MBF 3C1 Name: _____

Exponent Laws

EXPONENT LAWS CAN ONLY BE USED WHEN LIKE BASES EXIST

1. Complete each table.
2. Examine the relationship between the exponents in the original expression and the exponent in the expression as a single power. State a rule for this relationship.

DEVELOPING THE **MULTIPLICATION LAW**

MULTIPLCATION	EXPAND & SIMPLIFY	EXPRESSION AS A SINGLE POWER
$a^4 \times a^5$	$a \times a \times a \times a \times a \times a \times a \times a \times a$	a^9
$a^2 \times a^4$		
$a^5 \times a$		
$a^6 \times a^2$		
$a^4 \times a^3$		
Rule:		

DEVELOPING THE **DIVISION LAW**

DIVISION	EXPAND & SIMPLIFY	EXPRESSION AS A SINGLE POWER
$a^5 \div a^4$	$\frac{a \times a \times a \times a \times a}{a \times a \times a \times a}$	a^1
$a^4 \div a^2$		
$a^5 \div a$		
$a^6 \div a^2$		
$a^4 \div a^3$		
Rule:		

MBF 3C1 Name: _____

DEVELOPING THE **POWER OF A POWER LAW**

DIVISION	EXPAND & SIMPLIFY	EXPRESSION AS A SINGLE POWER
$(a^4)^5$	$a^4 \times a^4 \times a^4 \times a^4 \times a^4$	a^{20}
$(a^5)^2$		
$(a^2)^3$		
$(a^3)^4$		
$(a^6)^2$		
Rule:		

Example 1

Use the exponent laws to simplify.

a. $\left(x^3\right)\left(x^8\right)$

b. $x^9 \div x^3$

c. $\left(x^2\right)^4$

d. $\left(x^3 y^2\right)\left(xy^5\right)$

e. $x^4\left(x^6 y^3\right)$

f. $2x^7 y^4 \div x^6 y$

MBF 3C1 Name: _____

When using these laws with *more than one variable* apply the **distributive property.**

POWER OF A PRODUCT LAW

$(x^4y^3)^2$

POWER OF A QUOTIENT LAW

$(x^4 \div y^3)^2$

POWER OF A SUM/DIFFERENCE

$(x^4 - y^3)^2$

Example 2

Use the exponent laws to simplify.

a. $(x^2y^7)^3$

b. $(2x^6y)^4$

c. $\left(\frac{x^4}{y^5}\right)^3$

d. $\left(\frac{3y^2}{x^6}\right)^3$

e. $(x+2y^3)^2$

MBF 3C1 Name: _____

USING THE DIVISION LAW TO UNDERSTAND ZERO AND NEGATIVE EXPONENTS

1. Complete the table.
2. Examine the relationship between the exponents in the original expression and the exponent in the expression as a single power. State a rule for zero and negative exponents.
3. Test the rules to see if they hold true.

DIVISION	EXPAND & SIMPLIFY	EXPRESSION AS A SINGLE POWER	USE EXPONENT LAWS
$a^3 \div a$	$\frac{a \times a \times a}{a}$	a^2	a^2
$a^3 \div a^2$			
$a^3 \div a^3$			
$a^3 \div a^4$			
$a^3 \div a^5$			
$a^3 \div a^6$			
$a^3 \div a^7$			

ZERO LAW

Rule:

Test:

	EXPAND & SIMPLIFY	USE DIVISION LAW
$x^2 \div x^2$		
$2^3 \div 2^3$		
$5^4 \div 5^4$		

MBF 3C1 Name: _____

NEGATIVE EXPONENT LAW

Rule:		
Test:		
	EXPAND & SIMPLIFY	USE DIVISION LAW
$x^2 \div x^5$		
$2^3 \div 2^4$		
$5^4 \div 5^6$		

Example 3

Use the exponent laws to simplify. Write each answer with a positive exponent.

a. $x^{-8} \times x^8$ b. $x^{10} \div x^{12}$ c. $\left(x^9\right)^0$ d. $x^{-4} \times x^{-2}$

.

e. $\frac{2x}{x^3}$ f. $\frac{x^0}{4x^{-3}}$ g. $(5x^2y^5)^2 \bullet (5^{-2}x^{-6}y)$ h. $\frac{(9x^2y^5)^2}{3^3x^6y^{14}}$