

Abington Heights School District Algebra II Accelerated Curriculum



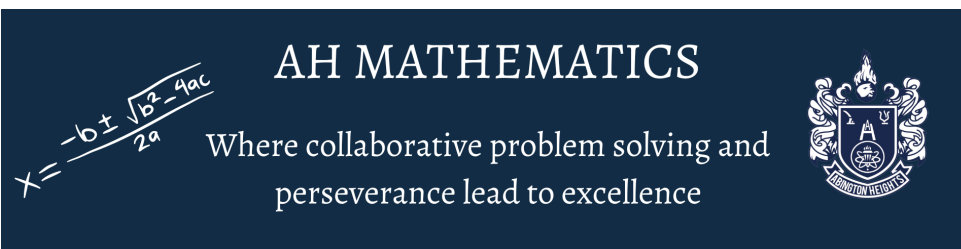
In Algebra II Accelerated, students develop their numeracy skills through the following areas of study:

1. Patterns, Relations, and Functions
2. Applications of Functions
3. Operations with Complex Numbers
4. Non-Linear Expressions
5. Non-Linear Equations
6. Data Analysis

Board Approval Date: June 7, 2023

Adoption: 2023 - 2024 SY

Review Date:



Abington Heights Math Framework

Stakeholders	Actions
Students	<ul style="list-style-type: none"> ★ Engage in mathematical discussions, share their ideas openly, be inquisitive, seek to understand and learn more about mathematical concepts, and try their best daily. ★ Exhibit creativity and curiosity in problem solving individually and collaboratively. ★ Persevere in engaging and challenging daily mathematical practice. ★ Come prepared to learn every day.
Teachers	<ul style="list-style-type: none"> ★ Create a safe and collaborative classroom environment where students feel vested in a shared vision for mathematical excellence. ★ Develop high quality instruction that meets the needs of all learners through differentiation. ★ Use a variety of 21st century methodologies to advance learning. ★ Partner with parents and guardians to support student success. ★ Establish a collaborative community within the building and amongst grade levels to ensure a cohesive level of instruction.
Building Leaders	<ul style="list-style-type: none"> ★ Deeply understand the needs of teachers, students, the instructional materials being used, programs being implemented, and the expectations for state-level assessment scores <ul style="list-style-type: none"> ○ Knowledgeable about program and grade level standards ○ Ensure consistent and equal access to high-quality instructional materials and resources, building. ★ Be partners with teachers, students and families: <ul style="list-style-type: none"> ○ Provide guidance and support to the mathematical community. ○ Understand needs of teachers, students and families. ★ Trust the educators to make professional decisions based on program, student, and district needs.
Central Admin	<ul style="list-style-type: none"> ★ Effectively communicate to the school board and community specific areas of need and how to support teachers and building leaders in a quest for mathematical excellence ★ Deeply understand the needs of teachers, students, the instructional materials being used, programs being implemented, and the expectations for state-level assessment scores <ul style="list-style-type: none"> ○ Have a common metric for mathematical excellence. ○ Ensure consistent and equal access to high-quality instructional materials and resources, district. ○ Re-examine best practices/curriculum routinely (6 years). ★ Support a culture of collaboration between the other stakeholder groups to maintain the standard of excellence of the Abington Heights ★ Trust the educators to make professional decisions based on program, student, and district needs.
Parents/Community	<ul style="list-style-type: none"> ★ Be a strong support system and contribute by building a positive math community for students. ★ Encourage a positive math mindset. ★ Have conversations with their children about school and ask what they are learning about in school. ★ Be open, receptive to the district's ideas about student learning and reach out to teachers/school to learn more about how they can support. ★ Trust the educators to make professional decisions based on program, student, and district needs.
School Board	<ul style="list-style-type: none"> ★ Provide the fiscal resources to support: <ul style="list-style-type: none"> ○ Highly qualified professionals for mathematics ○ High-quality instructional materials ○ Effective and efficient math interventions for remediation ○ Professional development for math content and instructional practices ★ Trust the educators to make professional decisions based on program, student, and district needs.

Algebra II Accelerated Scope and Sequence

Month	Unit	Estimated Number of Weeks
September	Essentials of Algebra I	4
October	Essentials of Algebra I	2
	f(x) Notation & Special Functions	2
November	f(x) Notation & Special Functions	2
	Quadratic Functions	2
December	Quadratic Functions	3
January	Quadratic Functions	2
	Radical Expressions & Complex Numbers	2
February	Radical Expressions & Complex Numbers	2
	Rational Equations & Functions	2
March	Polynomial Functions	4
April	Polynomial Functions	1
	Exponential and Logarithmic Functions	3
May	Exponential and Logarithmic Functions	2
	Conic Sections	1
	Probability	1
June	Final Exam Review	1

Unit	Essential Questions	Content	Skills	PA Core Standards	Activities	Assessment/ Evidence of Learning
Essentials of Algebra I	How do I simplify algebraic expressions?	Real number operations	Simplify and evaluate expressions using order of operations	CC.2.1.HS.F.5	First day of school activity - review of order of operations	Webwork/Delta Math
	What are the order of operations?	Algebraic expressions and models	Solve multi-step equations in one variable	CC.2.2.HS.D.7		
	How do I use the inverse order of operations to solve equations?	Solving equations	Use algebraic processes to solve a formula for a given variable	CC.2.2.HS.C.1	Delta Math/Webwork	Homework Assignments
		Solving literal equations		CC.2.2.HS.C.2	Class Participation	Quizzes
				CC.2.2.HS.C.3	Discovery Activities	
				CC.2.2.HS.C.6	Flipcharts/Google Slides	
				CC.2.2.HS.D.10		
	How do I solve absolute value equations and inequalities?	Absolute value equations and inequalities	Solve absolute value equations and inequalities in one variable			
	How do the solution methods and the solutions of linear equations and inequalities in one variable compare?	Inequalities	Solve inequalities in one variable, expressing solution in interval notation and graph solution on number line			
		Interval Notation				

Unit	Essential Questions	Content	Skills	PA Core Standards	Activities	Assessment/ Evidence of Learning
Essentials of Algebra I (continued)	What is a function?	Relations and Functions	Determine if a relation is a function			
	How can I determine the domain & range of a function using a graph, table, or an equation?	Domain and Range Interval Notation Evaluate functions	Find the domain and range of a relation or function in interval notation Evaluate a function at a given value			
	How do I find the equation given basic information about a line?	Slope and rate of change Equations of lines	Calculate slope Write equations of lines when given various pieces of information (slope and point, two points, parallel / perpendicular relationship) in point-slope, slope-intercept, or standard form			
	How can I manipulate a linear equation to be in the three different forms?	Regression equations (lines of best fit)	Make predictions using the equations or graphs of regression models (lines of best fit) of scatter plots.			
	How can I determine a perpendicular or parallel relationship of a line?					

Unit	Essential Questions	Content	Skills	PA Core Standards	Activities	Assessment/ Evidence of Learning
Essentials of Algebra I (continued)	<p>How can I manipulate equations to solve a system of equations?</p> <p>What is the difference between solving systems of equations by elimination & substitution methods?</p> <p>How do I know where to shade when graphing systems of inequalities?</p>	<p>Systems of linear equations in two variables</p> <p>Systems of linear inequalities in two variables</p>	<p>Solve systems of linear equations in two variables by graphing</p> <p>Solve systems of linear equations in two variables by elimination</p> <p>Solve systems of linear equations in two variables by substitution</p> <p>Solve systems of linear inequalities in two variables by graphing</p>			
f(x) Notation & Special Functions	<p>How do I use f(x) notation to determine the value of the function using a graph?</p> <p>How do I use f(x) notation to determine the value of the function using an equation?</p>	<p>f(x) notation</p> <p>Operations with f(x) Notation</p> <p>Combination of Functions</p> <p>Absolute Value Equations</p> <p>Piecewise Functions</p>	<p>Finding function value from a graph, table, or equation</p> <p>Add, subtract, multiply, divide with f(x) notation</p> <p>Graph transformations of absolute value functions</p>	CC.2.1.HS.F.3	<p>Delta Math/Webwork</p> <p>Class Participation</p> <p>Discovery Activities</p> <p>Flipcharts/Google Slides</p>	<p>Webwork/Delta Math</p> <p>Homework Assignments</p> <p>Quizzes</p> <p>Special Functions & f(x) Notation Test</p>

Unit	Essential Questions	Content	Skills	PA Core Standards	Activities	Assessment/ Evidence of Learning
f(x) Notation & Special Functions (continued)	How do I use $f(x)$ notation to determine the combination of functions?	Step Functions	Graph piecewise functions with an input-output table Use step functions to model real world applications			
Quadratic Functions	How do I solve quadratic equations? What are the elements of a parabola? How do I determine which method to use for factoring?	Factoring Solving using square roots Complex numbers Quadratic Formula Discriminant Quadratic inequalities Modeling quadratic functions	Solve quadratic equations by factoring, taking square roots, and using quadratic formula Utilize the discriminant to determine # of real zeros Use the graphing calculator to find points of interest (vertex, zeros, y-intercepts, values of intersection, etc.) State domain and range	CC.2.1.HS.F.3 CC.2.1.HS.F.4 CC.2.1.HS.F.6 CC.2.1.HS.F.7 CC.2.2.HS.D.5 CC.2.2.HS.D.6 CC.2.2.HS.D.7 CC.2.2.HS.D.8 CC.2.2.HS.D.9 CC.2.2.HS.D.10 CC.2.2.HS.C.3 CC.2.2.HS.C.4 CC.2.2.HS.C.5	Delta Math/Webwork Class Participation Discovery Activities Flipcharts/Google Slides	Webwork/Delta Math Homework Assignments Quizzes Chapter 5 Test

Unit	Essential Questions	Content	Skills	PA Core Standards	Activities	Assessment/ Evidence of Learning
Radical Expressions & Complex Numbers	<p>What is a complex number?</p> <p>How can I use properties of radicals to simplify an expression?</p>	<p>Properties of Radicals Operations with Radicals</p> <p>Rationalizing the Denominator</p> <p>Complex Numbers</p>	<p>Use properties of radicals to simplify expressions</p> <p>Add, subtract, multiply & divide with radicals</p> <p>Using properties of radicals to rationalize the denominator</p> <p>Operations with complex numbers</p> <p>Solve radical equations</p>	<p>CC.2.1.HS.F.1 CC.2.1.HS.F.6 CC.2.1.HS.F.7 CC.2.2.HS.D.5 CC.2.2.HS.D.6 CC.2.2.HS.D.7 CC.2.2.HS.D.8 CC.2.2.HS.D.9 CC.2.2.HS.D.10 CC.2.2.HS.C.3</p>	<p>Delta Math/Webwork</p> <p>Class Participation Discovery Activities</p> <p>Flipcharts/Google Slides</p>	<p>Webwork/Delta Math</p> <p>Homework Assignments</p> <p>Radicals Quiz</p> <p>Test</p>
Rational Equations & Functions	<p>How can I determine the LCD of a rational equation?</p> <p>How can I use factoring to simplify rational functions?</p>	<p>Operations with rational functions</p> <p>Simplifying Rational Functions</p> <p>Complex Fractions</p>	<p>Using Common factors to simplify a rational expression</p> <p>Multiply & Dividing Rational Functions using common factors</p> <p>Adding and subtracting rational functions using least common denominator</p>	<p>CC.2.2.HS.D.1 CC.2.2.HS.D.2 CC.2.2.HS.D.3 CC.2.2.HS.D.4 CC.2.2.HS.D.5 CC.2.2.HS.D.6 CC.2.2.HS.D.7 CC.2.2.HS.D.8</p>	<p>Delta Math/Webwork</p> <p>Class Participation</p> <p>Discovery Activities</p> <p>Flipcharts/Google Slides</p>	<p>Webwork/Delta Math</p> <p>Homework Assignments</p> <p>Quizzes</p> <p>Test</p>

Unit	Essential Questions	Content	Skills	PA Core Standards	Activities	Assessment/ Evidence of Learning
Rational Equations & Functions (continued)			Solve rational equations	CC.2.2.HS.D.9 CC.2.2.HS.D.10		
Polynomial Functions	How can I find the zeros of a polynomial function algebraically / graphically? What are the exponent properties? And how can I use them to simplify?	Properties of exponents Evaluating and graphing polynomial functions Adding, subtracting, multiplying and dividing polynomials Factoring and solving polynomial equations Remainder and factor theorem Finding rational zeros Analyze graphs of polynomial functions Model with poly. functions	Simplify expressions using exponent rules Complete polynomial operations Graph polynomial functions Use the graphing calculator to find points of interest (local min/max, zeros, y-intercepts, values of intersection, etc.) Find zeros (algebraically and graphically) State domain and range	CC.2.1.HS.F.3 CC.2.2.HS.D.1 CC.2.2.HS.D.2 CC.2.2.HS.D.3 CC.2.2.HS.D.4 CC.2.2.HS.D.5 CC.2.2.HS.D.7 CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3 CC.2.2.HS.C.5 CC.2.2.HS.C.6	Delta Math/Webwork Class Participation Discovery Activities Flipcharts/Google Slides	Webwork/Delta Math Homework Assignments Quizzes Test

Unit	Essential Questions	Content	Skills	PA Core Standards	Activities	Assessment/ Evidence of Learning
Exponential and Logarithmic Functions	<p>What does it mean to be exponential?</p> <p>What is a logarithm?</p> <p>What are the properties of logarithms?</p> <p>What is the relationship between logarithms and exponential functions?</p> <p>Can I solve logarithmic and exponential equations?</p>	<p>Exponential functions</p> <p>The number e</p> <p>Inverse functions</p> <p>Logarithmic functions</p> <p>Properties of logarithms</p> <p>Solving exponential and logarithmic equations</p> <p>Natural logarithms</p>	<p>Use logarithmic properties to simplify expressions</p> <p>Condense and expand logarithms</p> <p>Graph exponential and logarithmic equations</p> <p>Solve exponential and logarithmic equations</p>	<p>CC.2.1.HS.F.1</p> <p>CC.2.2.HS.D.2</p> <p>CC.2.2.HS.D.5</p> <p>CC.2.2.HS.D.7</p> <p>CC.2.2.HS.D.8</p> <p>CC.2.2.HS.D.9</p> <p>CC.2.2.HS.D.10</p> <p>CC.2.2.HS.C.2</p> <p>CC.2.2.HS.C.3</p> <p>CC.2.2.HS.C.4</p> <p>CC.2.2.HS.C.5</p> <p>CC.2.2.HS.C.6</p>	<p>Delta Math/Webwork</p> <p>Class Participation</p> <p>Discovery Activities</p> <p>Flipcharts/Google Slides</p>	<p>Webwork/Delta Math</p> <p>Homework Assignments</p> <p>Quizzes</p> <p>Test</p>
Conic Sections	<p>What are the conic sections?</p> <p>How can I determine the conics from equations and graphs?</p>	<p>Parabolas</p> <p>Circles</p> <p>Ellipses</p> <p>Hyperbolas</p> <p>Identifying conic sections</p>	<p>Write and graph equations of circles</p> <p>Using characteristics to identify conics</p>	<p>CC.2.3.HS.A.10</p>	<p>Delta Math/Webwork</p> <p>Class Participation</p> <p>Discovery Activities</p> <p>Flipcharts/Google Slides</p>	<p>Webwork/Delta Math</p> <p>Homework Assignments</p> <p>Quiz</p>

Unit	Essential Questions	Content	Skills	PA Core Standards	Activities	Assessment/ Evidence of Learning
Probability	How can you find the probability of events and combinations of events?	Probability Odds Combinations	Use combinations, permutations, and the fundamental counting principle to solve problems involving probability	CC.2.4.HS.B.4 CC.2.4.HS.B.5 CC.2.4.HS.B.6	Delta Math/Webwork Class Participation	Webwork/Delta Math Homework Assignments
	How are conditional probability and independence related?	Permutations Fundamental Counting Principle	Use odds to find probability and/or use probability to find odds	CC.2.4.HS.B.7	Discovery Activities Flipcharts/Google Slides	Quiz
	How are combinations and permutations useful when finding probabilities?	Independent, Dependent, and Compound Events	Use probability for independent, dependent, or compound events to predict outcomes			
	How are odds and probabilities related?					

Portrait of an Abington Heights Mathematician



By the end of Algebra II, students will:

Patterns, Relations, and Functions	Applications of Functions	Operations with Complex Numbers	Non-Linear Expressions	Non-Linear Equations	Data Analysis
<ul style="list-style-type: none"> <input type="checkbox"/> Analyze a set of data for the existence of a pattern, and represent the pattern with a rule algebraically and/or graphically <input type="checkbox"/> Determine the domain, range, or inverse of a relation <input type="checkbox"/> Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g. intercepts, zeros) 	<ul style="list-style-type: none"> <input type="checkbox"/> Create, interpret, and/or use the equation, graph, or table of quadratic, absolute value, piecewise, and step functions <input type="checkbox"/> Determine, use, and/or interpret minimum and maximum values over a specified interval of a graph of quadratic, absolute value, piecewise, or step functions <input type="checkbox"/> Translate a quadratic, absolute value, piecewise, and step function from one representation of a function to another (graph, table, and equation) 	<ul style="list-style-type: none"> <input type="checkbox"/> Simplify/write square roots in terms of i <input type="checkbox"/> Simplify/evaluate expressions involving powers of i <input type="checkbox"/> Add and subtract complex numbers <input type="checkbox"/> Multiply and divide complex numbers 	<ul style="list-style-type: none"> <input type="checkbox"/> Use exponential expressions to represent rational numbers <input type="checkbox"/> Simplify/evaluate expressions involving positive and negative exponents and/or roots <input type="checkbox"/> Simplify/evaluate expressions involving multiplying with exponents, powers of powers, and powers of products <input type="checkbox"/> Simplify or evaluate expressions involving logarithms and exponents <input type="checkbox"/> Factor algebraic expressions, including difference of squares and trinomials <input type="checkbox"/> Simplify rational algebraic expressions 	<ul style="list-style-type: none"> <input type="checkbox"/> Write and/or solve quadratic equations (including factoring and using Quadratic Formula) <input type="checkbox"/> Solve equations involving rational and radical expressions <input type="checkbox"/> Write and/or solve a simple exponential or logarithmic equation <input type="checkbox"/> Use algebra processes to solve a formula for a given variable <input type="checkbox"/> Identify or describe the effect of changing parameters within a family of functions 	<ul style="list-style-type: none"> <input type="checkbox"/> Draw, identify, find, interpret, and/or write an equation and make predictions for a linear regression model for a scatter plot <input type="checkbox"/> Use combinations, permutations, and the fundamental counting principle to solve problems involving probability <input type="checkbox"/> Use odds to find probability and/or use probability to find odds <input type="checkbox"/> Use probability for independent, dependent, or compound events to predict outcomes