

Bell Work:

1. What is the rule for multiplying monomials?
2. What is the rule for dividing monomials?
3. Multiply $(7x^2y^{-3}z)(3x^{-6}y^{-1}z^4)(-4x^4y^2z^{-7})$.
4. Divide $\frac{45a^8b^{-2}c^{-4}}{125a^3b^{-6}c^4}$.

Write your answers on the back bottom of yesterday's worksheet.

In today's lesson, you will learn how to use the Power of Powers exponent property with positive and negative exponents and solve problems that combine the different exponent properties.

$$(x^2)^3$$

$$\frac{(8f^3g^{-2}h)^2}{4f^{-5}g^3h^{-1}}$$

$$(4p^3q^{-5})^{-2}$$

Power of Powers:

$$(x^2)^3 = x^6$$

$$(j^3 k)^5 = j^{15} k^5$$

$$(a^2 b^{-4})^2 = a^4 b^{-8} = \frac{a^4}{b^8}$$

What is the rule for power of powers?

Outside exponent \times all inside exponents.

Power of Powers:

$$(3f^3g)^4 = 3^4 f^{12} g^4 = 81f^{12}g^4$$

$$(5x^4y^{-1}z^{-3})^3 = 5^3 x^{12} y^{-3} z^{-9} = \frac{125x^{12}}{y^{-3}z^{-9}}$$

$$(2h^3k^{-2}m)^5 = 2^5 h^{15} k^{-10} m^5 = \frac{32h^{15}m^5}{k^{10}}$$

Power of Powers:

$$\left(4p^3q^{-5}\right)^{-2} = \left(\frac{1}{4p^3q^{-5}}\right)^2$$

$$= \frac{1^2}{4^2 p^6 q^{-10}}$$

$$= \frac{q^{10}}{16p^6}$$

*Negative outside
exponent: flip
everything inside*

Power of Powers:

$$\begin{aligned}(-3d^2e^{-4}f^{-1})^{-4} &= \left(\frac{1}{-3d^2e^{-4}f^{-1}} \right)^4 \\ &= \frac{1}{(-3)^4 d^8 e^{-16} f^{-4}} \\ &= \frac{e^{16} f^4}{81d^8}\end{aligned}$$

Power of Powers:

$$\begin{aligned}\left(\frac{2a^{-3}b^4}{3a^2b^6}\right)^{-3} &= \left(\frac{3a^2b^6}{2a^{-3}b^4}\right)^3 \\ &= \left(\frac{3a^5b^2}{2}\right)^3 \\ &= \frac{3^3 a^{15} b^6}{2^3} = \frac{27a^{15}b^6}{8}\end{aligned}$$

You can flip everything inside, then simplify inside, or you can simplify everything inside, then flip.

Power of Powers:

Power of Powers is the 1st operation to do.

$$\frac{(8f^3 g^{-2} h)^2}{4f^{-5} g^3 h^{-1}} = \frac{16f^6 g^{-4} h^2}{4f^{-5} g^3 h^{-1}} = 4f^{11} g^{-7} h^3$$
$$= \frac{4f^{11} h^3}{g^7}$$

Power of Powers:

Power of Powers is the 1st operation to do.

$$(3x^4 y^6 z^{-1})(4x^{-2} y^{-2} z)^3 =$$

$$(3x^4 y^6 z^{-1})(64x^{-6} y^{-6} z^3) = 192x^{-2} z^2 = \frac{192z^2}{x^2}$$

Power of Powers:

$$\left(\frac{180m^7n^{-3}p^2}{63m^{-4}n^7p^6} \right)^0 =$$

Power of Powers:

Multiply the exponents.

Take the power of the coefficient.

Negative Power of Powers:

Flip everything the inside.

Negative Exponents:

Move them and make them positive.

Assignment:

Properties of Powers B Worksheet