SM3-A HANDOUT 7-2 (Exponents, Part-2)

Name the 3 properties of exponents we learned.

Negative Exponent Property

Possible errors

$$4x^{-2} = \frac{4 * x^{-2}}{1} = \frac{4}{x^2}$$

When you "Grab and drag" the <u>base and its exponent</u> across the "boundary line" between numerator and denominator, you just <u>change the sign</u> of the exponent.

$$\frac{4 * x^{-2}}{1} \neq \frac{1}{4x^2}$$

Quotient of Powers Property

$$\frac{x^5}{x^2} = \frac{x * x * x * x * x}{x * x} = x * x * x = x^3$$

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

This is really a silly property. We don't even need to memorize this as a separate property. It's just the negative exponent property.

$$\frac{x^m}{x^n} = x^{m-n}$$

Power of a Quotient Property

$$\left(\frac{x}{y}\right)^2 = \left(\frac{x}{y}\right)\left(\frac{x}{y}\right) = \frac{x^2}{y^2}$$

General form of
Power of a quotient: $\left(\frac{x}{y}\right)^m = \frac{x^m}{y^m}$

This is another <u>silly property</u>. Isn't it just exponent of a product?

Zero Exponent Property

Any base raised to the zero power simplifies to one.

$$10^3 = 1000$$
$$10^2 = 100$$
$$10^1 = 10$$
$$10^0 = 1$$

$$2^0 = 1$$
$$(2x)^0 = 1$$
$$2x^0 = 2*1 = 2$$

Combination: (1) Negative Exponent, (2) Product of Powers, (3) Power of a Power, (4) Power of a Quotient

$$\left(\frac{3x^2}{2x^{-4}y}\right)^2 = \left(\frac{3x^2 x^4}{2y}\right)^2 = \left(\frac{3x^6}{2y}\right)^2 = \left(\frac{3^1 x^6}{2^1 y^1}\right)^2$$

$$= \frac{3^{1*2} x^{6*2}}{2^{1*2} y^{1*2}} = \frac{3^2 x^{12}}{2^2 y^2} = \frac{9x^{12}}{4y^2}$$

$$\frac{2x^3}{4x^5}$$

$$\frac{(x^{-2})^4}{2x^{-3}}$$

$$\frac{9(2x)^4}{2x}$$

$$\frac{(-2y^2 x^{-3})^4}{2yx^{-3}}$$

$$\frac{32x^{10}}{x^2 y^{17}} = \frac{32x^{10}x^{-2}}{y^{17}} = \frac{32x^{10-2}}{y^{17}}$$

"Grab and drag"

Product of powers: add the exponents of same based powers

$$= \frac{32x^8}{y^{17}}$$

$(w^{-2})^5$ ⬜

$\dfrac{1}{2}(3x^{-3})^2$ ⬜

$\left(\dfrac{2x^2}{3y^{-2}z^3}\right)^{-2}$ ⬜

$\left(\dfrac{5x^4}{3y^{-2}}\right)^{-1}$ ⬜

Do you "grab and drag (<u>up</u> or <u>down</u>)??
It doesn't matter!!!!

$$\frac{3x^2}{2x^{-4}y} = \frac{3x^2x^4}{2y} = \frac{3x^{2+4}}{2y} = \boxed{\frac{3x^6}{2y}}$$

<u>Product of powers property</u>: add the exponents of like-based powers

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

<u>Product of powers property</u>: add the exponents of like-based powers

<u>Make sure</u> when you're all done, there are <u>NO NEGATIVE EXPONENTS</u> remaining.