{\frac{16}{25}} \end{aligned}$$

$$\begin{aligned} \text{b. } \left(-\frac{8}{5}\right)^{-3} &= \frac{(-8)^{-3}}{5^{-3}} \\ &= \frac{5^3}{(-8)^3} = \textcircled{\frac{125}{-512}} \\ &= \textcircled{\frac{-125}{512}} \end{aligned}$$

Example 3: Simplify Expressions Using Multiple Properties

Simplify $\frac{3xy^4}{4x^3} \cdot \frac{12x^3y^2}{x^2}$. Use only positive exponents.

$$\begin{aligned} \frac{3xy^4}{4x^3} \cdot \frac{12x^3y^2}{x^2} &= \frac{36x^4y^6}{4x^5} \\ &= \frac{9x^{-1}y^6}{1} \\ &= \frac{9y^6}{x^1} \\ &= \frac{9y^6}{x} \end{aligned}$$

Example 4: Simplify Expressions with Negative Exponents

Simplify the expression $\frac{b}{a^{-3}} \cdot \left(\frac{b^3}{a}\right)^{-2}$. Use positive exponents.

$$\begin{aligned} \frac{b}{a^{-3}} \cdot \left(\frac{b^3}{a}\right)^{-2} &= \frac{b}{a^{-3}} \cdot \frac{b^{-6}}{a^2} \\ &= \frac{b^{-5}}{a^{-5}} \\ &= \frac{a^5}{b^5} \end{aligned}$$

Try It Simplify the expression. Write any fractions in simplest form using only positive exponents.

1. $\frac{4^6}{4^4} = 4^{6-4} = 4^2 = 16$

2. $\frac{t^7}{t^8} = \frac{t^{-1}}{1} = \frac{1}{t}$

3. $\left(\frac{-5}{c}\right)^2 = \frac{(-5)^2}{c^2} = \frac{25}{c^2}$

4. $\left(\frac{3}{4}\right)^{-2} = \left(\frac{4}{3}\right)^2 = \frac{4^2}{3^2} = \frac{16}{9}$

5. $\frac{5x^2y^3}{6x^4} \cdot \frac{24x^5y^2}{x^6y^3} = \frac{120x^7y^5}{6x^{10}y^3} = \frac{20x^{-3}y^2}{1x^3} = \frac{20y^2}{x^3}$

6. $\frac{a^3}{b^{-4}} \cdot \left(\frac{a}{b^2}\right)^{-3} = \frac{a^3}{b^4} \cdot \frac{a^{-3}}{b^6} = \frac{a^0}{b^{-10}} = \frac{1}{b^{-10}} = b^{10}$

Steps to Simplify Exponents

(Dist. if possible)

① \times Bis ^{+ power}

② \div ^{- power}

③ Neg Exp. "Move"

8.4 Homework

Dividing Exponents wkst