Topic: IM2 – 2.1 (N – 1) Parts of a Polynomial	**Standard(s):** A.SSE.1a	Notes
Essential Question: What are the parts of polynomials, and how are they related?		

Questions / Big Ideas

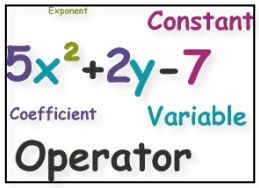
Key Terms

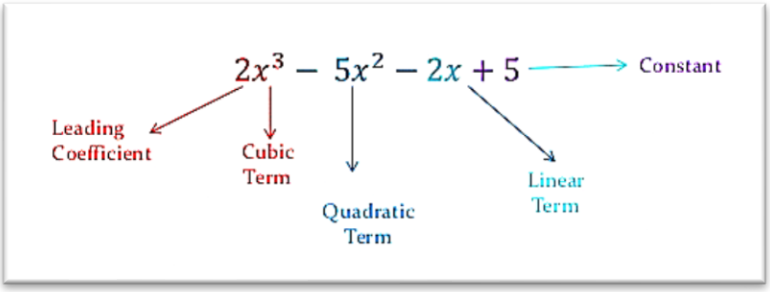
Descending Order ≡ Counting down from the largest number.

- Written from left to right (L → R).
- Ex. 5, 4, 3, 2, 1, 0

Polynomial ≡ A mathematical expression involving the sum (addition) of powers (base with an exponent) in one or more variables multiplied by coefficients.

- Form: $a_n x^k$
  - a is any real number (coefficient of each term)
  - k is a non-negative integer (exponent of each term: descending, L → R)
- Standard Form of a Polynomial: $a_1x^k + a_2x^{k-1} + \ldots + a_nx^0$
- Powers are written in descending order with variables in alphabetical order.
- Examples:
  - $-19x^7 + 4x^3 - 2x^2 + 13x + 9$
  - $5p^7 + p^2 + 10q - 40$





Term ≡ Each product in a polynomial expression.

- Includes: sign (positive or negative), coefficient, variable, and exponent
- Example: $-19x^7 + 4x^3 - 2x^2 + 13x + 9$
  1st term: $-19x^7$, 2nd Term: $+4x^3$, 3rd Term: $-2x^2$, etc.

Questions / Big Ideas	*Degree* ≡ The exponent of a term.
	
	• The greatest exponent determines the degree of the polynomial with one variable. If the polynomial has multiple variables, the greatest degree is the sum of the variable exponents.
	
	• Examples
	  ○ $-5x^6 + 4x^4 - x^3 + 3x + 9$ → 6th degree polynomial
	  ○ $7x^3 + 10x^2 - 15x + 1$ → 3rd degree polynomial
	  ○ $3x^3y^4 + 9y^5 - 8x + 1$ → 7th degree polynomial
	
	Coefficient ≡ The number being multiplied by a power. Its sign may be positive or negative.
	
	• Note: when a variable has a degree of zero, the coefficient is called a "constant."
	
	Leading Coefficient ≡ The number being multiplied by the power with the highest degree.
	
	• In standard form, it is the 1st term's number.
	
	• The sign can be positive or negative.
	
	  ○ Constant - A number without a variable (or a zero-degree variable).
	  ▪ $x^0 = 1$ (zero-degree variables equal 1)
	  ▪ Ex. ½, -42, 9, 2.4, $3x^0$
	
	Constant ≡ A real number in the form a_nx^0. The variable has a degree of zero. A constant is written without a variable.
	
	• Form: a_nx^0 (since x^0 equals 1, a constant does not vary).
	• Examples: ½, -42, 9, 2.4, $3x^0$
	
	Guided Practice
	
	$$-7x^{10} + 3.5x^8 + x^5 - \frac{2}{3}x^4 - x^2 + 6$$
	
	1. Leading Coefficient: _____
	
	2. Degree of Polynomial: _____
	
	3. Constant: _____
	
	4. Number of terms in the polynomial: _____
	
	5. List all coefficients (L → R): _____

Questions / Big Ideas	**Naming Polynomials**

1. Monomials: only ONE term
2. Binomials: exactly TWO terms
3. Trinomials: exactly THREE terms
4. Polynomials: any number of terms (1 through ∞)

- Monomials are one-term polynomials. All Polynomials are made up of monomial terms.
    - Monomials are the product of positive integer powers of variables. Ex: $x^4 \cdot x^2 = x^6 \leftarrow x^6$ is the monomial.
    - Monomials can be fractions, but can NOT have a variable in the denominator.
    - The exponents of monomials can NOT have fractional or negative exponents.
        - Remember: SOME radicals can be rewritten as fractional (rational) exponents.
    - Examples of Monomials:
        - $14x^2y, \quad -520x^8, \quad -2cd, \quad x, \quad 12, \quad \frac{1}{9}, \quad 9.2b, \quad 0$
    - Counterexamples of Monomials (NOT Monomials):
        - $3x^{-2}y, \quad -20x^{\frac{1}{8}}, \quad \sqrt{6}, \quad \frac{5}{y}, \quad \sqrt[4]{\frac{18}{2}}$

Guided Practice - Rearrange the polynomial into standard form, then breakdown each term into its parts.

1.

Given Form: $-5p^4-10p^3+6p^2-p+7$					
Standard Form:					
	1st Term	2nd Term	3rd Term	4th Term	5th Term
Term					
Coefficient					
Degree of Term					

Questions / Big Ideas

2.

Given Form: $\frac{8}{3}x^2-3y^3+1+2.6x^5-y$					
Standard Form:					
	1st Term	2nd Term	3rd Term	4th Term	5th Term
Term					
Coefficient					
Degree of Term					

3.

Given Form: $-2.1a^7-2.0b^{10}+2.6a^5b^3-1.9a^6-2.5b$					
Standard Form:					
	1st Term	2nd Term	3rd Term	4th Term	5th Term
Term					
Coefficient					
Degree of Term					

4.

Given Form: $14x^2-2+6x^3y^2+10x^2y-5y$					
Standard Form:					
	1st Term	2nd Term	3rd Term	4th Term	5th Term
Term					
Coefficient					
Degree of Term					

Summary: _____

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