**Math 9 Lesson 2-2: The Zero Exponent and Order of Operations with Exponents**

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| Number in Words | Standard Form | Power |
| One Billion | 1 000 000 000 | 109 |
| One hundred million | 100 000 000 | 108 |
| Ten million | 10 000 000 | 107 |
| One million | 1 000 000 | 106 |
| One hundred thousand | 100 000 | 105 |
| Ten thousand | 10 000 | 104 |
| One thousand | 1 000 | 103 |
| One hundred | 100 | 102 |
| Ten | 10 | 101 |
|  |  | 100 |

What we’re going to see is that there are certain laws of exponents that hold true for every power…over the next few days we’re going to be trying to discover these laws.

The first one is….

**Zero Exponent Law**

A power with an integer base (other than 0) and an exponent of 0 when evaluated is equal to 1.

 n0 = 1 n≠0

Where does this come from? We’ll see in a day or two….

**Examples: Evaluating Powers with the exponent zero**

The concept of the zero is pretty simple, but you need to be careful when it comes to negatives…same as always!

Evaluate each expression:

1. 40 b) – 40 c) (-4)0
2. 80 b) – 80 c) (-8)0

**Order of Operations with Powers**

When we’re performing an evaluation of an expression that has more than one operation, the order that we perform the steps matters! Try this:

$$-3+5×7+10÷2+6$$

There is an accepted order of operations that we follow universally so that no matter where we do math we will come up with the same value, referred to as the Order of Operations.

1. Brackets We look at the expression to see if there are any brackets, if

there are we simplify and evaluate any values within the brackets.

🡪If there are multiple operations within a set of brackets we follow the same series of operations steps 2-6

1. Exponents We evaluate any powers to simplify them
2. Division These two operations are performed as they appear from
3. Multiplication left to right in the expression
4. Addition These two operations are performed next as they appear from
5. Subtraction left to right in the expression

How to use this rule comes with practice…we can use the acronym BEDMAS to remember this order.

**Examples: 1. Adding and Subtracting with Powers**

Evaluate

1. 32 + 23
2. 3 – 23
3. (3 +2)3

**2. Multiplying and Dividing with Powers**

Evaluate

1. 3(2)2 b) -3(-5)4

 c) [2 x (-3)3 – 6]2 d) (182 + 50) ÷(-5)3

**3. Applications**

1. Write an expression with powers to determine the volume of the small cube and the large cube.

 9 cm 7 cm

1. What is the difference in their volumes?

**Assignment page 61 #4-6**

 **page 66 # 3-5 (a,c,e), 7, 8 and 10 (a,c,e)**