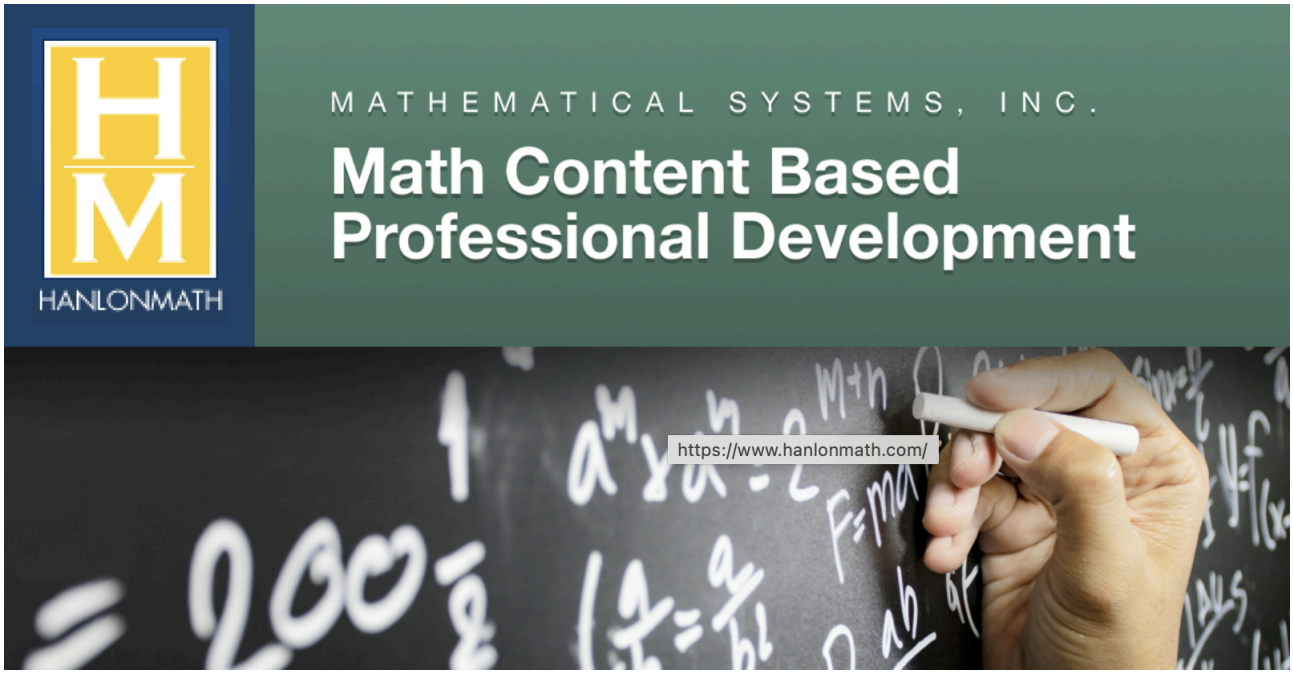

Building Success on Success:
Vocabulary & Notation

Too often the difficulties students experience in mathematics are not the result of not understanding the math concept, but are a direct result of not having acquired the vocabulary and notation needed to understand or apply those concepts. Emphasizing vocabulary & notation results in increased achievement and proficiency rates.

For example, many students will miss this question: Find the degree of the following monomial: $5x^2y^3z^4$. If students miss that, it's not because of the math, it's because they didn't know how a degree of a polynomial was defined. To find the degree, all you do is add the exponents. The answer is 2+3+4 = 9. Piece of cake, right?

The greatest differences between math taught in elementary to high school are vocabulary, notation and the recognition of patterns that make math so much easier to do. Let's look at words that have double meanings or synonyms. The words we use on the street sometimes do not match how they are used in a math classroom.

DOUBLE MEANINGS

Operation: surgery or add, sub, mult. or divide
Mean: not nice or measure of central tendency
Median: island in road or measure of central tendency

Total: breakfast cereal or answer to add problem
Product: something for sale or answer in mult. problem
Volume: turn up the sound or measure of capacity
Root: part of a plant or an answer in algebra

MATH SYNONYMS

- Solve the equation
- Find the roots
- Find the zeros
- Find the solution set
- Find the values of the variable that make the open sentence true

We know students learning to add fractions typically want to add BOTH numerators and denominators. The definition of a fraction explains why we don't add the denominators. A fraction is made up of two parts, a numerator and denominator; the denominator tells you how many equally sized pieces make ONE unit. If we add the denominators, that's more than one unit and does not meet the definition.

If we know decimals are defined as "special" fractions, then we know all the rules for fractions apply to decimals. That definition is also a great link that allows teachers to review, reinforce or address student deficiencies as we teach our assigned curriculum.

With adding fractions, students learned to find a common denominator, make equivalent fractions, add the numerators and bring down the denominator. With decimals, when students line up the decimal points and fill in zeros, they are finding the common denominator and making equivalent fractions; when they add the numbers, they are adding the numerators, and bringing down the decimal point is bringing down the denominator.

Knowing how things are defined — vocabulary — allows us to link concepts & skills all throughout math, which allows students a better understanding, and according to brain research, when you learn material in different contexts, it creates stronger connections in the brain.

If students know the definition of a logarithm is defined in terms of an exponent, then they almost automatically know the rules for logarithms.

For example: The product of exponentials with the same base is the sum of the exponents. The product of a logarithm is the sum of the logarithms. Mathematically, we write those rules:

$A^m A^n = A^{M+N}$ $\log (AB) = \log A + \log B$

We can increase student proficiency and achievement rates by ensuring students understand the questions being asked — understanding the vocabulary.

The Pythagorean Theorem, Distance Formula, Equation of a Circle, and trig identity, $\cos^2 x + \sin^2 = 1$, are all the same formula — just written differently because they are being used in different contexts.

Slope in algebra is defined as the change of the y-values over the change in x-values; on the roads it's called the "grade" on a hill, in construction it's called the "pitch" on a roof, and "growth" when looking at scores in school.

Vocabulary and notation should be emphasized in instruction for understanding, included in student notes, on homework, and on quizzes and tests. Those definitions link concepts and skills which create greater understanding of the math and result in "new" math not being taught in isolation.

Call 702.218.3875 or contact us today to learn more about professional development resources for math educators and administrators.