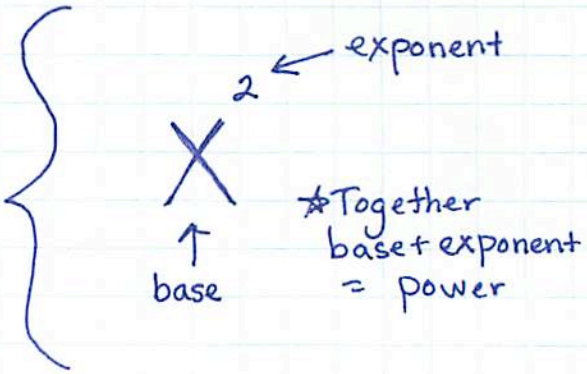
Unit 8 Exponents and Exponential Functions

An exponent signifies how many times some value is multiplied by itself, (how many times the base is used as a factor)

Designated with a smaller number or letter to the upper right of another number or letter

$$X^2 = \underbrace{X \cdot X}_{2\ x's}$$



Examples:

1. $2^8 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 256$
2. $5^3 = 5 \cdot 5 \cdot 5 = 125$
3. $3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$
4. $6^1 = 6$

Property of Exponents #1 Product of Powers Property

For all nonzero real numbers x and integers m and n

$$X^m \cdot X^n = X^{m+n}$$

* Note: bases are the same!!
: bases are being multiplied

Example: $X^3 \cdot X^5 = X^{3+5} = X^8$

#1 $\underbrace{X \cdot X \cdot X}_{X^3} \cdot \underbrace{X \cdot X \cdot X \cdot X \cdot X}_{X^5} = X^8$

#2 $2^3 \cdot 2^4 = 2^{3+4} = 2^7 = 128$

#3 $y^2 \cdot y^3 = y^{2+3} = y^5$

#4 $5^m \cdot 5^p = 5^{m+p}$

definition: monomial – a one term algebraic expression that is either a constant (number), a variable (letter) or the product of a constant and one or more variables.
"No addition or subtraction"

Ex: $2x^2$
$-3xy^3$
$180m^2p^3$

How do we multiply monomials?

Step 1: Group the constants together
Step 2: Group the variables together
Step 3: Simplify using the Product of Powers where appropriately.

What does that look like?

$$(5t)(-30t^2) = (5)(-30)(t)(t^2)$$
$$= -150t^3$$

$$(-4a^2b)(-ac^2)(3b^2c^2) = (-4)(3)(a^2)(a)(b)(b^2)(c^2)(c^2)$$
$$= 12a^3b^3c^4$$

8.2 Laws of Exponents
Powers and Products

Power of a Power Property $(x^m)^n = x^{m \cdot n}$

Examples #1 $(2^3)^4 = 2^{3 \cdot 4} = 2^{12} = 4096$
#2 $(10^3)^2 = 10^{3 \cdot 2} = 10^6 = 1{,}000{,}000$
#3 $(p^2)^5 = p^{2 \cdot 5} = p^{10}$
#4 $(x^m)^2 = x^{m \cdot 2} = x^{2m}$

When a monomial is being raised to a power, <u>every part</u> of the monomial gets raised

$$(xy)^n = x^n y^n$$
$$(xyz)^n = x^n y^n z^n$$

Example #1 $(x^2y)^3 = x^6y^3$
#2 $(ab^2c^n)^5 = a^5b^{10}c^{5n}$
#3 $(-5x)^3 = (-5)^3(x^3)$
$= -125x^3$

C.W. Practice 8.1 – 8.2
H.W. Pg 374 18-50 Evens
Pg 381 26-52 Evens