Name: _____
Date: _____

Math 9
Lesson 2.4 ~ Exponent Laws (Part 1)

Product of Powers

Product of Powers	Product as Repeated Multiplication	Product as a Power
$2^3 \times 2^5$		
$3^7 \times 3$		
	$(4 \times 4) \times (4 \times 4 \times 4 \times 4 \times 4 \times 4)$	
	$(5 \times 5 \times 5 \times 5 \times 5) \times (5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5)$	
		6^9

Exponent Law for a Product of Powers: $a^m \times a^n = a^{m+n} \quad a \neq 0$

To multiply powers with the same base, add the exponents. The variable a is any integer, except 0. The variables m and n are any whole numbers.

Quotient of Powers

Quotient of Powers	Quotient as Repeated Multiplication	Quotient as a Power
$7^5 \div 7^3$		
$8^9 \div 8^1$		
	$\frac{9 \times 9 \times 9 \times 9 \times 9 \times 9}{9 \times 9 \times 9}$	
	$\frac{10 \times 10 \times 10 \times 10}{10 \times 10 \times 10 \times 10}$	
		11^3

Exponent Law for a Quotient of Powers: $a^m \div a^n = a^{m-n} \quad a \neq 0, m \geq n$

To divide powers with the same base, subtract the exponents. The variable a is any integer, except 0. The variables m and n are any whole numbers; but m must be greater than n.

Example # 1: Write each expression as a single power.

a) $8^5 \times 8^7$

b) $(-4)^{12} \div (-4)$

Example # 2: Simplify and evaluate.

a) $3^6 \times (-3)^2$

b) $9^2 \times 9^5 \div 9^3$

Example #3: Simplify and evaluate.

a) $6^2 + 6^3 \times 6^2$

b) $(-10)^4 [(-10)^6 \div (-10)^4] - 10^2$

Practice

1. Write each product as a single power.

a) $7^6 \times 7^2 =$

b) $(-4)^5 \times (-4)^3 =$

To multiply powers with the same base, add the exponents.

c) $(-2) \times (-2)^3 =$

d) $10^5 \times 10^5 =$

e) $7^0 \times 7^1 =$

f) $(-3)^4 \times (-3)^5 =$

2. Write each quotient as a power.

a) $(-3)^5 \div (-3)^2 =$

b) $5^6 \div 5^4 =$

To divide powers with the same base, subtract the exponents.

c) $\frac{4^7}{4^4} =$

d) $\frac{5^8}{5^6} =$

e) $6^4 \div 6^4 =$

f) $\frac{(-6)^8}{(-6)^7} =$

3. Write as a single power.

a) $2^3 \times 2^4 \times 2^5 =$

b) $\frac{3^2 \times 3^2}{3^2 \times 3^2} =$

Which exponent law should you use?

c) $10^3 \times 10^5 \div 10^2 =$

d) $(-1)^9 \div (-1)^5 \times (-1)^0$
$=$

4. Simplify, then evaluate.

a) $(-3)^1 \times (-3)^2 \times 2$

$=$

b) $9^9 \div 9^7 \times 9^0 =$

See if you can use the exponent laws to simplify.

c) $\frac{5^2}{5^0} =$

d) $\frac{5^5}{5^4} \times 5 =$

5. Identify any errors and correct them.

a) $4^3 \times 4^5 = 4^8$

b) $2^5 \times 2^5 = 2^{25}$

c) $(-3)^6 \div (-3)^2 = (-3)^3$

d) $7^0 \times 7^2 = 7^0$

e) $6^2 + 6^2 = 6^4$

f) $10^6 \div 10 = 10^6$

g) $2^3 \times 5^2 = 10^5$