

Algebra I Lesson 8-2

- I can simplify expressions involving the quotient of monomials.
- I can simplify expressions containing negative exponents

$$\frac{4^5}{4^3} = \frac{\cancel{4} \cdot \cancel{4} \cdot \cancel{4} \cdot 4 \cdot 4}{\cancel{4} \cdot \cancel{4} \cdot \cancel{4}} = 4 \cdot 4 = 4^2$$

$$\frac{3^6}{3^2} = 3^{6-2} = 3^4$$

Quotient of Powers

To divide two powers, that have the same base,
Subtract the exponents

For all integers m and n and any nonzero number a , $\frac{a^m}{a^n} = a^{m-n}$

Example: $\frac{b^{15}}{b^7} = b^{15-7} = b^8$

Practice: $\frac{a^5 b^8}{ab^3} = \left(\frac{a^5}{a}\right) \left(\frac{b^8}{b^3}\right) = a^{5-1} b^{8-3} = a^4 b^5$

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

$$\frac{2}{5} \cdot \frac{2}{5} \cdot \frac{2}{5} = \frac{2^3}{5^3}$$

$$\frac{2^3}{5}$$

Power of a Quotient

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

For any integer m and any real numbers a and b , $b \neq 0$, $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$

Example: $\left(\frac{c}{d}\right)^5 = \frac{c^5}{d^5}$

Practice:

$$\left(\frac{2p^2}{3}\right)^4 = \frac{2^4 (p^2)^4}{3^4} = \frac{16p^8}{81}$$

Power	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}
Value	16	8	4	2	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$

$$\frac{2^4}{2^4} = \frac{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2}}{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2}} = 1$$

$$\frac{2^4}{2^4} = 2^{4-4} = 2^0$$

Zero Exponent

Any nonzero number raised to the zero power is 1

For any nonzero number a , $a^0 = 1$

Example: $(-0.25)^0 = 1$

Practice:

$$\left(-\frac{3x^5y}{8xy^7}\right)^0 = 1$$

$$\frac{t^3s^0}{t} = \frac{t^3 \cdot 1}{t} = t^2$$

$$\frac{8^2}{8^5} = \frac{8 \cdot 8}{8 \cdot 8 \cdot 8 \cdot 8 \cdot 8} = \frac{1}{8^3}$$

$$\frac{8^2}{8^5} = 8^{2-5} = 8^{-3}$$

Negative Exponent

For any nonzero number a and any integer n ,
 a^{-n} is the reciprocal of a^n . The reciprocal of a^n is $\frac{1}{a^n}$.

For any nonzero number a and any integer n , $a^{-n} = \frac{1}{a^n}$ $\frac{1}{a^{-n}} = a^n$

Example: $5^{-2} = \frac{1}{5^2} = \frac{1}{25}$ $\frac{1}{m^{-3}} = m^3$

Practice: $\frac{b^{-3}c^2}{d^{-5}}$ $\frac{-3a^{-4}b^7}{21a^2b^7c^{-5}} = \frac{-1}{7} \cdot a^{-4} \cdot 1 \cdot \frac{1}{c^{-5}}$

$$\left(\frac{b^{-3}}{1}\right) \left(\frac{c^2}{1}\right) \left(\frac{1}{d^{-5}}\right)$$

$$\frac{1}{b^3} \cdot c^2 \cdot d^5 = \frac{c^2 d^5}{b^3}$$

$$\frac{-1}{7} \cdot \frac{1}{a^4} \cdot c^5 = -\frac{c^5}{7a^4}$$

Assignment:

Pg. 421 #14-36 even