Learning Goals
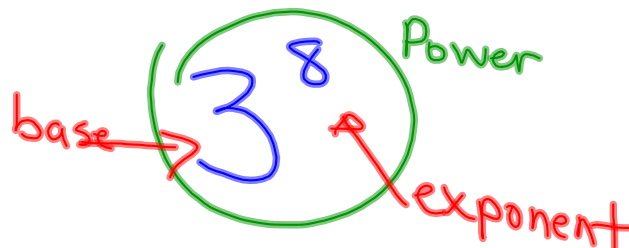
1. To understand, to multiply powers with the same base, add the exponents.

2. To understand, to divide powers with the same base, subtract the exponents.

2.2 - Multiplying and Dividing Powers

1. Exponent Rule when Multiplying

When two powers have the same base and are being multiplied, write the base and just add the exponents.

$$(a^m)(a^n) = a^{m+n}$$

For example, $(2^2)(2^3) = 2^{2+3} = 2^5$

2. Exponent Rule when Dividing

When two powers have the <u>same base</u> and are being <u>divided</u>, write the base and just <u>subtract the exponents</u>.

$$(a^m) \div (a^n) = a^{m-n} \qquad \frac{a^m}{a^n} = a^{m-n}$$

For example, $(3^4) \div (3^2) = 3^{4-2} = 3^2$

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

Example One
Simplify.

$$\frac{(x^7)(x^3)}{(x^6)}$$

1. Clean up the top.

$$(x^7)(x^3) = x^{10}$$

2. Subtract exponents.

$$\frac{x^{10}}{x^6} = x^{10-6}$$

$$= x^4$$

Example Two

Simplify $\dfrac{(x^4y^3)(x^3y^5)}{(x^5y^5)}$ and evaluate where x = 3 and y = -2.

1. Clean up the top.

$$x^4x^3y^3y^5 = x^7y^8$$

2. Clean up the bottom.

$$x^5y^5 \quad *\text{Nothing to do!}$$

3. Subtract exponents.

$$\frac{x^7y^8}{x^5y^5} = x^2y^3$$

4 Plug in x=3, y=-2

$$= (3)^2(-2)^3$$
$$= 9(-8)$$
$$= -72$$

In general, (ab)ᵐ = aᵐbᵐ and $\left(\dfrac{a}{b}\right)^m = \dfrac{a^m}{b^m}$.

Remember to apply exponent laws to coefficients as well!

Example Three

Simplify.

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

1. Clean up the top.

$$\left(-\frac{2}{5}\right)^5 x^5 y^5$$

2. Clean up the bottom.

$$\left(-\frac{2}{5}\right)^3 xy \quad \text{* Nothing to do!}$$

3. Subtract the exponents.

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

Complete: p. 89 - 91 #1 - 5, 6ace, 11ace, 12ace.