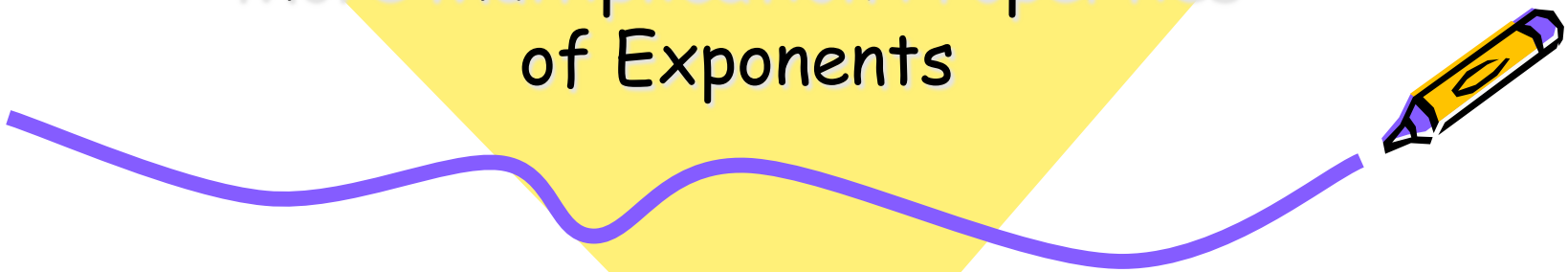
Ch 8.4

More Multiplication Properties of Exponents



Raising a Power to a Power

- For every non-zero # a & integers m & n,
  $(a^m)^n = a^{m(n)}$
- When a base & its exponent are raised to a power, multiply the exponents together
- Always raise powers before multiplying same bases, save negatives for last.

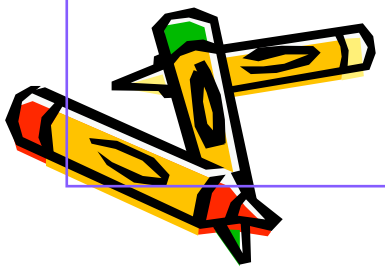
Examples:

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

Rmbr: $x^2 = x \cdot x$ so $(x^2)^3 = x \cdot x \cdot x \cdot x \cdot x \cdot x = x^6$

2. $(y^{-4})^7 = y^{-28} = \frac{1}{y^{28}}$

3. $n^5(n^4)^3 = n^5(n^{12}) = n^{17}$



Try some

Simplify each expression using the base only once.

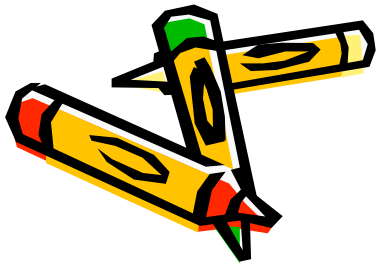
1. $(a^3)^2$

2. $b^2(b^3)^{-2}$

3. $(m^{-3} \cdot m^2 \cdot m^6)^2$

4. $(x^4)^2 \cdot (x^2)^5$

5. $y^3(y)^{-3}$



Raising a Product to a Power

- For every non-zero # a & b and integer n,

$$(ab)^n = a^n b^n$$

- When a power is attached to parentheses, the exponent gets 'distributed' to each value inside (multiply the exponents)

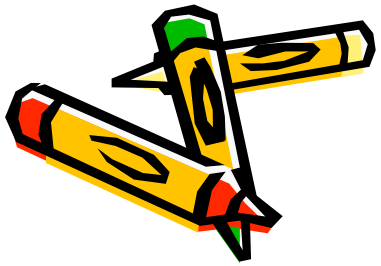
**Remember 1st 'remove' ( ) before applying the other rules of exponents

Examples:

1. $(2x^4)^3 = (2^3)x^{12} = 8x^{12}$

2. $(4y^4)^{-2} = (4^{-2})y^{-8} = \frac{1}{16y^8}$

3. $(2n^3)^5(3np^2)^3 = (2^5 * 3^3)(n^{15} * n^3)(p^6) = 864n^{18}p^6$



Try some

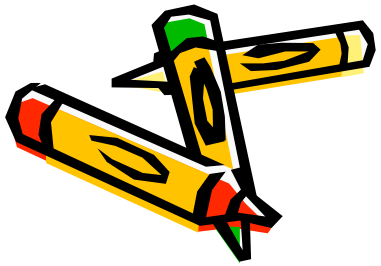
Simplify each expression.

1. $(2n^4)^3 \cdot n^5$

2. $(a^2)^3(3a^5)^4$

3. $(3g^5)^{-2}$

4. $(6bc)^3(5b^{-3})^2$



Raising Powers with Sci. Note

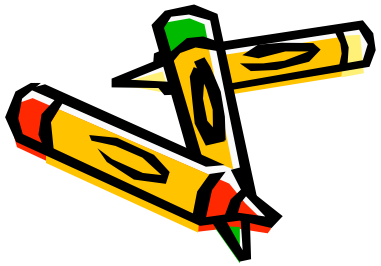
- Raise both the # & the base 10 to the power, simplify the #
- If the base 10 has an exponent already, multiply the 2 exponents
- Make sure # still in Sci. Note (rewrite if not, rmbr: Ask MR. AL)

Example:

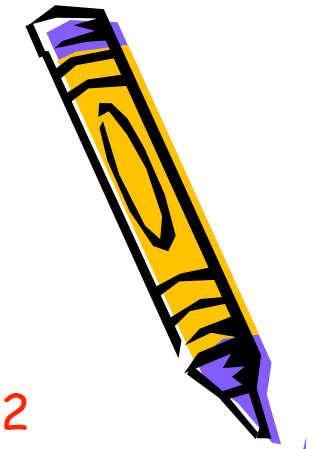
$10^{-3} * (4 \times 10^{4})^{2} = 10^{-3} * 4^{2} \times 10^{4*2}$

$= 16 \times 10^{8} * 10^{-3} = 16 \times 10^{5}$

$= 1.6 \times 10^{6}$



Try some
Simplify each expression.



1. $(5 \times 10^{6})^{-2}$

2. $10^{2} * (3 \times 10^{8})^{2}$