Exponent Rules

After you solve these, come up with some **rules** that you discover about how to take a power to a power.

$(x \cdot x \cdot x)^4 \rightarrow (x \cdot x \cdot x)(x \cdot x \cdot x)(x \cdot x \cdot x)(x \cdot x \cdot x)$

$(x^3)^4$ $= x^3 \cdot x^3 \cdot x^3 \cdot x^3$ x^{12}

$(a^5)^2$ $a^5 \cdot a^5 \rightarrow a^{10}$

$(p^1)^6$ p^6

$(m^5n^2)^3$ $(m^5n^2)(m^5n^2)(m^5n^2)$ $m^{15}n^6$

$\left(\frac{b^4}{c^3}\right)^4$ $\frac{b^{16}}{c^{12}}$

Taking a Power to a Power:

Keep the base · multiply the exponents

Example:

1. $(x^2)^5$ x^{10}

2. $(a^4b^3)^2$ a^8b^6

3. $(2m^3)^4$ $(2 \cdot m \cdot m \cdot m)(2 \cdot m \cdot m \cdot m)(2 \cdot m \cdot m \cdot m)(2 \cdot m \cdot m \cdot m)$ $16m^{12}$

4. $\left(\frac{5g^{50}}{6h^{30}}\right)^2$ $\left(\frac{5g^{50}}{6h^{30}}\right)\left(\frac{5g^{50}}{6h^{30}}\right)$ $\frac{25g^{100}}{36h^{60}}$

5. $-2(m^3)^{-5}$ $-2m^{-15} \rightarrow -2 \cdot \frac{1}{m^{15}} \rightarrow \frac{-2}{m^{15}}$

Example:

1. $(-2y)^3$ **and** $-(2y)^3$ $-2y \cdot -2y \cdot -2y$ $-8y^3$ | $-(2y)(2y)(2y)$ $-8y^3$

2. $(-3g^{-4})^2$ $9g^{-8} \rightarrow \frac{9}{g^8}$

3. $2(m^3)^{-4}(x^2)^2$ $2m^{-12}x^4 \rightarrow \frac{2x^4}{m^{12}}$

4. $(x^2y^3)^2(x^3y^2)^{-2}$ $x^4y^6x^{-6}y^{-4} \rightarrow x^{-2}y^2$ $\frac{y^2}{x^2}$

5. $2a^2b^3(a^3b^2)^{-2}$ $2a^2b^3a^{-6}b^{-4}$ $2a^{-4}b^{-1} \rightarrow \frac{2}{a^4b}$

Now it's your turn…

1. $(3x^4)^5$

2. $(16a^2b^2c)^2$

3. $\left(\frac{2m^{-3}}{v}\right)^{-4}$

4. $\left(\frac{4g^{50}}{8g^{30}}\right)^2$ **Hint: Simplify a bit inside the parentheses first.**

g^{40}

Real World:

1.) Find the perimeter and area of the square:

$5a^4$ 

2.) Manny has four pieces of carpet. Each piece is in the shape of a square like the one shown:
He is going to put these four pieces together in a grid like shown:
What is the area of the space he can cover with the carpet?

$2x^2$ yd