Lesson 1.4 – Numbers Raised to the Zeroth Power

Recall that when we raised an exponential expression to a power we __________ the exponents. At the beginning of the last lesson we reviewed the rule for dividing like bases in depth, let's take a closer look at our rule for raising a power to a power.

For any number *y* and any positive integers *m* and *n*,

$$\left(y^m\right)^n = y^{mn}$$

because

$$\left(y^m\right)^n = (\underbrace{y \cdot y \cdots y}_{m \text{ times}})^n$$

$$=$$

$$= y^{mn}$$

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Numbers in Exponential Form Raised to a Power of 0

$$5^0$$

A number in exponential form raised to the zeroth power.

We will use two methods of simplifying exponential expression to help determine what occurs when we raise a base to the zeroth power. In the first set of notes, we will expand our expression, condense it, then simplify. In the second set of notes, we will use the algorithm from lesson 2 for dividing numbers in exponential form.

Complete the notes on the next page.

Class Notes – Expand the expression, then condense it.

LP#1 $\dfrac{3^5}{3^5}$	$\dfrac{5^4}{5^4}$
LP#2 $\dfrac{x^7}{x^7}$	$\dfrac{y^{10}}{y^{10}}$
LP#3 $\dfrac{(-4)^3}{(-4)^3}$	$\dfrac{(-2)^6}{(-2)^6}$

Class Notes – Use the division rule and express your answers using powers.

LP#4 $\dfrac{3^5}{3^5}$	$\dfrac{5^4}{5^4}$
LP#5 $\dfrac{x^7}{x^7}$	$\dfrac{y^{10}}{y^{10}}$
LP#6 $\dfrac{(-4)^3}{(-4)^3}$	$\dfrac{(-2)^6}{(-2)^6}$

Use the two sets of class notes above to state the value of the exponential expressions below.

$3^0 =$	$5^0 =$	$x^0 =$	$y^0 =$	$(-4)^0 =$	$(-2)^0 =$

In general, what can we say that "anything" raised to the zeroth power is equivalent to?

$$(\text{anything})^0 =$$

Class Notes – Simplify the following expressions. When necessary, show your work.

LP#7 5^0	13^0	$(-11)^0$	$(-13)^0$
LP#8 y^0	m^0	$(3b)^0$	$(-7g)^0$
LP#9 $(xy)^0$	xy^0	$3b^0$	$-7g^0$

Class Notes – Write the expanded expression in standard form.

LP#10 $(6 \times 10^4) + (8 \times 10^3) + (3 \times 10^2) + (9 \times 10^1) + (5 \times 10^0)$
$(4 \times 10^3) + (7 \times 10^2) + (2 \times 10^1) + (9 \times 10^0)$

Class Notes – Write the following expression in expanded form using exponential notation.

LP#11 9,485
985,062

Review – Simplify the following expressions.

R#1 8^0	10^0	$(-3)^0$	$-(7)^0$
R#2 2^0	w^0	$(-6)^0$	$4x^0$
R#3 z^0	$(-13)^0$	$8m^0$	$(-b)^0$