

## Algebra 1 - Year 3

### Course Description

Algebra 1 in the eighth grade integrates the NC Standard Course of Study and the MYP prescribed framework of number, algebra, geometry, statistics and probability, and discrete mathematics into a thematic organization of seven units of study. Algebra 1 builds upon the knowledge and skills gained in Pre – Algebra, and also includes operations with polynomials and matrices, creation and application of linear functions and relations, algebraic representations of geometric relationships, and an introduction to nonlinear functions. Integral to each unit are investigations, reflections, or projects designed to highlight the areas of interaction central to the unit and to give the student the opportunity to apply their mathematical knowledge to a number of real life experiences. Class discussions encourage students to explain their thought processes, explore appropriate problem solving strategies, and discover alternate solutions, all of which will contribute to the successful completion of the personal project. Technology is used to explore, research, and present data. Algebra 1 prepares students for the North Carolina End-of-Course exam for Algebra 1.

### Aims

The aims of the teaching and study of mathematics are to encourage and enable the student to:

- Develop a positive attitude toward the continued learning of mathematics
- Appreciate the usefulness, power and beauty of mathematics, and recognize its relationship with other disciplines and with everyday life
- Appreciate the international dimensions of mathematics and its varied cultural and historical perspectives
- Gain knowledge and develop understanding of mathematical concepts
- Develop mathematical skills and apply them
- Develop the ability to reflect upon and evaluate the significance of their work and the work of others
- Develop patience and persistence when solving problems
- Develop and apply information and communication technology skills in the study of mathematics

### Objectives

By the end of the course, students will be able to:

- a. Knowledge and Understanding: Understand concepts, and demonstrate skills, from the following areas: Real Numbers, Data Analysis, and Probability; Linear Functions; Linear inequalities and systems; Nonlinear functions
- b. Application and Reasoning
  - i. Select and use appropriate mathematical knowledge when investigating problems
  - ii. Select and apply appropriate mathematical skills and techniques when investigating problems
  - iii. Recognize patterns and structures and describe them as relationships or general rules when investigating problems
  - iv. Draw conclusions consistent with findings
  - v. Justify mathematical relationships when investigating problems
- c. Communication: Communicate mathematical facts, ideas, methods, results and conclusions using:
  - i. Appropriate language and symbols
  - ii. Computer and graphing calculator

- d. Reflection and Evaluation:
- i. Reflect on their methods and processes
  - ii. Consider possible alternative approaches
  - iii. Evaluate the significance and reliability of their findings and the findings of others

### **Areas of Interaction**

- Human Ingenuity (HI) - Students are provided the opportunity to explore and appreciate the discoveries of mankind by participating in activities that highlight the contributions of different cultures and mathematicians to the study of Algebra. Students will also do a research project on a mathematician of their choice.
- Approaches to Learning (ATL) – Pattern recognition, problem solving, and investigations where mathematics is utilized in the decision making process allow students to develop critical thinking skills. A project where students create a study guide promotes effective study skills. Notebook quizzes reinforce the importance of an effective organizational system, and reflections promote sound, coherent thought.
- Health and Social Education (HSE) – Survey projects, and activities involving data interpretation help increase awareness of health related issues. Activities involving banking, the stock market, interest, profitability, population growth, and price comparisons enable students to make informed responsible choices.
- Environments (E) – Activities in data analysis enable students to study the impact of man’s actions on the environment. Activities with recycling, carbon dating, and air pollution allow students to examine their role in maintaining and improving our world.
- Community and Service (CS) – Students are encouraged to take an active role in their school community by tutoring or assisting younger students who are less proficient in mathematics. Students will assist in the organization of fund raising projects.

### **Student Resources**

All students will be provided a textbook – McDougall Littell Algebra 1, and the accompanying Practice with Examples Guide.

### **Methodology**

Students will be required to use mathematics and its related skills in many areas of their daily lives. This knowledge and understanding will be required for personal decision-making and participation in civic and cultural affairs. Students meet objectives through the completion of interdisciplinary and subject specific projects and explorations, and direct course instruction, which establishes relevant links between subject areas and the areas of interaction.

### **Topics**

Real numbers, Data analysis, and Probability  
Linear functions  
Linear Inequalities and Systems  
Nonlinear Functions

## Assessment

Students will be assessed utilizing the IB criteria on oral, visual, and written work. Students will also receive standardized scores on tests, quizzes, and homework assignments. Projects and Investigations will be assessed using both the IB criterion rubrics and standardized grading rubrics.

Criterion	Maximum	Assessment Methods
A - Knowledge and Understanding	8	Tests, quizzes, projects, daily class work, notebook, homework
B – Application and Reasoning	8	Investigations, reflections
C - Communication	6	Explanations in problem solving, presenting information clearly and logically, using appropriate technology
D – Reflection and Evaluation	6	Reflecting on and evaluating methods and processes used during investigations

## Curriculum Map

Year 1 - Sixth Grade Math	Year 2 – Seventh Grade Pre-Algebra	Year 3 - Eighth Grade Algebra 1
---------------------------	---------------------------------------	------------------------------------

<p>Number Sense, Decimals, Measurement (developing)</p> <ul style="list-style-type: none"> <li>- Recognizing/Describing Patterns</li> <li>- Variables and Expressions</li> <li>- Exponents/Order of Operations</li> <li>- Equations/mental math</li> <li>- Perimeter/Area</li> <li>- Operations with decimals</li> <li>- Scientific notation</li> <li>- Metric System</li> <li>- AOI: (ATL)</li> </ul>	<p>Integers, Equations, Inequalities(developing/mastery)</p> <ul style="list-style-type: none"> <li>- Variables/Simplifying expressions</li> <li>- Order of Operations/Powers</li> <li>- Operations with integers</li> <li>- Properties/operations with real numbers</li> <li>- Coordinate plane</li> <li>- Solutions</li> <li>- AOI: (ATL)</li> </ul>	<p>Real Numbers, Data Analysis, and Probability (Mastery)</p> <ul style="list-style-type: none"> <li>- Properties of real numbers</li> <li>- Data and graph analysis</li> <li>- Matrices (introduce)</li> <li>- Probability and Odds</li> <li>- AOI: (H&amp;S) &amp; (E)</li> </ul>
<p>Data Probability and Statistics(introduce and develop)</p> <ul style="list-style-type: none"> <li>- Mean/median/mode</li> <li>- Bar and Line graphs</li> <li>- Stem Leaf plots</li> <li>- Box and Whisker Plots</li> <li>- Histograms</li> <li>- Choosing appropriate data displays</li> <li>- Probability</li> <li>- Counting Principle</li> <li>-AOI: (H&amp;S) &amp; (ATL)</li> </ul>	<p>Factors and Rational Numbers (developing/mastery)</p> <ul style="list-style-type: none"> <li>- Prime factorization</li> <li>- GCF/LCM</li> <li>- Equivalent Fractions</li> <li>- Laws of Exponents</li> <li>- Scientific Notation</li> <li>- Operations with Rational Numbers</li> <li>- Equations/Inequalities with rational coefficients</li> <li>- AOI: (E)</li> </ul>	<p>Linear Equations and Functions (mastery)</p> <ul style="list-style-type: none"> <li>- Solve linear equations in one variable</li> <li>- Problem solving using the linear model</li> <li>- Rates, ratios, percents</li> <li>- Graphing, scatter plots, line of best fit</li> <li>- Direct variation</li> <li>- Writing linear equations</li> <li>- AOI: (ATL), (H&amp;S), (C&amp;S)</li> </ul>
<p>Factors and Fractions (developing)</p> <ul style="list-style-type: none"> <li>- Prime factors</li> <li>- LCM/GCF</li> <li>- Equivalent Fractions</li> <li>- Ordering and Estimation</li> <li>- Operations with fractions</li> <li>- Customary Units</li> <li>- AOI: (HI) &amp; (H&amp;S)</li> </ul>	<p>Data Analysis, Probability and Statistics (developing/mastery)</p> <ul style="list-style-type: none"> <li>- Stem leaf</li> <li>- Histograms</li> <li>- Box and Whisker</li> <li>- Using, collecting, interpreting data</li> <li>- Probability/Odds</li> <li>- Counting Principle</li> <li>- Permutations/Combinations</li> <li>- Disjoint/Overlapping Events</li> <li>- Independent/Dependent Events</li> <li>- AOI: (ATL) &amp; (H&amp;S)</li> </ul>	<p>Linear Inequalities and Systems (develop/mastery)</p> <ul style="list-style-type: none"> <li>- Solve/graph linear inequalities</li> <li>- Solve/graph absolute value equations and inequalities</li> <li>- Translation/Dilation</li> <li>- Solving/graphing linear systems</li> <li>- Applications of linear systems</li> <li>- AOI (ATL), (H&amp;S)</li> </ul>
<p>Integers, Equations, and Inequalities (introduce and develop)</p> <ul style="list-style-type: none"> <li>- Comparing/ordering integers</li> <li>- Operations with integers</li> <li>- Properties of real numbers</li> <li>- Coordinate plane</li> <li>- Writing/simplifying expressions and equations</li> <li>- Solving equations and inequalities</li> <li>- Functions</li> <li>- AOI: (ATL) &amp; (C&amp;S)</li> </ul>	<p>Ratio, Proportion, Percent (Mastery)</p> <ul style="list-style-type: none"> <li>- Ratio/Rates</li> <li>- Proportions</li> <li>- Similarity/Congruence</li> <li>- Percent Equation</li> <li>- Percent Change</li> <li>- Percent Application</li> <li>- AOI: (H&amp;S)</li> </ul>	<p>Exponential Functions (introduce/develop)</p> <ul style="list-style-type: none"> <li>- Properties of exponents</li> <li>- Graphing exponential functions</li> <li>- Growth/Decay functions</li> <li>- AOI: (H&amp;S)</li> </ul>
<p>Ratio, Proportion, and Percent (develop)</p> <ul style="list-style-type: none"> <li>- Ratios/Rates</li> <li>- Slope</li> <li>- Solving proportions</li> <li>- Percent proportions &amp; equations</li> <li>- Circle graphs</li> <li>- Percent change</li> <li>- Percent Applications</li> <li>- AOI: (H&amp;S) &amp; (E)</li> </ul>	<p>Linear Functions (introduce/develop)</p> <ul style="list-style-type: none"> <li>- Relations/Functions</li> <li>- Graphing/writing linear equations</li> <li>- Intercepts/slope</li> <li>- Systems of linear equations</li> <li>- Graphs of linear equations</li> <li>- Line of best fit</li> <li>- AOI: (ATL) &amp; (H&amp;S)</li> </ul>	<p>Quadratic Equations/Functions (Introduce/develop)</p> <ul style="list-style-type: none"> <li>- Solve/graph</li> <li>- Applications of discriminant</li> <li>- Vertical motion</li> <li>- Comparing linear and nonlinear models/best fit</li> <li>- AOI: (HI)</li> </ul>
<p>Geometry and Measurement (introduce and develop)</p> <ul style="list-style-type: none"> <li>- Angles</li> <li>- Polygons-perimeter/area</li> <li>- Similar/congruent polygons</li> <li>- Square roots</li> <li>- Pythagorean Theorem</li> <li>- Circles</li> <li>- Rectangular Prisms and Cylinders</li> <li>- AOI: (HI)</li> </ul>	<p>Geometry and Measurement(introduce/develop)</p> <ul style="list-style-type: none"> <li>- Square roots</li> <li>- Pythagorean Theorem</li> <li>- Distance/Midpoint formula</li> <li>- Special Right Triangles</li> <li>- Sine, Cosine, Tangent</li> <li>- Polygons</li> <li>- Circles</li> <li>- Surface Area/ volume</li> <li>- AOI: (HI) &amp; (C&amp;S)</li> </ul>	<p>Polynomial Functions (introduce/develop)</p> <ul style="list-style-type: none"> <li>- Operation with polynomials</li> <li>- Factoring</li> <li>- Solving</li> <li>- AOI: (ATL)</li> </ul> <p>Rational/Radical Functions (introduce/develop)</p> <ul style="list-style-type: none"> <li>- Operations with expressions</li> <li>- Solving</li> <li>-Graphing</li> <li>-Inverse variation</li> <li>-AOI: (H&amp;S)</li> </ul>

\*Approaches to learning will be a continued focus throughout the curriculum.