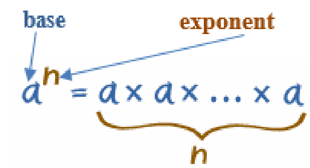
Math 4. Handout #19. March 3rd, 2019

Exponents

The main reason we use exponents is because it's a shorter way to write out big numbers.
Exponentiation is a mathematical operation, written as $\boldsymbol{a^n}$, involving two numbers, the **base** *a* and the **exponent** *n*. When *n* is a positive integer, an exponent tells us to multiply the base by itself that number of times: *We can say that a is raised to the power of n.*

a^n tells you multiply **a** by itself **n** times:



4^3 This tells us to multiply the base 4 by itself 3 times: $4^3 = 4 \times 4 \times 4$

When exponent *n* of the base *a* is a negative integer, it tells us to divide 1 by the base that number of times. Or multiply 1 by the base that number of times and take a reciprocal number

$$a^{-n} = \frac{1}{a^n}$$

Properties of exponent:

If the same base raised to the different power and then multiplied:

$$b^3 \times b^4 = (b \times b \times b) \times (b \times b \times b \times b) = b \times b \times b \times b \times b \times b \times b = b^{3+4} = b^7$$

$$\boxed{b^n \times b^m = b^{n+m}}$$

If the base raised to the power of n then raised again to the power of m:

$$(b^2)^3 = (b \cdot b)^3 = (b \cdot b) \cdot (b \cdot b) \cdot (b \cdot b) = b^{2 \cdot 3} = b^6$$

$$\boxed{(b^n)^m = b^{n \cdot m}}$$

$b^1 = b;$ $\qquad$ $b^0 = 1, for\ any\ b\ exept\ 0.$

If two different bases raised to the same power, then:

$$(a \cdot b)^3 = (a \cdot b) \cdot (a \cdot b) \cdot (a \cdot b) = a \cdot a \cdot a \cdot b \cdot b \cdot b = a^3 b^3$$

$$\boxed{(a \cdot b)^n = a^n b^n}$$

ORDER OF OPERATIONS!!!!!!!

1	2	3	4	5	6
P	E	M	D	A	S
Parentheses	Exponents	Multiplication	Division	Addition	Subtraction
(....)	a^2	X	÷	+	-