Section 2.4: Exponent Laws I

Oct 28-10:09 PM

Complete the following table:

Product of Powers	Repeated Multiplication	Power Form
$10^2 \times 10^3$	(10 x 10) x (10 x 10 x 10)	10^5
$10^3 \times 10^4$	(10 x 10 x 10) x (10 x 10 x 10 x 10)	10^7
$5^4 \times 5^5$	(5 x 5 x 5 x 5) x (5 x 5 x 5 x 5 x 5)	5^9
$2^3 \times 2^1$	(2 x 2 x 2) x (2)	2^4
$3^2 \times 3^5$	(3 x 3) x (3 x 3 x 3 x 3 x 3)	3^7
$4^3 \times 4^2$	(4 x 4 x 4) x (4 x 4)	4^5

Oct 28-10:11 PM

Exponent Law for a Product of Powers:

$a^m \times a^n = a^{m+n}$, where $a \neq 0$, and m and n are whole numbers.

To multiply powers with the same base, (excluding zero), keep the base and add the exponents.

Can you use your rule to multiply $2^3 \times 2^3$? Explain.

No, because the bases ARE NOT the same.

Oct 28-10:19 PM

Write as a single power.

A. $9^5 \times 9$

$= 9^{5+1}$

$= 9^6$

B. $8^{-11} \times 8^{13}$

$= 8^{-11+13}$

$= 8^2$

C. $5^2 \times 5 \times 5^3$

$= 5^{2+1+3}$

$= 5^6$

D. $6^4 \times 6^8 \times 6^3$

$= 6^{4+8+3}$

$= 6^{15}$

Oct 27-5:38 PM

Write as a single power, then evaluate.

A. $4^3 \times 4^4$

$= 4^{3+4}$

$= 4^7$

$= 16\ 384$

B. $(-7)^5 \times (-7)^{-5}$

$= (-7)^{5+(-5)}$

$= (-7)^0$

$= 1$

Your turn...

C. $10^5 \times 10$

$= 10^{5+1}$

$= 10^6$

$= 1\ 000\ 000$

D. $3^0 \times 3^2 \times 3^3$

$= 3^{0+2+3}$

$= 3^5$

$= 243$

Oct 27-5:49 PM

Quotients of Powers Investigation

Quotient of Powers	Repeated Multiplication	Power Form
$10^5 \div 10^3$	$\frac{10\times10\times10\times10\times10}{10\times10\times10}$	10^2
$10^8 \div 10^5$	$\frac{10\times10\times10\times10\times10\times10\times10\times10}{10\times10\times10\times10\times10}$	10^3
$5^{10} \div 5^4$	$\frac{5\times5\times5\times5\times5\times5\times5\times5\times5\times5}{5\times5\times5\times5}$	5^6
$9^8 \div 9^3$	$\frac{9\times9\times9\times9\times9\times9\times9\times9}{9\times9\times9}$	9^5
$7^5 \div 7^4$	$\frac{7\times7\times7\times7\times7}{7\times7\times7\times7}$	7

Oct 29-9:02 AM

Exponent Law for a Quotient of Powers:

$a^m \div a^n = a^{m-n}$, where $a \neq 0$, and m and n are whole numbers.

To divide powers with the same base, (excluding zero), keep the base and subtract the exponents.

Can you use your rule to divide $5^2 \div 2^3$? Explain.

No, because the bases are NOT the same.

Oct 25-6:59 PM

Write as a single power.

A. $12^6 \div 12$

$= 12^{6-1}$

$= 12^5$

B. $8^3 \div 8^2$

$= 8^{3-2}$

$= 8$

C. $2^6 \div 2^2$

$= 2^{6-2}$

$= 2^4$

Your turn...

D. $\frac{6^7}{6^5}$

$= 6^{7-5}$

$= 6^2$

E. $\frac{5^7}{5^3}$

$= 5^{7-3}$

$= 5^4$

Oct 27-6:14 PM

Write as a single power, then evaluate.

A. $2^5 \div 2^2$

$= 2^{5-2}$

$= 2^3$

$= 8$

B. $4^5 \div 4^3$

$= 4^{5-3}$

$= 4^2$

$= 16$

C. $\frac{3^4}{3^4}$

$= 3^{4-4}$

$= 3^0$

$= 1$

D. $\frac{(-6)^8}{(-6)^6}$

$= (-6)^{8-6}$

$= (-6)^2$

$= 36$

Oct 29-9:50 AM

Your turn...

E. $(-2)^7 \div (-2)^5$

$= (-2)^{7-5}$

$= (-2)^2$

$= 4$

F. $(-3)^9 \div (-3)^5$

$= (-3)^{9-5}$

$= (-3)^4$

$= 81$

Practice Exercises: Pgs. 76-77 #'s 4-6a

Oct 31-7:12 AM

Often problems will require applying more than one exponent law:

A. $8^{12} \div 8^7 \times 8^2$

$= 8^{12 - 7} \times 8^2$

$= 8^5 \times 8^2$

$= 8^{5 + 2}$

$= 8^7$

$= 2\ 097\ 152$

B. $\frac{2^3 \times 2^5}{2^2}$

$= \frac{2^{3 + 5}}{2^2}$

$= \frac{2^8}{2^2}$

$= 2^{8 - 2}$

$= 2^6$

$= 64$

Oct 29-10:00 AM

C. $\frac{(-4)^{10}}{(-4)^3 \times (-4)^3}$

$= \frac{(-4)^{10}}{(-4)^{3 + 3}}$

$= \frac{(-4)^{10}}{(-4)^6}$

$= (-4)^{10 - 6}$

$= (-4)^4$

$= 256$

D. $6^2 + 6^3 \times 6^2$

$= 6^2 + 6^{3 + 2}$

$= 6^2 + 6^5$

$= 36 + 7\ 776$

$= 7\ 812$

Oct 29-10:09 AM

Your turn...

G. $2^3(2^6 \div 2^2) - 2^4$

$= 2^3(2^{6-2}) - 2^4$

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

$= 2^{3+4} - 2^4$

$= 2^7 - 2^4$

$= 128 - 16$

$= 112$

H. $(-3)^6 \div (-3)^5 - (-3)^5 \div (-3)^3$

$= (-3)^{6-5} - (-3)^{5-3}$

$= (-3)^1 - (-3)^2$

$= (-3) - 9$

$= -12$

Practice Exercises: Pgs. 77-78 #'s 8, 10, & 15

Oct 31-7:13 AM