Park Hill School District

Building Successful Futures • Each Student • Every Day

High School Accelerated Algebra II A Curriculum

Course Description: The course is designed to cover the first half of the Algebra II curriculum This course includes the study of a variety of functions (linear, quadratic higher order polynomials, exponential, absolute value, logarithmic and rational) learning to graph, compare, perform operations and manipulate them in order to solve, analyze and apply to problems. Students will use probability and statistics to evaluate outcomes of decisions. Students develop rigorous problem solving skills, logical reasoning and mathematical communication skills required for success in higher math courses and real life experiences. *Graphing calculators are required.

Scope and Sequence:

Time Frame	Unit
12	Unit 1: Basics of Algebra II
12	Unit 2: Transformations of Functions
15	Unit 3: Quadratic Equations and Complex Numbers
14	Unit 4: Systems and Inequalities
24 (with 2 assessments)	Unit 5: Polynomial Functions

Curriculum Revision Tracking

Spring, 2022

- Adopted DESE Priority Standards
- Included Learning Targets and Success Criteria
- Updated units from:
    - Unit 1: Linear Equations, Inequalities, and Quadratics
    - Unit 2: Polynomials
    - Unit 3: Functions

  to

    - Unit 1: Basics of Algebra II
    - Unit 2: Transformations of Functions
    - Unit 3: Quadratic Equations and Complex Numbers
    - Unit 4: Systems and Inequalities
    - Unit 5: Polynomial Functions
- Updated scope, sequence and pacing to match newly updated units

Unit 1: Basics of Algebra IIA

Subject: Algebra II A
Grade: 9-12
Name of Unit: Basics of Algebra II
Length of Unit: 12 blocks (9 for learning, 3 for review and assessment)
Overview of Unit: Students will take a pretest over Algebra I concepts to determine which sections are necessary for review. The concepts in the unit cover the concepts of Algebra I that are crucial for Algebra II and commonly needed for review

Priority Standards for unit:

- A1.CED.A.1 Create equations and inequalities in one variable and use them to model and/or solve problems.
- A1.REI.C.6 Explain that the graph of an equation in two variables is the set of all its solutions plotted in the Cartesian coordinate plane.
- A1.IF.B.3 Using tables, graphs and verbal descriptions, interpret key characteristics of a function that models the relationship between two quantities.
- A1.IF.C.7 Graph functions expressed symbolically and identify and interpret key features of the graph.
- A1.SSE.A.1 Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.
- A2.IF.A.1 Identify and interpret key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.

Supporting Standards for unit:

- A1.NQ.B.3 "Use units of measure as a way to understand and solve problems involving quantities.
    - a)Identify, label and use appropriate units of measure within a problem.
    - b)Convert units and rates.
    - c)Use units within problems.
    - d)Choose and interpret the scale and the origin in graphs and data displays."
- A1.REI.A.1 Explain how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.
- A1.CED.A.4 Solve literal equations and formulas for a specified variable that highlights a quantity of interest.
- A1.IF.B.4 Relate the domain and range of a function to its graph and, where applicable, to the quantitative relationship it describes.
- A1.IF.B.6 Interpret the parameters of a linear or exponential function in terms of the context.

- A1.LQE.A.1 "Distinguish between situations that can be modeled with linear or exponential functions.
    - a) Determine that linear functions change by equal differences over equal intervals.
    - b) Recognize exponential situations in which a quantity grows or decays by a constant percent rate per unit interval."
- A1.IF.A.1 "Understand that a function from one set (domain) to another set (range) assigns to each element of the domain exactly one element of the range.
    - a) Represent a function using function notation.
    - b) Understand that the graph of a function labeled f is the set of all ordered pairs (x, y) that satisfy the equation y=f (x)."
- A1.IF.A.2 Use function notation to evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

Priority Standard	**Unwrapped Concepts (Students need to know)**	**Unwrapped Skills (Students need to be able to do)**	**Bloom's Taxonomy Levels**	**Webb's DOK**
A1.CED.A.1	equations and inequalities in one variable	Create	Create	4
A1.CED.A.1	equations and inequalities in one variable to model and/or solve problems.	Use	Apply	2
A1.REI.C.6	that the graph of an equation in two variables is the set of all its solutions plotted in the Cartesian coordinate plane.	Explain	Understand	2
A1.IF.B.3	key characteristics of a function that models the relationship between two quantities.	Interpret	Understand	3
A1.IF.C.7	functions expressed symbolically and	Graph	Apply	2
A1.IF.C.7	key features of the graph.	Identify	Remember	1

A1.IF.C.7	key features of the graph.	Interpret	Understand	2
A1.SSE.A.1	the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions	Interpret	Understand	2
A2.IF.A.1	key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.	Identify	Remember	1
A2.IF.A.1	key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.	Interpret	Understand	2

Essential Questions:

1. How is thinking algebraically different from thinking arithmetically?
2. How do I use algebraic expressions to analyze or solve problems?
3. How do the properties contribute to algebraic understanding?

Enduring Understanding/Big Ideas:

1. Real world situations can be represented symbolically and graphically.
2. Algebraic expressions and equations generalize relationships from specific cases.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
expression equal equation variable inequality compound inequality	isolate variable(s) properties of equality identity property of equality inverse property of equality commutative property of addition/multiplication associative property of addition/multiplication

greater than less than like terms Linear Non-linear Dependent variable Independent variable	distributive property Average rate of change Slope Intercepts (x and y) Horizontal lines Vertical lines Slope-intercept form Standard form Intervals Table of values Correlation coefficient

Big Ideas Chapter

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
Pre-test		1	*After the pre-test, teacher will determine which of the sections in this unit are necessary for review. Pacing is suggested for whichever topics are necessary.*	
A1.NQ.B.3, A1.REI.A.1, **A1.CED.A.1**, A1.CED.A.4	Solving Linear & Literal Equations *Alg I Sections:* *· 1.5 Solving Equations with Variables on Both Sides* *· 1.7 Rewriting Equations and Formulas*	*(1)*	Write and solve equations with variables on both sides. Solve literal equations for given variables.	● I can apply properties of equality using variable terms. ● I can solve equations with variables on both sides. ● I can recognize when an equation has zero, one, or infinitely many solutions. ● I can identify a literal equation. ● I can use properties of equality to rewrite literal equations. ● I can use rewritten formulas to solve problems.
A1.NQ.B.3, **A1.CED.A.1**, A1.REI.A.1	Writing Linear Equations *Alg I Sections:* *· 1.1 Solving Simple Equations* *· 1.2 Solving Multi-Step Equations*	*(1)*	Write one-step linear equations. Write multi-step linear equations.	● I can apply properties of equality to produce equivalent equations. ● I can apply more than one property of equality to produce equivalent equations.
A1.NQ.B.3, **A1.REI.C.6, A1.IF.B.3**, A1.IF.B.4, A1.IF.B.6, **A1.IF.C.7**, **A1.SSE.A.1**, A1.LQE.A.1	Graphing Linear Equations *Alg I Sections:* *· 3.5 Graphing Linear Equations in Standard Form* *· 3.6 Graphing Linear Equations in Slope-Intercept Form*	*(1)*	Graph and interpret linear equations written in standard form. Find the slope of a line and use slope-intercept form.	● I can graph equations of horizontal and vertical lines. ● I can graph linear equations written in standard form using intercepts. ● I can find the slope of a line. ● I can use the slope-intercept form of a linear equation.

A1.CED.A.1, A1.REI.A.1	Absolute Value equations *Alg I Sections:* *· 1.6 Solving Absolute Value Equations*	*(1/2)*	Write and solve equations involving absolute value.	● I can write the two linear equations related to a given absolute value equation. ● I can solve equations involving one or two absolute values. ● I can identify special solutions of absolute value equations.
A1.NQ.B.3	Linear & Absolute Value Inequalities *Alg I Sections:* *· 2.4 Solving Multi-Step Inequalities* *· 2.6 Solving Absolute Value Inequalities*	*(1/2)*	Write and solve multi-step inequalities. Write and solve inequalities involving absolute value.	● I can use more than one property of inequality to generate equivalent inequalities. ● I can solve multi-step inequalities using inverse operations. ● I can write a compound inequality related to a given absolute value inequality. ● I can solve absolute value inequalities.
A1.IF.A.1, **A1.IF.B.3**, A1.IF.B.4, A1.NQ.B.3, A1.IF.A.1, A1.IF.A.2	Function Notation *Alg I Sections:* *· 3.1 Functions* *· 3.4 Function Notation*	*(1/2)*	Understand the concept of a function. Understand and use function notation.	● I can determine whether a relation is a function. ● I can find the domain and range of a function. ● I can distinguish between independent and dependent variables. ● I can evaluate functions using function notation. ● I can interpret statements that use function notation. ● I can graph functions represented using function notation.

Engaging Scenarios

<u>Engaging Scenarios:</u> There are several options for engaging scenarios for this unit. They may be appropriate as a means for introducing concepts in the unit, as a unit-long project for attaching learning to, or as a culminating experience at the end of the unit.

- Performance Task found in the Big Ideas Assessment Book (accessible in the physical Assessment Book, or the digital version in the Assess area of the Featured Chapter Resources after selecting the appropriate Chapter).
- Performance Task found at the end of the chapter in Big Ideas.
- Performance Task found in the Teach area of the Featured Chapter Resources after selecting the appropriate Chapter.
- AlgII 1.3 Modeling with Linear Functions

Unit 2: Transformations of Functions

Subject: Algebra II A
Grade: 9-12
Name of Unit: Unit 2: Transformations of Functions
Length of Unit: 12 blocks (9 for learning, 3 for review and assessment)
Overview of Unit: Students will work on transformations of function. The goal is to identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k. Students will also learn characteristics of quadratic functions and writing equations of parabolas.

Priority Standards for unit:
- A2.IF.A.1 Identify and interpret key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.
- A2.BF.A.3 Describe the effects of transformations algebraically and graphically, creating vertical and horizontal translations, vertical and horizontal reflections and dilations (expansions/compressions) for linear, quadratic, cubic, square and cube root, absolute value, exponential and logarithmic functions.
- A2.FM.A.1 Create functions and use them to solve applications of quadratic and exponential function modeling problems.

Supporting Standards for unit:
- A2.APR.A.5 Identify zeros of polynomials when suitable factorizations are available, and use the zeros to sketch the function defined by the polynomial.
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Priority Standard	Unwrapped Concepts (Students need to know)	Unwrapped Skills (Students need to be able to do)	Bloom's Taxonomy Levels	Webb's DOK
A2.IF.A.1	key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.	Identify	Understand	1
A2.IF.A.1	key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.	Interpret	Apply	2

A2.BF.A.3	the effects of transformations algebraically and graphically, creating vertical and horizontal translations, vertical and horizontal reflections and dilations (expansions/compressions) for linear, quadratic, cubic, square and cube root, absolute value, exponential and logarithmic functions.	Describe	Apply	2
A2.FM.A.1	functions and use them to solve applications of quadratic and exponential function modeling problems.	Create	Create	4

Essential Questions:

1. 1. How can you transform the graphs of linear, absolute value, quadratic, polynomial, exponential, logarithmic, and trigonometric functions?
2. What are the characteristics of linear, absolute value, quadratic, polynomial, exponential, logarithmic, and trigonometric functions?
3. How can you show a function is even, odd or neither algebraically?
4. What are the characteristics of the graphs of an even or odd function?

Enduring Understanding/Big Ideas:

1. A variety of families of functions can be used to model and solve real world situations
2. The characteristics of linear inequalities and their representations are useful in solving real-world problems.
3. Identify even or odd functions.
4. Understand that the parent function of the graph can be transformed to fit a function.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
	quadratic function parabola vertex of a parabola vertex form of a quadratic function axis of symmetry standard form of a quadratic function minimum value maximum value

	intercept form of a quadratic function

Big Ideas Chapters 1, 2, and 4

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
A2.IF.A.1, A2.BF.A.3	1.1 Parent Functions and Transformations	1	Graph and describe transformations of functions.	• I can identify the function family to which a function belongs. • I can graph transformations of functions. • I can explain how translations, reflections, stretches, and shrinks affect graphs of functions.
A2.IF.A.1, A2.BF.A.3	1.2 Transformations of Linear and Absolute Value Functions		Write functions that represent transformations of functions.	• I can write functions that represent transformations of linear functions. • I can write functions that represent transformations of absolute value functions.
A2.APR.A.5, **A2.BF.A.3**	4.7 Transformations of Polynomial Functions		Describe and graph transformations of polynomial functions.	• I can describe transformations of polynomial functions. • I can graph transformations of polynomial functions. • I can write functions that represent transformations of polynomial functions.
A2.IF.A.1, A2.BF.A.3	2.1 Transformations of Quadratic Functions	1	Describe and graph transformations of quadratic functions.	• I can describe transformations of quadratic functions. • I can graph transformations of quadratic functions. • I can write functions that

				represent transformations of quadratic functions.
A2.IF.A.1	2.2 Characteristics of Quadratic Functions	2	Graph and describe quadratic functions.	● I can use properties of parabolas to graph quadratic functions. ● I can identify characteristics of quadratic functions and their graphs. ● I can use characteristics of quadratic functions to solve real-life problems.
A2.IF.A.1, A2.FM.A.1	2.4 Modeling with Quadratic Functions	1	Write equations of quadratic functions using given characteristics.	● I can write equations of quadratic functions using vertices, points, and x-intercepts. ● I can write quadratic equations to model data sets. ● I can use technology to find a quadratic model for a set of data.

Engaging Scenarios

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Unit 3: Quadratic Equations and Complex Numbers

Subject: Algebra II A
Grade: 9-12
Name of Unit: Quadratic Equations and Complex Numbers
Length of Unit: 15 (12 for learning, 3 for review and assessment)
Overview of Unit: Students will solve quadratic equations and inequalities, which may include imaginary solutions. Complex numbers are introduced after students review several methods they used in Algebra I to solve quadratic equations with real solutions.

Priority Standards for unit:
- A1.SSE.A.2 Analyze the structure of polynomials to create equivalent expressions or equations.
- A2.REI.A.1 Create and solve equations and inequalities, including those that involve absolute value.
- A2.NQ.B.7 Know and apply the Fundamental Theorem of Algebra.
- A2.IF.A.1 Identify and interpret key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.

Supporting Standards for unit:
- A1.NQ.B.3 Use units of measure as a way to understand and solve problems involving quantities.
    - a)Identify, label and use appropriate units of measure within a problem.
    - b)Convert units and rates.
    - c)Use units within problems.
    - d)Choose and interpret the scale and the origin in graphs and data displays.
- A1.SSE.A.3 Choose and produce equivalent forms of a quadratic expression or equations to reveal and explain properties.
    - a) Find the zeros of a quadratic function by rewriting it in factored form.
    - b) Find the maximum or minimum value of a quadratic function by completing the square.
- A2.NQ.B.5 Represent complex numbers.
- A2.NQ.B.6 Add, subtract, multiply and divide complex numbers.

Priority Standard	Unwrapped Concepts (Students need to know)	Unwrapped Skills (Students need to be able to do)	Bloom's Taxonomy Levels	Webb's DOK
A1.SSE.A.2	the structure of polynomials to create equivalent express	Analyze	Analyze	4
A2.REI.A.1	equations and inequalities, including those that involve absolute value.	Create	Create	4
A2.REI.A.1	equations and inequalities, including those that involve absolute value.	Solve	Apply	2
A2.NQ.B.7	Know and apply the Fundamental Theorem of Algebra.	Know	Understand	1
A2.NQ.B.7	Know and apply the Fundamental Theorem of Algebra.	Apply	Apply	2
A2.IF.A.1	key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.	Identify	Remember	1
A2.IF.A.1	key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.	Interpret	Understand	2

Essential Questions:

1. How does understanding how to find the vertex of a quadratic function help in making decisions in real-life applications?
2. What are the advantages of a quadratic function in vertex form? In standard form?
3. How is any quadratic function related to the parent quadratic function f(x)=x2 ?
4. How does solving for x in quadratic functions compare to solving for x in linear functions?
5. Why do we analyze quadratic functions?
6. How can quadratic functions maximize profits or minimize cost?
7. Why does the degree of an equation reveal the number of solutions to the equation?
8. To what extent are solutions to quadratic equations real?
9. How are the real solutions of a quadratic equation related to the graph of the related quadratic function?

Enduring Understanding/Big Ideas:

1. The vertex of a parabola will represent the maximum point of the function, which will help to understand maximum and minimum values in real-life situations.
2. No matter how you choose to solve a quadratic function for real solutions, you are always looking for where the function crosses the x-axis. These points on the graph are significant in many real-world applications.
3. Solutions that exist can exist beyond the real number system. All quadratic functions are a transformation on the parent function f(x)=x2.
4. The domain and range of quadratic functions can be relative to a situation.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
	quadratic equation in one variable zero of a function completing the square Quadratic Formula discriminant

Big Ideas Chapter 3

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
A1.NQ.B.3, **A1.SSE.A.2**, A1.SSE.A.3	*Factoring Review (optional based on pre-test results)* *Alg I Sections:* *· 7.6 Factoring ax2 + bx + c* *· 7.5 Factoring x2 + bx + c*	*(1)*	*Factor polynomials of the form ax^2 + bx + c and x^2 + bx + c.*	● I can factor a polynomial using the GCF of the terms of the polynomial. ● I can factor polynomials of the form ax^2 + bx + c and x^2 + bx + c. ● I can explain how to use a, b, and c to find binomial factors of a polynomial ax^2 + bx + c and x^2 + bx + c. ● I can identify the three terms of a trinomial.
A2.REI.A.1	3.1 Solving Quadratic Equations	1	Solve quadratic equations graphically and algebraically.	● I can solve quadratic equations by graphing. ● I can solve quadratic equations algebraically. ● I can use quadratic equations to solve real-life problems.
A2.NQ.B.5, A2.NQ.B.6, **A2.NQ.B.7**	3.2 Complex Numbers	1	Understand the imaginary unit *i* and perform operations with complex numbers.	● I can define the imaginary unit i and use it to rewrite the square root of a negative number. ● I can add, subtract, and multiply complex numbers. ● I can find complex solutions of quadratic equations and complex zeros of quadratic functions.
A2.REI.A.1	3.3 Completing the Square	1	Solve quadratic equations and rewrite quadratic functions by completing the square.	● I can solve quadratic equations using square roots. ● I can solve quadratic equations by completing the square. ● I can apply completing the square to write quadratic functions in vertex form.

A2.REI.A.1	3.4 Using the Quadratic Formula	1	Solve and analyze quadratic equations using the Quadratic Formula and discriminants.	● I can solve quadratic equations using the Quadratic Formula. ● I can find and interpret the discriminant of an equation. ● I can write quadratic equations with different numbers of solutions using the discriminant.
A2.IF.A.1	Real World, Application, and Word Problems	1	Solve quadratic equations graphically and algebraically.	● I can use quadratic equations to solve real-life problems.

Engaging Scenarios

Engaging Scenarios: There are several options for engaging scenarios for this unit. They may be appropriate as a means for introducing concepts in the unit, as a unit-long project for attaching learning to, or as a culminating experience at the end of the unit.

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Unit 4: Systems and Inequalities

Subject: Algebra II A
Grade: 9-12
Name of Unit: Systems and Inequalities
Length of Unit: 14 blocks (11 for learning, 3 for review and assessment)
Overview of Unit: Students will refresh and extend their understanding of solving nonlinear systems of equations and inequalities.

Priority Standards for unit:

- A2.REI.B.3 Create and solve systems of equations that may include non-linear equations and inequalities.
- A2.REI.A.1 Create and solve equations and inequalities, including those that involve absolute value.
- A2.IF.A.1 Identify and interpret key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.

Priority Standard	Unwrapped Concepts (Students need to know)	Unwrapped Skills (Students need to be able to do)	Bloom's Taxonomy Levels	Webb's DOK
A2.REI.A.1	equations and inequalities, including those that involve absolute value.	Create	Create	4
A2.REI.A.1	equations and inequalities, including those that involve absolute value.	Solve	Apply	2
A2.REI.B.3	systems of equations that may include non-linear equations and inequalities.	Create	Create	4
A2.REI.B.3	systems of equations that may include non-linear equations and inequalities.	Solve	Apply	2

A2.IF.A.1	key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.	Identify	Remember	1
A2.IF.A.1	key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.	Interpret	Understand	2

Essential Questions:

1. What techniques can be used to solve and graph system of linear equations or inequalities?
2. How can we translate verbal models into algebraic models to represent and solve real-life situations?
3. How can we model and solve real-life situations using a system of linear equations or inequalities?
4. How are systems of linear equations and inequalities useful?

Enduring Understanding/Big Ideas:

1. A variety of families of functions can be used to model and solve real world situations
2. The characteristics of linear inequalities and their representations are useful in solving real-world problems.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
	system of nonlinear equations quadratic inequality in two variables quadratic inequality in one variable

Big Ideas Chapters 1 & 3

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
A2.REI.B.3	1.4 Solving Linear Systems	2	Solve linear systems in two and three variables.	● I can visualize solutions of linear systems in two and three variables. ● I can solve linear systems in three variables algebraically. ● I can solve real-life problems using systems of equations in two and three variables.
A2.REI.B.3	3.5 Solving Nonlinear Systems of Equations	1	Solve nonlinear systems graphically and algebraically.	● I can describe what a nonlinear system of equations is. ● I can solve nonlinear systems using graphing, substitution, or elimination. ● I can solve quadratic equations by graphing each side of the equation.
A2.REI.A.1	3.6 Linear, Absolute Value, and Quadratic Inequalities	2	Graph linear, absolute value, and quadratic inequalities in two variables and solve quadratic inequalities in one variable.	● I can describe the graph of linear, absolute value, and quadratic inequalities. ● I can graph linear, absolute value, and quadratic inequalities. ● I can graph systems of linear, absolute value, and quadratic inequalities. ● I can solve linear, absolute value, and quadratic inequalities algebraically and graphically.

A2.IF.A.1	Real World, Application, and Word Problems	1	Solve nonlinear systems and inequalities graphically and algebraically	● I can use nonlinear systems and inequalities to solve real-life problems.

Engaging Scenarios

Engaging Scenarios: There are several options for engaging scenarios for this unit. They may be appropriate as a means for introducing concepts in the unit, as a unit-long project for attaching learning to, or as a culminating experience at the end of the unit.

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Unit 5: Polynomial Functions

Subject: Algebra II A
Grade: 9-12
Name of Unit: Polynomial Functions
Length of Unit: With remainder of time in the semester before finals/end of semester. Pacing is suggested. 24 Blocks (18 for learning, 6 for review and assessment)
Overview of Unit: This unit extends students' knowledge of linear and quadratic functions to other polynomial functions. Students will graph polynomial functions and write and solve polynomial equations. This unit should be split graphing/solving or with a review and test in the middle.

Priority Standards for unit:
- A2.IF.A.1 Identify and interpret key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.
- A2.BF.A.3 Describe the effects of transformations algebraically and graphically, creating vertical and horizontal translations, vertical and horizontal reflections and dilations (expansions/compressions) for linear, quadratic, cubic, square and cube root, absolute value, exponential and logarithmic functions.
- A2.REI.A.1 Create and solve equations and inequalities, including those that involve absolute value.
- A2.NQ.B.7 Know and apply the Fundamental Theorem of Algebra.

Supporting Standards for unit:
- A2.APR.A.1 Extend the knowledge of factoring to include factors with complex coefficients.
- A2.APR.A.5 Identify zeros of polynomials when suitable factorizations are available, and use the zeros to sketch the function defined by the polynomial.

Priority Standard	Unwrapped Concepts (Students need to know)	Unwrapped Skills (Students need to be able to do)	Bloom's Taxonomy Levels	Webb's DOK
A2.IF.A.1	key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.	Identify	Remember	1

A2.IF.A.1	key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.	Interpret	Understand	2
A2.BF.A.3	the effects of transformations algebraically and graphically, creating vertical and horizontal translations, vertical and horizontal reflections and dilations (expansions/compressions) for linear, quadratic, cubic, square and cube root, absolute value, exponential and logarithmic functions.	Describe	Apply	2
A2.REI.A.1	equations and inequalities, including those that involve absolute value.	Create	Create	4
A2.REI.A.1	equations and inequalities, including those that involve absolute value.	Solve	Apply	2
A2.NQ.B.7	Know and apply the Fundamental Theorem of Algebra.	Know	Understand	1
A2.NQ.B.7	Know and apply the Fundamental Theorem of Algebra.	Apply	Apply	2

Essential Questions:

1. What does the degree of a polynomial tell you about its related polynomial functions?
2. For a polynomial function, why are factors, zeros, and x-intercepts related?
3. For a polynomial equation, why are factors and roots related?

Enduring Understanding/Big Ideas:

1. The degree of the polynomial will determine the shape of its graph, the maximum number of turning points, its end behavior, and the number of roots (including multiple and complex roots) so that real world data can be analyzed in terms of its maximum, minimum, and break-even values.
2. Knowing the zeros of a polynomial function will help you factor the polynomial, graph the function, and solve the related polynomial equation.
3. Polynomials can be divided using steps similar to the long division steps used to divide whole numbers.
4. You can add, subtract, multiply, and divide functions based on how you perform these operations for real numbers. One difference is that you must consider the domain of each function.

Unit Vocabulary:

Academic Cross-Curricular Words	Content/Domain Specific
	monomial degree of a monomial polynomial degree of a polynomial polynomial function standard form of a polynomial function turning point greatest common factor imaginary number end behavior factor theorem multiple zero multiplicity relative maximum relative minimum sum of cubes difference of cubes synthetic division Remainder theorem Rational roots theorem Fundamental theorem of Algebra expand Pascal’s triangle Binomial theorem

	Composite functions

Big Ideas Chapter 4

Standard	Topic & Section	Suggested # of Days	Learning Target	Success Criteria
A2.APR.A.5, **A2.IF.A.1**	4.1 Graphing Polynomial Functions	1	Graph and describe polynomial functions.	• I can identify and evaluate polynomial functions. • I can graph polynomial functions. • I can describe end behavior of polynomial functions.
	4.2 Adding, Subtracting, and Multiplying Polynomials	1	Add, subtract, and multiply polynomials.	• I can add and subtract polynomials. • I can multiply polynomials and use special product patterns.
	4.3 Dividing Polynomials	2	Divide polynomials by other polynomials and use the Remainder Theorem.	• I can use long division to divide polynomials by other polynomials. • I can divide polynomials by binomials of the form $x - k$ using synthetic division. • I can explain the Remainder Theorem.
A2.APR.A.1	4.4 Factoring Polynomials	1	Factor polynomials and use the Factor Theorem.	• I can find common monomial factors of polynomials. • I can factor polynomials. • I can use the Factor Theorem.
A2.REI.A.1, A2.APR.A.5	4.5 Solving Polynomial Equations	2	Solve polynomial equations and find zeros of polynomial functions.	• I can explain how solutions of equations and zeros of functions are related. • I can solve polynomial equations. • I can write a polynomial function when given information about its zeros.

A2.NQ.B.7, A2.APR.A.5	4.6 The Fundamental Theorem of Algebra	1	Use the Fundamental Theorem of Algebra to find all complex roots of polynomial equations.	● I can identify the degree of a polynomial. ● I can explain the Fundamental Theorem of Algebra. ● I can find all the zeros of a polynomial function.
A2.APR.A.5, **A2.IF.A.1**, **A2.BF.A.3**	4.8 Analyzing Graphs of Polynomial Functions	1	Analyze graphs of polynomial functions.	● I can identify a turning point of a polynomial function. ● I can analyze real zeros and turning points numerically. ● I can explain the relationship among the degree of a polynomial function, real zeros, and turning points.

Engaging Scenarios

Engaging Scenarios: There are several options for engaging scenarios for this unit. They may be appropriate as a means for introducing concepts in the unit, as a unit-long project for attaching learning to, or as a culminating experience at the end of the unit.

- Performance Task found in the Big Ideas Assessment Book (accessible in the physical Assessment Book, or the digital version in the Assess area of the Featured Chapter Resources after selecting the appropriate Chapter).
- Performance Task found at the end of the chapter in Big Ideas.
- Performance Task found in the Teach area of the Featured Chapter Resources after selecting the appropriate Chapter.
- 4.9 Modeling with Polynomial Functions

Unit of Study Terminology

Appendices: All Appendices and supporting material can be found in this course's shell course in the District's Learning Management System.

Assessment Leveling Guide: A tool to use when writing assessments in order to maintain the appropriate level of rigor that matches the standard.

Big Ideas/Enduring Understandings: Foundational understandings teachers want students to be able to discover and state in their own words by the end of the unit of study. These are answers to the essential questions.

Engaging Experience: Each topic is broken into a list of engaging experiences for students. These experiences are aligned to priority and supporting standards, thus stating what students should be able to do. An example of an engaging experience is provided in the description, but a teacher has the autonomy to substitute one of their own that aligns to the level of rigor stated in the standards.

Engaging Scenario: This is a culminating activity in which students are given a role, situation, challenge, audience, and a product or performance is specified. Each unit contains an example of an engaging scenario, but a teacher has the ability to substitute with the same intent in mind.

Essential Questions: Engaging, open-ended questions that teachers can use to engage students in the learning.

Priority Standards: What every student should know and be able to do. These were chosen because of their necessity for success in the next course, the state assessment, and life.

Supporting Standards: Additional standards that support the learning within the unit.

Topic: These are the main teaching points for the unit. Units can have anywhere from one topic to many, depending on the depth of the unit.

Unit of Study: Series of learning experiences/related assessments based on designated priority standards and related supporting standards.

Unit Vocabulary: Words students will encounter within the unit that are essential to understanding. Academic Cross-Curricular words (also called Tier 2 words) are those that can be found in multiple content areas, not just this one. Content/Domain Specific vocabulary words are those found specifically within the content.