



### Advanced Algebra Concepts and Connections Unit 4: Modeling Polynomial Functions



#### Overview:

In this unit, students will explore a deeper understanding into quadratic functions to include those with non-real solutions. Students will solve systems of quadratic equations and perform quadratic regressions. They will perform computations with complex numbers (addition, subtraction, and multiplication) using properties of operations. Moving into exploration of polynomial functions, students will identify the number of zeros and end behavior for any polynomial, or to write a viable equation for the polynomial, given its zeros. Students will graph and identify the key features such as zeros of polynomials of degrees greater than 2 either by inspection of a pre-graphed or pre-factored equation, or by using technology.

#### Learning Targets

- Graph quadratic functions to answer questions about real-life phenomena.
- Analyze quadratic functions in context, including analysis of data sets with regressions.
- Define complex numbers.
- Show that every complex number has the form  $a + bi$  (where  $a$  and  $b$  are real numbers).
- Use the relation  $i^2 = -1$  to add, subtract, and multiply complex numbers.
- Use the structure of an expression to factor quadratics.
- Write and solve quadratic equations with real coefficients.
- Write and solve quadratic inequalities with real coefficients.
- Use solutions to quadratic equations to explain a contextual situation.
- Use solutions to quadratic inequalities to explain a contextual situation.
- Solve systems of linear and quadratic functions to determine points of intersection.
- Create quadratic equations to model real situations.
- Analyze quadratic equations to model real situations.

#### Key Vocabulary: (linked to GA DOE Interactive Glossary)

Associative Property	Concave Up	Exponential Function	Imaginary Number	Multiplicity	Rational Expression
Binominal Expression	Decreasing	Extrema	Increasing	Nth root	Root
Complex Conjugate	Degree of a Polynomial	Factor	Intersection Point	Quadrant	Real Number
Complex Number	Distributive Property	Fundamental Theorem of Algebra	Leading Coefficient	Quadratic	Regression
Commutative Property	End Behavior	Higher Order Polynomials	Limit	Polynomial	Trinomial
Concave Down	Exponent	$i$ (the number $i$ )	Maximum	Polynomial Function	Zero
			Minimum	Rational Exponents	

#### Supporting Resources:

<http://ctlslearn.cobbk12.org/>

[Intro to complex numbers Factoring in Algebra](#)

<https://gavirtual.instructure.com/courses/34342>

[Zeros of a Polynomial Function from a Table of Values](#)