Unit 4 - *Polynomial Functions*

Overview

Students will perform operations on polynomials, adding, subtracting, multiplying and dividing. They will be able to graph polynomial functions by factoring to find the zeroes and understanding end behavior and multiplicities.

21st Century Capacities: Analyzing, Collective Intelligence

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS	*Transfer:*
MP 1 Make sense sense of problems and persevere in solving them **MP5** Use appropriate tools strategically **MP6** Attend to precision A.APR.1 Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. A.APR.2 Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x). A.APR.3 Identify zeros of polynomials when suitable factorizations are available,	*Students will be able to independently use their learning in new situations to...* 1. Manipulate equations/expressions or objects to create order and establish relationships.(Analyzing) 2. Make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution (Analyzing) 3. Work respectfully and responsibly with others, exchanging and evaluating ideas to achieve a common objective (Collective Intelligence)

	Meaning:	
	UNDERSTANDINGS: *Students will understand that:* 1. Mathematicians examine relationships to discern a pattern, generalization, or structure. 2. Mathematicians identify relevant tools, strategies, relationships, and/or information in order to solve problems.	ESSENTIAL QUESTIONS: *Students will explore & address these recurring questions:* A. How can I break a problem (polynomial) down into manageable parts? B. What does the graph/function tell me? C. Does my solution make sense? D. Is there another way to represent this?

and use the zeros to construct a rough graph of the function defined by the polynomials	Acquisition:	
	Students will know…	*Students will be skilled at…*
	1. Properties of polynomial functions - exponents and end behavior 2. How to find real and complex zeros of a function 3. How to identify multiplicity of a function 4. Understand usefulness of the remainder theorem to evaluate complicated functions 5. Understand the Fundamental Theorem of Algebra 6. Vocabulary: multiplicity, roots, synthetic division	1. Determining right and left end behaviors from leading term 2. Using rational roots theorem to determine possible zeros 3. Using long and synthetic division to determine complete factorization of a polynomial 4. Sketching a graph of a polynomial function, using end behavior, degree, x and y intercepts, zeros and multiplicities 5. "Building a polynomial function" from a graph or from a set of parameters such as degree and zeros (including complex)