Math for Essentials

At the beginning of the math portion, I like to teach or review basic math principles. This usually only takes about 3 minutes.

PLAN for first semester:
Week 1: How to play N2K and the 0 exponent
Week 2: Using 0 exponent as a +/- (Building patterns)
Week 3: Squares
Week 4: Cubes
Week 5: Order of operations
Week 6: Use a 10 sided- die
Week 7: Change up the board

———————

Week 1: Basics of National Number Knockout

What you'll need:
- Board with 36 numbers
- 3 dice
- Must use all 3 numbers
- Can only use the number once
- Can't use a rolled numbest as an exponent
- If two "ones" are rolled, one "one" must be re-rolled

THIS WEEK: We are going to work together to learn the game and only use +, - first…. then add multiplication and division for students who are able. More experienced students can work on their own to clear their board if they wish, using all available math operators.

Week 2: Using 0 exponent as a +/- (Building patterns)

Math for Essentials

Last week, we learned that any number (often represented by an “n” in math) raised to the 0th power always equals 1.

$$n^0 = 1$$

We can use this to help form patterns - specifically, for each number you can calculate with 2 of the rolled numbers, you can use the 0 exponent to calculate the number before and after.

If you roll a 2,3, and 6, you can take two of those numbers:

2 + 3 = 5 —- now you can use the 0 exponent to find:

$2 + 3 = 5 + 6^0 = 5 + 1 =$ **6**
$2 + 3 = 5 \times 6^0 = 5 \times 1 =$ **5**
$2 + 3 = 5 - 6^0 = 5 - 1 =$ **4**

{ **By using this pattern, we have knocked out 4, 5, and 6 quickly!**

You can have the students try it on their own with 2 + 6 and 3 + 6.

<u>Week 3:</u> <u>Squares</u>

Any number to the power of two - or “squared” - is the same as multiplying it by itself:

$$n^2 = n \times n$$

After rolling the dice for the game, demonstrate how to find the square for each number. Or ask 3 students who would like to try to calculate a square at the board- one student for each of the three numbers rolled.

They can combine this info with the tip from last week. Using the 0 exponent, they can calculate the two numbers before and after the square.

If you roll a 2,3, and 6, you can square one of those numbers:

$2^2 = 4$ —- now you can use the 0 exponent to find:

$2^2 = 4 + 3^0 + 6^0 = 4 + 1 + 1 = \mathbf{6}$

$2^2 = 4 + 3^0 \times 6^0 = 4 + 1 \times 1 = \mathbf{5}$

$2^2 = 4 \times 3^0 \times 6^0 = 4 \times 1 \times 1 = \mathbf{4}$

$2^2 = 4 - 3^0 \times 6^0 = 4 - 1 \times 1 = \mathbf{3}$

$2^2 = 4 - 3^0 - 6^0 = 4 - 1 - 1 = \mathbf{2}$

And you can repeat the same pattern for 3^2 and 6^2.

Week 4: Cubes

Any number to the power of three - or "cubed" - is the same as multiplying it by itself twice:

$$n^3 = n \times n \times n$$

After rolling the dice for the game, demonstrate how to find the cube for each number. Or ask 3 students who would like to try to calculate a cube at the board- one student for each of the three numbers rolled.

They can use the pattern from last week. Using the 0 exponent, they can calculate the two numbers before and after the cube.

If you roll a 2,3, and 6, you can square one of those numbers:

$2^3 = 8$ —- now you can use the 0 exponent to find:

$2^3 = 8 + 3^0 + 6^0 = 8 + 1 + 1 = \mathbf{10}$

$2^3 = 8 + 3^0 \times 6^0 = 8 + 1 \times 1 = \mathbf{9}$

$2^3 = 8 \times 3^0 \times 6^0 = 8 \times 1 \times 1 = \mathbf{8}$

$2^3 = 8 - 3^0 \times 6^0 = 8 - 1 \times 1 = \mathbf{7}$

$2^3 = 8 - 3^0 - 6^0 = 8 - 1 - 1 = \mathbf{6}$

And you can repeat the same pattern for 3^3 and 6^3.

Week 5: Order of operations

What does “order of operations” mean? When you hear “operation,” you may be thinking of what a surgeon does to his/her patients. In math, an operation is a calculation done on numbers.

Hospital: An **operation** is something performed on a patient.
Math: An **operation** is something performed on a number -specifically, +, -, x, ÷, or ^

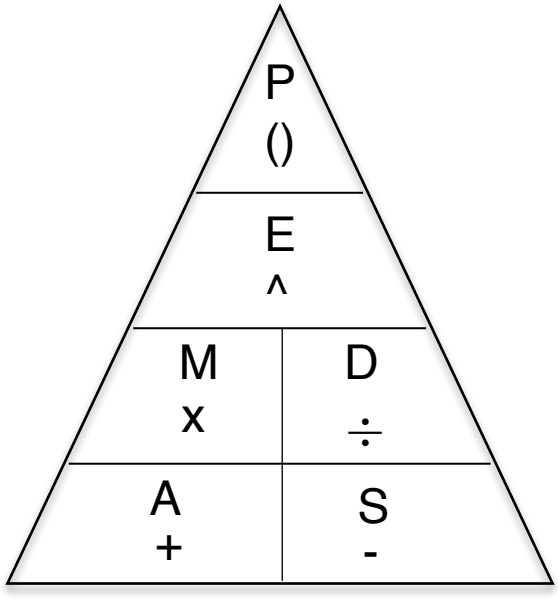
- that is, add, subtract, multiply, divide, or raise to a power (exponent)

The “order of operations” is the <u>order</u> in which we preform math within an expression or an equation.

When I was in school, we were taught the the mnemonic device, “Please Excuse My Dear Aunt Sally.”

P = Please	=	Parentheses
E = Excuse	=	Exponents
M = My	=	Multiplication
D = Dear	=	Division
A = Aunt	=	Addition
S = Sally	=	Subtraction

On thing to remember is that M & D are done at the same time from left to right, and A & S are done at the same time from left to right. This can be represented with this visual:



You may want to walk through a few examples:

5 x (3 + 2) = ?

If we don't pay attention to the proper order of operations, we could get:

5 x (3 + 2) = 15 + 2 = 17 = WRONG!

We have to do P (parenthesis) first:

5 x (3 + 2) = 5 x (7) = 35

Week 6: Use a 10 sided- die

Challenge the kids with larger numbers to work with!

Week 7: Change up the board

Print some "bigger number" boards here and here.