

# Catasauqua Area School District Planned Course of Study

**Course Title:** Algebra 1

**Grade Level(s):** 8

**Text:** enVision AGA Algebra I

## **Course Description**

The main goal of this course is to provide students with a rigorous and in depth understanding of the major concepts in Algebra 1, including rational and irrational numbers, the real number system, equations and inequalities, polynomials and rational expressions, patterns, relations and functions, categorical and quantitative data, and probability. These topics will be taught at an accelerated pace with a heavy emphasis on real-world applications. All course concepts will be covered in the following nine units: solving equations and inequalities, linear equations, linear functions, systems of linear equations and inequalities, exponents and exponential functions, polynomials and factoring, quadratic functions, working with functions, and statistics. Upon completion of the course, students will have a strong foundation of algebraic knowledge that they can apply in a wide array of mathematical situations.

## **Essential Questions & Competencies**

### **Essential Questions**

- How is mathematics used to quantify, compare, represent, and model numbers?
- How can mathematics support effective communication?
- How are relationships represented mathematically?
- What does it mean to estimate or analyze numerical quantities?
- How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?
- What makes a tool and/or strategy appropriate for a given task?
- How can patterns be used to describe relationships in mathematical situations?
- How can data be organized to provide insight into the relationships between quantities?
- How does the type of data influence the choice of display?
- How can probability and data analysis be used to make predictions?

- In what ways are the mathematical attributes of objects or processes measured, calculated, and/or interpreted?

- How precise do measurements and calculations need to be?

- How can recognizing repetition or regularity assist in solving problems more efficiently?

### **Competencies**

- Represent and/or use numbers in equivalent forms (integers, fractions, decimals, percents, square roots, exponents)

- Apply and extend the properties of exponents to solve problems with rational exponents.

- Apply number theory concepts to show relationships between real numbers in problem-solving settings.

- Use exponents, roots, and/or absolute values to solve problems.

- Interpret solutions to linear equations and inequalities.

- Interpret solutions to linear systems of equations and inequalities.

- Simplify/factor expressions involving polynomials.

- Use polynomial identities.

- Perform arithmetic operations on polynomials.

- Apply and extend previous understandings of arithmetic to algebraic expressions.

- Write, solve, and/or graph linear equations and inequalities using various methods.

- Write, solve, and/or graph systems of linear equations and inequalities using various methods.

- Use and/or identify algebraic properties.

- Understand and apply the Pythagorean Theorem.

- Write, solve, and/or graph compound inequalities.

- Write and/or identify linear equations in various forms (slope-intercept, point-slope, standard, etc.).

- Describe, compute, and/or use linear rate of change (slope).

- Define, evaluate, and compare functions.

- Use the concept and notation of function to interpret and apply them in terms of their context.

- Construct and compare linear, quadratic, and exponential models and solve problems.

- Create a function and/or sequence that models relationships between two quantities.

- Create and/or analyze functions using multiple representations (graph, table, and equation).

- Create new functions from existing functions (transformations of graphs).

- Analyze a set of data for a pattern, and represent the pattern with an algebraic rule and/or a graph.

- Summarize, represent, and interpret single-variable data and two-variable data.
- Use measures of dispersion to describe a set of data (range, quartiles, interquartile range).
- Analyze and/or interpret data displays and/or use them to make predictions (circle graph, line graph, bar graph, box-and-whisker plot, stem-and-leaf plot, scatter plot).
- Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.
- Calculate and/or make predictions based on measures of central tendency.
- Apply probability to practical situations, including compound events.
- Recognize and evaluate random processes underlying statistical experiments
- Apply the rules of probability to compute probabilities of compound events in a uniform probability model.

### **Career Awareness, Career Education, & Focus on Employability Skills**

Students will develop problem-solving and critical-thinking skills throughout the course. Embedded in all units are activities and instructional strategies to improve and promote these skills. Students are regularly expected to provide evidence for their reasoning and an explanation of their thinking. Critical thinking skills and peer collaboration will be frequently utilized in regular partner and small group activities, which will occur at least a few times a week. Daily class discussions will continue to develop further students' critical thinking abilities along with their communication skills.

Students will continue to improve upon their professionalism by working on their time management skills. For every unit, students will have a STEM project that they will need to complete. For this project, students will improve their professionalism by appropriately allocating enough time to complete each section and meeting the assigned due dates. These projects will also expose students to the application of mathematics in different professional fields. This career exposure will be extended by additional supplemental activities and projects for each unit.

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## Course Syllabus

Course Content	Tentative Timeframe	Assessment Anchors	State Standards
Unit 1: Solving Equations and Inequalities	August - September	A1.1.1.1.1 A1.1.1.1.2 A1.1.1.3.1 A1.1.2.1.1 A1.1.2.1.2 A1.1.2.1.3 A2.1.3.2.2 A1.1.3.1.1 A1.1.3.1.2 A1.1.3.1.3	CC.2.1.HS.F.1 CC.2.1.HS.F.2 CC.2.1.HS.F.3 CC.2.1.HS.F.4 CC.2.1.HS.F.5 CC.2.2.HS.C.3 CC.2.2.HS.D.8 CC.2.2.HS.D.9 CC.2.2.HS.D.10
Unit 2: Linear Equations	October	A1.2.2.1.1 A1.2.2.1.2 A1.2.2.1.3 A1.2.2.1.4 A2.1.3.2.2 A1.2.1.2.1 A1.2.1.2.2 A1.1.2.1.1 A1.1.2.1.2 A1.1.2.1.3	CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3 CC.2.2.HS.C.6 CC.2.2.HS.D.7 CC.2.2.HS.D.8
Unit 3: Linear Functions	October - November	A1.2.2.1.2 A1.2.2.1.3 A2.2.1.1.3 A1.2.1.1.1 A1.2.1.1.2 A1.2.1.1.3 A1.2.1.2.1 A1.2.1.2.2 A2.2.2.2.1 A1.2.2.1.1 A1.2.2.1.4 A2.2.1.1.1 A2.2.1.1.2 A1.2.2.2.1 A2.2.3.1.1 A2.2.3.1.2 A1.2.3.1.1 A1.2.3.2.2 A1.2.3.2.3	CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3 CC.2.2.HS.C.4 CC.2.2.HS.C.6 CC.2.1.HS.F.3 CC.2.1.HS.F.4 CC.2.1.HS.F.5 CC.2.4.HS.B.1 CC.2.4.HS.B.2 CC.2.4.HS.B.3

Unit 4: Systems of Linear Equations and Inequalities	December	A1.1.2.2.1 A1.2.1.2.1 A1.2.1.2.2 A1.2.2.1.4 A2.1.3.2.2 A1.1.2.1.1 A1.1.2.1.2 A1.1.2.2.2 A2.1.3.2.1 A1.1.2.1.3 A1.1.3.1.3 A1.1.3.2.1 A1.1.3.2.2	CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3 CC.2.2.HS.C.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.2.1.HS.F.5
Unit 5: Exponents and Exponential Functions	January	A1.1.1.1.2 A1.1.1.3.1 A2.1.2.1.1 A2.1.2.1.2 A2.1.2.1.3 A2.2.2.1.2 A2.2.2.1.3 A2.2.2.1.4 A2.2.1.1.1 A2.2.1.1.2 A2.2.1.1.4 A2.2.2.1.2 A2.2.2.1.3 A2.2.2.1.4 A2.2.2.2.1 A2.1.3.1.2 A2.1.3.1.3 A2.1.3.1.4	CC.2.1.HS.F.1 CC.2.1.HS.F.2 CC.2.1.HS.F.3 CC.2.1.HS.F.4 CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3 CC.2.2.HS.C.4 CC.2.2.HS.C.5 CC.2.2.HS.C.6 CC.2.2.HS.D.6 CC.2.2.HS.D.7 CC.2.2.HS.D.8 CC.2.2.HS.D.9
Unit 6: Polynomials and Factoring	February	A2.1.2.1.1 A2.1.2.1.2 A2.1.2.1.3 A1.1.1.3.1 A2.2.2.1.1 A1.1.1.2.1 A1.1.1.5.1 A1.1.1.5.2 A1.1.1.5.3 A2.1.2.2.1 A2.1.2.2.2	CC.2.1.HS.F.1 CC.2.1.HS.F.2 CC.2.2.HS.D.1 CC.2.2.HS.D.2 CC.2.2.HS.D.3 CC.2.2.HS.D.5 CC.2.2.HS.D.6
Unit 7: Quadratic Functions	March	A1.1.1.2.1 A1.1.1.5.2 A2.1.2.2.1 A2.1.2.2.2	CC.2.1.HS.F.1 CC.2.1.HS.F.2 CC.2.1.HS.F.3 CC.2.1.HS.F.4

		A2.1.3.1.1 A2.1.3.1.2 A2.1.3.2.2 A2.2.1.1.4 A2.2.2.1.1 A2.2.2.1.3 A2.2.2.1.4 A2.2.2.2.1 A2.2.2.1.3	CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3 CC.2.2.HS.C.4 CC.2.2.HS.C.5 CC.2.2.HS.C.6 CC.2.2.HS.D.1 CC.2.2.HS.D.2 CC.2.2.HS.D.3 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
Unit 8: Working with Functions	April - May	A1.2.2.1.1 A1.2.2.1.2 A2.2.2.2.1 A2.2.2.1.1 A1.2.1.1.3 A2.2.2.1.3 A2.2.2.1.4 A2.2.1.1.4 A2.2.1.1.3	CC.2.1.HS.F.3 CC.2.1.HS.F.4 CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3 CC.2.2.HS.C.4 CC.2.2.HS.C.5 CC.2.2.HS.C.6 CC.2.2.HS.D.7
Unit 9: Statistics	May - June	A1.2.3.1.1 A1.2.3.2.1 A1.2.3.2.2 A1.2.1.1.1	CC.2.4.HS.B.1 CC.2.4.HS.B.2 CC.2.4.HS.B.3 CC.2.4.HS.B.5

### Teaching Strategies Utilized

Direct Instruction  
 Guided Notes/Practice  
 Independent Practice  
 Class Discussion  
 PreAssessment  
 Formative Assessment  
 Summative Assessment  
 Individualized Instruction  
 Homework  
 Simulations  
 Calculator Demonstrations  
 Cooperative Learning  
 Station Rotations  
 Peer/Teacher Tutoring  
 Whiteboard with Teacher/Student Explanation

Student Companion Workbook  
Supplemental Learning Activities  
Games/Competitions  
iPad applications  
Interactive Math Workbook  
STEM Projects  
Supplemental videos and tutorials  
Enrichment Activities  
Diagnostic Assessments

**Catasauqua Area School District**

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**Grade Level:** 8

Objectives	Level of Ach.	Suggested Learning Activities	Forms of Assessment	Assess. Anchor	PA Stand.
<p><b>Solving Linear Equations &amp; Inequalities</b></p> <p><i>The student will be able to:</i></p> <p><i>Find the sum or product of two rational numbers and explain why the sum or product is rational.</i></p> <p><i>Find the sum or product of rational and irrational numbers and explain when the sum or product is irrational.</i></p> <p><i>Create and solve linear equations with one variable using the properties of equality.</i></p> <p><i>Use the properties of equality to solve linear equations with a variable on both sides.</i></p> <p><i>Identify whether linear equations have one solution, infinitely many solutions, or no solution.</i></p> <p><i>Rearrange formulas and equations to highlight a quantity of interest by isolating the variable using the same reasoning used to solve equations.</i></p> <p><i>Create and solve inequalities in one variable.</i></p> <p><i>Interpret solutions to inequalities within the context.</i></p> <p><i>Identify inequalities as true or false based on the number of solutions.</i></p> <p><i>Create and solve a compound inequality.</i></p> <p><i>Interpret the solution to a compound inequality within a modeling context</i></p> <p><i>Solve absolute value equations and inequalities.</i></p> <p><i>Use absolute value equations and inequalities to solve problems.</i></p>	<p>K, AP, M</p> <p>K, AP, M</p> <p>K, AP, M</p> <p>K, AP, M</p> <p>K, AP, M</p> <p>K, AP, M</p> <p>K, AP, M</p> <p>AP, M, R</p> <p>K, AP, M</p> <p>K, AP, M</p> <p>AP, M, R</p> <p>K, AP, M</p> <p>AP, M, R</p>	<p>Guided notes</p> <p>Homework</p> <p>Independent work</p> <p>Peer/Group learning activities</p> <p>Stations</p> <p>Class Discussion</p> <p>Projects</p> <p>Peer/Teacher tutoring</p> <p>Content Reviews</p> <p>iPad applications</p> <p>Board Work with explanations</p> <p>Differentiated Remediation</p> <p>Individualized Instructions</p>	<p>Warm-ups</p> <p>Diagnostic Testing</p> <p>Class Participation</p> <p>Homework</p> <p>Board work</p> <p>Graded Activities</p> <p>Classwork</p> <p>Projects</p> <p>Quizzes</p> <p>Tests</p>	<p>A1.1.1.1.1</p> <p>A1.1.1.1.2</p> <p>A1.1.1.3.1</p> <p>A1.1.2.1.1</p> <p>A1.1.2.1.2</p> <p>A1.1.2.1.3</p> <p>A2.1.3.2.2</p> <p>A1.1.3.1.1</p> <p>A1.1.3.1.2</p> <p>A1.1.3.1.3</p>	<p>CC.2.1.HS.F.1</p> <p>CC.2.1.HS.F.2</p> <p>CC.2.1.HS.F.3</p> <p>CC.2.1.HS.F.4</p> <p>CC.2.1.HS.F.5</p> <p>CC.2.2.HS.C.3</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>
<b>Resources/Materials</b>					



EnVision Student Companion  
 EnVision Textbook  
 SAVVAS Realize Website  
 Exact Path  
 Video Tutorials  
 Calculators  
 iPad applications  
 Supplemental Worksheets and Resources  
 Classroom Diagnostic Tests (CDTs)

**Interdisciplinary Relationships & 21st Century Skills**

- STEM-based project integrated with the Next Generation Science Standards
- Each lesson includes an application-based section where real-world situations are applied to the lesson's content
- 3 Act Mathematical Modeling activity - integrates a real-world problem with a mathematically based solution

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<b>Linear Equations</b>					
<i>The student will be able to:</i>					
<i>Write linear equations in two variables using slope-intercept form to represent the relationship between two quantities.</i>	K, AP, M	Guided notes Homework	Warm-ups Diagnostic Testing	A1.2.2.1.1 A1.2.2.1.2	CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3 CC.2.2.HS.C.6
<i>Interpret the slope and the intercept of a linear model</i>	AP, M, R	Independent work Peer/Group learning activities	Class Participation	A1.2.2.1.3	CC.2.2.HS.D.7 CC.2.2.HS.D.8
<i>Write and graph linear equations in point-slope form.</i>	K, AP, M	Stations	Homework Board work	A1.2.2.1.4 A2.1.3.2.2	
<i>Analyze different forms of a line to interpret the slope and y -intercept of a linear model in the context of data.</i>	AP, M, R	Class Discussion Projects	Graded Activities	A1.2.1.2.1	
<i>Write and graph linear equations in standard form.</i>	K, AP, M	Peer/Teacher tutoring	Classwork Projects	A1.2.1.2.2	
<i>Use linear equations in standard form to interpret the x - and y -intercepts in the context of given data.</i>	AP, M, R	Content Reviews iPad applications	Quizzes Tests	A1.1.2.1.1 A1.1.2.1.2	
<i>Write equations to represent lines that are parallel or perpendicular to a given line.</i>	K, AP, M	Board Work with explanations			
<i>Graph lines to show an understanding of the relationship between the slopes of parallel and perpendicular lines.</i>	K, AP, M	Differentiated Remediation			
<i>Solve real-world problems that involve parallel or perpendicular lines.</i>	AP, M, R	Individualized Instructions		A1.1.2.1.3	

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**Resources/Materials**

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<b>Linear Functions</b>					
<i>The student will be able to:</i>					
<i>Understand that a relation is a function if each element of the domain is assigned to exactly one element in the range.</i>	K, AP, M	Guided notes Homework	Warm-ups Diagnostic Testing	A1.2.2.1.2 A1.2.2.1.3	CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3 CC.2.2.HS.C.4 CC.2.2.HS.C.6
<i>Determine a reasonable domain and identify constraints on the domain based on the context of a real-world problem.</i>	AP, M, R	Independent work Peer/Group learning activities	Class Participation	A2.2.1.1.3	CC.2.1.HS.F.3 CC.2.1.HS.F.4 CC.2.1.HS.F.5
<i>Write and evaluate linear functions using function notation.</i>	K, AP, M	Stations	Homework	A1.2.1.1.1	CC.2.4.HS.B.1 CC.2.4.HS.B.2 CC.2.4.HS.B.3
<i>Graph a linear function and relate the domain of a function to its graph.</i>	K, AP, M	Class Discussion Projects	Board work Graded Activities	A1.2.1.1.2 A1.2.1.1.3	
<i>Interpret functions represented by graphs, tables, verbal descriptions, and function notation in terms of a context</i>	AP, M, R	Peer/Teacher tutoring Content Reviews	Classwork Projects	A1.2.1.2.1 A1.2.1.2.2	
<i>Graph transformations of linear functions by multiplying or adding specific values of k to the input or output of a function.</i>	K, AP, M	iPad applications	Quizzes	A2.2.2.2.1	
<i>Interpret the key features of the graph of a linear function and use them to write the function that the graph represents.</i>	K, AP, M	Board Work with explanations Differentiated Remediation	Tests	A1.2.2.1.1 A1.2.2.1.4	
<i>Write arithmetic and geometric sequences both recursively and with an explicit formula.</i>	K, AP, M	Individualized Instructions		A2.2.1.1.1	
<i>Use explicit formulas and recursive formulas to model real-world situations.</i>	AP, M, R			A2.2.1.1.2	
<i>Fit a function to linear data shown in a scatter plot and use fitted functions to solve problems in the context of the data.</i>	K, AP, M			A1.2.2.2.1 A2.2.3.1.1	
<i>Interpret the slope of a trend line within the context of data.</i>	AP, M, R			A2.2.3.1.2 A1.2.3.1.1 A1.2.3.2.2 A1.2.3.2.3	
<b>Resources/Materials</b>					

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<p><b>Systems of Linear Equations and Inequalities</b></p> <p><i>The student will be able to:</i></p> <p><i>Graph systems of linear equations in two variables to find an approximate solution.</i></p> <p><i>Write a system of linear equations in two variables to represent real-world problems.</i></p> <p><i>Use the substitution method to solve systems of equations.</i></p> <p><i>Represent situations as systems of equations and interpret solutions as viable/nonviable options for the situation</i></p> <p><i>Solve systems of linear equations by elimination and prove that the sum of one equation and a multiple of the other produces a system with the same solutions as the original system.</i></p> <p><i>Represent constraints with a system of equations in a modeling context.</i></p> <p><i>Graph solutions to linear inequalities in two variables.</i></p> <p><i>Represent constraints with inequalities and interpret solutions as viable or nonviable options in a modeling context.</i></p> <p><i>Graph the solution set of a system of linear inequalities in two variables.</i></p> <p><i>Interpret solutions of linear inequalities in a modeling context.</i></p>	<p>K, AP, M</p> <p>AP, M, R</p> <p>K, AP, M</p> <p>AP, M, R</p> <p>K, AP, M</p> <p>AP, M, R</p> <p>K, AP, M</p> <p>AP, M, R</p> <p>K, AP, M</p> <p>AP, M, R</p>	<p>Guided notes</p> <p>Homework</p> <p>Independent work</p> <p>Peer/Group learning activities</p> <p>Stations</p> <p>Class Discussion</p> <p>Projects</p> <p>Peer/Teacher tutoring</p> <p>Content Reviews</p> <p>iPad applications</p> <p>Board Work with explanations</p> <p>Differentiated Remediation</p> <p>Individualized Instructions</p>	<p>Warm-ups</p> <p>Diagnostic Testing</p> <p>Class Participation</p> <p>Homework</p> <p>Board work</p> <p>Graded Activities</p> <p>Classwork</p> <p>Projects</p> <p>Quizzes</p> <p>Tests</p>	<p>A1.1.2.2.1 A1.2.1.2.1</p> <p>A1.2.1.2.2</p> <p>A1.2.2.1.4</p> <p>A2.1.3.2.2 A1.1.2.1.1</p> <p>A1.1.2.1.2</p> <p>A1.1.2.2.2</p> <p>A2.1.3.2.1</p> <p>A1.1.2.1.3</p> <p>A1.1.3.1.3</p> <p>A1.1.3.2.1</p> <p>A1.1.3.2.2</p>	<p>CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3 CC.2.2.HS.C.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.2.1.HS.F.5</p>
<b>Resources/Materials</b>					
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<b>Exponents and Exponential Functions</b>					
<i>The student will be able to:</i>					
<i>Extend the properties of integer exponents to rational exponents to rewrite radical expressions using rational exponents.</i>	K, AP, M	Guided notes	Warm-ups	A2.1.2.1.1	CC.2.1.HS.F.1 CC.2.1.HS.F.2
		Homework	Diagnostic Testing	A2.1.2.1.2	CC.2.1.HS.F.3 CC.2.1.HS.F.4
		Independent work		A2.1.2.1.3	CC.2.2.HS.C.1
<i>Solve equations with rational exponents using the properties of exponents.</i>	K, AP, M	Peer/Group learning activities	Class Participation	A1.1.1.3.1	CC.2.2.HS.C.2 CC.2.2.HS.C.3 CC.2.2.HS.C.4
		Stations	Homework		CC.2.2.HS.C.5
<i>Use properties of exponents to rewrite radical expressions.</i>	K, AP, M			A1.1.1.1.2	CC.2.2.HS.C.6
		Class Discussion	Board work		CC.2.2.HS.D.6
<i>Multiply radical expressions.</i>	K, AP, M			A2.1.3.1.2	CC.2.2.HS.D.7
		Projects	Graded Activities	A2.2.2.1.2	CC.2.2.HS.D.8 CC.2.2.HS.D.9
<i>Write a radical expression to model or represent a real-world problem.</i>	AP, M, R	Peer/Teacher tutoring	Classwork	A2.2.2.1.2	
		Content Reviews	Projects	A2.2.2.1.3	
<i>Sketch graphs showing key features of exponential functions.</i>	K, AP, M	iPad applications	Quizzes	A2.2.2.1.4	
		Board Work with explanations	Tests		
<i>Write exponential functions using tables and graphs.</i>	K, AP, M				
<i>Compare linear and exponential functions.</i>	K, AP, M				
		Differentiated Remediation		A2.1.3.1.4	
<i>Construct exponential growth and decay functions given a description of a relationship.</i>	K, AP, M			A2.1.3.1.3	
		Individualized Instructions		A2.2.2.1.3	
<i>Recognize if a situation can be modeled with exponential growth or exponential decay, and interpret the parameters of the model in context.</i>	AP, M, R			A2.2.1.1.1	
				A2.2.1.1.2	
<i>Find explicit and recursive formulas for geometric sequences.</i>	K, AP, M				
				A2.2.2.2.1	
<i>Translate the graph of an exponential function vertically and horizontally, identifying the effect different values of h and k have on the graph of the function.</i>	K, AP, M				
				A2.2.1.1.4	
<i>Compare characteristics of two exponential functions represented in different ways, such as tables and graphs.</i>	K, AP, M			A2.2.2.1.4	

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## Interdisciplinary Relationships & 21st Century Skills

- STEM-based project integrated with the Next Generation Science Standards
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**Catasauqua Area School District**  
**Course Title: Algebra 1**  
**Grade Level: 8**

Objectives	Level of Ach.	Suggested Learning Activities	Forms of Assessment	Assess. Anchor	PA Stand.
<b>Polynomials and Factoring</b>					
<i>The student will be able to:</i>					
<i>Identify the parts of a polynomial, such as coefficients, variables, and constants.</i>	K, AP, M	Guided notes	Warm-ups	A2.1.2.1.1	CC.2.1.HS.F.1 CC.2.1.HS.F.2
<i>Classify polynomials by number of terms and by degree.</i>	K, AP, M	Homework	Diagnostic Testing	A2.1.2.1.2	CC.2.2.HS.D.1 CC.2.2.HS.D.2 CC.2.2.HS.D.3 CC.2.2.HS.D.5 CC.2.2.HS.D.6
<i>Write a polynomial in standard form.</i>	K, AP, M	Independent work	Class Participation		
<i>Add or subtract two polynomials and recognize that polynomials are closed under addition and subtraction, just as the integers are</i>	K, AP, M	Peer/Group learning activities	Homework		
<i>Use the Distributive Property with polynomials, recognizing that polynomials are closed under multiplication.</i>	K, AP, M	Stations	Board work	A2.1.2.1.3 A1.1.1.5.1	
<i>Multiply polynomials using a table and an area model.</i>	K, AP, M	Class Discussion	Graded Activities		
<i>Apply the product of polynomials to solve real-world problems.</i>	K, AP, M	Projects	Classwork		
<i>Determine the square of a binomial.</i>	K, AP, M	Peer/Teacher tutoring	Projects	A1.1.1.3.1	
<i>Find the product of a sum and difference of two squares.</i>	AP, M, R	Content Reviews	Quizzes		
<i>Solve real-world problems involving the square of a binomial.</i>	AP, M, R	iPad applications	Tests		
<i>Find the greatest common factor of the terms of a polynomial.</i>	K, AP, M	Board Work with explanations			
<i>Use the structure of a polynomial and the understanding that polynomials form a system similar to integers to rewrite it in factored form.</i>	K, AP, M	Differentiated Remediation		A1.1.1.5.3	
<i>Factor polynomials that represent real-world problems.</i>	AP, M, R	Individualized Instructions			
<i>Factor a trinomial in the form <math>x^2 + bx + c</math> by finding two binomial factors whose product is equal to the trinomial.</i>	K, AP, M			A1.1.1.2.1	
<i>Factor trinomials in the context of solving real-world problems.</i>	AP, M, R				
				A1.1.1.5.2	

Identify the common factor of the coefficients in the terms of a trinomial expression when $a \neq 1$ .	K, AP, M				
Write a quadratic trinomial as a product of two binomial factors.	K, AP, M				
Identify and factor a trinomial that is a perfect square or a binomial that is a difference of two squares.	K, AP, M			A2.1.2.2.1	
Use a polynomial to represent a measurement in a real-world situation and describe how a factored form of the polynomial relates to that situation.	AP, M, R			A2.1.2.2.2	

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**Course Title:** Algebra 1

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<b>Quadratic Functions</b>					
<i>The student will be able to:</i>					
<i>Identify key features of the graph of a quadratic function using graphs, tables, and equations.</i>	K, AP, M	Guided notes Homework	Warm-ups Diagnostic Testing	A2.2.2.1.1 A2.2.2.2.1	CC.2.1.HS.F.1 CC.2.1.HS.F.2 CC.2.1.HS.F.3 CC.2.1.HS.F.4
<i>Explain the effect of the value of a on the quadratic parent function.</i>	K, AP, M	Independent work	Class Participation		CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3 CC.2.2.HS.C.4
<i>Graph quadratic functions in vertex form.</i>	K, AP, M	Peer/Group learning activities	Homework	A2.2.2.1.3	CC.2.2.HS.C.5 CC.2.2.HS.C.6
<i>Graph quadratic functions in standard form and show intercepts, maxima, and minima</i>	K, AP, M	Stations	Board work		CC.2.2.HS.D.1
<i>Compare properties of quadratic functions presented in different forms (algebraically, in a table, graphically)</i>	K, AP, M	Class Discussion Projects	Graded Activities	A2.2.2.1.4 A2.1.3.2.2	CC.2.2.HS.D.2 CC.2.2.HS.D.3 CC.2.2.HS.D.5 CC.2.2.HS.D.6
<i>Use quadratic functions fitted to data to model real-world situations.</i>	AP, M, R	Peer/Teacher tutoring	Classwork Projects		CC.2.2.HS.D.7 CC.2.2.HS.D.8 CC.2.2.HS.D.9
<i>Use a graph to identify the x-intercepts as solutions of a quadratic equation.</i>	K, AP, M	Content Reviews iPad applications	Quizzes	A2.2.1.1.4	CC.2.2.HS.D.10
<i>Use a graphing calculator to make a table of values to approximate or solve a quadratic equation.</i>	K, AP, M	Board Work with explanations	Tests		
<i>Use the Zero-Product Property and factoring to find the solutions of a quadratic equation.</i>	K, AP, M	Differentiated Remediation		A1.1.1.5.2 A2.1.2.2.1	
<i>Apply factoring to solve real-world problems.</i>	AP, M, R	Individualized Instructions		A1.1.1.2.1	
<i>Solve quadratic equations by finding square roots.</i>	K, AP, M			A2.1.3.1.2	
<i>Solve a quadratic trinomial by completing the square to transform a quadratic equation into a perfect square trinomial</i>	K, AP, M				
<i>Solve quadratic equations in one variable by using the quadratic formula.</i>	K, AP, M			A2.1.3.1.1	
<i>Use the discriminant to determine the number and type of solutions to a quadratic equation.</i>	K, AP, M				
<b>Resources/Materials</b>					

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**Course Title: Algebra 1**  
**Grade Level: 8**

<b>Objectives</b>	<b>Level of Ach.</b>	<b>Suggested Learning Activities</b>	<b>Forms of Assessment</b>	<b>Assess. Anchor</b>	<b>PA Stand.</b>
<b>Working with Functions</b>					
<i>The student will be able to:</i>					
<i>Graph an absolute value function and identify the key features of the graph.</i>	K, AP, M	Guided notes Homework	Warm-ups Diagnostic Testing	A1.2.2.1.1 A1.2.2.1.2	CC.2.1.HS.F.3 CC.2.1.HS.F.4 CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3
<i>Calculate and interpret the rate of change of an absolute value function over a specified interval.</i>	AP, M, R	Independent work Peer/Group learning activities	Class Participation	A2.2.2.2.1	CC.2.2.HS.C.4 CC.2.2.HS.C.5 CC.2.2.HS.C.6
<i>Graph translations of the square root function.</i>	K, AP, M	Stations	Homework		
<i>Calculate and interpret the average rate of change for a square root function over a specified interval</i>	AP, M, R	Class Discussion	Board work	A2.2.2.1.1	CC.2.2.HS.D.7
<i>Identify key features of the graph of cube root functions and graph translations of them</i>	K, AP, M	Projects Peer/Teacher tutoring	Graded Activities Classwork		
<i>Model real-world situations using cube root functions</i>	AP, M, R	Content Reviews	Projects	A1.2.1.1.3	
<i>Relate the domain and range of a function to its graph.</i>	K, AP, M	iPad applications	Quizzes		
<i>Analyze the key features of the graph of a function—including the domain, range, maximum and minimum values, axis of symmetry, and end behavior—to identify the type of function it represents</i>	K, AP, M	Board Work with explanations	Tests	A2.2.2.1.3	
<i>Graph translations of absolute value, exponential, quadratic, and radical functions.</i>	K, AP, M	Differentiated Remediation		A2.2.2.1.4	
<i>Determine how combining translations affects the key features of the graph of a function</i>	K, AP, M	Individualized Instructions		A2.2.2.2.1	
<i>Combine functions using arithmetic operations, including addition, subtraction, and multiplication.</i>	K, AP, M			A2.2.1.1.4	
<i>Combine functions to solve real-world problems.</i>	AP, M, R				
<i>Write an equation for the inverse of a linear function.</i>	K, AP, M			A2.2.1.1.3	
<b>Resources/Materials</b>					

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**Catasauqua Area School District**

**Course Title:** Algebra 1

**Grade Level:** 8

<b>Objectives</b>	<b>Level of Ach.</b>	<b>Suggested Learning Activities</b>	<b>Forms of Assessment</b>	<b>Assess. Anchor</b>	<b>PA Stand.</b>
<p><b>Statistics</b></p> <p><i>The student will be able to:</i></p> <p><i>Represent data using dot plots, box plots, and histograms.</i></p> <p><i>Interpret the data displayed in dot plots, box plots, and histograms within the context it represents.</i></p> <p><i>Use measures of center to interpret and compare data sets displayed in dot plots, box plots, and histograms.</i></p> <p><i>Interpret differences in the variability or spread in the context of a data set.</i></p> <p><i>Calculate the standard deviation of a data set and use it to compare and interpret data sets.</i></p> <p><i>Organize and summarize categorical data by creating two-way frequency tables.</i></p> <p><i>Calculate and interpret joint and marginal frequencies, joint and marginal relative frequencies and conditional relative frequencies, and use them to make inferences about a population.</i></p>	<p>K, AP, M</p> <p>AP, M, R</p> <p>K, AP, M</p> <p>AP, M, R</p> <p>AP, M, R</p> <p>K, AP, M</p> <p>AP, M, R</p>	<p>Guided notes</p> <p>Homework</p> <p>Independent work</p> <p>Peer/Group learning activities</p> <p>Stations</p> <p>Class Discussion</p> <p>Projects</p> <p>Peer/Teacher tutoring</p> <p>Content Reviews</p> <p>iPad applications</p> <p>Board Work with explanations</p> <p>Differentiated Remediation</p> <p>Individualized Instructions</p>	<p>Warm-ups</p> <p>Diagnostic Testing</p> <p>Class Participation</p> <p>Homework</p> <p>Board work</p> <p>Graded Activities</p> <p>Classwork</p> <p>Projects</p> <p>Quizzes</p> <p>Tests</p>	<p>A1.2.3.1.1</p> <p>A1.2.3.2.1</p> <p>A1.2.3.2.2</p> <p>A1.2.1.1.1</p>	<p>CC.2.4.HS.B.1</p> <p>CC.2.4.HS.B.2</p> <p>CC.2.4.HS.B.3</p> <p>CC.2.4.HS.B.5</p>

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