

7-1 Zero and Negative Exponents



Zero Exponents: Any nonzero number raised to the zero power is 1.

A. Simplify $\left(\frac{12m^8n^7}{8m^5n^{10}}\right)^0 = 1$

B. $\frac{m^0n^3}{n^2} = \frac{1 \cdot n^3}{n^2} = \frac{\cancel{n} \cdot \cancel{n} \cdot n}{\cancel{n} \cdot \cancel{n}} = n$



Negative Exponents: $a^{-n} = \frac{1}{a^n}$ and $\frac{1}{a^{-n}} = a^n$

C. Simplify $4^{-3} = \frac{1}{4^3} = \frac{1}{16}$

D. $3^{-2} = \frac{1}{3^2} = \frac{1}{9}$

move to the denominator
make exponent positive & simplify

E. $6^{-1} = \frac{1}{6^1} = \frac{1}{6}$

F. $(-4)^{-2} = \frac{1}{(-4)^2} = \frac{1}{16}$

Simplifying Exponential Expressions



An algebraic expression is in simplest form when powers with a variable base are written with only positive exponents.

G. $x^{-9} = \frac{1}{x^9}$

H. $\frac{1}{n^{-3}} = n^3$

I. $4c^{-3}b = \frac{4b}{c^3}$

J. $\frac{n^{-5}}{m^2} = \frac{1}{n^5 m^2}$

K. $\frac{2}{a^{-3}} = 2a^3$

L. $4ab^0 = 4a(1) = 4a$

Negative exponent in the denominator, moves up to numerator

M. $\frac{3^{-2}}{n} = \frac{1}{3^2 n} = \frac{1}{9n}$

N. $c^{-5}d^{-7} = \frac{1}{c^5 d^7}$

P. $\frac{6a^{-1}c^{-3}}{d^0} = \frac{6}{a^1 c^3 \cdot 1} = \frac{6}{ac^3}$

PRACTICE: Try these problems on your own...

Simplify each expression:

1. $2^{-5} =$ _____

2. $m^0 =$ _____

3. $5s^2t^{-1} =$ _____

4. $\frac{4}{x^{-3}} =$ _____

Evaluating an Exponential Expression

Q. What is the value of $2a^{-2}b^4$ for $a = -2$ and $b = 1$?

Simplify first:

$$2a^{-2}b^4 = \frac{2b^4}{a^2}$$

Then substitute:

$$\frac{2(1)^4}{(-2)^2} = \frac{2(1)}{4}$$

Simplify:

$$= \frac{2}{4} = \frac{1}{2}$$

Substitute first:

$$2(-2)^{-2}(1)^4 =$$

$$= \frac{2(1)^4}{(-2)^2} = \frac{2(1)}{4}$$

$$= \frac{2}{4} = \frac{1}{2}$$

Then simplify (Rewrite with positive exponents and evaluate.)

Practice : Evaluate each expression for $a = 2$ and $b = -4$ Try these on your own...

5. a^3b^{-1}

6. $2a^{-4}b^0$

7. $r^{-4}s^2$ if $r = -3$ and $s = 5$
