

# Algebra,

*Been there – Done that*

# Polynomials

## Mathematical Systems

Bill Hanlon

Algebra, Been there –Done that is a newsletter that links algebra to previously learned concepts and skills or outside experiences

Expanded Notation



Polynomials

Polynomials – sounds tough enough. But, if you look at it you’ll notice that students have worked with polynomial expressions such as  $6x^2 + 5x + 2$  since first grade. The only difference is they have letters (x’s) instead of powers of ten. They have been taught that 652 means  $6(100) + 5(10) + 2(1)$ . They have been taught the six tells them how many hundreds they have, the five how many tens, and the two how many ones are 9in the number.

$$6(100) + 5(10) + 2(1) \rightarrow 6(10)^2 + 5(10) + 2(1) \rightarrow 6x^2 + 5x + 2$$

In the polynomial expression  $6x^2 + 5x + 2$ , called a trinomial because there are three terms, the six tells how many  $x^2$ s there are, the 5 tells you how many x’s, and the two tell you how many ones.

Monomial  
One term

The point is polynomial expressions in algebra are linked to what’s referred to as expanded notation in grade school. It’s not a new concept.

Ex.  $5x^3y$

In grade school we teach the students how to add or subtract numbers by place value. Typically, we have them line up the numbers vertically so the ones digits are in a column, the tens digits are in the next column and so on, then we have them add or subtract.

Binomial  
Two terms

In algebra, we have the students line up the polynomials the same way, we line up the numbers, the x’s, and the  $x^2$ ’s, then perform the operation as shown below.

Ex.  $3x + 2$

Trinomial  
Three terms

$$3x^2 + 4x + 3 \rightarrow 343$$

Ex.  $4x^2 + 3x + 2$

$$\underline{2x^2 + 3x + 5} \rightarrow 235$$

$$5x^2 + 7x + 8 \rightarrow 578$$

Notice when adding, we added “like” terms. That is, with the numbers, we added the hundreds column to the hundreds, the tens to the tens. In algebra, we added the  $x^2$ ’s to the  $x^2$ ’s, the x’s to the x’s

Combine like terms



Place Value

In algebra, the students can add the expressions from right to left as they have been taught or left to right. If the students understand place value, this could lead students to add columns of numbers more quickly without regrouping by adding numbers from left to right.

The students would have to add the hundreds column, then add to that the sum of the tens column, and finally the sum of the ones column

Add in your head

**Example** Add, in your head  $341 + 214 + 132$

You have  $300 + 200 + 100$ , that’s 600, adding the tens, we have  $40 + 10 + 30$  which is 680, and finally adding  $1 + 4 + 2$  or 7, the sum is 687.