

Exponents and Exponent Rules

Learning Goal:

By the end of today, I will be able to recognize the parts of a POWER.

In today's class, I will be performing standard operations (add, subtract, multiply, divide) with terms that have exponents on variables (powers).

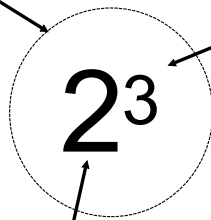
Feb 23-9:05 AM

Terminology

Power (the whole package)

Exponent

Base



Feb 23-9:06 AM

Exponential Form	Expanded Form
2^3	$2 \times 2 \times 2$
5^4	$5 \times 5 \times 5 \times 5$
$(-3)^2$	$(-3) \times (-3)$
$(a+5)^3$	$(a+5) \times (a+5) \times (a+5)$

Feb 23-9:08 AM

Popular Powers to Know											
	Exponents										
	0	1	2	3	4	5	6	7	8	9	10
1	1	1	1	1	1	1	1	1	1	1	1
2	1	2	4	8	16	32	64	128	256	512	1024
3	1	3	9	27	81	243					
4	1	4	16	64	256						
5	1	5	25	125							
6	1	6	36	216							
7	1	7	49								
8	1	8	64								
9	1	9	81								
10	1	10	100								

Feb 23-9:14 AM

Multiplication of Powers

$$4 \times 8 =$$

$$2^2 \times 2^3 = 2 \times 2 \times 2 \times 2 \times 2$$

$$=$$

Feb 23-9:10 AM

Multiplication of Powers

$$9 \times 81 =$$

$$3^2 \times 3^4 = 3 \times 3 \times 3 \times 3 \times 3 \times 3$$

$$=$$

Feb 23-9:10 AM

Multiplication of Powers

[illegible]

Feb 23-9:10 AM

There must be a faster way.....

Shortcut for Multiplying Powers

$$a^m \times a^n = a^{m+n}$$

Note, the bases must be the same (letters or numbers)

Feb 23-9:27 AM

Simplify

$$2^3 \times 2^4 =$$

$$(-3)^4(-3)^2 =$$

Feb 23-10:09 AM

Simplify

$$(-1)^2 =$$

$$(-1)^3 =$$

$$(-1)^4 =$$

$$(-1)^5 =$$

$$(-1)^6 =$$

$$(-1)^7 =$$

Feb 23-10:12 AM

Note the difference between:

$$(-3)^2 \quad \text{and} \quad -3^2$$

Feb 23-10:16 AM

Division of Powers

$$16 \div 8 =$$

$$2^4 \div 2^3 = \frac{2 \times 2 \times 2 \times 2}{2 \times 2 \times 2}$$

=

Feb 23-9:10 AM

Division of Powers

$$243 \div 9 =$$

$$3^5 \div 3^2 = \frac{3 \times 3 \times 3 \times 3 \times 3}{3 \times 3}$$

=

Feb 23-9:10 AM

Simplify

$$\frac{a^{10}}{a^6} =$$

Feb 23-10:28 AM

Shortcut for Dividing Powers

$$a^m \div a^n = a^{m-n}$$

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

Note, the bases must be the same (letters or numbers)

Feb 23-9:27 AM

Simplify

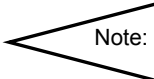
$$\frac{m^{12}}{m^8} =$$

$$\frac{2^{10}}{2^7} =$$

Sep 20-3:28 PM

Mixed Term Operations

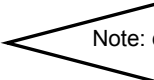
$$(2^3)(a^5)(2^4)(a^3)$$

Note: 

Feb 23-9:32 AM

Mixed Term Operations

$$(2^2)(3^3)(2^3)(3^3)$$

Note: 

Feb 23-9:32 AM

Simplify

$$\frac{5^4 a^6 b^8}{5^2 a^4 b^7}$$

=

Feb 23-9:37 AM

Power of a Power

$$(a^2)^3 = (\quad)(\quad)(\quad)$$

=

=

Feb 23-10:41 AM

Power of a Power

$$(2^3)^5 = (\quad)(\quad)(\quad)(\quad)(\quad)$$

$$=$$
$$=$$

Feb 23-10:41 AM

Shortcut for Power of a Power

$$\left(a^m\right)^n = a^{m \times n}$$

Note, the bases must be the same (letters or numbers)

Feb 23-9:26 PM

Simplify

$$(g^2)^5 =$$

$$(3^4)^2 =$$

Sep 20-3:32 PM

Mixing Exponents and Bracketed Terms

$$\left(\frac{2}{3}\right)^3 = \left(\frac{2}{3}\right)\left(\frac{2}{3}\right)\left(\frac{2}{3}\right)$$

=

=

Feb 23-9:26 PM

Mixing Exponents and Bracketed Terms

$$(2a)^5 = (2a)(2a)(2a)(2a)(2a)$$

=

=

Feb 23-9:26 PM

Mixing Exponents and Bracketed Terms

$$(3a^2)^4 = (3a^2)(3a^2)(3a^2)(3a^2)$$

=

=

Feb 23-9:26 PM

Mixing Exponents and Bracketed Terms

$$\left(\frac{a^3}{5}\right)^5 = \left(\frac{a^3}{5}\right)\left(\frac{a^3}{5}\right)\left(\frac{a^3}{5}\right)\left(\frac{a^3}{5}\right)\left(\frac{a^3}{5}\right)$$

$$=$$
$$=$$

Feb 23-9:26 PM

Shortcut for Power of a Power

$$\left(a^m\right)^n = a^{m \times n}$$

Note, the bases must be the same (letters or numbers)

Feb 23-9:26 PM

Simplify

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

Feb 23-10:02 PM

Simplify

$$\frac{(2a)^3(3a^4)}{6a^2}$$

Feb 23-9:59 PM

Summary of Exponent Rules

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$(a^m)^n = a^{m \times n}$$

$$(ab)^m = a^m b^m \quad \left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

Dec 3-2:27 PM

Consolidation Questions

pg 399 - 401 #1-3, 5-9, 11

Sep 20-3:44 PM