Lesson 5.7 Laws of Exponents

Goal: Apply exponent laws to simplify and evaluate exponential expressions

A ***power*** is an expression made up of two parts: the _____ and the _____

5^4 → base: _____ exponent: ____ 7^{-2} → base: _____ exponent: ____

$(-5)^4$ → base: _____ exponent: ____ -5^4 → base: _____ exponent: ____

x^3 → base: _____ exponent: ____ $(3x)^3$ → base: _____ exponent: ____

Mathematically, a power is the ***repeated multiplication*** of the base an "exponent" number of times

In expanded form 5^4 = _____ and $(-5)^4$ = _____

If the exponent is not shown, its value is _____. For example… $x = x$ $2 = 2$

MULTIPLICATION LAW: When I multiply powers with the SAME base, I _____ the exponents

$5^5 \times 5^4 =$ $(2x)(4x^2) =$

DIVISION LAW: When I divide powers with the SAME base, I _____ the exponents

$(-6)^{10} \div (-6)^{-2} =$ $\dfrac{3x^4y^5}{6x^2y} =$

POWER OF A POWER LAW: When an exponent is raised to another exponent, I _____ exponents

$\left(3^4\right)^5 =$ $\left(-x^3\right)^7 =$

POWER OF A PRODUCT OR QUOTIENT LAW: To simplify a power of two (or more) items multiplied and/or divided, I _____ the exponent to each item being multiplied and/or divided

$\left(-3x^4\right)^3 =$ $\left(\dfrac{4y^5}{6x^2}\right)^2 =$

ZERO EXPONENT LAW: ANY base raised to an exponent of 'zero' is equal to _____

$\left(3x^2y^{-6}\right)^0 =$ $\left(\left(3^2\right)^4\right)^0 =$

NEGATIVE EXPONENT LAW: Any base raised to a negative exponent is equal to the _____ of the base raised to the same _____ exponent

$3x^{-4}y^{-3}z =$ $\left(\dfrac{1}{5}\right)^{-2} =$

SUMMARY OF EXPONENT LAWS

$a^m \times a^n =$	$a^m \div a^n =$
$\left(a^m\right)^n =$	$a^0 =$
$(ab)^m =$	$a^{-m} =$
$\left(\frac{a}{b}\right)^m =$	$\left(\frac{a}{b}\right)^{-m} =$

To SIMPLIFY means to write expressions with POSITIVE EXPONENTS only

EXAMPLES

First **simplify** each of the following and <u>then</u> **evaluate** for $a = 1$, $b = -2$, and $c = 3$

a) $\left(a^{-2}b\right)\left(a^{-3}b^4\right)$ **b)** $\frac{a^{-4}b^5c^2}{ab^3c}$ **c)** $\left(2a^2b\right)^5$ **d)** $\frac{25ab}{(5a)^3b^2}$

Practice: Page 362 #1 – 3 (bef), 4 bce, 5 (bdfh), 6, 7b, 8ac, 10, 13