Windham School District

Math Curriculum

August 2017

Thank you to all of the teachers who assisted in revising the K-12 Mathematics Curriculum as well as the community members who volunteered their time to review the document, ask questions, and make edit suggestions.

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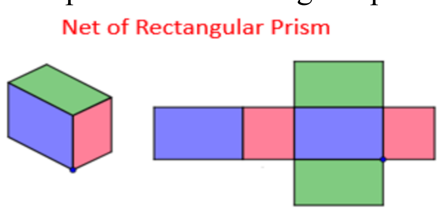
OVERVIEW:

The Windham School District K-12 Math Curriculum has undergone a formal review and revision during the 2017-2018 School Year. Previously, the math curriculum, with the Common Core State Standards imbedded, was approved in February, 2103. This edition is a revision of the 2013 curriculum not a redevelopment. Math teachers, representing all grade levels, worked together to revise the math curriculum to ensure that it is a comprehensive math curriculum incorporating both the Common Core State Standards as well as Local Windham School District Standards.

There are two versions of the Windham K-12 Math Curriculum. The first section is the summary overview section. This section also both parents and teachers to quickly see a list of the concepts to be taught. For each grade level or course, it includes the unit name, the "why" which specifies the enduring understandings, the "how" which specifies the skills to be taught, and the "what" which lists the related vocabulary and concepts to be discussed. In the how/skills section, the skills indicated in bold are the Math Mastery Standards. These standards, developed at each grade level, identify key benchmark skills necessary for students be successful in academic math progressions and in life. The goal is for all students retain essential, fundamental, and applicable math concepts and skills. The second section represents a more detailed version of the curriculum. It includes all of the information found in the summary overview section as well as Essential Questions section, a common summative assessment section and the formal list of Common Core State Standards, Windham Local Standards, and the Mathematical Practices Standards. The Mathematical Practices Standards require students to model mathematics, communicate mathematics in both oral and written forms, as well as apply their skills to real-life applications.

Sample of a Common Core State Standard:
CCSS.6.G.4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
Example: In this rectangular prism, the length is 10 cm, the width is 4 cm, and the height is 6 cm. Find the surface area.



Sample of a Local Windham School District Standard:
WIN.MD.1 Using quarters, dimes, nickels, and pennies, identify names and values, count like and unlike coins, and write value using cent sign, dollar sign, and decimal point.
Example: Given a bag of coins, create a table that shows how many of each type of coin in the bag. Then determine the value of all of the coins in your bag.

Sample of a Mathematical Practices Standard
CCSS.MP4 Model with mathematics
Example:
Sam Houston Elementary School has nearly 1,000 children from kindergarten through 5th grade, with about the same number of students in each grade. No class has more than 25 students, but most classes are close to that. What can you figure out from this information? (Adapted from Think Math! Grade 5.)

In grades Kindergarten through Grade 5, although the unit names are often specific to the skills covered, the curriculum falls under the strands of Operations and Algebraic Thinking, Number and Operations in Base Ten, Measurement and Data, and Geometry. In Kindergarten, the strand of Counting and Cardinality is also used. In grades 3 to 5, the strand of Number and Operations with Fractions is also included.

Sample standard for Operations and Algebraic Thinking in Grade 3:
Write equations with a variable to represent an unknown quantity in a word problem.
Example: Jenny has 7 marbles and Kenny has 5. How many do they have together? Before finding the solution, represent this problem using an equation. Specify what the variable represents.

Sample standard for Number and Operations in Base Ten in Grade 1:
Add or subtract two 2-digit numbers without regrouping.
Example: Using a mental math strategy, find 42 - 18. Explain your reasoning.

Sample standard for Measurement and Data in Grade 2:
Students will discover how and why things are measured with different units of measurement.

Example: You will work in groups of 3. Each group will be given 6 objects. You must measure each object using inches, centimeters, and an unique measuring device (such as a pencil). Create a chart of your data.

Sample standard for Geometry in Grade 4:
Identify right, acute, and obtuse angles.
Example: In the picture below, use colored pencils to trace 4 angles. Then label them as right, acute, or obtuse. Be sure to show at least one angle of each type.

Sample standard for Counting and Cardinality in Kindergarten:
Students will demonstrate how counting helps us solve problems in our lives.
Example: Your starting number is 32. Please count to 100.

Sample standard for Number and Operations with Fractions in Grade 5:
Students will add and subtract fractions and mixed numbers with unlike denominators.
Example: John ate ⅔ of a chocolate cake. Mary ate ¼ of the same chocolate cake. How much cake was eaten? How much cake is left?

In grades six through eight, although the unit names are often specific to the skills covered, the curriculum falls under the strands of The Number System, Expressions and Equations, Geometry, and Statistics and Probability. In grades six and seven, the strand of Ratios and Proportional Relationships is used. In grade eight, the strand of Functions is also included.

Sample standard for The Number System in Grade 6:
Simplify numerical expressions using the order of operations.
Example: Simplify: 3 - 4 X 5 + 6(8 - 3). Show all steps. Be ready to explain your process.

Sample standard for Expressions and Equations in Grade 7:

Solve two-step equations by using equivalent equations.
Example: Solve 3x - 4 = 12. Show all steps. Be ready to explain your process.

Sample standard for Geometry in Grade 8:
Apply the Pythagorean Theorem to solve problems.
Example: Mary takes a rectangular piece of fabric and cuts from one corner to the opposite corner. If the piece of fabric is 12 centimeters long and 55 centimeters wide, how long is the diagonal cut that Mary made?

Sample standard for Statistics and Probability in Grade 7:
Perform an activity, record results and calculate experimental probability.
Example: You have been given a 2.6 ounce bag of skittles. Create a chart that indicates how many skittles of each color that you have. Use this data to predict how many skittles of each color would be in a 15 ounce bag of skittles.

Sample standard for Ratios and Proportional Reasoning in Grade 6:
Students will calculate unit rate.
Example: Mark can buy 10 lbs. of bananas for $4.50 or 15 lbs. of bananas for $5.60. Which is the better buy? Explain your reasoning.

Sample standard for Functions in Grade 8:
Students will represent, compare and interpret linear relationships using tables, graphs and equations.
Example: Samantha starts with $20 on a gift card for the bookstore. She spends $3.50 per week to buy a magazine. Let y be the amount remaining as a function of the number of weeks. Create a graphical representation and an algebraic representation of this information. What does $20 and $3.50 represent in each representation?

In high school, the classes are created by grade level but by topic, such as Algebra I, Geometry, and Algebra II. Each of the course curriculum falls under one of the six high school strands: Number and Quantity, Algebra, Functions, Modeling, Geometry, and Statistics and Probability. These strands were developed to prepare students for both mathematics in college as well as their potential careers.

Sample standard for Number and Quantity in Algebra II:
Perform operations with complex numbers.
Example: Simplify $(5i - 3)(4i + 2)$

Sample standard for Algebra in Pre calculus:
Determine solution sets for non-linear and rational inequalities algebraically and graphically.

Example: Solve by an algebraic process: $\frac{x^2+x-12}{x-1} \le 0$

Sample standard for Functions in Algebra I:
Create and interpret linear equations from real world data.
Example: A band is performing at an auditorium for a fee of $1500. In addition to this fee, the band receives 30% of each $20 ticket sold. The maximum capacity of the auditorium is 800 people. Create a function to represent this data. How many tickets must be sold for the band to earn enough money to buy the new equipment?

Sample standard for Modeling in Statistics:
Data can be collected, displayed, described, and summarized in response to a question that has been raised.
Example: Determine an experiment based on a question for which you are looking for answers. Perform the experiment and then model your findings in at least 3 different forms.

Sample standard for Geometry in Calculus:
Find volumes of solids of revolution.
Example: Find the volume of the solid generated by revolving the region bounded by $y = x^2$ and the x-axis on $[-2,3]$ about the x-axis.

Sample standard for Statistics and Probability:
Make predictions based on the line of best fit.
Example: Using the data (a table would be given) and a graphing calculator, create a scatterplot to represent this data. Then write the line of best fit. Use this equation to answer the question: "Is there a relationship between fat grams and calories in fast food?" Clearly articulate your justification

Title of Curriculum: Kindergarten Mathematics

Unit Name	Why	How	What	Example
Place Value	• Students will learn to organize numbers by ones and tens (11 to 19)	• **Identify the value of each digit in a two-digit number (11 to 19).** • Distinguish between the tens and ones.	• Numbers 11to 19	
Addition and Subtraction	• Students will understand how to solve addition and subtraction problems (0 to 10)	• **Demonstrate fluency of addition and subtraction facts (zero to 5).** • **Represent addition and subtraction (6 to 10) with objects, fingers, mental images, drawings, and sounds.** • Solve addition and subtraction word problems. • **Decompose numbers (0 to10) into pairs in more than one way by using objects or drawings.**	• Number sentences • Math symbols + - =	

Counting and Ordering Numbers	• Students will demonstrate how counting helps us solve problems in our lives.	• **Count to tell how many objects and write the number 0 to 20.** • **Count to 100 by ones and tens**. • Count forward from any given number to 100. • **Identify and compare numbers, between 1 and 10, in terms of greater than, less than or equal.**	• Numbers 0 to 100	
Geometry	• Students will understand how shapes make up our world.	• Describe objects using names of shapes. • Identify two and three-dimensional shapes. • Name shapes using attributes. • Analyze and compare two- and three-dimensional shapes. • Construct shapes using various materials.	• Shapes – circle, square, triangle, rectangle • Two-dimensional shapes • Three-dimensional shapes • Positional words	
Measurement and Data	• Students will discover how and why things are measured in our lives.	• Describe and compare measurable attributes such as length and weight. • Count and sort objects and place into categories.	• Measureable objects	

Title of Curriculum: First Grade Mathematics

Unit Name	Why	How	What	Example
Counting	• Students will demonstrate how counting helps us solve problems in our lives.	• Identify the value of a whole number (0 to 120) • Count by 1s, 2s, 5s, 10s • Order whole number from 0 to 120 • **Write whole numbers from 0 to 120** • **Recognize visual representations of numbers (0 to 120)** • **Create visual representations using models and written numbers.** • Represent a number of objects with a numeral	• Numbers 1 - 120 • Visual representations	
Place Value	• Students will learn to organize numbers by ones and tens. • Students will learn to use place value to solve math problems more efficiently. • Students will use place value to compare numbers using symbols.	• **Represent ten ones as a bundle called "ten".** • **Identify the digit in the tens and ones places in a given two digit number** • Use mental math to add groups of 10 to a number • **Compare two-digit numbers using <, >, =** • Add or subtract two 2-digit numbers without regrouping	• Tens and ones • Symbols <, >, = • 2-digit numbers • Multiples of 10 (10, 20, 30, 40, 50, 60, 70, 80, 90)	

Addition and Subtraction	• Students will learn how to apply addition and subtraction strategies to solve problems in everyday life.	• **Use addition and subtraction within 20 to solve problems** • **Fluently add and subtract facts within 10** • Determine unknown number in addition or subtraction equations	• Addition and subtraction • Drawings, symbols, equations • Numbers 1 - 20 • Properties of addition and subtraction	
Geometry	• Students will learn to recognize shapes in the world around them. • Students will learn to divide a whole into equal shares.	• **Distinguish between defining and non-defining attributes** • **Build and draw shapes with defining attributes** • Compose three-dimensional shapes • Compare new shapes made from composite shapes • **Divide wholes into equal shares: halves and fourths**	• 2-D and 3-D shapes • Equal shares of a whole	
Measurement and Data	• Students will demonstrate how and why things are measured in our lives. • Students will use data and graphs to make decisions and solve problems. • Students will tell and write time to the hour and half hour to make decisions.	• **Measure and record the length of an object using non-standard tools (cubes, counters, paper clips)** • **Compare the lengths of objects** • **Organize and represent data with up to three categories** • **Interpret data with up to three categories** • **Tell and write time to the hour and half- hour**	• Length • Tools for measurement • Data • Graphs, charts, pictures • Graphing categories • Analog clock • Digital clock • Hour hand • Minute hand	

Money	• Students will learn to count money in everyday situations.	• **Identify coins** and their values • **Count like** and unlike **coins** • Write coin value using cent sign, dollar sign, and decimal point	• Penny • Nickel • Dime • Quarter • Cent sign, dollar sign, decimal point	

Title of Curriculum: Second Grade Mathematics

Unit Name	Why	How	What	Example
Time and Money	• Students will tell time and write time to make decisions. • Students will add and subtract money amounts in everyday situations.	• **Tell and write time to the nearest five minutes, using am and pm** • **Solve word problems involving dollar bills, quarters, dimes, nickels and pennies.**	• Analog and digital clocks • Hour and minute hand • Coins and bills • $ and cent symbols • Half past • Quarter past, quarter to	
Addition and Subtraction	• Students will use addition and subtraction strategies to solve problems in everyday life.	• Use addition and subtraction to solve word problems • **Fluently add and subtract facts within 20**	• Addition & subtraction drawings, symbols, equations, properties • Inverse operations • Sum, difference	
Addition and Subtraction for Larger Units	• Students will use place value knowledge and mental math to add and subtract within 1000.	• **Add and subtract fluently within 100.** • Add and subtract mentally by 10 or 100 to a given number • Add up to four two-digit numbers • **Add and subtract within 1000 using strategies related to a written method**	• Addition and subtraction equations • Regrouping • Composing and decomposing three digit numbers	

Representing and Interpreting Data	• Students will use data and graphs to make decisions and solve problems.	• **Use data to create bar graphs**, line plots **and picture graphs** • Generate measurement data by measuring lengths of several objects to nearest whole number	• Bar graphs, picture graphs and line plots • Data	
Geometry	• Students will recognize shapes in the world around them. • Students will learn to divide wholes into equal shares.	• **Recognize shapes having specified attributes, such as a given number of angles or a given number of equal faces.** • Draw shapes having specified attributes • Identify triangles, quadrilaterals, pentagons, hexagons, cubes, pyramids, cones, and cylinders. • Divide rectangles into rows and columns • Divide wholes into equal shares: ex. halves, thirds and fourths	• 2D and 3D shapes • Equal shares of a whole • Fraction • Halves • Thirds • Fourths • Quarters • Attributes	
Measurement	• Students will discover how and why things are measured with different units of measurement.	• Estimate and **measure lengths of objects in inches, feet, centimeters and meters** • **Measure to determine how much longer one object is than another**	• Rulers, yard and meter sticks, tape measures • Number lines • Units of measure: inches, feet, yards, centimeters and meters • Length	

		• Compare measurements • **Use addition and subtraction within 100 to solve measurement word problems** • Understand the relationship between number lines and measurement		
Multiplication	• Students will use rectangular arrays and repeated addition equations to explore the concept of multiplication.	• Determine whether a group of objects is even or odd • Count by 2's • Add objects arranged in a rectangular array • Write equations that correlate to arrays	• Even/odd • Arrays • Repeated addition equations • Column, row	
Place Value	• Students will understand the significance of ordering numbers in ones, tens, hundreds and thousands • Students will use place value to solve problems more efficiently.	• Read numbers to 1000 • Write numbers to 1000 • **Recognize the value of each digit in a 3-digit number** • Skip count by 5's, 10's and 100's • Identify the hundreds, tens and ones place in a 3 digit number • **Compare two three-digit numbers using the >, < and = symbols**	• Base 10 blocks • Hundreds charts • <, >, = symbols • 2, 3, 4 digit numbers • Greater than • Less than • Equal to • Value	

Title of Curriculum: Third Grade Mathematics

Unit Name	Why (Enduring Understandings)	How (Skills)	What (Content)	Example
Multiplication and Division	• Students will represent and solve problems involving multiplication and division • Students will understand properties of multiplication and the relationship between multiplication and division. • Students will multiply and divide within 100 • Students will solve problems involving the four operations, and identify and explain patterns in arithmetic	• Use repeated addition of equal groups to multiply. • Use arrays to model the Commutative Property of Multiplication. • Use patterns to multiply with different factors. • **Use multiplication facts they know to multiply with 0 to 10 as factors** • Use strategies to multiply (e.g. manipulatives, pictures, other facts they know). • Use the Distributive Property to break apart an array that models one multiplication fact into two smaller arrays that model two other multiplication facts. • Determine the unknown whole number in a multiplication or division equation •	• Multiplication • Repeated addition • Equal groups • Array • Commutative Property • Associative Property • Distributive Property • Identity Property • Zero Property • Patterns • Factors • Products • Unknown	

Math Fluency	• Student will fluently multiply and Divide Within 100.	• Use place value to break large addition problems into smaller ones that are easier to add • **Add and subtract fluently within 1000 using the standard algorithm** • **Show mastery of all multiplication facts 0 to 9 with accuracy and fluency** • Use multiplication facts to solve division facts	• Factors • Products • Quotient	
Place Value	• Students will use place value understanding and properties of operations to perform multi-digit arithmetic. • Students will use place value to estimate.	• Use regrouping when performing multi-digit arithmetic. • **Round numbers to nearest ten or hundred.** • Use rounding in estimating sums and differences. • Use rounding and estimating to assess the reasonableness of an answer.	• Ones, tens, hundreds, thousands • Round • Estimate • Reasonableness • Sum, difference • Regrouping • Multiples	
Two- Step Word Problems	• Students will solve word problems involving the four operations.	• Solve one and two-step word problems using all four operations • Write equations with a variable to represent an unknown quantity in a word problem	• Equation • Unknown • Operation	

Fractions	• Students will develop understanding of fractions as numbers.	• Write or draw a fraction to represent a drawing or place on a number line • Partition a shape into parts with equal areas and label those areas with fractions • **Draw a number line from 0 to 1, partition it into equal parts and label each part with a fraction.** • **Compare fractions that have the same numerator or fractions that have the same denominator and use <, >, or = by reasoning about their size and using a visual model** • Recognize and generate simple equivalent fractions • Express whole numbers as fractions • **Recognize fractions as parts to the whole with an understanding of the numerator and denominator parts.**	• Numerator and denominator • Equal parts • Unit Fraction • Fraction tiles/ fraction strips • Number lines • Equivalent fractions • Same numerator • Same denominator • Whole numbers	
Measurement and Data: Time	• Students will solve problems involving the measurement of intervals of time.	• **Tell time to the nearest minute.** • Solve problems related to the addition and subtraction of time in minutes.	• Minute hand • Hour hand • AM and PM • 5 minute intervals • Half past	

		• Use strategies to solve problems related to time.	• Quarter past • Quarter of • 1 minute intervals • Elapsed time (shown on number line, clock, or paper)	
Measurement and Data: Area and Perimeter	• Students will understand concepts of area and relate area to multiplication and division. • Students will recognize perimeter as an attribute of plane figures • Students will distinguish the difference between area and perimeter and how they are measured.	• Measure area by counting squares • **Find area of a rectangle by using multiplication** • Solve problems involving area of rectangles and perimeters of polygons. • Use area models to represent the Distributive Property. • **Add to find areas of shapes that consist of non-overlapping rectangles.** • **Find the perimeter of a polygon.** • When given the perimeter of a polygon and some side lengths, find an unknown side length. • Show that different rectangles can have the same perimeter as well as that different rectangles can have the same area.	• Area • Unit square • Perimeter • Square units • Units • Length x Width • Distributive Property	

Measurement and Data: Mass, Volume and Length	• Students will solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects	• Measure and estimate liquid volumes and masses of objects using standard units. • Solve one-step word problems involving any operation using mass and volume given in the same units. • **Measure lengths using rulers marked with halves and fourths of an inch**. • Show measurement data on a line plot and draw a horizontal scale using whole numbers, halves, and quarters.	• Liquid volume/ capacity • Mass • Length • Grams and kilograms • Milliliters and liters • Halves (inches) • Fourths (inches)	
Geometry: Shapes and Attributes	• Students will reason with shapes and their attributes.	• **Recognize rhombuses, rectangles, and squares as examples of quadrilaterals.** • Draw quadrilaterals that do not belong to any special subcategories of quadrilaterals. • Categorize shapes based on attributes they share. • Partition shapes into parts with equal areas and name each part.	• Polygon (closed shapes) • Attributes • Side • Angle, vertex • Parallel sides • Quadrilateral • Rectangle, square, rhombus, parallelogram, trapezoid • Category/ Categorize	

Measurement and Data: Picture Graphs, Bar Graphs, and Line Plots	• Students will represent and interpret data.	• **Use bar graphs, picture graphs, and** line plots **to answer questions and solve problems.** • **Draw a bar graph, picture graph, and** line plot **with given data.**	• Line plot • Bar graph • Picture Graph • Data • Scale • Key • Survey • Tally marks	

Title of Curriculum: Grade Four Mathematics

Unit Name	Why	How	What	Example
Place Value	• Students will understand place value and will be able to write, compare, and order whole numbers.	• Regroup numbers to the next place value • **Write a multi-digit whole number in expanded, standard, and word form** • **Round whole numbers to any place** • **Compare multi-digit whole numbers** • **Read multi-digit numbers** • Order multi-digit numbers	• Round • Compare • Periods (ones, thousands etc.)	
Math Fluency – Multi-digit Addition and Subtraction	• Students will fluently add and subtract multi-digit whole numbers.	• **Demonstrate the ability to add and subtract multi-digit numbers using the standard algorithm with fluency**	• Line up place value • Regroup	
Multiplication	• Students will use strategies and properties to multiply by 1-digit and 2-digit numbers.	• **Multiply a whole number (up to four digits) by a one-digit whole number** • **Multiply two two-digit numbers**	• Different algorithms	
Division	• Students will use strategies	• Demonstrate that	• Inverse operations	

	and properties to divide by 1-digit numbers.	multiplication is the inverse of division • **Show mastery of all division facts with accuracy and fluency** • **Find whole number quotients and remainders with up to four-digit dividends and one-digit divisors**	• Equations • Rectangular arrays • Area models	
Word Problems	• Students will use operations with whole numbers to solve word problems.	• Use multiple strategies to solve problems • Assess the reasonableness of answers	• Determine operation • Break down (steps) • Estimate to check	
Factors and Multiples	• Students will identify factors and multiples to find prime and composite numbers.	• **Find all factor pairs for a whole number in the range 1 to 100** • **Recognize that a whole number is a multiple of each of its factors** • **Determine whether a given whole number, in the range 0 to 100, is a multiple of a given one-digit number** • **Determine whether a given whole number, in the range 0 to 100, is prime or composite.**	• Factors/Multiples • Prime/Composite • The Number 1	

Expressions and Equivalency	• Students will read, write, and solve equations with variables.	• Translate a verbal statement into an expression or equation • Solve word problems with a symbol for the unknown number	• Variable represents unknown	
Algebra: Patterns	• Students will generate and analyze patterns.	• Extend a given pattern • Determine rule for a given pattern • Identify the features of a pattern • Create a pattern and name its rule	• Predictable • Numerical/Geometrical • Rules	
Fractions: Addition and Subtraction	• Students will understand addition and subtraction of fractions.	• **Add and subtract fractions** and mixed number **with like denominators** • Subtract fractions from a whole • Use models and pictures to show fraction addition and subtraction	• Joining and separating parts • Decomposing into a sum of fractions in more than one way • Use visual models	
Fractions: Multiplication	• Students will extend multiplication concepts to multiply fractions.	• Solve word problems using multiplication of fractions • Use a visual model to represent fraction multiplication	• Can be expressed as a multiple of a whole number and a fraction	

Fractions - Equivalent	• Students will extend understanding of fraction equivalence and ordering.	• **Find equivalent Fractions** • **Determine if two fractions are equivalent** • Compare fractions with like and unlike denominators • Use visual models to compare fractions	• What it means for two fractions to be equivalent • Benchmark fractions • Same numerators to compare • Same denominators to compare • Refer to same whole to compare	
Fractions: Decimal Notation	• Students will understand and compare decimals.	• Convert Fractions to decimals • Convert decimals to fractions with simplification • Locate decimals on number line • Compare decimals to hundredths • Use >, <, = in comparison sentence	• Find equivalent fraction • Hundredths < tenths • Compare decimals referring to same whole • Function of decimal	
Measurement & Data: Conversion	• Students will find equivalence in units of measure.	• **Compare the relative sizes of measurement units to objects** • Record measurement equivalence • Convert units of measurement • Solve word problems related to measurement	• Systems of measurement • Relative units • Measurement equivalence	

Measurement & Data: Area & Perimeter	• Students will use measurement formulas to find area and perimeter.	• Find area and perimeter using formulas • Solve real word problems involving area and perimeter	• Area and perimeter • Formulas for rectangles	
Measurement & Data: Interpreting Data & Graphing	• Students will represent and interpret data on line plots.	• Display measurement data with fractions in a line plot. • Solve fraction addition and subtraction using a line plot	• What a line plot is • What a line plot is used for	
Measurement & Data: Angles	• Students will understand concepts of angles and angle measurement.	• **Measure angles with a protractor** • Represent an angle measurement as a fraction of a circle (over 360) • Draw an angle with a given measurement • Find unknown angle using addition and subtraction	• Formed by two rays common endpoint • Fraction of a circle • Angle represents turn	
Lines and Angles	• Students will understand and classify lines, angles, and shapes.	• **Identify points, lines, line segments, rays, perpendicular, and parallel lines.** • Identify right, acute, and obtuse angles. • Identify right triangles • Classify two-dimensional	• Lines, line segments, and rays • Right, acute, and obtuse • Symmetry	

		figures based on parallel and perpendicular lines • Identify and draw lines of symmetry on two-dimensional figures		

Title of Curriculum: Grade Five Mathematics

Unit Name	Why	How	What	Example
Place Value	• Students will understand decimal place value and will be able to write, compare and order whole numbers and decimals.	• **Read and write decimals from 0.001 to 10,000,000 in standard, expanded and word form** • **Compare decimals.** • Identify place value of any digit from 0.001 to 10,000,000 • Explain patterns in number of zeroes and placement of decimal when a number is multiplied or divided by a power 10. • **Round decimals to the nearest tenths, hundredths, and thousandths**	• Place value system • Decimals to thousandths	
Multiplying and Dividing Multi-digit Whole Numbers	• Students will fluently multiply whole numbers using the standard algorithm and will expand on their knowledge of long division with bigger dividends and divisors	• Multiply and divide multi-digit whole numbers • Use place value, properties of operations, and the relationship between multiplication and division to solve problems.	• Real-world problems • Place value • Multiplication • Division • Regrouping • Multi-digit whole numbers	

		• **Fluently, accurately, and efficiently solve multi-digit multiplication problems using the standard algorithm** • **Explain answers using equations, rectangular arrays, and/or area models** • **Divide multi-digit whole numbers, up to four digits, by two-digit divisors.**		
Decimal Operations (Addition, Subtraction, Multiplication, and Division)	• Students will use models and standard algorithms to add, subtract, multiply and divide decimals	• **Add, subtract, multiply,** and divide **decimals to hundredths** • Explain answers using equations, rectangular arrays, and/or models • Use place value, properties of operations, and/or the relationship between addition and subtraction	• Real-world problems. • Place value • Decimal operations • Decimal point placement	
Fractions: Addition & Subtraction	• Students will add and subtract fractions and mixed numbers with unlike denominators	• **Add and subtract fractions** and mixed numbers **with unlike denominators**. • Determine equivalent	• Fractions • Add • Subtract • Common denominator	

		fractions. • Use estimation to solve problems with fractions • Solve real world word problems using addition and subtraction of fractions. • Regroup mixed numbers when adding/subtracting fractions	• Mixed Number • Improper Fractions • Equivalent Fractions • Simplest Form	
Fractions: Multiplication and Division	• Students will multiply using whole numbers, fractions and mixed numbers as factors and divide using whole numbers and unit fractions as dividends and divisors.	• Solve word problems involving the division of whole numbers that give quotients of fractions or mixed numbers • **Multiply using fractions**, mixed numbers **and whole numbers as factors**. • Solve word problems involving fraction and mixed number multiplication. • Divide unit fractions by whole numbers and whole numbers by unit fractions • Explain answers using models and the relationship between multiplication and	• Multiplication • Division • Fraction Bar • Inverse Operations • Multiplication/Division relationship • Reciprocal • Improper fraction and mixed number equivalence • Simplest Form	

		division. • Find the area of a rectangle with fractional side lengths • Compare the size of factors to the size of a product • Solve real world word problems involving unit fraction and whole number division.		
Expressions	• Students will learn how to use order of operations to simplify expressions	• **Simplify expressions involving parentheses, brackets and braces using order of operations**. • Write simple expressions given verbal or word-form expressions	• Parentheses, brackets, braces • Expressions • Order of Operation • Numerical Expressions	
Patterns	• Students will generate patterns given rules and identify relationships between corresponding terms of two different numerical patterns.	• Generate patterns given rules. • Identify relationships between corresponding terms • Form ordered pairs from corresponding terms in two patterns and graph them on a coordinate plane.	• Numerical patterns • Relationships between corresponding terms • Ordered Pairs • Coordinate Plane	
Measurement	• Students will convert	• **Convert within a**	• Measurement system	

& Data: Conversion	measurements within the customary and metric systems.	**measurement system.** • Solve multi-step, real world problems involving conversions within a measurement system.	• Conversions • Metric • Customary	
Measurement & Data: Interpreting Data	• Students will generate line plots given data with fractional amounts and use line plots to solve real world problems.	• Display a set of measurements in fractions on a line plot. • Solve word problems involving fractions with information presented in line plots.	• Line plot • Fractions • Data	
Measurement & Data: Volume	• Students will learn how to find the volume of right rectangular prisms.	• **Find the volume of a right rectangular prism using a formula** and by counting cubic units. • Solve real world and mathematical problems related to volume. • Find the volume of a solid figure formed by two right rectangular prisms • Explain why volume is measured in cubic units. • Show how counting cubic units in a rectangular prism is equivalent to multiplying	• Volume • Cubic units • Multiplication • Addition • Formula • Area of base • Unit cubes • Three-Dimensional • Right rectangular prism • Solid Figure	

		the height by the area of the base		
Geometry: Coordinate Planes	• Students will learn how to graph ordered pairs on a coordinate plane and use the coordinate plane to solve real world mathematical problems.	• Plot ordered pairs on a coordinate plane. • Name coordinate pairs on a coordinate plane. • Represent real world problems involving the first quadrant of the coordinate plane • Explain the meaning of each coordinate in the context of the problem. • Form and plot coordinate pairs based on numerical patterns • Locate and label the origin, x- and y-axis on a coordinate plane • Explain the difference between the words axis, coordinate and ordered pairs.	• Coordinate plane • X-axis • Y-axis • Origin • Coordinate • Ordered/coordinate pair • First quadrant	
Geometry: Two-	• Students will learn how to classify two-dimensional	• **Classify two-dimensional figures in a hierarchy**	• Hierarchy • Properties/Attributes	

Dimensional Figures	figures in a hierarchy based on properties	**based on properties.** • Give all names for a given figure • Group figures by a given property • Name a common property of a group of figures	• Categories • Subcategories • Two-Dimensional figures • Classifying/Grouping • Triangles by angles and by sides • Classifying quadrilaterals	

Title of Curriculum: Grade Six Mathematics

Unit Name	Why (Enduring Understanding)	How (Skills)	What (Content)	Example
Ratios and Proportional Relationships	• • Students will use their knowledge of multiplication and division to solve ratio and rate problems about quantities.	• Simplify ratios • Compare ratios in different formats • **Find equivalent ratios** • **Calculate unit rate** • **Find a missing number in a proportion** • **Interchange fractions, decimals and percents** • Find percent of a quantity. • Solve percent word problems	• Ratios • Unit Rates • Proportions • Fractions, decimals and percents	
The Number Systems	• Students will apply and extend previous understandings of multiplication and division to divide fractions by fractions. • Students will compute fluently with multi-digit numbers and find common factors and multiples. • Students will apply and extend previous understandings of numbers to the system of rational numbers.	• **Divide fractions by fractions** • **Find common factors, greatest common factors, and multiples** • **Add, subtract, multiply and divide mixed numbers** • **Divide decimals** • **Simplify numerical expressions using the order of operations** • Create a number line with integers • Understand the relationship between a positive or negative number and its opposite • Write a number sentence which reflects the actions and changes in	• Division of Fractions • Factors and Multiples • Integers • Absolute Value • Coordinate Grid	

		real world situations • Find missing values in a situation • **Graph with positive and negative coordinates**		
Expressions and Equations	• Students will understand the use of variables in algebraic expressions. • Students will understand how the solution to an equation relates to the problem presented. • Students will apply and extend previous understandings of arithmetic to algebraic expressions. • Students will reason about and solve one variable equations and inequalities. • Students will represent and analyze quantitative relationships between dependent and independent variables.	• • Simplify algebraic expressions with whole numbers • Create algebraic expressions from verbal expressions • Define a variable and create an equation from a word problem • Solve one step equations • Apply and extend previous understandings of arithmetic to algebraic expressions, including whole number exponents • Solve one variable inequalities • Represent and analyze quantitative relationships between dependent and independent variables	• Algebraic expressions • One step algebraic equations • Exponents • Inequalities • Dependent and independent variables • Constant • Coefficient	
Geometry	• • Students will understand the dimensions of a figure needed to find area, surface area, and volume of figures.	• **Calculate the area of irregular shapes (composite figures)** • Draw a net for a given solid • Identify faces, edges and vertices • **Calculate volume of rectangular**	• Composite (irregular) figures • Area • Nets • Volume	

	• Students will understand that irregular figures can be decomposed into regular figures. • Students will understand the relationship between two-dimensional and three-dimensional figures. • Students will solve real-world and mathematical problems involving area, surface area and volume.	**prisms** • **Calculate surface area of rectangular prisms** • Solve real-world and mathematical problems involving area, surface area, and volume.	• Surface area • Prism	
Statistics and Probability	• Students will develop an understanding of statistical variability. • Students will summarize and describe distributions.	• Create statistical questions • Determine measures of central tendency • Choose which measure of central tendency is most appropriate for a given set of points • Analyze data from given dot plots, histograms and box plots • Report observations about data using mathematical vocabulary • Make predictions from graphs or scatter plots • **Summarize and describe distributions using both measures of central tendency as well as variation data**	• Central tendency - mean, median, mode, and range • Dot plots, histograms, box and scatter plots	

Title of Curriculum: Grade Six Accelerated Mathematics

Unit Name	Why (Enduring Understanding)	How (Skills)	What (Content)	Example
Ratios and Proportional Relationships	• Students will use their knowledge of multiplication and division to solve ratio and rate problems about quantities.	• Simplify ratios • Compare ratios in different formats • **Find equivalent ratios** • **Calculate unit rate** • **Find a missing number in a proportion** • **Interchange fractions, decimals and percents** • Find percent of a quantity. • Solve percent word problems	• Ratios • Unit Rates • Proportions • Fractions, decimals and percents • Terminating and repeating decimals	
The Number System	• Students will apply and extend previous understandings of multiplication and division to divide fractions by fractions. • Students will compute fluently with multi-digit numbers and find common factors and multiples. • Students will apply and extend previous understandings of numbers to the system of rational numbers.	• **Divide fractions by fractions** • **Find common factors, greatest common factors, and multiples** • **Add, subtract, multiply and divide mixed numbers** • **Divide decimals** • **Simplify numerical expression using the order of operations** • Create a number line with integers • Understand the relationship between a positive or negative number and its opposite • Write a number sentence which	• Division of Fractions • Factors and Multiples • Integers • Absolute Value • Coordinate Grid	

		reflects the actions and changes in real world situations • Find missing values in a situation • **Graph with positive and negative coordinates** • **Add, subtract, multiply and divide integers**		
Expressions and Equations	• Students will understand the use of variables in algebraic expressions. • Students will understand how the solution to an equation relates to the problem presented. • Students will apply and extend previous understandings of arithmetic to algebraic expressions. • Students will reason about and solve one variable equations and inequalities. • Students will represent and analyze quantitative relationships between dependent and independent variables.	• • Simplify algebraic expressions with whole numbers • Create algebraic expressions from verbal expressions • Define a variable and create an equation from a word problem • Solve one step equations • Apply and extend previous understandings of arithmetic to algebraic expressions, including whole number exponents • Solve one variable inequalities • Represent and analyze quantitative relationships between dependent and independent variables	• Algebraic expressions • One step algebraic equations • Exponents • Inequalities • Dependent and independent variables • Constant • Coefficient • Distributive property • Equivalent expressions	
Geometry	• Students will understand the dimensions of a figure needed to find area, surface area, and volume of figures.	• **Calculate the area of composite shapes** • Draw a net for a given solid • Identify faces, edges and vertices	• Composite (irregular) figures • Area • Nets • Volume	

	• Students will understand that irregular figures can be decomposed into regular figures. • Students will understand the relationship between two-dimensional and three-dimensional figures. • Students will solve real-world and mathematical problems involving circumference, area, surface area and volume.	• **Calculate circumference and area of circles** • Draw similar figures using scale factor • Find missing lengths given similar figures • Draw nets of solid figures • **Calculate volume of rectangular prisms** • **Calculate surface area of rectangular prisms** • **Calculate the surface area and volume of triangular prisms** • Calculate surface area and volume of pyramids • Solve real-world problems involving area, surface area and volume • Explain the change in area and volume when applying scale factor • Draw and identify the two dimensional figure formed when taking cross sections of solids	• Surface area • Prism • Circumference and area • Right pyramids • Scale drawings • Scale factor • Cross sections in a plane	
Geometry – Angles and Triangles	• Students will draw, construct, and describe geometrical figures and describe the relationships between them.	• Create triangles given specific sides and/or angles • Determine the missing angles in triangles • Classify triangles by their sides	• Properties of triangles • Classification of triangles: acute, obtuse, right	

		and angles • Determine the missing angles in polygons • Compute interior angles of polygons • Classify angle pair relationships • Create algebraic equations using angle pair relationships	• Classification of angles: acute, obtuse, right, straight • Angle pair relationships: adjacent, vertical, complementary, supplementary, linear pair • Angle Sum Theorem • Intersecting lines • Congruency • Regular Polygons	
Statistics and Probability	• Students will develop an understanding of statistical variability. • Students will summarize and describe distributions.	• Create statistical questions • Determine measures of central tendency • Choose which measure of central tendency is most appropriate for a given set of points • Graph data using dot plots, histograms, and box plots • Analyze data from given dot plots, histograms and box plots • Report observations about data using mathematical vocabulary • Make predictions from graphs	• Central tendency - mean, median, mode, and range • Dot plots, histograms, box and scatter plots	

		or scatter plots • **Summarize and describe distributions using both measures of central tendency as well as variation data**		

Title of Curriculum: Grade Seven Mathematics

Unit Name	Why	How	What	Example
Ratio and Proportional Relationships	• Students will analyze proportional relationships and use them to solve real-world and mathematical problems including percents and unit rates.	• • Calculate complex unit rates • **Solve percent equations using proportions** • Calculate discount or sale price of an item • Calculate sales tax • Solve percent word problems including percent change and percent error • Express proportions in tables and graphs • Express a proportional relationship in an equation • Graph proportional relationship • Interpret a point on a graph in context	• Ratio, rate, unit rate • Equivalent ratios • Proportional relationship • Percent Proportion and Equation • Constant rate of change • Complex fractions • Markups, discounts, sales tax, commission, simple interest	
The Number System	• Students will apply and extend previous understanding of operations with fractions to add, subtract, multiply and divide rational numbers.	• Order and compare rational numbers • Model addition and subtraction of signed numbers on a number line • **Add, subtract, multiply,**	• Absolute value • Zero pairs • Additive inverse • Operations with integers • Order of	

	• Students will understand the properties of integers and perform operations with integers.	**and divide with integers** • **Add, subtract, multiply and divide with rational numbers** • **Use the order of operations with rational numbers** • Evaluate algebraic expressions with integer values • **Convert common fractions to decimals without a calculator** • Solve real world problems involving rational numbers	Operations • Rational Numbers • Terminating and • Repeating decimals	
Expressions and Equations	• Students will use properties of operations to generate equivalent expressions. • Students will solve real-world and mathematical problems using numerical and algebraic expressions and equations.	• • Simplify algebraic expressions with rational numbers • Create algebraic expressions from verbal expressions • Define a variable and create an equation from a word problem • **Create and solve one-step equations with integers by balancing the equation** • Solve two-step equations	• Distributive Property • Monomials • Binomials • Algebraic Properties • Inequalities • Variables, constants, and coefficients • Like terms • Equivalent expressions and equations	

		by using equivalent equations • Create and solve one- and two- step inequalities • **Graph inequalities on a number line** • Rewrite expressions in different forms • Solve problems with fractional coefficients • Check for reasonableness of solutions • Find GCF for monomials • Factor linear expressions using the distributive property		
Geometry - Solids	• Students will solve real world and mathematical problems involving circumference, area, surface area, and volume	• **Calculate circumference and area of circles** • Draw similar figures using scale factor • Find missing lengths given similar figures • Draw nets of solid figures • **Calculate volume of triangular prisms** • **Calculate surface area of triangular prisms** • Explain the change in area and volume when	• Circumference and area • Composite figures • Volume and Surface area of right prisms and pyramids • Volume and Surface area of right pyramids • Nets • Scale drawings • Scale factor	

		applying scale factor • Draw and identify the two dimensional figure formed when taking cross sections of solids	• Cross sections in a plane	
Geometry – Angles and Triangles	• Students will draw, construct, and describe geometrical figures and describe the relationships between them.	• Create triangles given specific sides and/or angles • Determine the missing angles in triangles • Classify triangles by their sides and angles • Determine the missing angles in polygons • Compute interior angles of polygons • Apply the angle sum theorem for given polygons • Classify angle pair relationships • Create and solve algebraic equations using angle pair relationships	• Properties of triangles • Classification of triangles: acute, obtuse, right • Classification of angles: acute, obtuse, right, straight • Angle pair relationships: adjacent, vertical, complementary, supplementary, linear pair • Angle Sum Theorem • Intersecting lines • Congruency • Regular Polygons	
Statistics	• Students will understand the difference in random sampling techniques and determine their optimal application	• Create data with specific mode, median, and mean • Identify when a measure of center is not an accurate reflection of data	• Measures of Central Tendency • Dispersion of data • Variation • Sampling	

	• Students will make inferences between two populations when given varied distributions	• **Use data from a random sample to draw inferences about a population** • Analyze data to make predictions • Display two samples of data on a box plot to illustrate variability • Create a line plot to compare two samples	Techniques • Bias • Valid and Invalid inferences • Comparing data sets	
Probability	• Students will investigate chance processes and develop, use and evaluate probability models.	• **Perform an activity, record results and calculate experimental probability.** • **Compare different experimental probabilities for the same activity and explain the differences.** • Make predictions based on probability. • **Create tree diagrams to find total possible outcomes**. • Express probability as fractions and percents. • Identify an event that would have a probability of zero and one. • Calculate compound	• Probability is between and includes 0 and 1 • Experimental probability • Theoretical Probability • Tree diagrams • Dependent and independent events • Compound probability • Possible and favorable outcomes	

		probability of both dependent and independent events.		

Title of Curriculum: Grade Seven Accelerated Mathematics

Unit Name	Why	How	What	Example
Ratio and Proportional Relationships	• Students will analyze proportional relationships and use them to solve real-world and mathematical problems including percents and unit rates.	• Calculate complex unit rates • **Solve a percent equation** • **Calculate discount or sale price of an item** • **Calculate sales tax** • Solve percent word problems including percent change and percent error • Express proportions in tables and graphs • Express a proportional relationship in an equation • Graph proportional relationship • Interpret a point on a graph in context	• Ratio, rate, unit rate • Equivalent ratios • Proportional relationship • Percent Proportion and Equation • Constant rate of change • Complex fractions • Markups, discounts, sales tax, commission, simple interest	
The Number System	• Students will apply and extend previous understanding of operations with fractions to add, subtract, multiply and divide rational numbers. • Students will understand the properties of integers and perform operations with integers.	• **Order and compare rational numbers** • **Determine if a number is rational or irrational** • Model addition and subtraction of signed numbers on a number line • **Add, subtract, multiply and divide with rational**	• Absolute value • Zero pairs • Additive inverse • Operations with integers • Order of Operations • Rational Numbers	

		numbers • **Use the order of operations with rational numbers** • Evaluate algebraic expressions with integer values • **Convert common fractions to decimals without a calculator** • Solve real world problems involving rational numbers • **Convert common fractions to decimals without a calculator** • Find square roots of perfect squares and cube roots of perfect cubes • Estimate, to the nearest whole number, non-perfect square roots	• Terminating and repeating decimals	
Expressions and Equations	• Students will use properties of operations to generate equivalent expressions. • Students will solve real-world and mathematical problems using numerical and algebraic expressions and equations.	• **Simplify algebraic expressions with rational numbers** • Create algebraic expressions from verbal expressions • Define a variable and create an equation from a word problem	• Distributive Property • Monomials • Binomials • Algebraic Properties • Inequalities • Variables, constants, and coefficients • Like terms	

		• **Solve one-step equations with integers by balancing the equation** • **Solve two-step equations by using equivalent equations** • Create and solve one- and two- step inequalities • Rewrite expressions in different forms • Solve problems with fractional coefficients • Check for reasonableness of solutions • Find GCF for monomials • Factor linear expressions using the distributive property	• Equivalent expressions and equations	
Congruence	• Students will determine whether transformations result in congruent or similar figures. • Students will discover and apply angle relationships formed by triangles and parallel lines cut by a transversal.	• Transform polygons using dilations, **translations, reflections**, and rotations. • Identify coordinates of transformed figures. • Describe sequence of transformations that result in congruent or similar figures. • Find angle measurements using properties of similar figures, exterior and interior angles, and	• Transformations • Congruence • Similarity • Triangle angle relationships • Angles formed by parallel lines cut by a transversal • Interior, exterior, and corresponding angles	

		parallel lines cut by a transversal.		
Pythagorean Theorem	• Students will explain and apply the Pythagorean Theorem and its converse in problem solving situations	• Informally prove the Pythagorean Theorem ($a^2 + b^2 = c^2$) • Determine if a triangle is a right triangle using its converse. • **Apply the Pythagorean theorem to find missing triangle side lengths.** • **Apply the Pythagorean Theorem to solve problems**	• Pythagorean Theorem • Right Triangles • Area of squares • Radicals	
Geometry - Volume	• Students will solve real-world and mathematical problems involving volume of cylinders, cones, and spheres	• Calculate **volumes** of cones, **cylinders**, and spheres using appropriate formulas and units. • Use volume formulas to solve real world problems.	• Cylinder • Cones • Spheres	
Statistics	• Students will understand the difference in random sampling techniques and determine their optimal application • Students will make inferences between two populations when given varied distributions	• Create data with specific mode, median, and mean • Identify when a measure of center is not an accurate reflection of data • **Use data from a random sample to draw inferences about a**	• Measures of Central Tendency • Dispersion of data • Variation • Sampling Techniques • Bias • Valid and Invalid	

		population. • Analyze data to make predictions • **Display two samples of data on a box plot to illustrate variability** • Create a line plot to compare two samples	inferences • Comparing data sets	
Probability	• Students will investigate chance processes and develop, use and evaluate probability models.	• **Perform an activity, record results and calculate experimental probability.** • **Compare different experimental probabilities for the same activity and explain the differences.** • Make predictions based on probability. • **Create tree diagrams to find total possible outcomes.** • Express probability as fractions and percents • Identify an event that would have a probability of zero and one. • **Calculate compound probability of both dependent and independent events.**	• Probability is between and includes 0 and 1 • Experimental probability • Theoretical Probability • Tree diagrams • Dependent and independent events • Compound probability • Possible and favorable outcomes	

Title of Curriculum: Grade Eight Mathematics

Unit Name	• Why (Enduring understanding)	• How (Skills)	• What (Content)	Example
The Real Number System	• Students will know that there are numbers that are not rational, and approximate them by rational numbers. • Students will symbolically represent numbers.	• **Determine whether a number is irrational or rational** • Approximate rational numbers • **Compare and order rational and irrational numbers** • Find perfect square and cube roots • Write expressions using integer exponents • **Write numbers using scientific notation** • Perform operations with numbers in scientific notation	• Rational numbers • Irrational numbers • Radicals • Exponents • Scientific notation	
Solving Equations	• Students will apply properties and inverse operations to efficiently solve equations and interpret solutions.	• Solve one-step equations with rational number coefficients using inverse operations. • **Solve two-step equations, with integers.** • Solve multi-step equations using inverse operations. • Interpret three types of	• Equivalent expressions • Equations • Inverse operations • Equation solutions • Rational number coefficients	

		solutions to linear equations, including equations with one solution, no solutions, and infinitely many solutions. • Apply mathematics to problem solving situations.		
Linear Functions	• Students will understand connections between proportional relationships, lines and linear equations. • Students will represent, compare and interpret linear relationships using tables, graphs and equations. • Students will use functions to model relationships between quantities.	• **Determine if a relationship is linear or nonlinear** • Write and interpret linear equations in slope intercept (y=mx+b) form. • Analyze and translate information for linear relationships between tables, graphs and equations • **Find and interpret rate of change (slope, m) using table, graph, and equation.** • **Find and interpret the initial value (y-intercept, b) using table, graph, and equation.** • **Represent and compare proportional relationships and other functions.** • Use similar triangles to explain why the slope is the same between any two	• Relations • Functions • Linear Equations • Slope • Y-intercept • Proportional relationships • Qualitative graphs and descriptions	

		distinct points on a non-vertical line.		
Linear Systems	• Students will analyze and solve linear systems and interpret the solutions.	• • Solve linear systems using graphing and algebraic methods. • Determine whether lines will be parallel or intersecting. • Interpret the solution to a linear system in real world situations	• Linear system • Solutions (intersection point, infinite, none)	
Congruence	• Students will determine whether transformations result in congruent or similar figures. • Students will discover and apply angle relationships formed by triangles and parallel lines cut by a transversal.	• Transform polygons using dilations, **translations, reflections**, and rotations. • Identify coordinates of transformed figures. • Describe sequence of transformations that result in congruent or similar figures. • Find angle measurements using properties of similar figures, exterior and interior angles, and parallel lines cut by a transversal.	• Transformations • Congruence • Similarity • Triangle angle relationships • Angles formed by parallel lines cut by a transversal • Interior, exterior, and corresponding angles	
Pythagorean Theorem	• Students will explain and apply the Pythagorean	• Informally prove the Pythagorean Theorem (a^2 +	• Pythagorean Theorem • Right Triangles	

	Theorem and its converse in problem solving situations	$b^2 = c^2$) • Determine if a triangle is a right triangle using its converse. • **Apply the Pythagorean theorem to find missing triangle side lengths.** • **Apply the Pythagorean theorem to solve problems.**	• Area of squares • Radicals	
Geometry: Volume	• Students will solve real-world and mathematical problems involving volume of cylinders, cones, and spheres	• Calculate **volumes** of cones, **cylinders**, and spheres using appropriate formulas and units. • Use volume formulas to solve real world problems. • Calculate surface area of cylinders and cones.	• Cylinder • Cones • Spheres	
Statistics: Bivariate Data	• Students will investigate patterns of association in bivariate data. • Students will model linear data with an equation to answer questions and make predictions.	• **Construct and interpret scatter plots to investigate patterns of association between two quantities.** • Describe patterns of association for two quantities (positive, negative, no association) • Create and use lines of best fit to make & evaluate predictions.	• Scatterplots • Association (Correlation) • Best fit line	

Title of Curriculum: Grade Eight Honors Algebra I

Unit Name	Why (Enduring Understanding)	How (Skills)	What (Content)	Example
Foundations of Functions and Expressions	• Relations and functions can represent real world phenomena • Variables represent numbers	• Translate between verbal and algebraic expressions • Perform order of operations • **Determine whether a relation is a function** • **Evaluate a function** • Apply mathematical properties to simplify expressions • Write function rules from tables and word problems • Determine domain and range of various functions	• Function notation • Representations of relations • Functions • Translations between words and mathematical expressions • Solutions • Mathematical properties	
Solving Equations and Inequalities	• Operations performed on one side of an equation must be performed on the other side(s) in order to preserve the equality • There are differences between solutions to inequalities and equations	• **Write and solve multistep equations with rational coefficients** • **Write and solve multi-step one-variable inequalities, and graph them on a number line** • **Solve and graph compound inequalities** • Solve absolute value equations • Solve literal equations	• Literal and algebraic equations • Absolute value • Percents • Proportions • Inequalities • Compound inequalities	

		• **Write and solve proportions including with binomials in numerator and denominator** • **Solve application percent problems**		
Linear Relationships	• Linear relationships have a constant rate of change • Tables, graphs, and equations are all ways of representing functions and real world phenomena • Slope can be referred to in many different ways	• **Calculate slope between two points** • **Determine the slope of a line, given an equation, table, or graph** • Find and determine intercepts • **Write and graph linear equations** • **Determine whether lines are parallel, perpendicular, or neither** • **Write linear equations in slope-intercept and point-slope form** • Create and interpret linear equations from real world data • Write a rule given an arithmetic sequence	• Slope • Forms of linear equations • Arithmetic sequences • Direct variation • Linear representations • Parallel and perpendicular lines • Properties of horizontal and vertical lines	

Linear Systems	• There is more than one way to solve a system of equations and students can determine the most efficient method for solving • Systems of equations with two unknowns can be used to solve real world problems	• **Write and solve linear systems using multiple methods** • Distinguish if a system of equations has one solution, no solution, or infinitely many solutions • **Graph linear inequalities on a coordinate plane** • **Graph systems of linear inequalities on a coordinate plane** • Create and interpret linear inequalities • Model real world situations with systems of equations	• Systems of equations • Systems of inequalities • Linear inequalities	
Polynomials	• Very large and small numbers can be represented efficiently using scientific notation • Exponent properties can be proven through expansion	• **Add, subtract, and multiply monomials and polynomials** • **Use the rules of exponents to simplify monomials** • Solve quadratic equations by factoring • Find perimeter and area involving polynomials • **Factor quadratics (leading coefficient is 1)** • Factor polynomials	• Properties of exponents • Operations with polynomials • Scientific notation • Factoring polynomials • Quadratic equations • Geometry applications	

		• Multiply and divide numbers in scientific notation		
Radical Expressions and Equations	• Radicals can be represented different ways	• **Simplify radicals** • Add, subtract, multiply, and divide radicals • Solve problems involving the Pythagorean theorem • Solve radical equations • Determine extraneous solutions when solving radical equations	• Operations with radicals • Pythagorean theorem • Representations of radicals • Radical Equations • Extraneous solutions	
Scatter plots	• Scatter plots can model data, and be used to make predictions	• Represent bivariate data with scatterplots • Interpret scatterplots • **Calculate the line of best fit** • **Use the line of best fit to find starting point represented by the y-intercept; to describe what the slope means; and to find the values at a particular point including outside the given graph** • Determine if there is a correlation between bivariate data	• Scatterplots • Line of best fit • Correlation	

		• Make predictions based on the line of best fit • Recognize linear, quadratic, and exponential functions given data and graphs		
Rational Expressions	• To operate with rational expressions, you can use much of what you know about operating with fractions	• Simplify rational expressions • State excluded values • Perform operations with rational expressions.	• Rational expressions • Excluded values	

Title of Curriculum: Algebra I

Unit Name	Why (Enduring Understanding)	How (Skills)	What (Content)	Example
Foundations of Functions and Expressions	• Relations and functions can represent real world phenomena • Variables represent numbers	• Translate between verbal and algebraic expressions • **Determine whether a relation is a function** • Apply mathematical properties • Represent relations using different formats • **Evaluate a function** • Write function rules from tables and word problems • Determine domain and range of various functions	• Function notation • Representations of relations • Functions • Translations between words and mathematical expressions • Solutions	
Solving Equations and Inequalities	• Operations must be performed on both sides of an equation in order to preserve the equality • There are differences between solutions to inequalities and equations	• **Write and solve multistep equations with rational coefficients** • **Write and solve multi-step one variable inequalities and graph them on a number line** • **Solve and graph compound inequalities** • Solve absolute value equations • Solve literal equations	• Literal and algebraic equations • Absolute value • Percents • Proportions • Inequalities • Compound inequalities • Graphs of Linear inequalities	

		• **Write and solve proportions including ones with binomials in the numerator or denominator** • **Solve application percent problems**		
Linear Relationships	• Linear relationships have a constant rate of change • Tables, graphs, and equations are all ways of representing data and real world phenomena • Slope can be referred to in many different ways	• **Calculate slope between two points** • **Determine the slope of a line, given an equation, table, or graph** • Determine whether lines are parallel, perpendicular, or neither • Find intercepts given both graphs and equations • **Write and graph linear equations** • **Write linear equations in slope-intercept and point-slope form** • Create and interpret linear equations from real world data • Write a rule given an arithmetic sequence	• Slope • Forms of linear equations • Arithmetic sequences • Direct variation • Linear representations • Parallel and perpendicular lines • Properties of horizontal and vertical lines	

Linear Systems	• There are multiple ways to solve a system of equations. • Systems of equations with two unknowns can be used to solve real world problems.	• **Write and solve linear systems using multiple methods** • Distinguish if a system of equations has one solution, no solution, or infinitely many solutions • Determine most efficient method for solving a given system of equation • **Graph linear inequalities in the coordinate plane** • Graph systems of linear inequalities • Create and interpret linear inequalities in one variable • Model real world situations with systems of equations	• Systems of equations • Word problems	
Polynomials	• Very large and small numbers can be represented efficiently using scientific notation • Exponent properties can be proven	• **Add, subtract, and multiply polynomials** • Use the rules of exponents to simplify monomials • Solve quadratic equations by factoring • Find perimeter and area involving polynomials • Factor polynomials • Multiply and divide numbers in scientific notation	• Properties of exponents • Operations with polynomials • Scientific notation • Factoring polynomials • Quadratic equations	

Data Analysis	• Visual displays can model data and be used to make predictions	• Represent data visually with boxplots and scatterplots • Interpret visual displays • **Calculate the line of best fit** • Determine if there is a correlation between bivariate data • **Make predictions based on the line of best fit** • **Use the line of best fit to find the starting point represented by the y-intercept and to describe what the slope means** • Calculate mean, median, mode and range • Recognize linear, quadratic, and exponential functions given data and graphs	• Scatterplots • Line of best fit • Measures of central tendency • Box plots • Correlation	

Title of Curriculum: College Prep Algebra I

Unit Name	Why (Enduring Understanding)	How (Skills)	What (Content)	Example
Foundations of Functions and Expressions	• Relations and functions can represent real world phenomena • Variables represent numbers	• Translate between verbal and algebraic expressions • **Determine whether a relation is a function** • Apply mathematical properties • Represent relations using different formats • **Evaluate a function** • Write function rules from tables and word problems • Determine the domain and range of various functions	• Function notation • Representations of relations • Functions • Translations between words and mathematical expressions • Solutions	
Solving Equations and Inequalities	• Operations must be performed on both sides of an equation in order to preserve the equality • There are differences between solutions to inequalities and equations	• **Write and solve multi-step equations with rational coefficients.** • **Write and solve multi-step inequalities, and graph them on a number line** • **Solve and graph compound inequalities** • Solve absolute value equations • Solve literal equations • **Write and solve proportions including**	• Literal and algebraic equations • Absolute value • Percents • Proportions • Inequalities • Compound inequalities	

		ones with binomials in the numerator or denominator • **Solve application percent problems**		
Linear Relationships	• Linear relationships have a constant rate of change • Tables, graphs, and equations are all ways of representing data and real world phenomena • Slope can be referred to in many different ways	• **Calculate slope between two points** • **Determine the slope of a line, given an equation, table, or graph** • Determine whether lines are parallel, perpendicular, or neither • Find intercepts given graphs and equations • **Graph linear equations** • Write a rule given an arithmetic sequence • **Write equations of lines** • Create and interpret linear equations from real world data	• Slope • Forms of linear equations • Arithmetic sequences • Direct variation • Linear representations • Parallel and perpendicular lines • Properties of horizontal and vertical lines	
Linear Systems	• There are many ways to solve a system of equations • Systems of equations with two unknowns can be used to solve real world problems	• **Write and solve linear systems using multiple methods** • Determine the most efficient method for solving a given system of equations • Distinguish if a system of equations has one solution,	• Systems of equations • Systems of inequalities • Linear inequalities	

		no solution, or infinitely many solutions • **Graph linear inequalities on a coordinate plane** • Graph systems of linear inequalities • Model real world situations with systems of equations • Create and interpret linear inequalities in one variable		
Polynomials	• Very large and small numbers can be represented efficiently using scientific notation • Exponent properties can be proven	• **Add, subtract, and multiply polynomials** • Use the rules of exponents to simplify monomials • Solve quadratic equations by factoring • Find perimeter and area involving polynomials • Factor polynomials • Multiply and divide numbers in scientific notation	• Properties of exponents • Operations with polynomials • Scientific notation • Factoring polynomials • Quadratic equations • Geometry applications	
Radical Expressions	• Radicals can be represented different ways	• Simplify radicals • Add, subtract, multiply, and divide radicals • Solve problems involving the Pythagorean theorem	• Operations with radicals • Pythagorean theorem • Representations of radicals	

Data Analysis	• Visual displays can model data and be used to make predictions	• Represent data visually with boxplots, histograms, and scatterplots • Interpret visual displays • **Calculate the line of best fit** • Determine if there is a correlation between bivariate data • **Make predictions based on the line of best fit** • **Use the line of best fit to find the starting point represented by the y-intercept and to describe what the slope means** • Calculate mean, median, mode and range • Recognize linear, quadratic, and exponential functions given data and graphs.	• Scatterplots • Line of best fit • Measures of central tendency • Box plots • Histograms • Correlation	

Title of Curriculum: Geometry

Unit Name	Why	How	What	Example
Geometric Structure	• Geometry is the mathematics of spatial relationships. • Points, lines, and planes are the undefined terms that make up the foundation of geometry. • Basic geometric concepts are used to determine relationships between angles and lines. • Proofs are written to validate statements using given information, a conclusion, and deductive reasoning. • Inductive reasoning is used to make conjectures in geometry.	• Make conjectures about lines and angles and determine the validity of those conjectures using logic. • **Find midpoint, length of a segment, measures of angles, and slopes of lines and use them to investigate geometric relationships.** • Determine the validity of a conditional statement and its converse as it connects to a definition. • Use deductive reasoning to prove a statement. • Make connections between definitions, postulates, logical reasoning, and theorems. • Identify and model points, lines, and planes. • **Apply the segment addition and angle addition postulates**	• Postulates related to points, lines, and planes • Distance between two points • Midpoint of a segment • Properties of perpendicular lines • Characteristics of polygons • Inductive reasoning • Conditional statements and converses • Proofs involving segment addition, angle addition, congruence, supplementary and complementary angles, and right angles • Angle pairs including those formed by parallel lines and transversals • Slopes of lines	

		• **Find all angle pairs, including the ones formed by a transversal on a set of parallel lines, and use them to solve problems** • **Recognize the characteristics of parallel and perpendicular lines and write the equations of these lines.** • Perform basic geometric constructions by compass and straightedge as well as dynamic geometric software. • **Justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence**	• Parallel and perpendicular lines	
Congruence	• Unique properties of quadrilaterals can be identified. • Triangles are fundamental structural elements. • Congruent parts of congruent triangles are congruent. • Proofs are written to validate statements using given information, a conclusion, and deductive reasoning.	• Identify and classify triangles. • **Name and use corresponding parts of congruent triangles.** • Prove triangle congruence. • **Recognize and apply properties of quadrilaterals.** • **Recognize and apply properties of triangles and**	• Classification of triangles by angle measures and side measures. • Triangle congruence and its corresponding parts. • Properties of isosceles and equilateral	

	• Inductive reasoning is used to make conjectures in geometry.	**other polygons** • Identify relationships between sides and angles of triangles. • **Justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence**	triangles. • Perpendicular bisectors, angle bisectors, and mid-segments in triangles. • Measures of the interior and exterior angles of a polygon. • Properties of quadrilaterals	
Similarity	• Right triangles are highly useful in applications. • Similar polygons have ratios, proportions, and scale factors that are used to describe and compare quantities in real world applications.	• **Solve problems using the properties of similar polygons.** • **Apply the Pythagorean theorem.** • **Identify and apply patterns from right triangles to solve meaningful problems.** • Develop, apply, and justify triangle similarity relationships including trigonometric ratios • Use scale factor to solve problems. • Perform congruence transformations and dilations.	• Similar polygons • Similar triangles • Scale factors • Special right triangles • Congruence and similarity transformations	

		• **Justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence**		
Measurement	• The measurements of geometric figures can be calculated using a variety of strategies. • A change in one dimension of an object results in predictable changes in area and or volume.	• Describe the relationships between central angles, arcs, and inscribed angles in a circle. • Find areas of polygons, composite figures, circles and sectors. • **Solve problems using the properties of circles.** • **Recognize the diameter, radius, and center of a circle from its equation** • Find the arc length. • Use scale factor of similar figures. • **Use areas of 2-D objects as well as lateral areas, surface areas, and volumes of various solid figures.** • **Use properties of similar solids to solve real world problems.** • **Perform unit conversions for square and cubic units.**	• Central angles, arcs, inscribed angles, and tangents in a circle. • Sector of a circle • Equation of a circle and its parts • Lateral area, surface area, and volume of various solid figures • Properties of similar solids	

		• **Justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence**		

Title of Curriculum: College Prep Geometry

Unit Name	Why	How	What	Example
Geometric Structure	• Geometry is the mathematics of spatial relationships. • Points, lines, and planes are the undefined terms that make up the foundation of geometry. • Basic geometric concepts are used to determine relationships between angles and lines. • Proofs are written to validate statements using given information, a conclusion, and deductive reasoning. • Inductive reasoning is used to make conjectures in geometry.	• Make conjectures about lines and angles and determine the validity of those conjectures using logic. • **Find midpoint, length of a segment, measures of angles, and slopes of lines and use them to investigate geometric relationships.** • Determine the validity of a conditional statement and its converse as it connects to a definition. • Use deductive reasoning to prove a statement. • Make connections between definitions, postulates, logical reasoning, and theorems. • Identify and model points, lines, and planes.	• Postulates related to points, lines, and planes • Distance between two points • Midpoint of a segments • Properties of perpendicular lines • Characteristics of polygons • Inductive reasoning • Conditional statements and converses • Proofs involving segment addition, angle addition, congruence, supplementary and complementary angles, and right angles • Angle pairs including those formed by parallel lines and transversals • Slopes of lines	

		• **Find all angle pairs, including the ones formed by a transversal on a set of parallel lines, and use them to solve problems.** • **Recognize the characteristics of parallel and perpendicular lines and write the equations of these lines.** • Perform basic geometric constructions by compass and straightedge as well as dynamic geometric software. • **Justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence**	• Parallel and perpendicular lines	
Congruence	• Unique properties of quadrilaterals can be identified. • Triangles are fundamental structural elements. • Congruent parts of congruent triangles are congruent.	• Identify and classify triangles. • **Name and use corresponding parts of congruent triangles.** • **Prove triangle congruence.** • **Recognize and apply**	• Classification of triangles by angle measures and side measures. • Triangle congruence and its corresponding parts.	

	• Proofs are written to validate statements using given information, a conclusion, and deductive reasoning. • Inductive reasoning is used to make conjectures in geometry.	**properties of quadrilaterals.** • **Identify relationships between sides and angles of triangles.** • **Recognize and apply properties of triangles and other polygons.** • Find interior and exterior angles of regular polygons • **Use coordinates in conjunction with geometric properties to determine the specific quadrilateral.** • **Justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence**	• Properties of isosceles and equilateral triangles. • Perpendicular bisectors, angle bisectors, and mid segments in triangles. • Measures of the interior and exterior angles of a polygon. • Properties of quadrilaterals	
Similarity	• Right triangles are highly useful in applications. • Similar polygons have ratios, proportions, and scale factors that are used to describe and compare quantities in real world applications.	• **Solve problems using the properties of similar polygons.** • **Apply the Pythagorean theorem.** • **Identify and apply patterns from right triangles to solve**	• Similar polygons • Similar triangles • Scale factors • Special right triangles • Triangle similarity relationships • Trigonometric ratios	

	• Knowledge of transformations connects congruency and similarity.	**meaningful problems.** • **Develop, apply, and justify triangle similarity relationships including trigonometric ratios** • Use scale factor to solve problems. • Perform congruence transformations. • **Justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence**	• Congruence and similarity transformations	
Measurement	• The measurements of geometric figures can be calculated using a variety of strategies. • A change in one dimension of an object results in predictable changes in area and or volume.	• **Describe the relationships between central angles, arcs, and inscribed angles in a circle.** • Find areas of polygons, composite figures, circles and sectors. • **Solve problems using the properties of circles.** • **Recognize the diameter, radius, and center of a circle from its equation.** • Find the arc length. • **Use areas of 2-D objects as well as lateral areas, surface areas, and**	• Central angles, arcs, inscribed angles, and tangents in a circle. • Sector of a circle • Equation of a circle and its parts • Lateral area, surface area, and volume of various solid figures • Properties of similar solids	

		volumes of various solid figures. • **Use properties of similar solids to solve real world problems.** • **Perform unit conversions for square and cubic units.** • Convert between degrees and radians • **Justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence**		

Title of Curriculum: Honors Geometry

Unit Name	Why	How	What	Example
Geometric Structure	• Geometry is the mathematics of spatial relationships. • Points, lines, and planes are the undefined terms that make up the foundation of geometry. • Basic geometric concepts are used to determine relationships between angles and lines. • Proofs are written to validate statements using given information, a conclusion, and deductive reasoning. • Inductive reasoning is used to make conjectures in geometry.	• Make conjectures about lines and angles and determine the validity of those conjectures using logic. • **Develop proofs involving segment addition, angle addition, congruence, supplementary and complementary angles, vertical angles, and right angles.** • **Use midpoint, length of a segment, measures of angles, and slopes of lines to investigate geometric relationships.** • Determine the validity of a conditional statement and its converse as it connects to a definition. • Use deductive reasoning to prove a statement. • **Apply the segment addition and angle addition postulates.** • Make connections between definitions, postulates,	• Postulates related to points, lines, and planes • Distance between two points • Midpoint of a segment • Properties of perpendicular lines • Characteristics of polygons • Inductive reasoning • Conditional statements and converses • Proofs involving segment addition, angle addition, congruence, supplementary and complementary angles, and right angles • Angle pairs including those formed by parallel lines and transversals • Slopes of lines • Parallel and	

		logical reasoning, and theorems. • Identify and model points, lines, and planes. • **Find all angle pairs, including ones formed by a transversal on a set of parallel lines, and use them to solve problems.** • **Recognize the characteristics of parallel and perpendicular lines and write the equations of these lines.** • Perform basic geometric constructions by compass and straightedge as well as dynamic geometric software. • Convert between square inches, feet and yards. • Write linear and quadratic equations for geometric patterns. • Find area of triangles using the distance formula to find the needed lengths • Find the distance between parallel lines and a point and a line • Learn and use the four steps for problem solving.	perpendicular lines • Distance between parallel lines and a point and a line • Convert square units in real-life problems. • Write equations for geometric patterns. • Solve problems using the four-step process.	

		• **Justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence.**		
Congruence	• Unique properties of quadrilaterals can be identified. • Triangles are fundamental structural elements. • Congruent parts of congruent triangles are congruent. • Proofs are written to validate statements using given information, a conclusion, and deductive reasoning. • Inductive reasoning is used to make conjectures in geometry.	• Identify and classify triangles. • **Name and use corresponding parts of congruent triangles.** • **Prove triangle congruence.** • **Recognize and apply properties of quadrilaterals.** • **Recognize and apply properties of triangles and other polygons.** • **Identify relationships between sides and angles of triangles.** • Find the number of sides, number of diagonals, interior and exterior angles of regular polygons. • Use coordinates to construct perpendicular bisectors, angle bisectors, and altitudes to explore more relationships.	• Classification of triangles by angle measures and side measures. • Triangle congruence and its corresponding parts. • Properties of isosceles and equilateral triangles. • Perpendicular bisectors, angle bisectors, medians, altitudes and mid segments in triangles. • Measures of the interior and exterior angles of a polygon, along with number of sides and diagonals. • Properties of quadrilaterals	

		• **Use coordinates in conjunction with geometric properties to determine the specific quadrilateral.** • Explore the relationships of special segments in triangles. • **Justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence**	• Create perpendicular bisectors, angle bisectors, medians, and altitudes of triangles on a coordinate grid to explore more relationships.	
Similarity	• Right triangles are highly useful in applications. • Similar polygons have ratios, proportions, and scale factors that are used to describe and compare quantities in real world applications. • Knowledge of transformations connects congruency and similarity.	• **Solve problems using the properties of similar polygons.** • **Apply the Pythagorean theorem.** • **Identify and apply patterns from right triangles to solve meaningful problems.** • **Develop, apply, and justify triangle similarity relationships including trigonometric ratios and the law of sines and cosines**	• Similar polygons • Similar triangles • Scale factors to create drawings of real-life applications • Special right triangles • Triangle similarity relationships • Trigonometric ratios • Law of Sines and Cosines • Congruence and similarity transformations on and off a coordinate grid	

		• Use scale factor to solve problems and to create new drawings. • Perform transformations on and off a coordinate grid. • **Justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence**		
Measurement	• The measurements of geometric figures can be calculated using a variety of strategies. • A change in one dimension of an object results in predictable changes in area and or volume.	• **Describe the relationships between central angles, arcs, and inscribed angles in a circle.** • Find areas of polygons, composite figures, circles and sectors. • **Solve problems using the properties of circles.** • **Recognize the diameter, radius, and center of a circle from its equation.** • Find the arc length. • Use scale factor of similar figures. • **Use areas of 2-D objects as well as lateral areas, surface areas, and volumes of various solid figures.** • **Use properties of similar**	• Central angles, arcs, inscribed angles, and tangents in a circle. • Sector of a circle • Equation of a circle and its parts • Lateral area, surface area, and volume of various solid figures • Properties of similar solids • Degrees and radians	

		solids to solve real world problems. • **Perform unit conversions for square and cubic units.** • Convert between degrees and radians. • **Justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence**		

Title of Curriculum: Algebra II with Advanced Functions Part A

Unit Name	Why	How	What	Example
Properties of Transformations and Functions	• Patterns, relations, and functions can be described with tables, graphs, and equations to analyze patterns of change • Relations and functions can be represented numerically, graphically, algebraically, and/or verbally • Properties of functions and function operations are used to model and analyze real world applications and quantitative relationships	• **Find the domain and range given a graph, equation, table, or mapping diagram** • Compose and combine all types of functions • **Recognize function notation and evaluate functions.** • **Recognize a graph by its characteristics.** • **Graph absolute value inequalities on a number line** • **Use transformations to graph quadratic** and absolute value **functions** • Graph piecewise functions • Utilize a graphing calculator to model functions and their transformations • Attend to precision when graphing transformations by hand	• Characteristics of a graph • Function notation and composition • Transformations of $f(x) = x^2$ • Transformations of $f(x) = \| x \|$ • Piecewise functions • Absolute value inequalities	
Linear Relations and Functions	• Linear functions can be used to describe, interpret, and	• Solve equations, inequalities, compound	• Properties of equality • Absolute value	

	predict real world phenomena. • Table, graphs, and equations are ways for depicting and analyzing patterns of change in data. • Linear relationships have a constant rate of change.	inequalities, and absolute value inequalities • Graph linear and absolute value inequalities • Write equations of lines in slope-intercept, point-slope, and standard forms • Calculate the rate of change and its associated meaning	equations • Linear inequalities • Compound inequalities • Absolute value inequalities • Linear equations in slope intercept form, point slope form, and standard form • Linear and absolute value graphs.	
System of Equations and Inequalities	• Systems of equations and inequalities can be used to model and solve problems	• **Solve a system of linear and/or nonlinear equations graphically, or algebraically (elimination or substitution).** • Write a system of equations or inequalities given a verbal description • **Solve a system of inequalities by graphing** • Solve a system by the most effective method and determine the answer's reasonableness. • Write and graph constraints using a linear programming model, and analyze the graph to find solutions	• Solution(s) to a system of equations • Solution(s) to a system of inequalities • Linear programming (optimization problems)	

Quadratics	• The characteristics of quadratic functions and their representations are useful in solving real-world problems • Imaginary numbers exist and can be used to describe solutions	• **Identify the vertex, axis of symmetry, direction, maximum or minimum, x and y intercepts, domain and range** • Write and graph quadratic equations in vertex and standard form • **Solve quadratics involving real and complex solutions by factoring, square root property, and/or quadratic formula** • **Factor using GCF, difference of squares, sum/difference of cubes, leading coefficient not equal to 1, leading coefficient equal to 1** • **Identify characteristics of a quadratic function** • **Compare vertical and standard form of a quadratic function** • Choose the most efficient method to solve a quadratic, solve, and determine the reasonableness of the answer	• Vertex form • Standard form • Characteristics of a quadratic • Properties and operations of complex numbers • Quadratic formula • Square root property • Factoring quadratics • Applications of quadratics	

		• Write and solve applications of quadratic functions • **Perform operations of complex numbers**		

Title of Curriculum: Algebra II with Advanced Functions Part B

Unit Name	Why	How	What	Example
Properties of exponents and Operations of Polynomials	• Understand the relationship between zeros and factors of polynomials	• **Multiply and divide polynomials including synthetic and long division** • **Perform arithmetic operations on polynomials.** • Use the properties of exponents to transform expressions • Understand that a function models a relationship between two quantities by linking factors, zeros, and roots. • Use a graphing calculator to represent given polynomials and analyze the graph.	• Properties of exponents • Synthetic division • Long division • Factors, roots, zeros	
Radical and Rational Expressions and Equations	• Understand the connection between rational exponents and radicals • Use inverse operations to solve radical and/or rational exponent equations	• **Simplify expressions and solve equations with integer and rational exponents** • **Simplify numeric and algebraic radical expression up to the 5th degree** • **Solve radical equations** • **Solve basic exponential functions** • **Simplify rational expressions** and solve rational equations • Convert between rational exponent and radical form	• Rational exponents and equations • Radical expressions and equations • Rational expressions and equations	

Trigonometry (optional pathway)	• Trigonometry can be used to model and solve real-world problems	• Solve real life problems using right triangle trigonometry, the law of sines, and the law of cosines. • Evaluate trigonometric functions of any angle. • Use reference angles to evaluate trigonometric functions. • Using a graphing calculator or computer, explore the graphs of sine, cosine, and tangent.	• Angles and Radian Measure • Right Triangle Trigonometry • Reference Angles • Trigonometric Functions and their graphs • Laws of Sines and Cosines	
Statistics (optional pathway)	• Data can be collected, displayed, described, and summarized in response to a question that has been raised.	• Create and interpret graphical displays of data • Describe data • Calculate summary statistics • Compare distributions • Make calculations about individuals based on the normal model • Calculate a regression line for bivariate data • Interpret the regression line • Make predictions based on the regression line	• Graphical Displays • Summary Statistics • Descriptions • Comparisons • Normal Models • Percentages and percentiles • Regression Lines • Residuals • Correlation	

Financial Mathematics (optional pathway)	• Investments and loans are fundamentally governed by the laws of compound interest and exponential growth. • A comprehensive budget must include all cash flow in and out of your account.	• Calculate interest using technology • Determine monthly car payments • Calculate the total car payment including both principal and interest paid • Determine educational finances • Create a monthly budget using technology • Calculate gross pay and take home pay • Discuss the mortgage options and process	• Interest rates for both loans and investments • Gross pay, net pay, and income taxes • Effects of a down payment, interest rate, and duration of a loan • Factors included in a monthly budget	

Note: This course is designed to complete the formal teaching of Algebra II topics (as listed above) as well as preparing students for college level mathematics. Other potential pathways for this course include an introduction to trigonometry, statistics, and financial mathematics.

Title of Curriculum: College Prep Algebra II

Unit Name	Why	How	What	Example
Properties of Transformations and Functions	• Patterns, relations, and functions can be described with tables, graphs, and equations to analyze patterns of change • Relations and functions can be represented numerically, graphically, algebraically, and/or verbally • Properties of functions and function operations are used to model and analyze real world applications and quantitative relationships	• **Find the domain and range given a graph, equation, table, or mapping diagram** • Compose and combine all types of functions • Solve and graph absolute value inequalities • **Use transformations to graph quadratic and absolute value functions** • **Describe transformations on any type of function** • Transform generic functions on the coordinate plane • Graph piecewise functions • Use graphing calculator to model functions and their transformations	• Characteristics of a graph • Function notation and composition • Transformations of $f(x) = x^2$ • Transformations of $f(x) = \| x \|$ • Piecewise functions • Absolute value inequalities	
System of Equations and Inequalities	• Systems of equations and inequalities can be used to model and solve problems	• **Solve a system of linear and/or nonlinear equations graphically, or algebraically using elimination or substitution**	• Solution(s) to a system of equations • Solution(s) to a system of inequalities • Linear programming	

		• **Solve a system of inequalities by graphing** • Solve a system of 2 quadratic functions. • Write and graph constraints using a linear programming model, and analyze the graph to find solutions		
Quadratics	• The characteristics of quadratic functions and their representations are useful in solving real-world problems • Imaginary numbers exist and can be used to describe solutions	• **Identify the vertex, axis of symmetry, direction, maximum or minimum, x and y intercepts, domain and range of quadratic functions** • **Write and graph quadratic equations in vertex and standard form** • **Solve quadratics by factoring, completing the square, square root property, and/or quadratic formula** • **Factor using GCF, difference of squares,** sum/difference of cubes**, leading coefficient not equal to 1, leading coefficient equal to 1** • **Model a quadratic problem that arises in everyday life.**	• Vertex form • Standard form • Complete the Square • Characteristics of a quadratic • Properties and operations of complex numbers • Quadratic formula • Square root property • Factoring quadratics	

		• Use a graphing calculator to represent given quadratics • Use a graphing calculator to compare linear, quadratic, and exponential growth • **Perform operations with complex numbers**		
Properties of exponents and Operations of Polynomials	• Understand the relationship between zeros and factors of polynomials	• **Divide polynomials including synthetic and long division** • **Perform arithmetic operations on polynomials** • Use the properties of exponents to transform expressions • Understand that a function models a relationship between two quantities by linking factors, zeros, and roots • Use a graphing calculator to represent given polynomials and analyze the graphs	• Properties of exponents • Synthetic division • Long division • Factors, roots, zeros	
Radical and Rational Expressions and Equations	• Understand the connection between rational exponents and radicals • Use inverse operations to	• **Simplify expressions and solve equations with integer and rational exponents**	• Rational exponents and equations • Radical expressions and equations	

	solve radical and/or rational exponent equations	• **Simplify numeric and algebraic radical expression up to the 4th degree** • **Solve radical equations** • **Solve basic exponential functions** • **Add, subtract, multiply, divide, and simplify rational expressions** • Solve rational equations • Convert between rational exponent and radical form	• Rational expressions and equations	

<u>Title of Curriculum</u>: Honors Algebra II

Unit Name	Why	How	What	Example
Properties of Transformations and Functions	• Patterns, relations, and functions can be described with tables, graphs, and equations to analyze patterns of change • Relations and functions can be represented numerically, graphically, algebraically, and/or verbally • Properties of functions and function operations are used to model and analyze real world applications and quantitative relationships	• **Find the domain and range given a graph, equation, table, or mapping diagram** • Compose and combine all types of functions • **Solve and graph absolute value inequalities** • **Use transformations to graph quadratic** and absolute value **functions** • **Describe transformations on any type of function** • **Transform generic functions on the coordinate plane** • Graph piecewise functions • Use a graphing calculator to model functions and their transformations • Develop rules for transformations of functions given a variety of examples	• Characteristics of a graph • Function notation and composition • Transformations of $f(x) = x^2$ • Transformations of $f(x) = \|x\|$ • Piecewise functions • Absolute value inequalities	

System of Equations and Inequalities	• Systems of equations and inequalities can be used to model and solve problems • Matrices can be used to model and solve systems of equations	• **Solve a system of linear and/or nonlinear equations graphically, or algebraically using elimination or substitution** • Write a system of equations/inequalities given a verbal description • **Solve a system of inequalities by graphing** • **Solve a system of 2 quadratic functions** • Choose the most efficient method to solve a system, solve, and determine the reasonableness of the answer • Write and graph constraints using a linear programming model, and analyze the graph to find solutions • Solve a system of equations using matrices • Perform operations with matrices including addition, subtraction, scalar multiplication, and multiplication	• Solution(s) to a system of equations • Solution(s) to a system of inequalities • Linear programming (optimization problems) • Operations with matrices	

Quadratics	• The characteristics of quadratic functions and their representations are useful in solving real-world problems • Imaginary numbers exist and can be used to describe solutions	• **Identify the vertex, axis of symmetry, direction, maximum or minimum, x and y intercepts, domain and range of quadratics** • **Write and graph quadratic equations in vertex and standard form** • **Solve quadratics involving real and complex solutions by factoring, completing the square, square root property, and/or quadratic formula** • **Factor using GCF, difference of squares, sum/difference of cubes, leading coefficient not equal to 1, leading coefficient equal to 1** • Choose the most efficient method to solve a quadratic, solve, and determine the reasonableness of the answer • **Model quadratic problems that arise in everyday life** • Write and solve applications of quadratic functions • Use a graphing calculator	• Vertex form • Standard form • Complete the Square • Characteristics of a quadratic • Properties and operations of complex numbers • Quadratic formula • Square root property • Factoring quadratics • Applications of quadratics	

		to represent given quadratics • Use a graphing calculator to compare linear, quadratic, and exponential growth • **Perform operations with complex numbers**		
Properties of exponents and Operations of Polynomials	• Understand the relationship between zeros and factors of polynomials	• **Divide polynomials including synthetic and long division** • **Perform arithmetic operations on polynomial** • Use the properties of exponents to transform expressions • Understand that a function models a relationship between two quantities by linking factors, zeros, and roots • Use a graphing calculator to represent given polynomials and analyze the graph	• Properties of exponents • Synthetic division • Long division • Factors, roots, zeros	

Radical and Rational Expressions and Equations	• Understand the connection between rational exponents and radicals • Use inverse operations to solve radical and/or rational exponent equations	• **Simplify expressions and solve equations with integer and rational exponents** • **Simplify numeric and algebraic radical expression up to the 5^{th} degree** • **Solve radical equations** • **Solve basic exponential functions** • **Add, subtract, multiply, divide, and simplify rational expressions** • **Solve rational equations** • Convert between rational exponent and radical form	• Rational exponents and equations • Radical expressions and equations • Rational expressions and equations	
Sequences, Series, and Set Theory	• Arithmetic and geometric series represents patterns and can be used to model real-life problems. • Relationships can be represented using set theory.	• Draw and interpret Venn Diagrams to solve real life problems • Create arithmetic, geometric, and other sequences and series to solve real life problems. • Identify and describe sets, subsets, complements, unions, and intersections of sets	• Arithmetic and geometric sequences • Arithmetic and geometric series • Set theory • Venn Diagrams • Relationships of sequences and series to functions	

Logarithmic and Exponential Functions	• There is a relationship between exponential and logarithmic functions.	• Solve application problems using exponential and logarithmic functions including: appreciation, depreciation, compound interest, half time, and double-time problems. • Apply the power, quotient, and product properties of logarithms. • Solve logarithmic equations. • Explain the relationship between exponential and logarithmic functions	• Logarithmic functions • Exponential functions • Logarithmic and exponential application problems	

Title of Curriculum: Pre-calculus

Unit Name	Why	How	What	Example
Relations, Functions, and Graphs	• Characteristics within and across families of functions define the shape of a graph and application.	• Write equations for linear and quadratic functions • **Graph higher degree polynomials and other functions** • Graphically manipulate functions and expressions to convey meaning • **Determine zeros, domain, and range of polynomial functions** • **Find the inverse of a function** • Graph piece wise functions • Interpret results and reflect on reasonableness of their solutions and others • Model problems algebraically, graphically, and with table and charts • Use technology appropriately to solve mathematical problems.	• Characteristics of a function • Domain and range of a function • Inverses of functions • Rigid and non-rigid graphical transformations. • Higher degree polynomial functions. • Roots of polynomial equations	

		• Identify functions given tables, equations, or graphs		
Rational Numbers and Equations	• Specific characteristics within a function define the shape of the graph and associated application	• **Graph rational functions by determining domain restrictions, horizontal and vertical asymptotes, x- and y-intercepts, holes, and other critical points** • Determine solution sets for non-linear and rational inequalities algebraically and graphically • Interpret results and reflect on reasonableness of their solutions • Model problems algebraically, graphically, and with table and charts • Use technology appropriately to solve mathematical problems • **Attend to precision when graphing the key features of a rational function**	• Graphs of Rational Functions • Horizontal and Vertical Asymptotes • Non-Linear and Rational Inequalities	

Exponential and Logarithmic Functions	• Characteristics in exponential and logarithmic functions define the application being modeled	• **Graph logarithmic and exponential functions** • **Model real world applications functions with exponential and logarithmic expressions** • **Identify a common log and a natural log and determine their base.** • **Solve expressions and equations where the variable is the exponent** • **Make a change of base using the definition of logarithm.** • Interpret results and reflect on reasonableness of their solutions and others • Use technology appropriately to solve mathematical problems • Recognize patterns associated with properties of exponents to determine the analogous properties of logarithms	• Logarithmic and exponential functions and their graphs • Natural base e and the natural ln • Real-world applications with common logarithmic and exponential functions • Properties of logarithms	

Trigonometric Functions	• Advanced mathematics and trigonometry can be used to model and solve real-world problems	• **Evaluate trigonometric functions of any angle.** • **Use reference angles to evaluate trigonometric functions.** • **Sketch graphs of sine, cosine, and tangent graph and their inverse accurately and precisely.** • **Solve real life problems using right triangle trigonometry.** • **Recognize and write fundamental trigonometric equations.** • **Verify trigonometric identities.** • **Use standard algebraic techniques to solve trigonometric equations.** • **Use sum, difference, double angle, and half-angle formulas to verify and solve trigonometric equations.** • **Find the area of an oblique triangle use the law of sine or cosine.**	• Angles and Radian Measure • Right Triangle Trigonometry • Reference Angles • Trigonometric Functions and their graphs • Amplitude, Phase Shift, Period • Trigonometric Identities • Laws of Sines and Cosines • Area of Triangles	

		• Use technology appropriately to solve mathematical problems • Recognize patterns in amplitude, phase shift, and period components of trigonometric functions to generalize a formula for any trigonometric function		
Conics	• Conic sections represent a branch of analytical geometry and can model real-world applications	• Apply mathematical concepts and computation skills to real world situations • Algebraically model a conic section • Graph a conic section from an equation that analytically describes it with accuracy • Recognize and solve for the different variables that represent characteristics of a conic section. • Recognize structure and patterns associated with graphing circles, ellipses, hyperbolas, and parabolas	• General form of equation and graph of: • Circle • Ellipse • Hyperbola • Parabola	

Title of Curriculum: Honors Pre-calculus

Unit Name	Why	How	What	Example
Relations, Functions, and Graphs	• Characteristics within and across families of functions define the shape of a graph and application.	• Write equations for linear and quadratic functions • **Graph higher degree polynomials and other functions** • **Graphically manipulate functions and expressions to convey meaning** • **Determine zeros, domain, and range polynomial functions** • **Find the inverse of a function** • **Graph piecewise functions** • Interpret results and reflect on reasonableness of their solutions and others • Model problems algebraically, graphically, and with table and charts • Use technology appropriately to solve mathematical problems. • Identify functions given	• Characteristics of a function • Domain and range of a function • Inverses of functions • Rigid and non-rigid graphical transformations. • Higher degree polynomial functions. • Roots of polynomial equations	

		tables, equations, or graphs		
Rational Numbers and Equations	• Specific characteristics within a function define the shape of the graph and associated application	• **Graph rational functions by determining domain restrictions, horizontal, vertical, and slant asymptotes, x- and y-intercepts, holes, and other critical points** • Determine solution sets for non-linear and rational inequalities algebraically and graphically • Interpret results and reflect on reasonableness of their solutions • Model problems algebraically, graphically, and with table and charts • Use technology appropriately to solve mathematical problems • **Attend to precision when graphing the key features of a rational function**	• Graphs of Rational Functions • Horizontal, Vertical, and Slant Asymptotes • Non-Linear and Rational Inequalities	
Exponential and Logarithmic	• Characteristics in exponential and logarithmic functions define the application being	• **Graph logarithmic and exponential functions**	• Logarithmic and exponential functions	

Functions	modeled	• **Model real world applications functions with exponential and logarithmic expressions** • **Identify a common log and a natural log and determine their base.** • **Solve expressions and equations where the variable is the exponent** • **Make a change of base using the definition of logarithm.** • Interpret results and reflect on reasonableness of their solutions and others • Use technology appropriately to solve mathematical problems • Recognize patterns associated with properties of exponents to determine the analogous properties of logarithms	and their graphs • Natural base e and the natural ln • Real-world applications with common logarithmic and exponential functions • Properties of logarithms	

Trigonometric Functions	• Advanced mathematics and trigonometry can be used to model and solve real-world problems	• **Evaluate trigonometric functions of any angle.** • **Use reference angles to evaluate trigonometric functions.** • **Sketch graphs of sine, cosine, and tangent graph and their inverse accurately and precisely.** • **Sketch the translations of trigonometric graphs.** • **Solve real life problems using right triangle trigonometry.** • **Recognize and write fundamental trigonometric equations.** • **Verify trigonometric identities.** • **Use standard algebraic techniques to solve trigonometric equations.** • **Use sum, difference, double angle, and half-angle formulas to verify and solve trigonometric equations.**	• Angles and Radian Measure • Right Triangle Trigonometry • Reference Angles • Trigonometric Functions and their graphs • Amplitude, Phase Shift, Period • Trigonometric Identities • Laws of Sines and Cosines • Area of Triangles	

		• **Find the area of an oblique triangle use the law of sine or cosine.** • Interpret results and reflect on reasonableness of their solutions • Use technology appropriately to solve mathematical problems		
Conics	• Conic sections represent a branch of analytical geometry and can model real-world applications	• Apply mathematical concepts and computation skills to real world situations • Algebraically model a conic section • **Graph a conic section from an equation that analytically describes it with accuracy** • Recognize and solve for the different variables that represent characteristics of a conic section • Recognize structure and patterns associated with graphing circles, ellipses, hyperbolas, and parabolas	• General form of equation and graph of: • Circle • Ellipse • Hyperbola • Parabola	

Limits	• The concept of a limit is one of the foundations of calculus	• Evaluate limits using properties of limits • Evaluate when a limit can fail to exist • Interpret results and reflect on reasonableness of their solutions and others • Use technology appropriately to solve mathematical problems	• Properties of Limits • Limits of functions and sequences graphically, numerically, and algebraically • Infinite Limits	

Title of Curriculum: Calculus

Unit Name	Why	How	What	Example
Limits	• Limits are the basis to the study of calculus	• Evaluate a limit using properties of limits. • Determine continuity at a point and an open interval • Use the Intermediate Value Theorem • Determine infinite limits • Sketch vertical asymptotes	• Limits graphically and numerically • Limits analytically • Continuity and one-sided limits • Infinite limits	
Differentiation	• Derivatives can be used to solve real world problems. • Derivatives are used to analyze and sketch the graphs of functions	• Evaluate derivatives of various functions using basic differentiation rules • Use implicit differentiation to find the derivative of functions • Use related rates to solve real-life problems • Find the extrema of a function • Analyze and sketch the graph of a function • Solve minimum and maximum problems using derivatives	• Basic differentiation rules, product and quotient rules, the chain rule, and implicit differentiation • Related rates • The first and second derivative test • Optimization problems	
Integration	• The Fundamental Theorem of Calculus can be used to solve real-world application	• Use basic integration rules to find anti-derivatives • Evaluate a definite integral	• Anti derivatives and indefinite integration • Area under a curve	

	• Integrals can be used to find the area under the curve, the area between two curves and the volume of solids of revolution.	using the Fundamental Theorem of Calculus • Understand and use the Mean Value Theorem for integrals • Find derivatives and integrals of natural logarithms and exponential functions • Differentiate and integrate inverse trig. Functions • Find the area between two curves • Find the volume of a solid of revolution • Recognize limits that produce indeterminate form.	• The Fundamental Theorem of Calculus • Derivatives and integrals of logarithmic and exponential functions • Derivatives and integrals of inverse trigonometric functions • Growth and decay problems • Area between two curves • Volume of solids of revolution • Slope fields • Indeterminate forms and L'Hopital's Rule	

Title of Curriculum: AP Calculus

Unit Name	Why	How	What	Example
Limits	• Limits are the basis to the study of Calculus.	• Evaluate a limit using the limit properties. • Learn different ways a limit fails to exist. • Determine if a function is continuous at a point or on an open interval. • Determine infinite limits from the right and left. • Find limits as x approaches infinity.	• Graphical and numerical limits. • One-sided limits. • Continuity • Infinite limits and limits at infinity.	
Differentiation	• Derivatives can be used to solve real world applications. • Derivatives can be used to analyze and sketch the graphs of functions.	• Understand the relationship between continuity and differentiability. • Graph derivative functions given the graph of the function. • Use the limit definition of the derivative to find derivatives of polynomial functions. • Use basic differentiation rules to evaluate derivatives of various functions including polynomial, trigonometric, exponential, and logarithmic functions.	• Limit definition of the derivative and the tangent line problem. • Graphs of functions and their derivatives. • Relationship between continuity and differentiability. • Derivatives using technology. • Differentiation rules: power, product, quotient, chain rules • Derivatives of all	

		• Differentiate implicitly. • Solve related rates real-world problems. • Understand and be able to use Rolle's theorem, Mean Value Theorem, and Intermediate Value Theorem. • Find relative and absolute extrema of functions and points of inflection. • Analyze a function using the first and second derivatives. • Solve applied optimization problems using derivatives. • Look at the graph of the derivative of a function and be able to find characteristics of the function itself. • Use derivatives to apply L'Hopital's Rule to limits of indeterminate forms. • Use derivatives to understand the motion of particles.	trigonometric, exponential, logarithmic, and inverse trigonometric functions. • Derivatives given a table. • Implicit differentiation. • Related Rates • Rolle's, Mean Value, and Intermediate Value Theorems • Extrema • Analysis and sketch graphs using 1st and 2nd derivatives • Applied optimization problems • L'Hopital's Rule • Motion – position, velocity, and acceleration	
Integration	• The Fundamental Theorem of Calculus can be used to solve real-world applications • Integrals can be used to find the area under the curve, the	• Use basic integration techniques to find anti-derivatives of various functions including trigonometric, polynomial,	• Anti-derivatives. • Area under a curve – integral notation and use of geometric area • Riemann Sums and	

	area between two curves, and the volume of solids of revolution.	exponential, and logarithmic. • Estimate the area under a curve using Riemann Sums and the Trapezoid Rule. • Evaluate definite integrals using the Fundamental Theorem of Calculus • Use the graphing calculator to evaluate integrals. • Use integrals to find the average value of a function. • Use integrals of exponential functions to model compound interest and exponential growth. • Use slope fields to approximate solutions of differential equations. • Find a particular solution to a differential equation. • Find the area between two curves using integration. • Find volumes of solids of revolution. • Find volumes using cross-sectional areas. • Use integrals to further understanding of the motion particles.	Trapezoid Rule • First and second Fundamental Theorems of Calculus • Integration using graphing calculator • Average value of a function • U-substitution • Compound interest and exponential growth • Slope fields • Differential Equations • Area between two curves • Volume of a solid of revolution • Volumes using cross-sectional areas • Motion – position, velocity, and acceleration.	

Title of Curriculum: AP Statistics

Unit Name	Why (Enduring Understanding)	How (Skills)	What (Content)	Example
Descriptive Statistics	• Data can be collected, displayed, described, and summarized in response to a question that has been raised.	• Create and interpret graphical displays of data • Describe data • Calculate summary statistics • Compare distributions • Make calculations about individuals based on the normal model • Calculate a regression line for bivariate data • Interpret the regression line • Make predictions based on the regression line	• Graphical Displays • Summary Statistics • Descriptions • Comparisons • Normal Models • Percentages and percentiles • Regression Lines • Residuals • Correlation	
Experimental Design	• Proper techniques of experimentation and sampling can decrease or eliminate bias and confounding variables.	• Use techniques of randomization • Develop and critique surveys • Identify situations as experiments or studies • Design Randomized Comparative Experiments • Design and run simulations • Describe the types of bias, confounding or lurking variables that may exist.	• Randomization • Surveys • Observational Studies • Experiments • Simulations • Bias • Causation	

Probability	• Why is it important to understand the likelihood of an event? • How do you calculate theoretical probability? • How can you simulate a situation?	• Calculate probabilities of different events • Calculate expected value and make decisions based on that • Calculate the mean and standard deviation of a sum or difference of two random variables • Decide whether two variables are independent or not • Simulate a situation and compare it to a theoretical probability	• Rules of probability • Expected Value • Tests of independence • Sum and difference of random variables • Simulations	
Inferential Statistics	• You can infer something about the population by taking a sample. • You can decide the significance of a statistic.	• Calculate probabilities about samples • Check conditions for inference • Calculate and interpret Confidence Intervals • Do and interpret Hypothesis Tests • Choose appropriate type of inference • Explain what type of errors exist and their consequences	• Sampling Distributions • Normal, T and Chi-Square distributions • Central Limit Theorem • Hypothesis tests • Confidence Intervals • Statistical Significance • Types of Errors	

Title of Curriculum: Statistics (Semester)

Unit Name	Why (Enduring Understanding)	How (Skills)	What (Content)	Example
Descriptive Statistics	• Data can be collected, displayed, described, and summarized in response to a question that has been raised.	• Create and interpret graphical displays of data • Describe data • Calculate summary statistics • Compare distributions • Make calculations about individuals based on the normal model • Calculate a regression line for bivariate data • Interpret the regression line • Make predictions based on the regression line	• Graphical Displays • Summary Statistics • Descriptions • Comparisons • Normal Models • Percentages and percentiles • Regression Lines • Residuals • Correlation	
Experimental Design	• Proper techniques of experimentation and sampling can decrease or eliminate bias and confounding variables.	• Use techniques of randomization • Develop and critique surveys • Identify situations as experiments or studies • Design Randomized Comparative Experiments • Design and run simulations • Describe the types of bias that may exist.	• Randomization • Surveys • Observational Studies • Experiments • Simulations • Bias • Causation	
Probability	• Why is it important to	• Calculate probabilities of	• Rules of probability	

	understand the likelihood of an event? • How do you calculate theoretical probability? • How can you simulate a situation?	different events • Calculate expected value and make decisions based on that • Decide whether two variables are independent or not • Simulate a situation and compare it to a theoretical probability	• Expected Value • Tests of independence • Simulations	

Title of Curriculum: Finite Math

Unit Name	Why (Enduring Understanding)	How (Skills)	What (Content)	Example
Straight Lines and Linear Models	• Linear functions and systems of equations are mathematical models that describe concrete situations	• Determine the linear equation that models a given set of data • Determine and interpret slope as average rate of change in a context • Find and interpret the intercepts given a context • Algebraically determine the equation that best models a set of data • Use Excel to determine the equation that best models a set of data • Use graphing calculator to determine the equation that best models a set of data • Model a system and solve using substitution method	• The Cartesian coordinate system • Slope in context • X- and y-intercepts in context • Straight lines • Linear functions • Linear models • Intersection of two lines (including break even analysis, market equilibrium, and linear depreciation) • Scatter plots • Linear regression by hand using method of least squares • Linear regression using Excel	

Systems of Linear Equations	• Linear functions and systems of equations and equalities are the mathematical models that describe concrete situations. • Systems can have zero, one, or infinite solutions.	• Model various real-world applications using systems of equations • Solve systems of equations in 2 variables algebraically • Solve n-variable systems of equations by various methods • Classify systems and their solutions based on a graph • Classify systems and their solutions based on a reduced augmented matrix • Interpret their solution in context • Use various technologies to solve systems (Excel, Grapher.app, and graphing calculator)	• Solving systems using substitution method • Solving systems using elimination method • Types of solutions (independent, dependent, inconsistent) • Over determined and underdetermined systems • Supply and demand functions • Market equilibrium • Graphs of 3-variable systems and their solutions • Applications of systems of equations • Finding the equation of a unique parabola using 3 data points • Augmented matrices • Solving systems using reduced echelon form	

Matrix Operations and Applications	• Matrix analysis is the method that enables technology integration to aid in modeling real life scenarios and solving systems.	• Perform matrix operations by hand • Apply matrices to model real-world problems • Interpretation of the solutions to applied matrix operations problems • Solve systems using matrix inverses • Perform all operations using TI-Graphing calculator • Perform all operations using excel • Encrypt a message and decode an encrypted message using matrices • Interpret Leontief input-output matrices	• Matrix operations (add, subtract, scale, multiply) • Applications of matrices to model real-world problems • Interpretation of the solutions to applied matrix operations problems • Matrix inverses • Solving systems using matrix inverses • Leontief input-output matrices • Using matrices for encryption	
Linear Programming A Geometric Approach	• Linear systems of equalities in two variables are a useful tool in optimization problems involving several constraints.	• Develop a system of linear constraints, an optimization function, and determine the optimum solution to a linear programming problem • Perform sensitivity analysis of optimization function	• Graphing linear inequalities • Graphing systems of linear inequalities • Developing a system of constraints given a real-world application • Developing an	

		and constraints algebraically • Apply linear programming to model real-world optimization problems.	optimization equation • Determining critical points of feasible region • Analysis of unbounded feasible region • Determining the optimal solution • Sensitivity analysis of the parameter of the optimization function • Sensitivity analysis of the constraints	
Mathematics of Finance and Exponential Functions	• Exponential functions can be used to model and solve problems involving exponential growth/decay and compound interest.	• Identify collected data set as exponential or not • Perform exponential regression analysis using excel • Solve for any parameter in a compound interest function (with aid of graphing calculator) • Apply compound interest functions to real-world investment and loan problems • Calculate the savings of a	• Exponential functions as a model for growth and decay • Use of logarithms in solving exponential growth equations • Logistic growth model • Simple interest • Compound interest • Continuously compounded interest/growth • Annuities • Amortization	

		loan refinance	• Mortgages and loans • Using TI-Graphing Calculator TVM Solver app in compound interest problems • Exponential Regression in Excel	
Sets, Counting, and Probability	• Counting and combinatorics are the fundamental tools of probability. • Probability helps us to determine the likelihood of certain outcomes and make decisions.	• Solve counting problems using set theory, multiplication principle, permutations and combinations • Use counting techniques to solve probability problems • Determine whether events are independent • Solve conditional probability problems	• Set theory and set operations • Venn diagrams • Number of elements in a finite set • Multiplication Principle • Permutations • Combinations • Experiments, sample spaces, and events • Definition of probability • Rules of probability • Counting techniques in probability • Conditional probability • Independent events	

Title of Curriculum: Mathematical Modeling

Unit Name	Why (Enduring Understanding)	How (Skills)	What (Content)	Example
Exploring Fractals	• Draw a connection between pure mathematics, fractals, art, and natural phenomena.	• Add, subtract, multiply complex numbers • Compute several iterations of the Mandelbrot formula • Create their own fractal art with Xaos.app • Create a fractal by hand	• Add, subtract, multiply complex numbers • Compute several iterations of the Mandelbrot formula • Create their own fractal art with Xaos.app • Create a fractal by hand	
Programming Models with Netlogo	• Netlogo.app is free agent-based programming language that models many real-life phenomena	• Fundamentals of agent-based programming • How to define properties of 'Turtles' and 'Patches' • How to program simple models using Netlogo	• Identify key aspects of phenomena to be modeled and make appropriate simplifying assumptions • Define variables appropriately • Create basic programs from scratch • Analyze more sophisticated models and make alterations appropriate to the context	

Budgets, Loans, and Investing	• Investments and loans are fundamentally governed by the laws of compound interest and exponential growth. • A comprehensive budget must include all cash flow in and out of your account.	• Use appropriate technology to calculate a future value, present value, or payment for a loan or investment • Calculate the effects of a loan refinance • Calculate total actual repayment and total interest for a loan • Create an organized monthly budget in excel using realistic values.	• The effects of a down payment, interest rate, and duration of a loan, annuity, or investment • The exponential growth nature of compound interest • An amortization schedule and why payments primarily go towards interest in the beginning and principle at the end of a loan • How to make a monthly budget	

Creating and Solving Mathematical Models	• A mathematical model is a representation of a system or scenario that is used to gain qualitative and/or quantitative understanding of some real-world problems and to predict future behavior.	• Define the problem statement • Make appropriate simplifying assumptions • Define variables • Distinguish between independent variables, dependent variables, and model parameters • Get a solution • Apply appropriate technology • Analyze and assess their model and make revisions as is necessary and time permits • Report results in written, visual, and/or verbal from. • Generalize their model solution to model similar situations	• The difference between a mathematical model and "word problems" • The mathematical modeling process.	

Title of Curriculum: Fundamentals of Mathematics (I and II)

Unit Name	Why (Enduring Understanding)	How (Skills)	What (Content)	Example
Whole Numbers and Decimals	• Decimals have place values related by groups (powers) of 10. • Strategies for adding, subtracting, multiplying, or dividing decimals are the same strategies we have always used with whole numbers.	• Read and write whole numbers and decimals • Round whole and decimal numbers • Add, subtract, multiply, and divide whole numbers and decimals	• Whole numbers • Decimals • Place Value	
Fractions and Mixed Numbers	• Students will fluently compute with fractions and mixed numbers. • Students will use their knowledge of fractions to successfully solve problems.	• Find the greatest common of factor of two or more numbers • Simplify fractions • Add, subtract, multiply, and divide fractions and mixed numbers.	• Proper fraction • Improper fraction • Mixed number • Greatest common factor • Divisibility rules • Factors • Prime numbers • Composite numbers	
Integers and Algebraic Expressions	• Integers are useful for noting relative changes or values. • Every numerical operation has an inverse.	• Add, subtract, multiply, and divide integers • Evaluate numerical expressions containing	• Integers • Exponents • Distributive property	

	• Students will understand the use of variables in algebraic expressions. • Students will apply and extend previous understandings of arithmetic to algebraic expressions.	exponents • Simplify numerical expressions using the order of operations • Write algebraic expressions • Evaluate algebraic expressions • Simplify algebraic expressions including the use of the distributive property	• Algebraic expression • Numerical expression • Like terms • Order of operations	
Equations and Inequalities	• An equation represents two quantities that are equal and can be used as a tool to find an unknown value. • The understanding that solving equations is a process of working backwards. • The solutions to equations and inequalities can be represented on a number line.	• Solve one step and two step equations • Solve equations by combining like terms • Solve equations using the distributive property • Solve equations with variables on both sides • Graph inequalities on a number line • Solve inequalities using addition and subtraction	• Solutions of equations • Solutions of inequalities • Like terms • Distributive property	

Exponents and Scientific Notation	• Exponential and scientific notation are efficient ways of expressing numbers.	• Simplify expressions using the product, quotient, and power rules of exponents • Read and write very large and very small numbers in scientific notation. • Multiply numbers using scientific notation.	• Product, quotient, and power rule of exponents • Scientific notation	
Ratios, Proportions, and Percents	• Proportional relationships express how quantities change in relationship to each other. • Students will understand that proportional reasoning can be useful in solving real life situations. • Proportions are a tool for calculating percents and finding missing pieces of information. • A part of a whole can be expressed as a decimal, fraction, or percent. • Real life data is often represented as percentages.	• Determine if two ratios create a proportion • Solve proportions. • Use proportions to solve problems. • Convert between fractions, decimals, and percents. • Solve percent equations. • Solve word problems using percents. This includes, but is not limited to, mark-up, tax, discount, and percent of change.	• Ratios • Proportions • Equivalency of fractions, decimals, and percents • Mark-up, tax, and discount	

Graphing Linear Equations	• Understand slope is a constant rate of change. • Understand linear equations describe the association between two quantities in bivariate data.	• Plot points on the coordinate plane • Find the slope of a line given a graph, 2 points, and a linear equation • Graph linear equations given an equation in slope-intercept form and standard form	• Ordered pair • Coordinate plane • Origin • X-axis and y-axis • Quadrants • Slope of a line • Slope-intercept and standard forms of a linear equation	
Geometry	• Geometry and spatial sense offer ways to interpret and reflect on our physical environment. • Analyzing geometric relationships develops reasoning and justification skills. • The special properties of right triangles can be used to solve real world problems. • Geometric transformations are functional relationships.	• Draw and measure angles • Find the congruent angles formed when parallel lines are intersected by a transversal • Find the sum of the angles of a triangle and quadrilateral • Transform figures using rotations, translations, and reflections • Find the diameter given the radius of a circle. • Find the circumference and area of a circle • Find the area of parallelograms, triangles, and trapezoids • Find the surface area and volume of prisms, pyramids, cylinders, cones,	• Types of angles: acute, obtuse, right, and straight • Parallel lines • Transversal • Types of triangles: acute, obtuse, and right • Quadrilaterals • Rotations, translations, and reflections • Parts of a circle: radius, diameter, circumference, and area • Quadrilaterals: parallelograms, rectangles, squares, and trapezoid • Prisms, pyramids, cylinders, cones, and spheres • Pythagorean theorem.	

		and spheres • Approximate square roots using a calculator • Estimate a square root between two whole numbers • Solve problems using the Pythagorean theorem • Find the distance between two points.	• Distance formula	

Title of Curriculum: Individualized Mathematics Curriculum - Algebra (2-year program)

Unit Name	Why (Enduring Understanding)	How (Skills)	What (Content)	Example
Number and Operations	• There is a specific order in which numerical calculations must be completed. • There are equivalent forms for writing every real number.	• Order and compare real numbers written in a variety of forms • Add, subtract, multiply, and divide integers • Simplify numerical exponential expressions • Simplify numerical expressions containing absolute value • Evaluate numerical expressions • Evaluate algebraic expressions • Use real numbers in authentic applications • Check answers of large numbers by estimating	• Order of operations • Integers • Real numbers • Exponents • Absolute value • Rational Numbers	
Algebraic Equations	• An equation can be seen as a tool to find an unknown value. • Proportional reasoning can be useful in solving real life situations.	• Solve one-step equations • Solve two-step equations • Solve equations using the distributive property • Solve equations by combining like terms on	• Distributive property • Equivalent Expressions • Ratio • Proportion • Percents • Discount, Tax, Tip	

		both sides of the equal sign • Determine if two ratios form a proportion. • Solve equations involving proportional relationships • Convert between fractions, decimals, and percents using a calculator • Apply proportional reasoning to solve percent problems including discount, tax, and tip • Use the concept of equations to solve real world applications • Check answers by determining if an answer is reasonable • Solve and graph on a number line one-step and two-step inequalities		
Patterns and Functions	• Patterns provide insights into potential relationships. • Relations and functions can be represented numerically, graphically, algebraically, and/or verbally.	• Recognize linear and nonlinear patterns from graphs, scatterplots, equations, and tables • Complete the pattern for simple arithmetic patterns • Difference between a relation and a function from	• Linear • Nonlinear • Function • Relation • Arithmetic pattern • Functional notation	

		a table and from graph • Demonstrate a conceptual understanding of linear and nonlinear functions through the use of a graphing calculator or computer program given real-world data. • Evaluate functions • Show understanding with explanation that some equations are relations and not functions, with the use of a graphing utility		
Graphs of Linear and Nonlinear Functions	• Real-world data can model both as linear and nonlinear functions. • Systems of linear equations can be used to model problems.	• Find slope of a line given graph, points, and equation in slope-intercept form • Graph a line by hand (table, point and slope and slope-intercept equation) • Graph a line on a graphing calculator • Analyze a linear function with the use of a graphing calculator (slope, y-intercept, x-intercept, domain, range)	• Slope • Slope-intercept form of linear equation • X-intercept • Y-intercept • Domain • Range • Minimum and maximum values • System of equations • Linear regression equation	

		• Solve a system of equations by graphing (on calculator) and explain the significance of the intersection point • Graph a nonlinear function on a graphing calculator • Analyze a nonlinear function with the use of a graphing calculator. This includes (but is not limited to) x- and y-intercepts, maximum and minimum (when applicable), domain, range • Use the graphing calculator to model data using a scatterplot; write a linear regression equation; and predict future data		
Polynomials	• The properties of integers apply to polynomials. • Multiplying and factoring polynomials are related.	• Simplify expressions using the properties of exponents • Combine like terms in an expression • Use the distributive property to simplify expressions • Add, subtract, and multiply	• Properties of exponents • Like terms • Distributive property • Polynomials • Greatest common factor	

		polynomials • Factor expressions using greatest common factor		
Geometry and Measurement	• The measurements of geometric figures can be calculated using a variety of strategies. • A change in one dimension of an object results in predictable changes in area and or volume.	• Use scale factor to shrink or enlarge figures. • Find areas of polygons, composite figures, circles, and sectors. • Find lateral areas, surface areas, and volumes of various solid figures.	• Scale factor • Polygon • Sector of circle • Lateral area • Surface area • Volume	
Statistics and Probability	• Data can be collected, displayed, described, and summarized in response to a question that has been raised. • Probability helps us to determine the likelihood of certain outcomes and make decisions.	• Create appropriate graphical displays of data • Interpret graphical displays. • Summarize center and spread of univariate data • Determine probability of basic and compound events	• Center and spread of data • Compound events • Basic probability • Conditional probability • Experiments • Simple space • Events • Independent events	

Course Name: **Mathematics** Grade: Kindergarten

Title of Unit	**Place Value**
Enduring Understanding	Students will understand place value.
Essential Questions	Why is understanding place value important?
Content	Students will understand the magnitude of numbers (11 to 19) and know that the number is one ten and ones. Students will understand the unique two-digit symbol that goes with each number word.
Skills	Students will be able to represent ten ones as a bundle of "tens". Students will be able to identify the digit in the tens and ones places in a given two-digit number (11 to 19). **Students will be able to identify the value of a digit in a two-digit number (11 to 19).** Students will be able to demonstrate an understanding of "how many" ten and ones are in a given two-digit number.
Common Summative Assessments	Summative Assessment on writing two digit numbers.
Standards	CCSS.K.NBT.1. Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 =10 +8 and 10+8=18); understanding that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.

Course Name: **Mathematics** Grade: Kindergarten

Title of Unit	**Addition and Subtraction (0 to 10)**
Enduring Understanding	Students will understand how to solve addition and subtraction problems (0 to10).
Essential Questions	How do we use addition and subtraction in our lives?
Content	Students will understand that addition means putting groups together and subtraction means taking apart and taking from groups. Students will understand the symbols (+, -, =) in math problems. Students will understand that addition and subtraction problems can be represented using a variety of strategies.
Skills	**Students will be able to demonstrate fluency of addition and subtraction facts (zero family to 5)** **Students will be able to represent addition and subtraction (6 to 10) with objects, fingers, mental images, drawings, sounds (e.g., claps, acting out situations, verbal explanations, expressions, or equations).** Students will be able to solve addition and subtraction word problems, within 10, by using objects or drawings to represent the problem. **Students will be able to decompose numbers (0-10) into pairs in more than one way by using objects or drawings, and record in the form of an equation or drawing. (Ex. 5=2+3, 5= 4+1 or 8=2+6, 10=6+4).** Students will be able to find the number that makes 10 when added to a given number (1 to 9) using objects or drawings, and record in the form of an equation or drawing (Ex. 7+? =10).
Common Summative Assessments	Summative Assessment on addition and subtraction facts 0 to 10. Fact fluency 0 to 5.
Standards	CCSS.K.OA 1. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. CCSS.K.0A 2. Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem. CCSS.K.OA 3. Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5=2+3 and 5=4+1). CCSS.K. OA 4. For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation. CCSS.K.OA 5. Fluently add and subtract within 5.

Course Name: **Mathematics** Grade: Kindergarten

Title of Unit	**Counting and Ordering Numbers**
Enduring Understanding	Students will demonstrate how counting helps us solve problems in our lives.
Essential Questions	How do we use numbers in our lives? How does counting help us to solve problems?
Content	Students will understand number names and be able to count in sequence. Students will understand the vocabulary (more, less, fewer, and same) when counting and comparing objects. Students will understand whole numbers using concrete, pictorial, and symbolic representations.
Skills	**Students will be able to count to tell "how many" objects, regardless of arrangement. (0 to 20) (Ex: arranged in a line, a rectangular array, or in a circle).** **Students will be able to identify whether a number of objects (0 to 10) in a group is greater than, less than, or equal to the number of objects in another group (0 to 10) using matching and counting strategies. (Ex: 1:1 correspondence).** **Students will be able to compare two numbers, between 1 and 10, presented as a written numeral.** Students will be able to write numbers from 11 to 20. **Students will be able to represent a number of objects (0 to 20) with a written numeral.** Students will be able to count to tell "how many" objects (0 to 20) with a written numeral. Students will be able to count out objects, when given a number 1 to 20. **Students will be able to count to 100 by ones and by tens.** Students will be able to count forward beginning at any given number up to and including 100.
Common Summative Assessments	Summative Assessment on counting and identifying numbers.

Standards	CCSS.K.CC 1. Count to 100 by ones and by tens. CCSS.K.CC 2. Count forward beginning from a given number within the known sequence (instead of having to begin at 1). CCSS.K.CC 3. Write numbers from 0 to 20. Represent a number of objects with a written numeral 0 to 20 (with 0 representing a count of no objects). CCSS.K.CC 4. Understand the relationship between numbers and quantities; connect counting to cardinality. - When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object. - Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted. - Understand that each successive number name refers to a quantity that is one larger. CCSS.K.CC.5 Count to answer "how many?" questions about as many as 20 things arranged in a line, rectangular array, or a circle, or and many as 10 things in a scattered configuration; given a number from 1 to 20, count out that many objects. CCSS.K.CC 6. Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies. CCSS.K.CC.7. Compare two numbers between 1 and 10 presented as written numerals.

Course Name: **Mathematics** Grade: Kindergarten

Title of Unit	**Geometry**
Enduring Understanding	Students will understand how shapes make up our world.
Essential Questions	How do shapes make up our world?
Content	Students will understand two-dimensional shapes (squares, circles, triangles, rectangles, hexagons) and three-dimensional shapes (cubes, cones, cylinders, spheres). Students will understand that positional words can describe an object's location. Students will understand that objects can be described, classified, analyzed, compared, and created by their attributes.
Skills	Students will be able to describe objects in the environment using names of shapes. Students will be able to describe the relative position of objects using positional words. Students will be able to name shapes regardless of their orientations or overall size. Students will be able to identify two-dimensional shapes. Students will be able to identify three-dimensional shapes. Students will be able to analyze and compare two- and three- dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length). Students will be able to model shapes in the world by building shapes from components (e.g. sticks and clay balls), and draw shapes. Students will be able to compose simple shapes to form larger shapes. (For example, "Can you join these two triangles with full sides touching to make a rectangle?").
Common Summative Assessments	Summative Assessment on identifying and creating a variety of shapes.

Standards	CCSS.K.G 1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to. CCSS.K.G. 2. Correctly name shapes regardless of their orientations or overall size. CCSS.K.G. 3. Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid"). CCSS.K.G. 4. Analyze and compare two- and three- dimensional shapes, in different sizes and orientations using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/ "corners") and other attributes (e.g., having sides of equal length). CCSS.K.G. 5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes. CCSS.K.G. 6. Compose simple shapes to form larger shapes. For example, "Can you join these two triangles with full sides touching to make a rectangle?"

Course Name: **Mathematics** Grade: Kindergarten

Title of Unit	**Measurement and Data**
Enduring Understanding	Students will discover how and why things are measured in our lives.
Essential Questions	Can all things be measured? How do we use measurement every day? Why do we measure things?
Content	Students will understand objects have measurable attributes that can be recognized and described. Students will ~~know~~ understand that objects can have similar measurable attributes. Students will understand that objects can be sorted into categories.
Skills	Students will be able to describe measurable attributes of objects, such as length or weight. Students will be able to describe several measurable attributes of a single object. Students will be able to directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. (For example, directly compare the heights of two children and describe one child as taller/shorter.) Students will be able to classify objects into categories. Students will be able to count the number of objects in each category, and sort the categories in terms of "how many" objects (0 to 10) are in each category. (Ex: 2 circles, 1 triangle, 3 rectangles).
Common Summative Assessments	Summative Assessment on measurement and data.
Standards	CCSS.K.MD 1. Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. CCSS.K.MD 2. Directly compare two objects with a measurable attribute in common, to see which object has "more of/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter. CCSS.K.MD 3. Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.

Course Name: **Mathematics** Grade: First

Title of Unit	**Counting**
Enduring Understanding	Students will demonstrate how counting helps us solve problems.
Essential Questions	What can numbers represent? How can numbers be represented using symbols, words and tools? Why do we need numbers?
Content	Students will understand counting follows a sequence. Students will understand numbers represent an object (1:1 correspondence). Students will understand numbers can be expressed in pictures, objects and numerals.
Skills	Students will be able to identify the value of a whole number (0 to 120). Students will be able to count forward by 1, 2, 5, 10s (0 to 120). Students will be able to order whole numbers (0 to 120). **Students will be able to recognize visual representations of numbers (0 to 120).** **Students will be able to create visual representation using models and written numbers (0 to 120).** **Students will be able to write whole number (0 to 120).**
Common Summative Assessments	Common Summative assessment on matching number of objects to corresponding numeral. Common Summative assessment on writing numbers 1 to 120 in order. Common Summative assessment on oral counting.
Standards	CCSS.NBT 1. Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: First

Title of Unit	**Place Value**
Enduring Understanding	Students will learn to organize numbers by ones and tens. Students will learn to use place value to solve math problems more efficiently. Students will use place value to compare numbers using symbols.
Essential Questions	How does understanding place value help us to compare and order numbers? How can knowing the value of a number help us to make decisions? Why are zero and ten important?
Content	Students will understand the value of zero and ten. Students will understand the meaning of base-ten and use that understanding to solve number and real life problems (addition, subtraction, comparison).
Skills	**Students will be able to represent ten ones as a bundle called "ten".** **Students will be able to identify the digit in the tens and one places in a given two-digit number.** Students will be able to identify the value of each digit within the number. Students will be able to demonstrate an understanding of "how many" tens and ones are in a given two-digit number. Students will be able to compare two two-digit numbers based on meaning of the tens and ones digits. **Students will be able to record the comparison of two two-digit numbers using symbols >, =, and <.** Students will be able to add within 100, including adding a two-digit number and a one digit number (23+7=30), and adding a two-digit number and a multiple of 10 (23+20=43). Students will be able to understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. Students will be able to mentally find ten more and ten less than a given two-digit number without having to count and explain reasoning. Students will be able to subtract multiples of 10 in the range of 10 to 90 from multiples of 10 in the range 10 to 90 (positive or zero differences). Students will be able to relate strategies used to add or subtract two two-digit numbers to a written method and explain reasoning used.
Common Summative Assessments	Common Summative Assessment on comparing numbers using >, <, and =. Common Summative assessment on identifying 10s and 1s. Common Summative assessment on adding or subtracting two 2-digit numbers without regrouping. Common Summative assessment on mental math with multiples of 10.

Standards	CCSS.1.NBT 2. Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: - 10 can be thought of as a bundle of ten ones – called a "ten". - The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. - The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones). CCSS.1.NBT 3. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <. Use place value understanding and properties of operations to add and subtract. CCSS.1.NBT 4. Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10 using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. CCSS.1.NBT 5. Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. CCSS.1.NBT 6. Subtract multiples of 10 in the range 10 to 90 from multiples of 10 in the range 10 to 90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: First

Title of Unit	**Addition and Subtraction**
Enduring Understanding	Students will learn how to apply addition and subtraction strategies to solve problems in everyday life.
Essential Questions	How do addition and subtraction help me function in my world? How does comparing numbers help us solve problems?
Content	Students will understand that there are multiple ways to solve addition and subtraction equations with whole numbers. Students will understand that addition and subtraction procedures have real world application. Students will understand the commutative and associative properties of addition and subtraction. Students will understand that number models, objects and drawings are various ways to solve problems. Students will understand the meaning of the symbols and the equal sign within equations. Students will understand that an unknown number in an equation can be determined by demonstrating the relationship between addition and subtraction.
Skills	**Students will be able to use addition and subtraction within 20 to solve problems, including word problems (adding to, taking from, putting together, taking apart, comparing) by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.** Students will be able to solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20. **Students will be able to fluently add and subtract facts within ten.** Students will be able to determine the unknown number in an addition or subtraction equation relating to three whole numbers (8+? =10).
Common Summative Assessments	Common Summative Assessment on word problems for addition and subtraction.

Standards	CCSS.1.OA 1. Use addition and subtraction within 20 to solve word problems involving situations of adding to taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. CCSS.1.OA 2. Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. Understand and apply properties of operations and the relationship between addition and subtraction. CCSS.1.OA 3. Apply properties of operations as strategies to add and subtract. 3 Examples: If 8+3 =11 is known, then 3+8 =11 is also known. (Commutative property of addition.) To add 2+6+4, the second two numbers can be added to make a ten, so 2+6+4=2+10=12. (Associative property of addition.) CCSS.1.OA 4. Understand subtraction as an unknown-addend problem. For example, subtract 10-8 by finding the number that makes 10 when added to 8. CCSS.1.OA 5. Relate counting to addition and subtraction (e.g., by counting on 2 to add 2). CCSS.1.OA 6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8+6=8+2+4=10+4=14); decomposing a number leading to a ten (e.g., 13-4=13-3-1=10-1=9); using the relationship between addition and subtraction (e.g., knowing that 8+4=12, one knows 12-8=4); and creating equivalent but easier or known sums (e.g., adding 6+7 by creating the known equivalent 6+6+1=12+1=13). CCSS.1. OA 7. Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false? 6=6, 7=8-1, 4+1=5+2. CCSS.1.OA 8. Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8+? =11, 5=? +3, 6+6=? CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: First

Title of Unit	**Geometry**
Enduring Understanding	Students will learn to recognize shapes in the world around them. Students will learn to divide a whole into equal shares.
Essential Questions	How do shapes make up our world? How is the world of geometry connected to the world of numbers?
Content	Students will understand that two and three-dimensional objects can be described, classified and analyzed by their attributes. Students will understand shapes and objects have names based on their attributes. Students will understand shapes can be measured.
Skills	**Students will be able to distinguish between defining (triangles have three sides) and non-defining attributes (color, orientation, overall size).** **Students will be able to build shapes with defining attributes.** **Students will be able to draw shapes with defining attributes.** Students will be able to compose (make) two-dimensional shapes to create a composite shape (Ex. Two trapezoids to create a hexagon). Students will be able to compose (make) three-dimensional shapes (Ex. 6 squares to create a cube). Students will be able to compare new shapes made from composite shapes. **Students will be able to partition circles and rectangles into two and four equal shares.** Students will be able to describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of. Students will be able to describe a whole as two of, or four of the shares. (Ex. A whole circle is made of two halves). Students will be able to demonstrate understanding that decomposing (take apart) an object into more equal shares creates smaller shares.
Common Summative Assessments	Common Summative assessment to identify shapes by attributes. Common Summative assessment to create a new shape from 2-D or 3-D shapes. Common Summative assessment to identify equal shares with accurate vocabulary.

Standards	CCSS.1.G 1. Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g. color, orientation, overall size); build and draw shapes to possess defining attributes. CCSS.1.G 2. Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape. CCSS.1.G 3. Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: First

Title of Unit	**Measurement and Data**
Enduring Understanding	Students will demonstrate how and why things are measured in our lives. Students will use data and graphs to make decisions and solve problems. Students will tell and write time to the hour and half hour to make decisions.
Essential Questions	Can all things be measured? Why is measuring important? How can data help us to make decisions and solve problems? How can time affect the decisions we make?
Content	Students will understand that some attributes of objects are measureable and can be quantified using unit amounts. Students will understand that time is measureable and can be broken into units. Students will understand that questions can be answered by collecting and analyzing data. Students will understand that data represents real world objects and ideas. Students will understand that data can be represented in different forms (chart, graph, picture).
Skills	Students will be able to order three objects by length. **Students will be able to compare the lengths of two objects indirectly by using a third object (a pencil, a shoe, a cube).** Students will be able to express the length of an object by stating the length as a whole number of units (5 same size pencils) by laying multiple copies of a shorter object end to end. **Students will be able to measure the length of an object using same size units that span the object with no gaps or overlaps.** **Students will be able to tell time to the hour and half-hour using analog and digital clocks.** **Students will be able to write time in hours and half-hours using analog and digital clocks.** **Students will be able to organize and represent data with up to three categories (Pets: dog, cat, bird).** **Students will be able to interpret data with up to three categories.** Students will be able to ask and answer questions about the total number of data points: How many in each category? How many more or less are in one category than in another?
Common Summative Assessments	Common Summative assessment to measure accurately. Common Summative assessment to use data to ask and answer questions. Common Summative assessment to tell time.

Standards	CCSS.1.MD 1. Order three objects by length; compare the lengths of two objects indirectly by using a third object. CCSS.1.MD 2. Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps. CCSS.1.MD 3. Tell and write time in hours and half-hours using analog and digital clocks. CCSS.1.MD 4. Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: First

Title of Unit	**Money**
Enduring Understanding	Students will learn to count money in everyday situations.
Essential Questions	What would the world be like without money? Why is it important to know the value of coins?
Content	Students will understand the identity of each coin. Students will understand the value of each coin. Students will understand that skip counting can be applied when counting like coins. Students will understand that skip counting and sequential counting can be applied when counting unlike coins. Students will understand the meaning of the cent sign, dollar sign and decimal point.
Skills	**Students will be able to identify the coin.** Students will be able to identify the value. **Students will be able to count like coins.** Students will be able to count unlike coins. Students will be able to write coin value amount using appropriate symbols.
Common Summative Assessments	Common Summative assessment to identify and count coins.
Standards	WIN.MD.1 Using quarters, dimes, nickels, and pennies, identify names and values, count like and unlike coins, and write value using cent sign, dollar sign, and decimal point. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP4 Model with mathematics. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Second

Title of Unit	**Time and Money**
Enduring Understanding	Students will tell time and write time to make decisions. Students will add and subtract money amounts in everyday situations.
Essential Questions	How would life be different if we couldn't measure time? What would the world be like without money? How can time affect the decisions we make?
Content	Students will understand that time can be measured. Students will understand that word problems are used to solve problems involving money.
Skills	**Students will be able to tell time from analog and digital clock to the nearest five minutes, using a.m. and p.m.** **Students will be able to write time from analog and digital clock to the nearest five minutes, using a.m. and p.m.** **Students will be able to solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using dollar and cent symbols appropriately. Example: If you have two dimes and three pennies, how many cents do you have?**
Common Summative Assessments	Common Summative assessment on using analog and digital clocks, verbally and in writing, tell time to the nearest 5 minutes. Common Summative assessment on solving word problems involving bills and coins.
Standards	CCSS.2.MD 7. Tell and write time from analog and digital clocks to the nearest five minutes using a.m. and p.m. CCSS.2.MD 8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using dollar and cent symbols appropriately. Example: If you have two dimes and three pennies, how many cents do you have? CCSS.MP 1 Make sense of problems and persevere in solving them. CCSS.MP 4 Model with mathematics. CCSS.MP 5 Use appropriate tools strategically. CCSS.MP 7 Look for and make use of structure. CCSS.MP 8 Look for and express regularity in repeated reasoning.

Title of Unit	**Addition and Subtraction**
Enduring Understanding	Students will learn how to apply addition and subtraction strategies to solve problems in everyday life.
Essential Questions	How would life be different if we couldn't add or subtract? Why is being able to add and subtract important? What would happen if you could only add, and not subtract?
Content	Students will understand that addition and subtraction are inverse operations.
Skills	Use addition and subtraction within 20 to solve one and two-step word problems with unknowns in all positions. **Students will be able to demonstrate fluency, using mental strategies, or addition and subtraction facts within 20.**
Common Summative Assessments	Common Summative assessment on 1- and 2-step word problems involving addition and subtraction. Common Summative assessment on fact fluency tests (flashcards and/or written).
Standards	CCSS.2. OA 1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions; e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. CCSS.2. OA 2. Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Second

Title of Unit	**Addition and Subtraction for Larger Units**
Enduring Understanding	Students will use place value knowledge and mental math to add and subtract within 1000.
Essential Questions	How could you add or subtract in a world without place value? If numbers stopped at 100, how would that affect our world?
Content	Students will understand the relationship between addition and subtraction. Students will understand when it is necessary to compose and/or decompose numbers in the hundreds based on place value knowledge. Students will understand how to apply addition and subtraction strategies when solving problems.
Skills	**Students will be able to add and subtract fluently within 100 using strategies.** Students will be able to add up to four 2-digit numbers using strategies. Students will be able to add and subtract within 1000 using a variety of strategies and relate the strategies to a written method. **Students will be able to add and subtract within 1000 using strategies related to a written method.** Students will be able to compose or decompose three-digit numbers when adding and subtracting. Students will be able to add and subtract mentally 10 or 100 to a given number and to a given number 100-900. Students will be able to evaluate the importance of addition and subtraction strategies. Students will be able to mentally add/subtract to increase their automaticity. Students will be able to mentally add or subtract 10 or 100 to a given number 100-900.
Common Summative Assessments	Common Summative assessment on adding and subtracting of 2-digit and 3-digit numbers, as well as adding up to 4 2-digit numbers.

Standards	CCSS.2 NBT 5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. CCSS.2 NBT 6. Add up to four two-digit numbers using strategies based on place value and properties of operations. CCSS.2 NBT 7. Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens ones and ones; and sometimes it is necessary to compose or decompose tens and hundreds. CCSS.2 NBT 8. Mentally add 10 or 100 to a given number 100 to 900, and mentally subtract 10 or 100 from a given number 100 to 900. CCSS.2.NBT 9. Explain why addition and subtraction strategies work, using place value and the properties of operations. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Second

Title of Unit	**Representing and Interpreting Data**
Enduring Understanding	Students use data and graphs to make decisions and solve problems.
Essential Questions	Why graph? Is one graph better than another? How do graphs help us learn about our world?
Content	Students will understand that a graph represents data. Students will understand data up to four categories, as depicted on a picture graph and/or bar graph represented in units. Students will understand that objects can be measured. Students will understand that data can be compared.
Skills	Students will be able to generate measurement data by measuring lengths of several objects to the nearest whole unit or by making repeated measurements of the same object. Students will be able to show the measurements by making a line plot, where the horizontal scale is marked off in whole number units. **Students will be able to draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. (Fall, Winter, Spring, Summer).** Students will be able to solve simple addition, subtraction, and compare word problems using information presented in a bar graph.
Common Summative Assessments	Common Summative assessment on bar graphs, line plots and picture graphs. Students will construct and interpret each and problem solve with information from the graphs.

Standards	CCSS.2. MD 9. Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units. CCSS.2. MD 10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Second

Title of Unit	**Geometry**
Enduring Understanding	Students will recognize shapes in the world around them. Students will learn to divide wholes into equal shares.
Essential Questions	How can geometry be used to solve problems? How does understanding shapes help you to build? How can you prove that something is divided equally?
Content	Students will understand that shapes have attributes (angles and faces). Students will understand that shapes have names base on attributes. Students will understand how shapes will be measured. Students will understand that shapes can be divided into equal parts (halves, thirds, half of, a third of, etc.).
Skills	**Students will be able to recognize that shapes having specified attributes, such as a given number of angles or a given number of equal faces.** Students will be able to draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Students will be able to identify triangles, quadrilaterals, pentagons, hexagons, cubes, pyramids, cones, and cylinders. Students will be able to divide a rectangle into rows and columns of same-size squares. Students will be able to count the same-size squares within the rows and columns to find the total number of squares. Students will be able to divide circles and rectangles into two, three or four equal shares. Students will be able to describe the shares as halves, thirds, half of, a third of, etc. Students will be able to describe the whole as two halves, three thirds, four fourths, etc. Students will be able to recognize that equal shares of identical wholes need not have the same shape.
Common Summative Assessments	Common Summative assessment on which students identify and draw shapes, find number of squares inside of a rectangle and divide circles and rectangles into halves, thirds, and fourths.

Standards	CCSS.2.G.1. Recognize and draw shapes having specified attributes, such as a given number of angels or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. CCSS.2.G.2. Partition a rectangle into rows and columns of same-size squares and count to find the total number of them CCSS.2.G.3. Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Second

Title of Unit	**Measurement**
Enduring Understanding	Students will discover how and why things are measured with different units of measurement.
Essential Questions	What would life be like if standard units of measurement did not exist? How does what we measure affect what we use to measure?
Content	Students will understand that tools can be used to measure objects. Students will understand that measurements can be compared. Students will understand that one object can be measured with multiple units. Students will understand using computation to solve measurement word problems. Students will understand the similarity between a measuring tool and a number line.
Skills	**Students will be able to measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.** Students will be able to measure the length of an object twice, using two different units of measure, and describe how the two measurements relate to the size of the unit chosen. Students will be able to estimate lengths using units of inches, feet, centimeters, and meters. **Students will be able to measure to determine how much longer one object is than another.** Students will be able to express the differences in length in terms of standard length unit. **Students will be able to use addition and subtraction within 100 to solve word problems involving lengths that are given in the same unit by using drawings and equations with a symbol for the unknown number to represent the problem.** Students will be able to represent whole numbers as lengths from 0 on a number line with equally spaced points corresponding to the numbers 0, 1, 2… and represent whole number sums and differences within 100 on a number line.
Common Summative Assessments	Common Summative assessment on measuring, estimating, and adding/subtracting of measurement. Includes different units of measurement and relation of units to size.

Standards	CCSS.2.MD. 1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. CCSS.2.MD. 2. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen. CCSS.2.MD. 3 Estimate lengths using units of inches, feet, centimeters, and meters. CCSS.2.MD. 4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard-length unit. CCSS.2.MD.B5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. CCSS.2.MD.B6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, and represent whole-number sums and differences within 100 on a number line diagram. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Second

Title of Unit	**Multiplication**
Enduring Understanding	Students will use rectangular arrays and repeated addition equations to explore the concept of multiplication.
Essential Questions	Why study multiplication? How are addition and multiplication related?
Content	Students will understand what it means to be odd or even. Students will understand how the formation of an array leads to understand equations.
Skills	Students will be able to determine whether a group of objects (up to 20) has an odd or even number of members. Students will be able to pair or count objects by 2s. Students will be able to write an equation to express an even number as a sum of two equal addends. Students will be able to add objects arranged in rectangular arrays (up to 5x5). Students will be able to write an equation to express the sum of an array.
Common Summative Assessments	Common Summative assessment to written test in which students identify whether a number is even or odd. Also, students will count the objects in an array using repeated addition.
Standards	CCSS.2.OA. 3. Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends. CCSS.2.OA. 4. Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Second

Title of Unit	**Place Value**
Enduring Understanding	Students will understand the significance of ordering numbers in ones, tens, hundreds, and thousands. Students will use place value to solve problems more efficiently.
Essential Questions	Why is the number zero important in place value? What might happen in a world without place value? What is the difference between place value and value?
Content	Students will understand the power of zero. Students will understand the role of place value in determining the value of a number. Students will understand that numbers can be divided into parts. Students will understand the need for composing and decomposing. Students will understand that skip counting will lead to the understanding of time and money. Students will understand that numbers can be compared. Students will understand how knowing how many hundreds, tens and ones up to 999 will lead you to understand a number and its parts.
Skills	Students will be able to read numbers to 1000 using base ten numerals, number names, and expanded form. Students will be able to write numbers to ~~500~~ 1000 using base ten numerals, number names, and expanded form. **Students will be able to recognize the value of each digit in a 3-digit number.** Students will be able to skip count within 1000 (by 5s, 10s, 100s). Students will be able to demonstrate an understanding of "how many" hundreds; tens and ones are in a given three-digit number up to 999. **Students will be able to compare two three-digit numbers (up to 999) based on meaning of the hundreds, tens and ones digits.** Students will be able to record the comparison of two three-digit numbers (up to 999) using symbols >, =, and <.
Common Summative Assessments	Common Summative assessment to written assessments that include problems that involve identifying place value of hundreds, tens, ones; skip counting by 5's, 10's, and 100's; comparing two 3-digit numbers; adding and subtracting within 1000 and lastly using expanded form and number word to represent a 3-digit number.

Standards	CCSS.2.NBT. 1. Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: - 100 can be thought of as a bundle of ten tens – called a "hundred". - The numbers 100, 200, 300, 400, 500, 600 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones). CCSS.2.NBT. 2. Count within 1000; skip-count by 5s, 10s, and 100s. CCSS.2.NBT. 3. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. CCSS.2.NBT. 4. Compare two three-digit numbers based on meanings of the hundreds tens, and ones digits, using >, =, and < symbols to record the results of comparisons. CCSS.2.NBT. 5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name**: Mathematics** Grade: **Three**

Title of Unit	**Multiplication and Division**
Enduring Understanding	Represent and solve problems involving multiplication and division. Understand properties of multiplication and the relationship between multiplication and division. Identify and explain patterns in multiplication and division. Multiply and divide within 100.
Essential Questions	What are different meanings of multiplication? What patterns can be found in multiplication? What are different meanings of division? How is division related to other operations?
Content	Students will understand properties of multiplication and the relationship between multiplication and division. Students will understand how to use known facts and multiplication and addition properties to find answers to unknown facts. (Example: 6x7 can be found by doing 6x5 and adding 6x2). Students will understand that multiplication is repeated multiplication. Students will understand that multiplication is the number of objects in a number of equal groups. Students will understand division as an unknown-factor problem related to multiplication. Students will understand division as an unknown-factor problem related to multiplication.

Skills	Students will be able to use repeated addition of equal groups to multiply. Students will be able to use arrays to model the Commutative Property of Multiplication. Students will be able to use patterns to multiply with 2 and 5 as factors. Students will be able to use the Distributive Property to break apart an array that models one multiplication fact into two smaller arrays that model two other multiplication facts. **Students will be able to use multiplication facts they know to multiply with 0-10 as factors.** Students will be able to learn how to use strategies to multiply. Students will be able to represent and solve problems involving multiplication and division. Students will be able to multiply one-digit whole numbers by multiples of 10 in the range 10 to 90. Students will be able to solve problems involving the four operations and identify and explain patterns in arithmetic. Students will be able to use counters, pictures and arrays to divide into equal groups in sharing situations. Students will be able to write equations to represent the situations in word problems, and use the equations to solve the problems. Students will be able to use related multiplication facts in fact families to divide and will use a symbol for the unknown number in the equation. Students will be able to multiply one-digit whole numbers by multiples of 10. **Students will be able to recognize and use the multiplication properties: commutative, associative, and distributive.**
Common Summative Assessment	Common Summative assessment to understand division and multiplication of whole numbers. Common Summative assessment to multiplication facts: use patterns. Common Summative assessment to apply properties to solve multiplication equations. Common Summative assessment to fluently multiply and divide within 100. Common Summative assessment to use multiplication to divide: division facts.

Standards	CCSS.3.OA. 1. Interpret products of whole numbers, e.g., interpret 5x7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5x7.* CCSS.3.OA. 2. Interpret whole-number quotients of whole numbers, e.g., interpret 56÷8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56÷8.* CCSS.3.OA. 4. Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8x? =48, 5 = _ ÷3, 6x6=, 7x b=14.* CCSS.3.OA. 5. Apply properties of operations as strategies to multiply and divide. *Examples: If 6x4=24 is known, then 4x6=24 is also known. (Commutative Property of Multiplication) 3x5x2 can be found by 3x5=15, then 15x2=30, or by 5x2=10, then 3x10=30. (Associative Property of Multiplication.) Knowing that 8x5=40 and 8x2=16, one can find 8x7 as 8x(5+2) = (8x5) + (8x2) = 40+16=56. (Distributive Property.)* CCSS.3.OA. 6. Understand division as an unknown-factor problem. *For example, find 32÷8 by finding the number that makes 32 when multiplied by 8.* CCSS.3.OA. 7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8x5=40, one knows 40÷5=8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. CCSS.3.OA. 9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal parts.* CCSS.3.NBT. 3. Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9x80, 5x60) using strategies based on place value and properties of operation. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Third

Title of Unit	**Math Fluency**
Enduring Understanding	Fluently multiply and divide within 100.
Essential Questions	How can sums and differences be found mentally? Why do we need to know math facts?
Content	Students will understand the importance of place value in strategies and algorithms of addition and subtraction. Students will understand the purpose in knowing multiplication facts with fluency.
Skills	Students will be able to use what they know about place value to break large addition problems into smaller ones that are easier to add. **Students will be able to add and subtract fluently within 1000 using the standard algorithm.** **Students will be able to show mastery of all multiplication facts 0-9 with accuracy and fluency.** Students will be able to use multiplication facts to solve division facts.
Common Summative Assessments	Common Summative assessment to use strategies and properties to add and subtract within 1000. Common Summative assessment to use strategies and properties to fluently multiply and divide within 100.
Standards	CCSS.3.NBT. 2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. CCSS.3.OA. 7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8x5=40, one knows 40÷5=8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Third

Title of Unit	**Place Value:**
Enduring Understanding	Use place value understanding and properties of operations to perform multi-digit arithmetic. Use place value to estimate.
Essential Questions	Why is estimation useful? How does place value affect estimation? Why is estimation used in our everyday lives?
Content	Students will understand how to round two-digit and three-digit whole numbers to the nearest ten or hundred, by comparing to the number halfway between or by using place value. Students will understand how to use rounding to estimate sums and differences. Students will understand how to use regrouping when performing multi-digit arithmetic.
Skills	**Students will be able to round numbers to the nearest ten or hundred.** Students will be able to use rounding in estimating sums and differences. Students will be able to use rounding and estimating to assess the reasonableness of their answers. Students will be able to use regrouping when performing multi-digit arithmetic.
Common Summative Assessments	Common Summative assessment to use strategies and properties to add and subtract.
Standards	CCSS.3.NBT. 1. Use place value understanding to round whole numbers to the nearest 10 or 100. CCSS.3.OA. 8. Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Third

Title of Unit	**Word Problems: 2 Step, +, -, x, ÷**
Enduring Understanding	**Solve word problems involving the four operations.**
Essential Questions	How can a word problem be broken into smaller parts?
Content	Students will ~~know~~ understand which keywords in a word problem tell them which operation to use. Students will understand that word problems can be represented by equations and that in these equations a letter can stand for an unknown quantity.
Skills	Students will be able to solve one and two-step word problems using all 4 operations. Students will be able to use write equations with a variable to represent an unknown quantity in a word problem. Students will be able to solve multi-step problems by finding and solving the first step(s) and then using that answer to solve the problem.
Common Summative Assessments	Common Summative assessment to use operations with whole numbers to solve problems.
Standards	CCSS.3.OA. 3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. CCSS.3.0A. 8. Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computations and estimation strategies including rounding. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Third

Title of Unit	**Fractions**
Enduring Understanding	Develop an understanding of fractions as numbers.
Essential Questions	How is a fraction related to a whole?
Content	Students will understand that a fraction is a quantity formed when a part of a whole is divided into equal parts. Students will understand that a fraction is made up of equal parts. Students will understand that a fraction can be represented on a number line. Students will understand what it means for two fractions to be equivalent.
Skills	Students will be able to write a fraction to represent a drawing or place on a number line. Students will be able to partition a shape into parts with equal areas and label those areas with fractions. **Students will be able to draw a number line from 0 to 1, partition it into equal parts and label each part with a fraction.** **Students will be able to compare two fractions that have the same numerator or two fractions that have the same denominator and use <, > or = by reasoning about their size and using a visual model.** Students will be able to recognize and generate simple equivalent fractions and explain why they are equivalent. Students will be able to express whole numbers as fractions. **Students will be able to recognize fractions as parts to the whole with an understanding of the numerator and denominator parts.**
Common Summative Assessments	Common Summative assessment to understand fractions as numbers. Common Summative assessment to fraction equivalence and comparison.

Standards	CCSS.3.NF. 1. Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction *a/b* as the quantity formed by a parts of size 1/*b*. CCSS.3.NF. 2. Understand a fraction as a number on the number line; represent fractions on a number line diagram. - Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line. - Represent a fraction *a/b* on a number line diagram by marking off a lengths 1/*b* from 0. Recognize that the resulting interval has size a/*b* and that its endpoint locates the number a/b on the number line. CCSS.3.NF. 3. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. - Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. - Recognize and generate simple equivalent fractions, e.g., ½ = 2/4, 4/6 =2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model. - Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.* - Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. CCSS.3.G.2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition shape into 4 parts with equal area, and describe the area of each part as ¼ of the area of the shape.* CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Third

Title of Unit	**Measurement & Data: Time**
Enduring Understanding	Solve problems involving the measurement of intervals of time.
Essential Questions	Why is a clock designed the way it is? How is time measured? How are problems related to time used in our everyday life?
Content	Students will understand how to tell time to the nearest minute. Students will understand what elapsed time is and how to find it.
Skills	**Students will be able to tell time to the nearest minute.** Students will be able to solve problems related to the addition and subtraction of time in minutes. Students will be able to use strategies such as a number line to solve problems relating to time.
Common Summative Assessments	Common Summative assessment to solve problems using time.
Standards	CCSS.3.MD.1 Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Third

Title of Unit	**Measurement & Data: Area & Perimeter**
Enduring Understanding	Understand concepts of area and relate area to multiplication and addition. Recognize perimeter as an attribute of plane figures and distinguish the difference between area and perimeter and how they are measured.
Essential Questions	How do we use area and perimeter in our everyday lives?
Content	Students will understand that a unit square is a square with a side length of 1 unit and that a unit square is used to measure area. Students will understand that a plane figure can be covered with a certain number of unit squares with no gaps or overlaps and that the number of square it takes is the area of that figure. Students will understand that the distributive property can be explained using an area model. Students will understand that area is additive and so figures can be decomposed into non-overlapping rectangles in order to find their area.
Skills	Students will be able to measure area by counting squares. **Students will be able to find the area of a rectangle using multiplication.** Students will be able to solve real world problems involving area of rectangles and perimeters of polygons. Students will be able to use area models to represent the distributive property. **Students will be able to add to find areas of shapes that consist of non-overlapping rectangles.** **Students will be able to find the perimeter of a polygon.** Students will be able to, when given the perimeter of a polygon and some side lengths, find an unknown side length. Students will be able to show that different rectangles can have the same perimeter as well as that different rectangles can have the same area.
Common Summative Assessments	Common Summative assessment to connect area to multiplication and division. Common Summative assessment to solve perimeter problems.

Standards	CCSS.3.MD.C5. Recognize area as an attribute of plane figures and understand concepts of area measurement. - A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. - A plane figure, which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units. CCSS.3.MD.C6. Measure areas by counting unit squares (square cm, square m, square in, square ft., and improvised units). CCSS.3.MD.7. Relate area to the operations of multiplication and addition. - Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. - Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. - Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of a x b and a x c. Use area models to represent the distributive property in mathematical reasoning. - Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. CCSS.3.MD.C8. Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Third

Title of Unit	**Measurement & Data: Mass, Volume and Length**
Enduring Understanding	Solve problems involving measurement and estimation of liquid volumes and masses of objects.
Essential Questions	Why is measurement important in our lives? How is measurement used and shared around the world?
Content	Students will understand the difference between mass, volume and length. Students will understand appropriate units to use when measuring mass, volume and length.
Skills	Students will be able to measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms and liters. Students will be able to solve one-step word problems involving any operation using mass and volume given in the same units. **Students will be able to measure lengths using rulers marked with halves and fourths of an inch.** Students will be able to show measurement data on a line plot and draw a horizontal scale using whole numbers, halves, and quarters.
Common Summative Assessments	Common Summative assessment to solve time, capacity and mass problems.
Standards	CCSS.3.MD.4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units – whole numbers, halves, or quarters. CCSS.3.MD.2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). 1 Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Third

Title of Unit	**Geometry: Shapes and Attributes**
Enduring Understanding	Reason with shapes and their attributes.
Essential Questions	Why is a square always a rectangle but a rectangle isn't always a square? How does math define different shapes in our world?
Content	Students will understand that we can divide shapes into categories based on their properties and attributes that they share. Students will understand that there is a hierarchical way to define shapes with larger categories (i.e. quadrilaterals) and subcategories that belong to it (such as rectangles).
Skills	**Students will be able to recognize rhombuses, rectangles and squares as examples of quadrilaterals.** Students will be able to draw quadrilaterals that do not belong to any special subcategories of quadrilaterals (such as rhombuses, rectangles and squares). Students will be able to categorize shapes based on attributes they share. Students will be able to partition shapes into parts with equal areas and name each part.
Common Summative Assessments	Common Summative assessment to attributes of 2-dimensional shapes.
Standards	CCSS.3.G.1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. CCSS.3.G.2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as ¼ of the area of the shape. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Third

Title of Unit	**Measurement & Data: Picture Graphs, Bar Graphs and Line Plots**
Enduring Understanding	Represent and interpret data.
Essential Questions	How can data be shared?
Content	Students will understand how to read a bar graph, picture graph, and line plot. Students will understand what a scale on a bar or picture graph means and how it is used.
Skills	**Students will be able to use bar graphs, picture graphs,** and line plots **to answer questions and solve problems** **Students will be able to draw a bar graph, picture graph,** and line plot **with given data.** Students will be able to show measurement data on a line plot and draw a horizontal scale using whole numbers, halves and quarters.
Common Summative Assessments	Common Summative assessment to represent and interpret data.
Standards	CCSS.3.MD.3. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.* CCSS.3.MD.4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units – whole numbers, halves, or quarters. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Place Value**
Enduring Understanding	Students will understand place value and will be able to write, compare, and order whole numbers.
Essential Questions	How is our number system organized? How does the position of a digit in a number affect its value? In what ways can numbers be composed and decomposed? When can rounding be useful and in what situations should we not round?
Content	Students will understand that our number system is based on groups of 10. Students will understand that the position of a digit in a number affects its value. Students will understand the role of the number 5 in rounding. Students will understand when the rounding to a specific place they need to look to the place value to the right. Students will understand the need to look at the biggest place value first when comparing numbers. Students will understand the use of periods (ones, thousands, millions, etc.) and grouping of the three numbers in each period when reading numbers.
Skills	Students will be able to regroup numbers to the next place value (ex. 11 ones to 1 ten and 1 one). **Students will be able to write a multi-digit whole number in expanded, standard and word-form.** **Students will be able to round whole numbers to any place.** **Students will be able to compare multi-digit whole numbers.** **Students will be able to read multi-digit numbers.** Students will be able to order multi-digit numbers.
Common Summative Assessments	Common Summative Assessment on place value.
Standards	CCSS.4.NBT.1. Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that $700 \div 70 = 10$ by applying concepts of place value and division. CCSS.4.NBT.2. Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. CCSS.4.NBT.3. Use place value understanding to round multi-digit whole numbers to any place. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Math Fluency – Multi-digit Addition and Subtraction**
Enduring Understanding	Students will fluently add and subtract multi-digit whole numbers.
Essential Questions	Why is it important to be fluent in adding and subtracting multi-digit whole numbers?
Content	Students will understand how to line up place values when performing operations. Students will understand how to regroup when performing operations.
Skills	**Students will be able to demonstrate the ability to add and subtract multi-digit numbers using the standard algorithm with fluency.**
Common Summative Assessments	Common Summative Assessment on multi-digit addition and subtraction.
Standards	CCSS.4.NBT.4. Fluently add and subtract multi-digit whole numbers using the standard algorithm. CCSS.MP4 Model with mathematics. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Multiplication**
Enduring Understanding	Students will use strategies and properties to multiply by 1-digit and 2-digit numbers.
Essential Questions	How can we use a model to show how the standard algorithm works? Why is place value important in all algorithms for multiplication? What is the relationship between repeated addition and multiplication?
Content	Students will understand-multiplication algorithms.
Skills	**Students will be able to multiply a whole number (up to four digits) by a one-digit whole number.** **Students will be able to multiply two two-digit numbers.**
Common Summative Assessments	Common Summative Assessment on single and multi-digit multiplication.
Standards	CCSS.4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. CCSS.MP4 Model with mathematics. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Division**
Enduring Understanding	Students will use strategies and properties to divide by 1-digit numbers.
Essential Questions	How are multiplication and division related? What is the relationship between repeated subtraction and division?
Content	Students will understand that multiplication and division are inverse operations. Students will understand that equations, rectangular arrays, and/or area models can be used to solve a division problem. Students will understand that place value is essential in performing division problems.
Skills	Students will be able to demonstrate that multiplication is the inverse of division. **Students will be able to show mastery of all division facts 0-9 with accuracy and fluency.** **Students will be able to find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division.**
Common Summative Assessments	Common Summative Assessment on dividing by 1-digit numbers.
Standards	CCSS.4. NBT.6. Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. CCSS.MP4 Model with mathematics. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Word Problems (All four operations)**
Enduring Understanding	Students will use operations with whole numbers to solve word problems.
Essential Questions	How do you know which operation to use in a word problem? What are the steps to solving a multi-step word problem?
Content	Students will understand when to use each operation in a word problem. Students will understand how to take a word problem and break it into steps and write number sentences to solve the problem. Students will understand the importance of estimation in checking the reasonableness of their answer.
Skills	Students will be able to use strategies such as drawing a picture, writing an equation, acting the problem out, making an organized list, making a graph or table, etc. to solve problems. Students will be able to assess the reasonableness of answers using mental computation and estimation strategies including rounding.
Common Summative Assessments	Common Summative Assessment on using operations with whole numbers to solve problems.
Standards	CCSS.4.OA.2. Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. CCSS.4.OA.3. Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Factors and Multiples**
Enduring Understanding	Students will identify factors and multiples to find prime and composite numbers.
Essential Questions	In what ways are factors and multiples connected and what is the difference between them?
Content	Students will understand what a factor and a multiple is. Students will understand that a whole number is a multiple of each of its factors. Students will understand the difference between prime and composite. Students will understand that 1 is neither prime nor composite.
Skills	**Students will be able to find all factor pairs for a whole number in the range 1-100.** **Students will be able to recognize that a whole number is a multiple of each of its factors.** **Students will be able to determine whether a given whole number (in the range 1-100) is a multiple of a given one-digit number.** **Students will be able to determine whether a given whole number (in the range 1-100) is prime or composite.**
Common Summative Assessments	Common Summative Assessment on factors and multiples.
Standards	CCSS.4.OA.4. Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a give one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Algebra: Expressions and Equivalency**
Enduring Understanding	**Students will read, write, and solve equations using variables.**
Essential Questions	Why do we represent numbers as letters when working with algebraic expressions? How do we translate verbal mathematical statements into written mathematical expressions and equations?
Content	Students will understand that a variable represents an unknown, what a variable is, and why it is used. Students will understand that variables follow the same rules as numbers.
Skills	Students will be able to translate a verbal statement into an expression or equation. Students will be able to solve word problems with a symbol for the unknown number
Common Summative Assessments	Common Summative Assessment on algebraic expressions and equivalency.
Standards	CCSS.4.OA.1. Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 x 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. CCSS.4.OA.2. Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. CCSS.4.OA.3. Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. CCSS.MP4 Model with mathematics. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Algebra: Patterns**
Enduring Understanding	Students will generate and analyze patterns.
Essential Questions	How do patterns help us to make predictions and solve problems? How are geometric and numerical patterns similar and different from one another? How can we identify features of a pattern? How does understanding patterns help you understand relationships between numbers?
Content	Students will understand that patterns become predictable. Students will understand the difference between a numerical and geometric pattern. Students will understand that a pattern follows a given rule.
Skills	Students will be able to extend a given pattern. Students will be able to write a rule for a given pattern. Students will be able to identify the features of a pattern. Students will be able to create a pattern and name its rule.
Common Summative Assessments	Common Summative Assessment on generating and analyzing patterns.
Standards	CCSS.4.OA.5. Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule “Add 3” and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way. CCSS.MP4 Model with mathematics. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Fractions: Addition and Subtraction**
Enduring Understanding	Students will understand addition and subtraction of fractions.
Essential Questions	In what situations would we need to involve fractions in a word problem? Why don't we add or subtract the denominators when adding/subtracting fractions?
Content	Students will understand addition and subtraction of fractions as joining and separating parts referring to the same whole. Students will understand that fractions with the same denominator can be decomposed into a sum of fractions in more than one way. They can record each de-composition with an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 +1/8; 3/8 = 1/8 + 2/8; 2 1/8 = 1 + 1 +1/8 = 8/8 +1/8.*
Skills	**Students will be able to add and subtract fractions** and mixed numbers **with like denominators**. Students will be able to solve word problems involving addition and subtraction of fractions with like denominators. Students will be able to subtract fractions from a whole. Students will be able to show fraction addition and subtraction using models and pictures.
Common Summative Assessments	Common Summative Assessment on understanding addition and subtraction of fractions.
Standards	CCSS.4.NF.3. Understand a fraction *a/b* with *a*> 1 as a sum of fractions *1/b*. - Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. - Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each de-composition by an equation. Justify decompositions e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8; 3/8 = 1/8 + 2/8; 2 1/8 = 1 + 1 +1/8 = 8/8 +1/8.* - Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. - Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem. CCSS.MP1 Make sense of problems and persevere in solving them. MP 4 Model with mathematics.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Fractions: Multiplication**
Enduring Understanding	Students will extend multiplication concepts to multiply fractions.
Essential Questions	Why is it that when we multiply a fraction by a fraction we get a smaller result? What is a situation when we will need to multiply fractions?
Content	Students will understand that a fraction can be expressed as a multiple of a whole number and a fraction (Ex. 5/4 = 5 x (1/4). Students will understand when to use multiplication of fractions in a word problem.
Skills	Students will be able to solve word problems using multiplication of fractions. Students will be able to use a visual model to represent fraction multiplication.
Common Summative Assessments	Common Summative Assessment on multiplying fractions.
Standards	CCSS.4.NF.4. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. - Understand a fraction *a/b* as a multiple of *1/b*. *For example, use a visual fraction model to represent 5/4 as the product 5 x (1/4), recording the conclusion by the equation 5/4 = 5 x (1/4).* - Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. *For example use a visual fraction model to express 3 x (2/5) as 6 x (1/5), recognizing this product as 6/5. (In general, n x (a/b) = (n x a)/b.)* - Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?* CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP4 Model with mathematics.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Fractions - Equivalent**
Enduring Understanding	Students will extend understanding of fraction equivalence and ordering.
Essential Questions	Why do we multiply or divide the numerator and denominator by the same number when finding equivalent fractions? How can you use a model to show equivalent fractions?
Content	Students will understand what it means for two fractions to be equivalent. Students will understand the use of benchmark fractions in comparing fractions. Students will understand the use of same numerators in comparing fractions. Students will understand the use of same denominators in comparing fractions. Students will understand that comparisons are valid only when the two fractions refer to the same whole.
Skills	**Students will be able to find equivalent fractions.** **Students will be able to determine if two fractions are equivalent.** Students will be able to compare fractions with like and unlike denominators Students will be able to use <, > and = when comparing fractions. Students will be able to use visual models to compare fractions.
Common Summative Assessments	Common Summative Assessment on equivalent fractions.
Standards	CCSS.4. NF.1. Explain why a fraction *a/b* is equivalent to a fraction *(n x a)/(n x b)* by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. CCSS.4.NF.2. Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as ½. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP4 Model with mathematics.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Fractions: Decimal Notation**
Enduring Understanding	Students will understand and compare decimals.
Essential Questions	Why do we need denominators of 10 and 100 when we turn fractions into decimals? Why is a hundredth smaller than a tenth when a hundred is bigger than a ten? How are decimals related to fractions?
Content	Students will understand that in order to change a fraction to a decimal they must find an equivalent fraction with 10 or 100 in the denominator. Students will understand that hundredths are smaller than tenths. Students will understand that when comparing decimals, comparisons are only valid when both decimals are referring to the same whole. Students will understand uses for decimals.
Skills	Students will be able to convert fractions to decimals. Students will be able to change decimals to fractions and simplify. Students will be able to locate decimals on a number line. Students will be able to compare decimals to hundredths by reasoning about their size. Students will be able to record comparisons of decimals with <, >, and =.
Common Summative Assessments	Common Summative Assessment on understanding and comparing decimals.
Standards	CCSS.4.NF.5. Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.2 *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.* CCSS.4.NF.6. Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters, locate 0.62 on a number line diagram.* CCSS.4.NF.7. Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model. CCSS.MP4 Model with mathematics.

Course Name: **Mathematics** **Grade:** Fourth

Title of Unit	**Measurement & Data: Conversion**
Enduring Understanding	Students will find equivalence in units of measure.
Essential Questions	What is the importance of measuring? What is the purpose of having more than one unit of measurement within a system? What is a system of measurement and why are there different systems?
Content	Students will understand the relative size of measurement units within one system of units including km, m, cm; kg, g; lb., oz.; l, ml; hr., min, sec. Students will understand that different systems of measurement are used to measure different things (i.e. km, m, cm are used to measure distance whereas lb., oz. are used to measure weight). Students will understand measurement equivalents. Students will understand that multiple units of measurement can represent the same data.
Skills	**Students will be able to compare the relative sizes of measurement units (including km, m, cm; kg, g; lb., oz.; l, ml; hr., min, sec) to each other and to objects in their lives.** Students will be able to record measurement equivalents. Students will be able to convert units of measurement. Students will be able to solve word problems related to measurement using the four operations.
Common Summative Assessments	Common Summative Assessment on equivalence and conversions of units of measurement.
Standards	CCSS.4. MD.1. Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb., oz.; l, ml; hr., min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft. is 12 times as long as 1 in. Express the length of a 4 ft. snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), 3, 36), ...* CCSS.4.MD.2. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Measurement & Data: Area & Perimeter**
Enduring Understanding	Students will use measurement formulas to find area and perimeter.
Essential Questions	What are some real-world situations where we would use area and perimeter? How are area and perimeter related?
Content	Students will understand what area and perimeter are. Students will understand formulas for the area and perimeter of rectangles. Students will understand how to apply area and perimeter in real world problems.
Skills	Students will be able to find area and perimeter using formulas. Students will be able to solve real world problems involving area and perimeter.
Common Summative Assessments	Common Summative Assessment on area and perimeter.
Standards	CCSS.4.MD.3. Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.* CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Measurement & Data: Interpreting Data & Graphing**
Enduring Understanding	Students will represent and interpret data on line plots.
Essential Questions	A line plot is useful for what type of data? And why? What conclusions can we draw by looking at a line plot?
Content	Students will understand what a line plot is and what it can be used for.
Skills	Students will be able to display measurement data with fractions in a line plot. Students will be able to solve fraction addition and subtraction problems using a line plot.
Common Summative Assessments	Common Summative Assessment on interpreting data on line plots.
Standards	CCSS.4.MD.4. Make a line plot to display a data set of measurements in fractions of a unit (1/2, ¼, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection*. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Measurement & Data: Angles**
Enduring Understanding	Students will understand concepts of angles and angle measurement.
Essential Questions	When measuring angles, why is it important to use the correct measuring tool? How do angles relate to circles and lines? What should be taken into consideration when solving an angle's measurement?
Content	Students will understand that an angle is formed when two rays share a common endpoint. Students will understand that angles are measured in reference to a circle and that an angle is a fraction of a circle. Students will understand angles as turns.
Skills	**Students will be able to measure angles with a protractor.** Students will be able to represent an angle measurement as a fraction over 360. Students will be able to draw an angle with a given measurement. Students will be able to solve problems related to angle addition and subtraction. Students will be able to find an unknown angle using addition, subtraction, or sums of parts.
Common Summative Assessments	Common Summative Assessment on understanding angles and angle measurements.
Standards	CCSS.4.MD.5. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement. - An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. - An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees. CCSS.4.ND.6. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. CCSS.4.MD.7. Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Fourth

Title of Unit	**Geometry: Lines and Angles**
Enduring Understanding	Students will understand and classify lines, angles, and shapes.
Essential Questions	How is symmetry present in our everyday life? What strategies can be used to verify symmetry, parallel lines, and perpendicular lines?
Content	Students will understand the difference between lines, line segments, and rays. Students will understand the classification of angles as right, acute, and obtuse. Students will understand that a line of symmetry means that a figure can be folded on a line into matching parts.
Skills	**Students will be able to identify points, lines, line segments, rays, perpendicular, and parallel lines in two-dimensional figures.** Students will be able to identify right, acute, and obtuse angles in two-dimensional figures. Students will be able to recognize and identify right triangles. Students will be able to classify two-dimensional figures based on parallel and perpendicular lines. Students will be able to identify and draw lines of symmetry in two-dimensional figures.
Common Summative Assessments	Common Summative Assessment on lines and angles.
Standards	CCSS.4.G.1. Draw points, lines line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines Identify these in two-dimensional figures. CCSS.4.G.2. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of specified size recognize right triangles as a category, and identify right triangles. CCSS.4.G.3. Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts Identify line-symmetric figures and draw lines of symmetry. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Fifth

Title of Unit	**Place Value**
Enduring Understanding	**Students will understand decimal place value and will be able to write, compare, and order whole numbers and decimals.**
Essential Questions	How are decimal places named and why don't we have a ones place? How are decimals used in everyday life? What patterns occur in our number system?
Content	Students will understand the place value system and decimals up to the thousandths place.
Skills	Students will be able to identify the relationship of "10 times as much" and "1/10 of" in multi-digit numbers within our place value system. **Students will be able to read and write decimals from 0.001 to 10,000,000 in standard, expanded, and word form.** **Students will be able to compare decimals.** Students will be able to identify the place value of any digit in numbers 0.001 to 10,000,000. Students will be able to explain the pattern in the number of zeroes and placement of the decimal point when a number is multiplied or divided by a power of 10. **Students will be able to round decimals to the nearest tenths, hundredths, and thousandths.**
Common Summative Assessments	Common Summative Assessment on Understanding Place Value
Standards	CCSS.5.NBT.1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. CCSS.5.NBT.3. Read, write, and compare decimals to thousandths. - Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 x 100 + 4 x 10 + 7 x 1 + 3 x (1/10) + 9 x (1/100) + 2 x (1/1000). - Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. CCSS.5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole number exponents to denote powers of 10. CCSS.5.NBT.4 Use place value understanding to round decimals to any place. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Fifth

Title of Unit	**Multiplying and Dividing Multi-Digit Whole Numbers**
Enduring Understanding	Students will fluently multiply whole numbers using the standard algorithm and will expand on their knowledge of long division with bigger dividends and divisors.
Essential Questions	How can multiplication and division be used to solve real-world problems? Why is the standard algorithm of multiplication an effective and efficient way of solving multiplication problems? Why is it important to be fluent in multiplying multi-digit whole numbers?
Content	Students will understand how multiplication and division can be used to solve real-world problems. Students will understand the importance of place value and lining up place values in multiplication and division algorithms. Students will understand regrouping when multiplying.
Skills	Students will be able to multiply and divide multi-digit whole numbers using concrete models or drawings and strategies. Students will be able to use place value, properties of operations, and/or the relationship between multiplication and division. **Students will be able to fluently (accurately and efficiently) solve multi-digit multiplication problems using the standard algorithm and explain answers using equations, rectangular arrays, and/or area models.** **Students will be able to divide multi-digit whole numbers with up to four-digit dividends and two-digit divisors.**
Common Summative Assessments	Common Summative Assessment on Fluently Multiplying Multi-Digit Whole Numbers Common Summative Assessment on Dividing Whole Numbers
Standards	CCSS.5.NBT.5. Fluently multiply whole numbers using the standard algorithm. CCSS.5.NBT.6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculations by using equations, rectangular arrays, and/or area models. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Fifth

Title of Unit	**Decimal Operations (Addition, Subtraction, Multiplication, Division)**
Enduring Understanding	**Students will use models and standard algorithms to add, subtract, multiply and divide decimals.**
Essential Questions	How can addition, subtraction, multiplication, and division of decimals be used to solve real-world problems? Why does changing numbers help you compute with decimals? What strategies do we use to place a decimal point in an answer and why does it make sense?
Content	Students will understand how decimal operations can be used to solve real-world problems. Students will understand the importance of place value and lining up place values in decimal operations. Students will understand where to properly place the decimal point in their answer to addition, subtraction, multiplication and division problems.
Skills	**Students will be able to add, subtract, multiply**, and divide **decimals** to hundredths. Students will be able to explain answers using equations, rectangular arrays, and/or models. Students will be able to use place value, order of operations, and/or the relationship between addition and subtraction.
Common Summative Assessments	Common Summative Assessment on Adding and Subtracting Decimals Common Summative Assessment on Multiplying Decimals Common Summative Assessment on Dividing Decimals
Standards	CCSS.5.NBT.7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties, of operations, and/or the relationship between addition and subtractions; relate the strategy to a written method and explain the reasoning used. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Fifth

Title of Unit	**Fractions: Addition & Subtraction**
Enduring Understanding	Students will add and subtract fractions and mixed numbers with unlike denominators.
Essential Questions	How can performing different operations with fractions help solve real world problems? Why can't we add and subtract fractions with unlike denominators without finding a common denominator?
Content	Students will understand how to add and subtract fractions. Students will understand why it is necessary to find a common denominator when adding/subtracting fractions.
Skills	**Students will be able to add and subtract fractions** and mixed numbers **with unlike denominators**. Students will be able to determine equivalent fractions. Students will be able to use estimation to solve problems with fractions. Students will be able to solve real world word problems using addition and subtraction of fractions. Students will be able to regroup mixed numbers when adding/subtracting fractions (i.e. borrowing from a whole, regrouping if the sum is a mixed number with an improper fraction).
Common Summative Assessments	Common Summative Assessment on Adding and Subtracting Fractions
Standards	CCSS.5.NF.1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 +5/3 = 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd).* CCSS.5.NF.2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + ½ = 3/7, by observing that 3/7 < ½.* CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Fifth

Title of Unit	**Fractions, Multiplication and Division**
Enduring Understanding	Students will multiply using whole numbers, fractions, and mixed numbers as factors and divide using whole numbers and unit fractions as dividends and divisors.
Essential Questions	What real world situations and problems involve fraction multiplication and division? Why is the quotient bigger than the divisor and dividend when dividing a whole number by a fraction less than 1?
Content	Students will understand that the fraction bar is another symbol for a division sign. Students will understand the relationship between fraction multiplication and division as inverse operations (i.e., 3 ÷ 4 = ¾ and ¾ x 4 = 3). Students will understand that the product (a/b) x q = is equal to (a x q) ÷ b. (ex ½ x 4 = (1x4) / 2) Students will understand the relationship of the size of the factors to the size of the product (ex. ¼ x 5 product that is less than one of the factors, ¼ x 1/5 produces a product that is less than both factors). Students will understand that the process of finding an equivalent fraction works through understanding fraction multiplication. (1/4 = 2/8 because (1x2)/(4x2) is the same as multiplying ¼ by 1.
Skills	Students will be able to solve word problems involving the division of whole numbers that give quotients of fractions or mixed numbers. (ex. 4 / 3 = 1 1/3 and 3 / 4 = ¾) **Students will be able to multiply using fractions**, mixed numbers, **and whole numbers as factors**. Students will be able to solve word problems involving fraction and mixed number multiplication. Students will be able to divide unit fractions by whole numbers and whole numbers by unit fractions and explain their answer using models and the relationship between multiplication and division. Students will be able to find the area of a rectangle with fractional side lengths using a model and show this is equivalent to the area found by multiplying the side lengths. Students will be able to compare the size of factors to the size of a product (ex. 4 X ½ would be smaller than 4, 4 X 1 ½ would be larger than 4). Students will be able to solve real world problems involving unit fraction and whole number division.
Common Summative Assessments	Common Summative Assessment on Multiplying Fractions Common Summative Assessment on Dividing Fractions

Standards	CCSS.5.NF.3. Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret ¾ as the result of dividing 3 by 4, noting that ¾ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size ¾. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?* CCSS.5.NF.4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. - Interpret the product *(a/b x q* as a part of a partition of q into b equal parts; equivalently as the result of a sequence of operations *a x q ÷ b. For example, use a visual fraction model to show (2/3) x 4 = 8/3, and create a story context for this equation. Do the same with (2/3) x /94/5) = 8/15. (In general, (a/b) x (c/d) = ac/bd).* - Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. CCSS.5.NF.5. Interpret multiplication as scaling (resizing), by: - Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. - Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number and relating the principle of fraction equivalence *a/b = (n x a)/(n x b)* to the effect of multiplying *a/b* by 1. CCSS.5.NF.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem. CCSS.5.NF.7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.1 - Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) x 4 = 1/3.* - Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, crate a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 x (1/5) = 4.* - Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much*

	chocolate will each person get if 3 people share ½ lb. of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins? CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Fifth

Title of Unit	**Expressions**
Enduring Understanding	Students will learn how to use order of operations to simplify expressions.
Essential Questions	Why are parentheses, brackets and braces important in numerical expressions?
Content	Students will understand that they need to simplify expressions inside parentheses first, starting with the innermost parentheses. Students will understand how to interpret numerical expressions without evaluating them.
Skills	**Students will be able to simplify expressions using parentheses, brackets and braces.** Students will be able to write simple expressions given verbal or word-form expressions. For example, express the calculation "add 8 and 7, then multiply by 2" as 2 x (8 + 7)
Common Summative Assessments	Common Summative Assessment on Writing and Interpreting Numerical Expressions
Standards	CCSS.5.OA.1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. CCSS.5.OA.2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 x (8 = 7). Recognize that 3 x (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.* CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Fifth

Title of Unit	**Patterns**
Enduring Understanding	Students will generate patterns given rules and identify relationships between corresponding terms of two different numerical patterns.
Essential Questions	What types of relationships can occur between corresponding terms in two different numerical patterns?
Content	Students will understand the relationship between corresponding terms in two different numerical patterns.
Skills	Students will be able to generate patterns given rules Students will be able to identify relationships between corresponding terms. Students will be able to form ordered pairs from corresponding terms in two patterns and graph them on a coordinate plane.
Common Summative Assessments	Common Summative Assessment on Analyzing Patterns and Relationships
Standards	CCSS.5.OA.3. Generate two numerical patterns using two given rule. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.* CCSS.MP2 Reason abstractly and quantitatively CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Fifth

Title of Unit	**Measurement & Data: Conversion**
Enduring Understanding	Students will convert measurements within the customary and metric systems.
Essential Questions	Why is it important to be able to convert within a measurement system? Do you think the whole world should use the same measurement system? If so, which system would you pick and why? If not, why not?
Content	Students will understand why it is important to convert within a measurement system. Students will understand the process of converting within a system and how multiplication and division are used.
Skills	**Students will be able to convert within a measurement system.** Students will be able to solve multi-step real world problems involving conversions within a measurement system.
Common Summative Assessments	Common Summative Assessment on Converting Measurements Within Systems
Standards	CCSS.5.MD.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05m), and use these conversions in solving multi-step, real world problems. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Fifth

Title of Unit	**Measurement & Data: Interpreting Data**
Enduring Understanding	Students will generate line plots given data with fractional amounts and use line plots to solve real world problems.
Essential Questions	What real life situations are there in which it is helpful to display data on a line plot? How do you determine if a line plot is the best way to represent a given set of data?
Content	Students will understand how to make a line plot that uses fractions and how to use a line plot to solve problems.
Skills	Students will be able to display a set of measurements in fractions on a line plot. Students will be able to solve word problems involving fractions with information presented in line plots.
Common Summative Assessments	
Standards	CCSS.5.MD.2. Make a line plot to display a data set of measurements in fractions of a unit (1/2, ¼, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.* CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Fifth

Title of Unit	**Measurement & Data: Volume**
Enduring Understanding	Students will learn how to find the volume of right rectangular prisms.
Essential Questions	What is volume? Why is volume measured in cubic units? Why does finding volume involve multiplication and addition?
Content	Students will understand why volume is measured in cubic units. Students will understand what it means to have 1 cubic unit. Students will understand why multiplication and addition are used in calculating volume. Students will understand what is meant by V = l x w x h or V = B x h. Students will understand a solid figure can be packed without gaps or overlaps using unit cubes. Students will understand that volume is only found in three-dimensional solid figures.
Skills	**Students will be able to find the volume of a right rectangular prism using a formula.** Students will be able to find volume by counting cubic units. Students will be able to solve real world and mathematical problems related to volume. Students will be able to find the volume of a solid figure formed by two right rectangular prisms by adding the volume of each part and apply this to solving real world problems. Students will be able to explain why volume is measured in cubic units. Students will be able to show how counting cubic units in a rectangular prism is equivalent to multiplying the height by the area of the base.
Common Summative Assessments	Common Summative Assessment on Volume Concepts

Standards	CCSS.5.MD.3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement. - A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. - A solid figure that can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units. CCSS.5.MD.4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft., and improvised units. CCSS.5.MD.5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. - Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. - Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. - Apply the formulas $V = 1 \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. - Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Fifth

Title of Unit	**Geometry: Coordinate Planes**
Enduring Understanding	Students will learn how to graph ordered pairs on a coordinate plane and use the coordinate plane to solve real world mathematical problems.
Essential Questions	Why are two numbers needed to graph a point on a coordinate plane instead of one or three? What real world problems relate to coordinate planes?
Content	Students will understand the parts of a coordinate plane (x and y-axis, origin, intersections, etc.) Students will understand the importance of always having the first coordinate be how far you travel on the x-axis and the second as how far you travel on the y-axis. Students will understand the difference between the words axis and coordinate.
Skills	Students will be able to plot ordered pairs on a coordinate plane. Students will be able to name coordinate pairs on a coordinate plane. Students will be able to represent real world problems involving the first quadrant of the coordinate plane~~s~~ and explain the meaning of each coordinate in the context of the problem. Students will be able to form coordinate pairs based on two different numerical patterns and plot these pairs. Students will be able to locate and label the origin on a coordinate plane. Students will be able to locate and label the x- and y- axis. Students will be able to explain the difference between the words: axis, coordinate, and ordered pairs.
Common Summative Assessments	Common Summative Assessment Graphing Points on the Coordinate Plane

Standards	CCSS.5.G.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a give point in the plan located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). CCSS.5.G.2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. CCSS.5.OA.3. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.* CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP5 Use appropriate tools strategically. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Fifth

Title of Unit	**Geometry: Two-Dimensional Figures**
Enduring Understanding	Students will learn how to classify two-dimensional figures in a hierarchy based on properties.
Essential Questions	What attributes are important for naming two-dimensional figures? What is the difference between a two-dimensional and three-dimensional shape? Why do some figures have more than one name?
Content	Students will understand the use of categories and subcategories when classifying two-dimensional figures. Students will understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category (ex. Rectangles have 4 right angles and squares have 4 right angles).
Skills	**Students will be able to classify two-dimensional figures in a hierarchy based on properties.** Students will be able to give all names for a given figure. Students will be able to group figures by a given property and name a common property of a group of figures.
Common Summative Assessments	Common Summative Assessment on Classifying Two-Dimensional Figures
Standards	CCSS.5.G.3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have 4 right angles and squares are rectangles, so all squares have 4 right angles. CCSS.5.G.4. Classify two-dimensional figures in a hierarchy based on properties. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Sixth

Title of Unit	**Ratios and Proportional Relationships**
Enduring Understanding	Students will use their knowledge of multiplication and division to solve ratio and rate problems.
Essential Questions	How can 100% of something not be a lot? How can you define a part to whole relationship? How can proportions be used for problem solving?
Content	Students will understand that a ratio can be expressed as a fraction or percent. Students will understand equivalency between ratios. Students will understand that a rate is a ratio involving units. Students will understand 100% of something is all of it. Students will understand that numbers can be expressed in different formats and sometimes one is preferable in a given situation.
Skills	Students will be able to simplify ratios. Students will be able to compare ratios in different formats. **Students will be able to find equivalent ratios.** **Students will be able to calculate unit rate.** **Students will be able to find missing number in a proportion.** **Students will be able to interchange fractions, decimals and percents.** Students will be able to find a missing percent. Students will be able to find the percent of a quantity. Students will be able to solve percent word problems.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.6.RP.1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. CCSS.6.RP.2 Understand the concept of a unit rate a/b associated with a ration *a:b* with $b \neq 0$, and use rate language in the context of a ration relationship. CCSS.6.RP.3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. CCSS.6.RP.3a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. CCSS.6.RP.3b. Solve unit rate problems including those involving unit pricing and constant speed. CCSS.6.RP.3c. Find a percent of a quantity as a rate per 100 9e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. CCSS.6.RP.3d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP6 Attend to precision. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Sixth

Title of Unit	**The Number System**
Enduring Understanding	Students will apply and extend previous understandings of multiplication and division to divide fractions by fractions. Students will compute fluently with multi-digit numbers and find common factors and multiples. Students will apply and extend previous understandings of numbers to the system of rational numbers.
Essential Questions	Why is each number unique? What am I divisible by? Is the product of two numbers always greater than either factor? Why is the quotient of two fractions larger than the dividend or divisor?
Content	Students will understand that a number line is a visual representation of numbers. Students will understand that value of a digit is determined by its position in a number. Students will understand the concepts of factors and multiples. Students will understand exponents. Students will understand integers. Students will understand that absolute value is the distance away from zero. Students will understand that the coordinate plane is formed by the x and y-axis.
Skills	**Students will be able to apply and extend previous understandings of multiplication and division to divide fractions by fractions.** **Students will be able to divide decimal numbers.** **Students will be able to perform operations on mixed numbers.** **Students will be able to simplify numerical expressions using the order of operations.** **Students will be able to find common factors, greatest common factors, and multiples.** Students will be able to create a number line with integers. Students will be able to understand the relationship between a positive or negative number and its opposite. Students will be able to write a number sentence which reflects the actions and changes in real world situations. Students will be able to find missing values in a situation. **Students will be able to graph with positive and negative coordinates on a coordinate grid.**
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.6.NS.1. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. CCSS.6.NS.2. Fluently divide multi-digit numbers using the standard algorithm. CCSS.6.NS.3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. CCSS.6.NS.4. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. CCSS.6.NS.5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values 9e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. CCSS.6.NS.6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. CCSS.6.NS.6. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself. CCSS.6.NS.6. b. Understand signs of numbers in ordered pairs as indicating locations in a quadrant of the coordinate plane; recognize that when two ordered pairs differ only by signs the locations of the points are related by reflections across one or both axes. CCSS.6.NS.6. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. CCSS.6.NS.7. Understand ordering and absolute value of rational numbers. CCSS.6.NS.7.a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. CCSS.6.NS.7.b. Write, interpret and explain statements or order for rational numbers in real-world contexts. CCSS.6.NS.67.c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value and magnitude for a positive or negative quantity in a real-world situation. CCSS.6.NS.7.d. Distinguish comparisons of absolute value from statements about order. CCSS.6.NS.8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate plane. Include use of coordinates and absolute value to find distance between points with the same first coordinate or the same second coordinate. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Sixth

Title of Unit	**Expressions and Equations**
Enduring Understanding	Students will understand the use of variables in algebraic expressions. Students will understand how the solution to an equation relates to the problem presented. Students will apply and extend previous understandings of arithmetic to algebraic expressions. Students will reason about and solve one variable equations and inequalities. Students will represent and analyze quantitative relationships between dependent and independent variables.
Essential Questions	What is x?
Content	Students will understand an algebraic expression, an algebraic equation and an inequality. Students will understand the difference between a variable term and a constant term. Students will understand that the coefficient is related to the variable term. Students will understand the difference between dependent and independent variables.
Skills	Students will be able to simplify algebraic expressions with whole numbers. Students will be able to create algebraic expressions from verbal expressions. Students will be able to define variable and create equation from a word problem. Students will be able to solve one-step equations by balancing the equation. Students will be able to apply and extend previous understandings of arithmetic to algebraic expressions, including with whole number exponents. Students will be able to solve one variable and inequalities. Students will be able to represent and analyze quantitative relationships between dependent and independent variables.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.6.EE.1 Write and evaluate numerical expressions involving whole-number exponents. CCSS.6.EE.2. Write, read, and evaluate expressions in which letters stand for numbers. CCSS.6.EE.2. a. Write expressions that record operations with numbers and with letters standing for numbers. CCSS.6.EE.2. b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. CCSS.6.EE.2. c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. CCSS.6.EE.2. d. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). CCSS.6.EE.3. Apply the properties of operations to generate equivalent expressions. CCSS.6.EE.4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). CCSS.6.EE.5. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. CCSS.6.EE.6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. CCSS.6.EE.7. Solve real-world and mathematical problems by writing and solving equations of the form $x + P = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers. CCSS.6.EE.8. Write an inequality of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams. CCSS.6.EE.9. Use variable to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Sixth

Title of Unit	**Geometry**
Enduring Understanding	Students will understand the dimensions of a figure needed to find area, surface area, and volume of figures. Students will understand that irregular figures can be decomposed into regular figures. Students will understand the relationship between two-dimensional and three-dimensional figures. Students will solve real-world and mathematical problems involving area, surface area and volume.
Essential Questions	Will the size of a container indicate its contents? How is geometry part of the world?
Content	Students will understand that area is the surface inside a flat, closed figure. Students will understand that irregular shapes are the combination of multiple figures. Students will understand that three-dimensional figures have faces, edges, vertices. Students will understand that nets are three-dimensional figures drawn on a surface. Students will understand that volume is the space inside a solid. Students will understand that surface area is the sum of the areas of all faces. Students will understand that a prism is a solid with two, parallel congruent bases connected by rectangles. Students will understand that lateral surface includes all of the surfaces except the bases.
Skills	**Students will be able to calculate the area of irregular shapes (composite figures).** Students will be able to draw a net for a given solid. Students will be able to identify faces, edges and vertices. **Students will be able to calculate volume of rectangular prisms.** **Students will be able to calculate surface area of rectangular prisms**. Students will be able to solve real-world and mathematical problems involving area, surface area, and volume.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.6.G.1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. CCSS.6.G.2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\,w\,h$ and $V = b\,h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. CCSS.6.G.3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. CCSS.6.G.4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP6 Attend to precision. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Sixth

Title of Unit	**Statistics and Probability**
Enduring Understanding	Students will develop an understanding of statistical variability. Students will summarize and describe distributions.
Essential Questions	When would you choose a circle graph, histogram or scatter plot? What are mean, median, and mode and when is one more appropriate to use? Why is there variability in data?
Content	Students will understand that line plots, histograms, and scatter plots are visual representations of data. Students will understand that measures of central tendency are the mean, median, and the mode. Students will understand that some interpretation of data can be misleading. Students will understand the concept of statistical variability.
Skills	Students will be able to create statistical questions. Students will be able to analyze data using measures of central tendency. Students will be able to choose which measure of central tendency is most appropriate for a given set of points. Students will be able to graph data using dot plots, histograms, and box plots. Students will be able to analyze data from given dot plots, histograms, and box plots. Students will be able to report observations about data using mathematical vocabulary. Students will be able to make predictions from graphs or scatter plots. **Students will be able to summarize and describe distributions using both measures of central tendency as well as variation data.**
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.6.SP.1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I? is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.* CCSS.6.SP.2. Understand that a set of data collected to answer a statistical question has a distribution, which can be described by its center, spread, and overall shape. CCSS.6.SP.3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. CCSS.6.SP.4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots. CCSS.6.SP.5. Summarize numerical data sets in relation to their context, such as by: CCSS.6.SP.5. a. Reporting the number observations. CCSS.6.SP.5. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. CCSS.6.SP.5. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. CCSS.6.SP.5. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Accelerated Mathematics** Grade: Sixth

Title of Unit	**Ratios and Proportional Relationships**
Enduring Understanding	Students will use their knowledge of multiplication and division to solve ratio and rate problems about quantities.
Essential Questions	How can 100% of something not be a lot? How can you define a part to whole relationship? How can proportions be used for problem solving?
Content	Students will understand that a ratio can be expressed as a fraction or percent. Students will understand equivalency between ratios. Students will understand that a rate is a ratio involving units. Students will understand 100% of something is all of it. Students will understand that numbers can be expressed in different formats and sometimes one is preferable in a given situation.
Skills	Students will be able to simplify ratios. Students will be able to compare ratios in different formats. **Students will be able to find equivalent ratios.** **Students will be able to calculate unit rate.** **Students will be able to find missing number in a proportion.** **Students will be able to interchange fractions, decimals and percents.** Students will be able to find a missing percent. Students will be able to find the percent of a quantity. Students will be able to solve percent word problems.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.6.RP.1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. CCSS.6.RP.2 Understand the concept of a unit rate a/b associated with a ration *a:b* with $b \neq 0$, and use rate language in the context of a ration relationship. CCSS.6.RP.3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. CCSS.6.RP.3a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. CCSS.6.RP.3b. Solve unit rate problems including those involving unit pricing and constant speed. CCSS.6.RP.3c. Find a percent of a quantity as a rate per 100 9e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. CCSS.6.RP.3d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP6 Attend to precision. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Accelerated Mathematics** Grade: Sixth

Title of Unit	**The Number System**
Enduring Understanding	Students will apply and extend previous understandings of multiplication and division to divide fractions by fractions. Students will compute fluently with multi-digit numbers and find common factors and multiples. Students will apply and extend previous understandings of numbers to the system of rational numbers.
Essential Questions	Why is each number unique? What am I divisible by? Is the product of two numbers always greater than either factor? Why is the quotient of two fractions larger than the dividend or divisor?
Content	Students will understand that a number line is a visual representation of numbers. Students will understand that value of a digit is determined by its' position in a number. Students will understand the concepts of factors and multiples. Students will understand terminating and repeating decimals. Students will understand exponents. Students will understand integers. Students will understand that absolute value is the distance away from zero. Students will understand that the coordinate plane is formed by the x and y-axis.
Skills	**Students will be able to apply and extend previous understandings of multiplication and division to divide fractions by fractions.** **Students will be able to divide decimal numbers.** **Students will be able to find common factors, greatest common factors, and multiples.** **Students will be able to perform operations on mixed numbers.** **Students will be able to simplify numerical expressions using the order of operations.** Students will be able to create a number line with integers. Students will be able to understand the relationship between a positive or negative number and its opposite. **Students will be able to calculate the sum, difference, product and quotient of integers.** Students will be able to write a number sentence that reflects the actions and changes in real world situations. Students will be able to find missing values in a situation. **Students will be able to graph with positive and negative coordinates.**
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.6.NS.1. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. CCSS.6.NS.2. Fluently divide multi-digit numbers using the standard algorithm. CCSS.6.NS.3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. CCSS.6.NS.4. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. CCSS.6.NS.5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values 9e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. CCSS.6.NS.6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. CCSS.6.NS.6. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself. CCSS.6.NS.6. b. Understand signs of numbers in ordered pairs as indicating locations in a quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs the locations of the points are related by reflections across one or both axes. CCSS.6.NS.6. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. CCSS.6.NS.7. Understand ordering and absolute value of rational numbers. CCSS.6.NS.7.a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. CCSS.6.NS.7.b. Write, interpret and explain statements or order for rational numbers in real-world contexts. CCSS.6.NS.67.c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value and magnitude for a positive or negative quantity in a real-world situation. CCSS.6.NS.7.d. Distinguish comparisons of absolute value from statements about order. CCSS.6.NS.8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate plane. Include use of coordinates and absolute value to find distance between points with the same first coordinate or the same second coordinate.

	CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP7 Look for and make use of structure.

Course Name: **Accelerated Mathematics** Grade: Sixth

Title of Unit	**Expressions and Equations**
Enduring Understanding	Students will understand the use of variables in algebraic expressions. Students will understand how the solution to an equation relates to the problem presented. Students will apply and extend previous understandings of arithmetic to algebraic expressions. Students will reason about and solve one variable equations and inequalities. Students will represent and analyze quantitative relationships between dependent and independent variables.
Essential Questions	What is x?
Content	Students will understand an algebraic expression, algebraic equation, and an inequality Students will understand the difference between a variable term and a constant term. Students will understand that the coefficient is related to the variable term. Students will understand the difference between dependent and independent variables. Students will understand the distributive property. Students will understand when expressions are equivalent.
Skills	Students will be able to simplify algebraic expressions with whole numbers. Students will be able to create algebraic expressions from verbal expressions. Students will be able to define variable and create equation from a word problem. Students will be able to solve one-step equations by balancing the equation. Students will be able to apply and extend previous understandings of arithmetic to algebraic expressions, including with whole number exponents. Students will be able to solve one variable inequalities. Students will be able to represent and analyze quantitative relationships between dependent and independent variables.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.6.EE.1 Write and evaluate numerical expressions involving whole-number exponents. CCSS.6.EE.2. Write, read, and evaluate expressions in which letters stand for numbers. CCSS.6.EE.2. a. Write expressions that record operations with numbers and with letters standing for numbers. CCSS.6.EE.2. b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. CCSS.6.EE.2. c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. CCSS.6.EE.2. d. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). CCSS.6.EE.3. Apply the properties of operations to generate equivalent expressions. CCSS.6.EE.4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). CCSS.6.EE.5. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. CCSS.6.EE.6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. CCSS.6.EE.7. Solve real-world and mathematical problems by writing and solving equations of the form $x + P = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers. CCSS.6.EE.8. Write an inequality of the form $x > c$ or $x < c$ has infinitely many solutions; represent solutions of such inequalities on number line diagrams. CCSS.6.EE.9. Use variable to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP7 Look for and make use of structure.

Course Name: **Accelerated Mathematics** Grade: Sixth

Title of Unit	**Geometry**
Enduring Understanding	Students will understand the dimensions of a figure needed to find area, surface area, and volume of figures. Students will understand that irregular figures can be decomposed into regular figures. Students will understand the relationship between two-dimensional and three-dimensional figures. Students will solve real-world and mathematical problems involving circumference, area, surface area and volume.
Essential Questions	Will the size of a container indicate its contents? What shape container should I use? How did they build that? How is geometry part of the world?
Content	Students will understand that the concepts of area, perimeter, circumference, surface area, and volume. Students will understand that composite shapes are the combination of multiple figures. Students will understand that three-dimensional figures have faces, edges, vertices. Students will understand that nets are three-dimensional figures drawn on a surface. Students will understand that volume is the space inside a solid. Students will understand that surface area is the sum of the areas of all faces. Students will understand the characteristics of right prisms and pyramids. Students will understand that lateral surface includes all of the surfaces except the bases. Students will understand the concept of a scale drawing and a scale factor. Students will understand that a cross section of a solid is the plane figure formed when a solid is sliced.
Skills	**Students will be able to calculate the circumference and area of circles.** **Students will be able to calculate the area of composite shapes.** Students will be able to draw a net for a given solid. Students will be able to identify faces, edges and vertices. **Students will be able to calculate the volume of rectangular and triangular prisms.** **Students will be able to calculate surface area of rectangular and triangular prisms.** Students will be able to calculate the surface area and volume of pyramids. Students will be able to solve real-world and mathematical problems involving area, surface area, and volume. Students will be able to draw similar figures applying a given scale factor. Students will be able to find missing lengths given similar figures. Students will be able to explain the change in area and volume when a scale factor is applied to one or more dimensions. Students will be able to draw and identify the two-dimensional figure formed by taking a cross section of a solid.
Common	Common Summative Mastery Assessment.

Summative Assessments	
Standards	CCSS.6.G.1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. CCSS.6.G.2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\ w\ h$ and $V = b\ h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. CCSS.6.G.3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. CCSS.6.G.4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. CCSS.7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. CCSS.7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. CCSS.7.G.4. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. CCSS.7.G.6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Accelerated Mathematics** Grade: Sixth

Title of Unit	**Geometry – Angles and Triangles**
Enduring Understanding	Students will draw, construct, and describe geometrical figures and describe the relationships between them.
Essential Questions	Why are angles important in sports? Who needs to use angles and how do they use them?
Content	Students will understand the requirements for three segments to form a triangle. Students will understand that there are 180 degrees in ~~a~~ every triangle. Students will understand the classifications of triangles by both sides and angles. Students will understand the characteristics of a regular polygon. Students will understand the different angle pair relationships: adjacent, vertical, complementary, supplementary, and linear pair. Students will understand congruent angles are angles with the same measure. Students will understand that intersecting lines are lines with one point in common.
Skills	Students will be able to create triangles given specific sides and/or angles. Students will be able to find missing angles in a triangle and classify the triangle by both its sides and its angles. Students will be able to classify angle pair relationships. Students will be able to break polygons into triangles and compute the sum of interior angles. Students will be able to determine the missing angles in polygons. Students will be able to create algebraic equations using angle pair relationships.
Common Summative Assessments	Common Summative Mastery Assessment.
Standards	CCSS.7.G.2. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. CCSS.7.G.5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Accelerated Mathematics** Grade: Sixth

Title of Unit	**Statistics and Probability**
Enduring Understanding	Students will develop an understanding of statistical variability. Students will summarize and describe distributions.
Essential Questions	When would you choose a circle graph, histogram or scatter plot? What are mean, median, and mode and when is one more appropriate to use? Why is there variability in data?
Content	Students will understand that line plots, histograms, and scatter plots are visual representations of data. Students will understand that measures of central tendency are the mean, median, and the mode. Students will understand that some interpretation of data can be misleading. Students will understand the concept of statistical variability.
Skills	Students will be able to create statistical questions. Students will be able to analyze data using measures of central tendency. Students will be able to choose which measure of central tendency is most appropriate for a given set of points. Students will be able to graph data using dot plots, histograms, and box plots. Students will be able to analyze data from given dot plots, histograms, and box plots. Students will be able to report observations about data using mathematical vocabulary. Students will be able to make predictions from graphs or scatter plots. **Students will be able to summarize and describe distributions using both measures of central tendency as well as variation**
Common Summative Assessments	Common Summative Mastery Assessment

Standards	CCSS.6.SP.1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I? is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.* CCSS.6.SP.2. Understand that a set of data collected to answer a statistical question has a distribution, which can be described by its center, spread, and overall shape. CCSS.6.SP.3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. CCS.6.SP.4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots. CCSS.6.SP.5. Summarize numerical data sets in relation to their context, such as by: CCSS.6.SP.5. a. Reporting the number observations. CCSS.6.SP.5. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. CCSS.6.SP.5. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. CCSS.6.SP.5. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Seventh

Title of Unit	**Ratios and Proportional Relationships**
Enduring Understanding	Students will analyze proportional relationships and use them to solve real-world and mathematical problems including percents and unit rates.
Essential Questions	What is the better deal? How can proportions be used to solve a variety of problems?
Content	Students will understand that a unit rate is the rate of change based on one. Students will understand that a proportion is two ratios that are equivalent. Students will understand that a complex fraction is a comparison of decimals or fractions and may be expressed as a simple fraction. Students will understand that the constant of proportionality is the rate of change. Students will understand that the graph of a proportional relationship is a straight line that goes through the origin. Students will understand that a percent is the ratio of the percent to one hundred. Students will understand the concept of interest. Students will understand that commission is money earned based on sales. Students will understand that markups, markdowns and sales tax are related to sales.
Skills	Students will be able to calculate complex unit rates. **Students will be able to solve a percent equation using proportions.** Students will be able to find the discount and the sale price of an item. Students will be able to calculate sales tax. Students will be able to solve percent word problems involving percent change and percent error. Students will be able to express proportions in tables and graphs. Students will be able to express a proportional relationship in an equation. Students will be able to graph proportional relationships. Students will be able to interpret a point in the graph in the context of a word problem.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.7.RP.1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks ½ mile in each ¼ hour, compute the unit rate as the complex fraction 12/14 miles per hour, equivalently 2 miles per hour.* CCSS.7.RP.2. Recognize and represent proportional relationships between quantities. CCSS.7.RP.2.a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. CCSS.7.RP.2.b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. CCSS.7.RP.2.c. Represent proportional relationships by equations. *For example, if total cost **t** is proportional to the number **n** of items purchased at a constant price **p**, the relationship between the total cost and the number of items can be expressed as **t = pn.*** CCSS.7.RP.2.d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate. CCSS.7.RP.3. Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Seventh

Title of Unit	**The Number System**
Enduring Understanding	Students will apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. Students will understand properties of integers and perform operations with integers.
Essential Questions	How are integers related to science, social studies and language arts? How do you represent rational numbers?
Content	Students will understand additive inverses as zero pairs. Students will understand that addition and subtraction are inverse operations and that subtraction problems can be changed to addition problems by adding the additive inverse. Students will understand the rules for addition, subtraction, multiplication and division of integers. Students will understand that zero cannot be a divisor. Students will understand that a fraction must be equivalent to either a terminating or a repeating decimal.
Skills	Students will be able to order and compare rational numbers. Students will be able to model addition and subtraction of signed numbers on a number line. **Students will be able to add, subtract, multiply, and divide rational numbers.** **Students will be able to use the order of operations with rational numbers.** Students will be able to evaluate algebraic expressions with integer values. **Students will be able to convert common fractions to decimals without a calculator.** Students will be able to solve real world problems involving rational numbers.
Common Summative Assessments	Common Summative Mastery Assessments

Standards	CCSS.7.NS.1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. CCSS.7.NS.1. a. Describe situations in which quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* CCSS.7.NS.1.b. Understand p + q as the number located a distance lql from p, in the positive or negative. Show that a number and its opposite have a sum of 0 (are available inverses). Interpret sums of rational numbers by describing real-world contexts. CCSS.7.NS.1.c. Understand subtraction of rational numbers as adding the additive inverse, p - q = p + (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. CCSS.7.NS.1.d. Apply properties of operations as strategies to add and subtract rational numbers. CCSS.7.NS.2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. CCSS.7.NS.2.a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. CCSS.7.NS.2.b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers by describing real-world contexts. CCSS.7.NS.2.c. Apply properties of operations as strategies to multiply and divide rational numbers. CCSS.7.NS.3. Solve real-world and mathematical problems involving the four operations with rational numbers. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics.

Course Name: **Mathematics** Grade: Seventh

Title of Unit	**Expressions and Equations**
Enduring Understanding	Students will use properties of operations to generate equivalent expressions. Students will solve real-world and mathematical problems using numerical and algebraic expressions and equations.
Essential Questions	How do you compare algebraic solutions to arithmetic solutions? How do you translate real world problems to algebraic expressions? Does my answer make sense?
Content	Students will understand the difference between a constant and a coefficient including coefficients of one. Students will understand that like terms are terms with the same variable. Students will understand that equivalent expressions have the same value. Students will understand that an algebraic equation has a solution. Students will understand that an inequality states two values are not the same. Students will understand ~~that~~ the commutative, associative, identity, distributive, and inverse properties. Students will understand that a monomial is a single math term.
Skills	**Students will be able to simplify algebraic expressions with rational numbers.** Students will be able to create algebraic expressions from verbal expressions. Students will be able to define a variable and create an equation from a word problem. **Students will be able to create and solve one-step equations with integers by balancing the equation.** Students will be able to solve two-step equations by using equivalent equations. **Students will be able to graph inequalities on a number line.** Students will be able to create and solve one and two-step inequalities. Students will be able to rewrite expressions in a different form; example, ½ of x = .5x = x/2. Students will be able to solve problems with fractional coefficients. Students will be able to check for the reasonableness of the solution. Students will be able to find the Greatest Common Factor for monomials. Students will be able to factor linear expressions using the distributive property.
Common Summative Assessments	Common Summative Mastery Assessment.
Standards	CCSS.7.EE.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. CCSS.7.EE.2. Understand that rewriting an expression in different forms in a problem context can shed light on the

	problem and how the quantities in it are related. For example, $a + 0.05a = 1.05a$ means that “increase by 5%” is the same as “multiply by 1.05.” CCSS.7.EE.3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals) using tolls strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: if a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 ¾ inches long in the center of a door that is 27 ½ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.* CCSS.7.EE.4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. CCSS.7.EE.4.a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution identifying the sequence of the operations used in each approach. *For example, the perimeter of rectangle is 54 cm. Its length is 6 cm. What is its width?* CCSS.7.EE.4.b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Seventh

Title of Unit	**Geometry Solids**
Enduring Understanding	Students will solve real-life and mathematical problems involving circumference, area, surface area, and volume.
Essential Questions	What shape container should I use? How did they build that?
Content	Students will understand the concepts of area, perimeter, circumference, surface area, and volume. Students will understand that a net is a two-dimensional drawing of a three-dimensional figure. Students will understand the characteristics of right prisms and pyramids. Students will understand ~~that~~ the concepts of a scale drawing and scale factor. Students will understand that a cross section of a solid is the plane figure formed when a solid is sliced.
Skills	**Students will be able to calculate the circumference and area of circles.** Students will be able to draw similar figures applying a given scale factor. Students will be able to find missing lengths given similar figures. Students will be able to draw nets for solid figures. **Students will be able to calculate volume of triangular prisms.** **Students will be able to calculate surface area of triangular prisms.** Students will be able to explain the change in area and volume when a scale factor is applied to one or more dimensions. Students will be able to draw and identify the two-dimensional figure formed by taking a cross section of a solid.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. CCSS.7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. CCSS.7.G.4. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. CCSS.7.G.6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Seventh

Title of Unit	**Geometry – Angles and Triangles**
Enduring Understanding	Students will draw, construct, and describe geometrical figures and describe the relationships between them.
Essential Questions	Why are angles important in sports? Who needs to use angles and how do they use them?
Content	Students will understand the requirements for three segments to form a triangle. Students will understand that there are 180 degrees in every triangle. Students will understand the classifications of triangles by both sides and angles. Students will understand the characteristics of a regular polygon. Students will understand the different angle pair relationships: adjacent, vertical, complementary, supplementary, and linear pair. Students will understand congruent angles are angles with the same measure. Students will understand that intersecting lines are lines with one point in common.
Skills	Students will be able to create triangles given specific sides and/or angles. Students will be able to find missing angles in a triangle. Students will be able to classify a triangle by both its sides and its angles. Students will be able to determine the missing angles in polygons. Students will be able to break polygons into triangles and compute the sum of interior angles. Students will be able to classify angle pair relationships. Students will be able to create algebraic equations using angle pair relationships.
Common Summative Assessments	Common Summative Mastery Assessment.
Standards	CCSS.7.G.2. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. CCSS.7.G.5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Seventh

Title of Unit	**Statistics**
Enduring Understanding	Students will understand the difference in random sampling techniques and determine their optimal application. Students will make inferences between two populations when given varied data distributions.
Essential Questions	How do you interpret data from statistical representations?
Content	Students will understand ~~that~~ the characteristics of each measure~~s~~ of central tendency Students will understand that the dispersion of data is the way it is spread out. Students will understand that the less variation a set has the closer the numbers are to each other. Students will understand that random sampling gives unbiased data. Students will understand that a valid inference is a prediction based on a random sample.
Skills	Students will be able to create data with a specific mode, median and mean. Students will be able to identify when a measure of central tendency would not be an accurate reflection of the data. **Students will be able to use data from a random sample to draw inferences about a population.** Students will be able to analyze data to make a prediction. Students will be able to display two samples of data in a box plot to illustrate variability. Students will be able to create a line plot to compare two samples.
Common Summative Assessments	Common Summative Assessment Mastery Assessment.

Standards	CCSS.7.SP.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. CCSS.7.SP.2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be. CCSS.7.SP.3. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable. CCSS.7.SP.4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically.

Course Name: **Mathematics** Grade: Seventh

Title of Unit	**Probability**
Enduring Understandings	Students will investigate chance processes and develop, use and evaluate probability models.
Essential Questions	What makes a game fair? How are probabilities used to make everyday decisions?
Content	Students will understand that probability is the likelihood that something will happen. Students will understand that experimental probability is based on someone's results~~.~~ Students will understand that theoretical probability is based on what exists~~.~~ Students will understand the difference between possible outcomes and favorable outcomes. Students will understand that equally likely outcomes are results that have the same probability of happening. Students will understand tree diagrams as a method for finding all possible outcomes. Students will understand that if the probability of an outcome ranges between 0 (never happening) and 1(always happening). Students will understand that compound probability is used when more than one event is happening. Students will understand that probability is either independent or dependent.
Skills	**Students will be able to perform an activity, record results and calculate experimental probability.** **Students will be able to compare different experimental probabilities for the same activity and explain the differences.** **Students will be able to compare and explain experimental versus theoretical probability.** Students will be able to make predictions based on probability. **Students will be able to create tree diagrams to find total possible outcomes**~~.~~ Students will be able to express probability as fractions and percents. Students will be able to identify an event that would have a probability of zero. Students will be able to identify an event that would have a probability of one. Students will be able to calculate compound probability of both dependent and independent events.
Common Summative Assessments	Common Summative Mastery Assessment.
Standards	CCSS.7.SP.C.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an

	unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. CCSS.7.SP.C.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times*. CCSS.7.SP. C.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.* b Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?* CCSS.7.SP.C.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. c Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?* CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics.

Course Name: **Accelerated Mathematics** Grade: Seventh

Title of Unit	**Ratios and Proportional Relationships**
Enduring Understanding	Students will analyze proportional relationships and use them to solve real-world and mathematical problems including percents and unit rates.
Essential Questions	What is the better deal? How can proportions be used to solve a variety of problems?
Content	Students will understand that a unit rate is the rate of change based on one. Students will understand that a proportion is two ratios that are equivalent. Students will understand that a complex fraction is a comparison of decimals or fractions and may be expressed as a simple fraction. Students will understand that the constant of proportionality is the rate of change. Students will understand that a linear equation will graph as a line due to constant rate of change. Students will understand that the graph of a proportional relationship is a straight line that goes through the origin. Students will understand that a percent is the ratio of the percent to one hundred. Students will understand the concept of interest. Students will understand that commission is money earned based on sales. Students will understand that markups, markdowns and sales tax are related to sales.
Skills	Students will be able to calculate complex unit rates. **Students will be able to solve a percent equation using proportions.** **Students will be able to find the discount and the sale price of an item.** **Students will be able to calculate sales tax.** Students will be able to solve percent word problems involving percent change and percent error. Students will be able to express proportions in tables and graphs. Students will be able to express a proportional relationship in an equation. Students will be able to graph proportional relationships. Students will be able to interpret a point in the graph in the context of a word problem.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.7.RP.1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks ½ mile in each ¼ hour, compute the unit rate as the complex fraction 12/14 miles per hour, equivalently 2 miles per hour.* CCSS.7.RP.2. Recognize and represent proportional relationships between quantities. CCSS.7.RP.2.a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. CCSS.7.RP.2.b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. CCSS.7.RP.2.c. Represent proportional relationships by equations. *For example, if total cost **t** is proportional to the number **n** of items purchased at a constant price **p**, the relationship between the total cost and the number of items can be expressed as **t = pn.*** CCSS.7.RP.2.d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate. CCSS.7.RP.3. Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: Accelerated **Mathematics** **Grade: Seventh**

Title of Unit	**The Number System**
Enduring Understanding	Students will apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. Students will understand properties of integers and perform operations using them.
Essential Questions	How are integers related to science, social studies and language arts? How do you represent rational numbers?
Content	Students will understand additive inverses as zero pairs. Students will understand that addition and subtraction are inverse operations and that subtraction problems can be changed to addition problems by adding the additive inverse. Students will understand the rules for addition, subtraction, multiplication and division of integers. Students will understand exponents, square roots, and cube roots. Students will understand that zero cannot be a divisor. Students will understand that a fraction must be equivalent to either a terminating or a repeating decimal. Students will understand the difference between a rational and irrational number.
Skills	**Students will be able to order and compare rational numbers.** **Students will be able to determine if a number is rational or irrational.** Students will be able to model addition and subtraction of signed numbers on a number line. **Students will be able to add, subtract, multiply and divide rational numbers.** **Students will be able to use the order of operations with rational numbers.** Students will be able to evaluate algebraic expressions with integer values. **Students will be able to convert common fractions to decimals without a calculator.** Students will be able to find square roots of perfect squares and cube roots of perfect cubes. Students will be able to estimate, to the nearest whole number, non-perfect square roots. Students will be able to interpret sums of rational numbers in a real-world context. Students will be able to solve real world problems involving rational numbers.
Common Summative Assessments	Common Summative Mastery Assessments

Standards	CCSS.7.NS.1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. CCSS.7.NS.1. a. Describe situations in which quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* CCSS.7.NS.1.b. Understand p + q as the number located a distance lql from p, in the positive or negative. Show that a number and its opposite have a sum of 0 (are available inverses). Interpret sums of rational numbers by describing real-world contexts. CCSS.7.NS.1.c. Understand subtraction or rational numbers as adding the additive inverse, p - q = p + (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. CCSS.7.NS.1.d. Apply properties of operations as strategies to add and subtract rational numbers. CCSS.7.NS.2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. CCSS.7.NS.2.a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. CCSS.7.NS.2.b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers by describing real-world contexts. CCSS.7.NS.2.c. Apply properties of operations as strategies to multiply and divide rational numbers. CCSS.7.NS.3. Solve real-world and mathematical problems involving the four operations with rational numbers. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics.

Course Name: Accelerated **Mathematics** **Grade: Seventh**

Title of Unit	**Expressions and Equations**
Enduring Understanding	Students will use properties of operations to generate equivalent expressions. Students will solve real-life and mathematical problems using numerical and algebraic expressions and equations.
Essential Questions	How do you compare algebraic solutions to arithmetic solutions? How do you translate real world problems to algebraic expressions? Does my answer make sense?
Content	Students will understand the difference between a constant and a coefficient including coefficients of one. Students will understand that like terms are terms with the same variable. Students will understand that equivalent expressions have the same value. Students will understand that an algebraic equation has a solution. Students will understand that an inequality states two values are not the same. Students will understand that the commutative, associative, identity, distributive, and inverse properties. Students will understand that a monomial is a single math term.
Skills	**Students will be able to simplify algebraic expressions with rational numbers.** Students will be able to create algebraic expressions from verbal expressions. Students will be able to define a variable and create an equation from a word problem. **Students will be able to solve one-step equations with integers by balancing the equation.** **Students will be able to solve two-step equations by using equivalent equations.** Students will be able to solve equations with variable on both sides of the equation. **Students will be able to graph inequalities on a number line.** **Students will be able to create and solve 1step inequalities.** Students will be able to create and solve 2 step inequalities. Students will be able to rewrite expressions in a different form; example, ½ of x = .5x = x/2. Students will be able to solve problems with fractional coefficients. Students will be able to check for the reasonableness of the solution. Students will be able to find the Greatest Common Factor for monomials. Students will be able to factor linear expressions using the distributive property.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.7.EE.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. CCSS.7.EE.2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05." CCSS.7.EE.3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals) using tolls strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: if a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 ¾ inches long in the center of a door that is 27 ½ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.* CCSS.7.EE.4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. CCSS.7.EE.4.a. Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution identifying the sequence of the operations used in each approach. *For example, the perimeter of rectangle is 54 cm. Its length is 6 cm. What is its width?* CCSS.7.EE.4.b. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP7 Look for and make use of structure.

Course Name: **Accelerated Mathematics** **Grade:** Seventh

Title of Unit	**Congruence**
Enduring Understanding	Students will determine whether transformations result in congruent or similar figures. Students will discover and apply angle relationships formed by triangles and parallel lines cut by a transversal.
Essential Questions	What movements preserve or change shapes? How can a house fit on a piece of paper?
Content	Students will understand that transformations preserve congruence of polygons, lines, and angle measurements. Students will understand that dilations create similar figures. Students will understand angle relationships between exterior and interior triangle angles, similar triangles, and parallel lines cut by a transversal.
Skills	Students will be able to transform polygons using dilations, **translations, reflections**, and rotations. Students will be able to identify coordinates of transformed figures. Students will be able to describe sequence of transformations that result in congruent or similar figures. Students will be able to find angle measurements using properties of similar figures, exterior and interior angles, and parallel lines cut by a transversal.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.8.G.1. Verify experimentally the properties of rotations, reflections, and translations. a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines. CCSS.8.G.2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. CCSS.8.G.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. CCSS.8.G.4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. CCSS.8.G.5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.* CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP6 Attend to precision CCSS.MP7 Look for and make use of structure.

Course Name: **Accelerated Mathematics** Grade: Seventh

Title of Unit	**The Pythagorean Theorem**
Enduring Understanding	Students will explain and apply the Pythagorean Theorem and its converse in problem solving situations.
Essential Questions	How can right triangle relationships model real world phenomena? How can you use the Pythagorean Theorem to solve everyday problems?
Content	Students will understand the Pythagorean Theorem equates the sum of the squares of the legs to the square of the hypotenuse. Students will understand that the Pythagorean Theorem can be used to solve real world problems. Students will understand that the converse of the Pythagorean Theorem can be used to determine whether a given triangle is a right triangle.
Skills	Students will be able to prove the Pythagorean Theorem and its converse. **Students will be able to apply the Pythagorean Theorem to find missing triangle side lengths.** **Students will be able to apply the Pythagorean Theorem to solve problems.**
Common Summative Assessments	Common Summative Mastery Assessment.
Standards	8.G.6. Explain a proof of the Pythagorean Theorem and its converse. 8.G.7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. 8.G.8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. MP 2 Reason abstractly and quantitatively. MP 4 Model with mathematics. MP 6 Attend to precision.

Course Name: **Accelerated Mathematics** Grade: Seventh

Title of Unit	**Geometry: Volume**
Enduring Understanding	Students will solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.
Essential Questions	Will the size of a container indicate its contents? How will the volume change if one dimension is changed? How does understanding two-dimensional figures help find volume of three-dimensional figures?
Content	Students will understand that the volume of some solid figures is calculated using the area of the base and its height. Students will understand the connection between finding volume of one base vs. two base figures. Students will understand the formulas for finding volume of cones, cylinders, and spheres. Students will understand volume formulas help solve real world problems.
Skills	Students will be able to calculate **volumes of** cones, **cylinders**, and spheres using appropriate formulas and units. Students will be able to use volume formulas to solve real world problems.
Common Summative Assessments	Common Summative Mastery Assessment.
Standards	CCSS.8.G.9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP4 Model with mathematics. CCSS.MP6 Attend to precision CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Accelerated Mathematics** Grade: Seventh

Title of Unit	**Statistics**
Enduring Understanding	Students will understand the difference in random sampling techniques and determine their optimal application. Students will make inferences between two populations when given varied data distributions.
Essential Questions	How do you interpret data from statistical representations?
Content	Students will understand that the characteristics of each measures of central tendency. Students will understand that the dispersion of data is the way it is spread out. Students will understand that the less variation a set has the closer the numbers are to each other. Students will understand that random sampling gives unbiased data. Students will understand that a valid inference is a prediction based on a random sample.
Skills	Students will be able to create data with a specific mode, median and mean. Students will be able to identify when a measure of central tendency would not be an accurate reflection of the data. **Students will be able to use data from a random sample to draw inferences about a population.** Students will be able to analyze data to make a prediction. **Students will be able to display two samples of data in a box plot to illustrate variability.** Students will be able to create a line plot to compare two samples.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.7.SP.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. CCSS.7.SP.2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be. CCSS.7.SP.3. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable. CCSS.7.SP.4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically.

Course Name: **Accelerated Mathematics** Grade: Seventh

Title of Unit	Probability
Enduring Understandings	Students will investigate chance processes and develop, use and evaluate probability models.
Essential Questions	What makes a game fair? How are probabilities used to make everyday decisions?
Content	Students will understand that probability is the likelihood that something will happen. Students will understand that experimental probability is based on someone's results~~.~~ Students will understand that theoretical probability is based on what exists~~.~~ Students will understand the difference between possible outcomes and favorable outcomes. Students will understand that equally likely outcomes are results that have the same probability of happening. Students will understand tree diagrams as a method for finding all possible outcomes. Students will understand that if the probability of an outcome ranges between 0 (never happening) and 1(always happening). Students will understand that compound probability is used when more than one event is happening. Students will understand that probability is either independent or dependent
Skills	**Students will be able to perform an activity, record results and calculate experimental probability.** **Students will be able to compare different experimental probabilities for the same activity and explain the differences.** Students will be able to make predictions based on probability. **Students will be able to create tree diagrams to find total possible outcomes.** Students will be able to express probability as fractions and percents. Students will be able to identify an event that would have a probability of zero. Students will be able to identify an event that would have a probability of one. **Students will be able to calculate compound probability of both dependent and independent events.**
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.7.SP.C.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. CCSS.7.SP.C.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times*. CCSS.7.SP. C.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected*. b Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?* CCSS.CCSS.7.SP.C.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event. c Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?* CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP 4 Model with mathematics.

Course Name: **Mathematics** Grade: Eighth

Title of Unit	**The Real Number System**
Essential Questions	When are numbers exact? How can mathematics make really large or really small numbers understandable?
Enduring Understanding	Students will know that there are irrational numbers and approximate them using rational numbers. Students will symbolically represent numbers.
Content	Students will understand that different subsets of the real number system are comparable. Students will understand that finding perfect square roots help to estimate the values of square roots that are not perfect. Students will understand radical symbols that indicate square or cube roots. Students will understand that equivalent expressions can be written using integer exponents. Students will understand that very large or very small numbers can be written using scientific notation. Students will understand that exponent rules apply for operations performed on numbers written in scientific notation.
Skills	**Students will be able to determine whether a number is irrational or rational.** Students will be able to approximate irrational numbers. **Students will be able to compare and order rational and irrational numbers.** Students will be able to find perfect square and cube roots. Students will be able to write equivalent expressions using integer exponents. **Students will be able to write large** and small numbers **in scientific notation.** Students will be able to perform operations with numbers expressed in scientific notation.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	**CCSS.8.NS.1. Know that numbers that are not rational are called irrational.** Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion that repeats eventually into a rational number. **CCSS.8.NS.2. Use rational approximations of irrational numbers to compare the size of irrational numbers**, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.* CCSS.8.EE.1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$ CCSS.8.EE.2. Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational. **CCSS.8.EE.3. Use numbers expressed in the form of a single digit times a whole-number power of 10 to estimate very large** of very small **quantities**, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 times 10 8 and the population of the world as 7 times 10 9, and determine that the world population is more than 20 times larger.* CCSS.8.EE.4. Perform operations with numbers expressed in scientific notation including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Eighth

Title of Unit	**Solving Equations**
Essential Questions	Are all things created equal? What situations can be modeled using equations How can two equations look different but be the same? When is equality true, and when is equality false?
Enduring Understanding	Students will apply properties and inverse operations to efficiently solve equations and interpret solutions.
Content	Students will understand that solving an equation involves inverse operations and maintaining balance. Students will understand that some equations have one solution, no solutions, or infinitely many solutions. Students will understand how the properties of mathematics produce equivalent statements.
Skills	Students will be able to solve one-step equations using inverse operations. **Students will be able to solve two-step equations, with integers, using inverse operations**. Students will be able to solve equations with variables on both sides. Students will be able to interpret three types of solutions to linear equations, including equations with one solution, no solutions, and infinitely many solutions. Students will be able to simplify expressions and solve equations with rational number coefficients. Students will be able to apply mathematics to problem solving situations.
Common Summative Assessments	Common Summative Mastery Assessment
Standards	**CCSS.8.EE.7. Solve linear equations in one variable.** a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, *or* $a = b$ results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Eighth

Title of Unit	**Linear Functions**
Enduring Understanding	Students will understand connections between proportional relationships, lines and linear equations. Students will represent, compare and interpret linear relationships using tables, graphs and equations. Students will use functions to model relationships between quantities.
Essential Questions	How can relations and functions represent real world phenomena? When do two variables represent a linear relationship?
Content	Students will understand the difference between relations and functions. Students will understand that a function is a rule that assigns to each input exactly one output. Students will understand that linear and nonlinear functions can be shown using different representations. Students will understand the difference between proportional and non-proportional relationships. Students will understand the connections between verbal descriptions and graphical representations.
Skills	**Students will be able to determine if a relationship is linear or nonlinear.** Students will be able to write and interpret linear equations in $y = mx + b$ form. Students will be able to analyze and translate information for linear relationships between tables, graphs and equations. **Students will be able to find and interpret rate of change (slope, m) using table, graph, and equation.** **Students will be able to find and interpret the initial value (y-intercept, b) using table, graph, and equation.** **Students will be able to represent and compare proportional relationships and other functions.** Students will be able to use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	**CCSS.8.EE.5.** Graph proportional relationships, interpreting the unit rate as the slope of the graph. **Compare two different proportional relationships represented in different ways.** For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. **CCSS.8.EE.6**. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; **derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.** CCSS.8.F.1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and corresponding output. 1 **CCSS.8.F.2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).** *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.* **CCSS.8.F.3. Interpret the equation y = mx + b as a defining a linear function, whose graph is a straight** line; give examples of functions that are not linear. *For example, the function A = s 2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.* **CCSS.8.F.4.** Construct a function to model a linear relationship between two quantities. **Determine the rate of change and initial value of the function from a description of a relationship** or from two (x, y) values, including reading these **from a table or from a graph**. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. CCSS.8.F.5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Mathematics** Grade: Eighth

Title of Unit	**Linear Systems**
Enduring Understanding	Students will analyze and solve linear systems and interpret the solutions.
Essential Questions	What can happen when you have two lines? How does the intersection of a linear system model make real world phenomena?
Content	Students will understand that lines may or may not intersect. Students will understand that there are different methods to find an intersection point. Students will understand how finding a solution to a linear system compares to finding a solution to a linear equation.
Skills	Students will be able to solve linear systems using graphing and algebraic methods. Students will be able to determine whether lines will be parallel or intersecting. Students will be able to interpret the solution to a linear system in real world situations.
Common Summative Assessments	Common Summative Mastery Assessment.
Standards	CCSS.8.EE.8. Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersections of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. c. Solve simple cases by inspection. *For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.* Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, give coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.* CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically.

Course Name: **Mathematics** Grade: Eighth

Title of Unit	Congruence
Enduring Understanding	Students will determine whether transformations result in congruent or similar figures. Students will discover and apply angle relationships formed by triangles and parallel lines cut by a transversal.
Essential Questions	What movements preserve or change shapes? How can a house fit on a piece of paper?
Content	Students will understand that transformations preserve congruence of polygons, lines, and angle measurements. Students will understand that dilations and transformations create similar figures. Students will understand angle relationships between exterior and interior triangle angles, similar triangles, and parallel lines cut by a transversal.
Skills	Students will be able to transform polygons using dilations, **translations, reflections**, and rotations. Students will be able to identify coordinates of transformed figures. Students will be able to describe sequences of transformations that result in congruent or similar figures. Students will be able to find angle measurements using properties of similar figures, exterior angles, interior angles, and parallel lines cut by a transversal.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	**CCSS.8.G.1. Verify experimentally the properties of** rotations, **reflections, and translations**. a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines. CCSS.8.G.2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. CCSS.8.G.3. **Describe the effect of** dilations, **translations**, rotations, **and reflections on two-dimensional figures using coordinates.** CCSS.8.G.4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. CCSS.8.G.5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.* CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP6 Attend to precision CCSS.MP7 Look for and make use of structure.

Course Name: **Mathematics** Grade: Eighth

Title of Unit	**The Pythagorean Theorem**
Enduring Understanding	Students will explain and apply the Pythagorean Theorem and its converse in problem solving situations.
Essential Questions	How can right triangle relationships model real world phenomena? How can you use the Pythagorean Theorem to solve everyday problems?
Content	Students will understand the Pythagorean Theorem equates the sum of the squares of the legs to the square of the hypotenuse. Students will understand that the Pythagorean Theorem can be used to solve real world problems. Students will understand that the converse of the Pythagorean Theorem can be used to determine whether a given triangle is a right triangle.
Skills	Students will be able to prove the Pythagorean Theorem and its converse. **Students will be able to apply the Pythagorean Theorem to find missing triangle side lengths.** **Students will be able to apply the Pythagorean Theorem to solve problems.**
Common Summative Assessments	Common Summative Mastery Assessment.
Standards	CCSS.8.G.6. Explain a proof of the Pythagorean Theorem and its converse. **CCSS.8.G.7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two** and three **dimensions**. CCSS.8.G.8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics. CCSS.MP6 Attend to precision.

Course Name: **Mathematics** Grade: Eighth

Title of Unit	**Geometry: Volume and Surface Area**
Enduring Understanding	Students will solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.
Essential Questions	Will the size of a container indicate its contents? How will the volume change if one dimension is changed? How does understanding two-dimensional figures help find volume of three-dimensional figures?
Content	Students will understand that the volume of some solid figures is calculated using the area of the base and its height. Students will understand the connection between finding volume of one base vs. two base figures. Students will understand the formulas for finding volume of cones, cylinders, and spheres. Students will understand volume formulas help solve real world problems.
Skills	Students will be able to calculate volumes of cones, **cylinders**, and spheres using appropriate formulas and units. Students will be able to use volume formulas to solve real world problems. Students will be able to calculate surface area of cylinders and cones.
Common Summative Assessments	Common Summative Mastery Assessment.
Standards	**CCSS.8.G.9. Know the formulas for the volumes of** cones, **cylinders**, and spheres and use them to solve real-world and mathematical problems. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP4 Model with mathematics. CCSS.MP6 Attend to precision CCSS.MP8 Look for and express regularity in repeated reasoning.

Title of Unit	**Statistics and Bivariate Data**
Enduring Understanding	Students will investigate patterns of association in bivariate data. Students will model linear data with an equation to answer questions and make predictions.
Essential Question	How can mathematics be used to model and make predictions for real world phenomena?
Content	Students will understand that scatter plots show relationships between two variables. Students will understand that some data can be modeled using a linear equation. Students will understand that linear models can be used to make predictions about data.
Skills	**Students will be able to construct and interpret scatter plots to investigate patterns of association between two quantities.** Students will be able to describe patterns of association for two quantities. Students will be able to create and use lines of best fit to make and evaluate predictions.
Common Summative Assessment	Common Summative Mastery Assessment

Standards	**CCSS.8.SP.1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities.** Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. CCSS.8.SP.2. Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. CCSS.8.SP.3. Use the equation of a linear model to solve problems in the context of bivariate measurement of data, interpreting the slope and interpret. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr. as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.* CCSS.8.SP.4. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores? CCSS.MP 3 Construct viable arguments and critique the reasoning of others. CCSS.MP 4 Model with mathematics.

Course Name: **Honors Algebra I** Grade: Eighth

Title of Unit	**Foundations of Functions and Expressions**
Enduring Understandings	Relations and functions can represent real world phenomena. Variables represent numbers.
Essential Questions	How can relations and functions relate to real world problems? How do you use variable, expressions, and equations to model real world problems?
Content	Students will understand verbal and algebraic expressions. Students will understand the order of operations. Students will understand Mathematical Properties Students will understand the representations of relations and graphs of relations. Students will understand functions and function notation. Students will understand solutions to equations. Students will understand the domain and range of a function.
Skills	Students will be able to translate between verbal and algebraic expressions. Students will be able to perform order of operations. **Students will be able to determine whether a relation is a function.** **Students will be able to evaluate a function in function notation.** Students will be able to apply mathematical properties to simplify expressions. **Students will be able to recognize and evaluate functions.** Students will be able to identify and use the algebraic properties. Students will be able to write function rules from tables and word problems. Students will be able to determine the domain and range of various functions.
Common Summative Assessments	Common Summative Mastery Assessment

Standards	CCSS.HSF.IF.A.1: Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$. CCSS.HSF.IF.A.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. CCSS.HSF.IF.B.6: Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. CCSS.HSF.IF.C.8: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. CCSS.HSF.IF.B.5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. CCSS.HSF.BF.A.1: Write a function that describes a relationship between two quantities. CCSS.HSA.SSE.A.1: Interpret expressions that represent a quantity in terms of its context. CCSS.HSA.SSE.A.1.A: Interpret parts of an expression, such as terms, factors, and coefficients. CCSS.HSA.SSE.A.2: Use the structure of an expression to identify ways to rewrite it. CCSS.HSA.SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. CCSS.HSF.BF.A.1.C: (+) Compose functions. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP7 Look for and make use of structure.

Course Name: **Honors Algebra I** Grade: Eighth

Title of Unit	**Solving Equations and Inequalities**
Enduring Understanding	Relations and functions can represent real world phenomena. Variables represent numbers.
Essential Questions	How do you use expressions and equations to model real world problems? How can an equation or inequality be manipulated to isolate a variable while preserving the value of the original equation/inequality?
Content	Students will understand literal and algebraic equations. Students will understand absolute value equations. Students will understand percents and proportions. Students will understand inequalities. Students will understand compound inequalities. Students will understand absolute value inequalities. Students will understand dimensional analysis.
Skills	**Students will be able to write and solve multistep rational equations.** **Students will be able to write and solve multistep one-variable inequalities.** **Students will be able to solve and graph compound inequalities.** **Students will be able to graph inequalities on a number line.** Students will be able to solve absolute value equations. Students will be able to solve literal equations. **Students will be able to write and solve proportions, including proportions with binomials in the numerator or denominator.** **Students will be able to write and solve application percent problems.** Students will be able to solve absolute value inequalities. Students will be able to change units using dimensional analysis.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.HSA.REI.10. Represent and solve equations and inequalities graphically. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane often forming a curve (which could be a line). CCSS.HSA.REI.12. Represent and solve equations and inequalities graphically. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. CCSS.HSA.CED.1. Create equations and inequalities in one variable and use them to solve problems. CCSS.HSA.REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. CCSS.HSA.CED.A.4: Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Honors Algebra I** Grade: Eighth

Title of Unit	**Linear Relationships**
Enduring Understanding	Linear relationships have a constant rate of change Tables, graphs, and equations are all ways of representing functions and real world phenomena Slope can be referenced in many different forms.
Essential Questions	How can graphs be used to solve linear equations? How do you determine the appropriate form of an equation for a line when given specific characteristics? What is the relationship between slope and rate of change and how can each be used to solve real world problems?
Content	Students will understand the concept of slope and rate of change in problem solving. Students will understand direct variation equations and how to solve them. Students will understand arithmetic sequences. Students will understand equations of lines in slope-intercept form, point slope form, and standard form. Students will understand how to write equations of a line passing through a given point, parallel/perpendicular to a given line. Students will understand the properties of horizontal and vertical lines.
Skills	**Students will be able to calculate slope between two points** **Students will be able to determine the slope of a line, given an equation, table, or graph** Students will be able to find and determine intercepts. **Students will be able to determine whether lines are parallel, perpendicular or neither.** **Students will be able to graph linear equations**. **Students will be able to write linear equations in slope-intercept and point-slope form.** Students will be able to create and interpret linear equations from real world data. Students will be able to write a rule given an arithmetic sequence.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.HSF.IF.B.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. CCSS.HSF.IF.B.6: Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. CCSS.HSF.IF.C.7.A: Graph linear and quadratic functions and show intercepts, maxima, and minima. CCSS.HSF.IF.C.8: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. CCSS.HSF.IF.C.9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). CCSS.HSA.CED.A.1: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. CCSS.HSA.CED.A.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. CCSS.HSA.REI.D.10: Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). CCSS.HSF.LE.A.2: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). CCSS.HSF.LE.A.1.A: Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. CCSS.HSF.LE.A.1.B: Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. CCSS.HSF.LE.B.5: Interpret the parameters in a linear or exponential function in terms of a context. CCSS.MP4 Model with mathematics. CCSS.MP7 Look for and make use of structure.

Course Name: **Honors Algebra I** Grade: Eighth

Title of Unit	**Linear Systems**
Enduring Understanding	There is more than one way to solve a system of equations, and students can determine the most efficient method for solving. Systems of equations with two unknowns can be used to solve real world problems.
Essential Questions	How do you solve real world problems using systems of equations? Which method is best and why? How can systems of equations be used to represent situations and solve problems? What does the number of solutions (none, one or infinite) of a system of linear equations represent?
Content	Students will understand linear systems as a model in a problem-solving situation. Students will understand linear inequalities and their graphical representation.
Skills	**Students will be able to write and solve linear systems by graphing, elimination, and substitution.** Students will be able to distinguish if a system of equations has one solution, no solution, or infinitely many solutions. **Students will be able to graph linear inequalities on a coordinate plane.** **Students will be able to graph systems of linear inequalities on a coordinate plane.** Students will create and interpret linear inequalities in one variable. Students will be able to model and solve real world situations with systems of equations.
Common Summative Assessments	Common Summative Mastery Assessment
Standards	CCSS.HSA.CED.A.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. CCSS.HSA.REI.C.5: Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. CCSS.HSA.REI.C.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. CCSS.HSA.REI.D.12: Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Honors Algebra I** Grade: Eighth

Title of Unit	**Polynomials**
Enduring Understanding	Very large and small numbers can be represented efficiently using scientific notation Exponent properties can be proven through expansion Polynomial expressions may be simplified.
Essential Questions	What characteristics of a polynomial determine how to factor it completely? What are the rules of exponents and how are they applied to simplify expressions?
Content	Students will understand the degree and standard form of a polynomial Students will understand properties of exponents. Students will understand operations with polynomials Students will understand factoring polynomials Students will understand scientific notation Students will understand quadratic equations Students will understand geometric applications. Students will understand negative exponents have a reciprocal relationship.
Skills	**Students will be able to add, subtract, multiply and simplify monomials and polynomials.** **Students will be able to use the rules of exponents to simplify monomials.** Students will be able to solve quadratic equations by factoring. Students will be able to solve geometric problems involving polynomials. **Students will be able to factor quadratics (leading coefficient is 1)** and other polynomials. Students will be able to multiply and divide numbers in scientific notation.
Common Summative Assessments	Common Summative Mastery Assessment
Standards	**CCSS.**HSA.SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. CCSS.HSA.SSE.B.3.a: Factor a quadratic expression to reveal the zeros of the function it defines. CCSS.HSA.APR.A.1: Understand that polynomials form a system analogous to the integers; namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP7 Look for and make use of structure.

Course Name	**Honors Algebra I**
Title of Unit	**Radical Expressions and Equations**
Enduring Understanding	Radical expressions can be represented different ways
Essential Questions	How can finding roots help us solve problems?
Content	Students will understand operations with radical expressions. Students will understand how to apply the Pythagorean theorem to problem solving situations. Students will understand equivalent representations of radical expressions. Students will understand solving radical equations. Students will understand extraneous solutions in radical equations.
Skills	**Students will be able to simplify radical expressions.** Students will be able to add, subtract, multiply, and divide radicals. Students will be able to solve problems involving the Pythagorean theorem. Students will be able to solve radical equations. Students will be able to determine extraneous solutions when solving radical equations.
Common Summative Assessments	Common Summative Mastery Assessment
Standards	CCSS.HSA.SSE.A.2: Use the structure of an expression to identify ways to rewrite it. CCSS.HSA.SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. CCSS.HSG.SRT.C.8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. CCSS.HSN.RN.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents. CCSS.HSA.REI.A.2: Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Honors Algebra I** Grade: Eighth

Title of Unit	**Scatter plots**
Enduring Understandings	Scatter plots can model data and be used to make predictions.
Essential Questions	How can mathematics be used to model and make predictions for real world phenomena?
Content	Students will understand and interpret scatterplots. Students will understand that scatter plots show relationships between two variables. Students will understand that some data can be modeled using a linear equation. Students will understand equations of a line of best fit. Students will understand correlation. Students will understand that not all data is linear.
Skills	Students will be able to construct and interpret scatterplots. **Students will be able to calculate the line of best fit.** **Students will be able to use the line of best fit to find starting point represented by the y-intercept; to describe what the slope means; and to find the values at a particular point including outside the given graph.** Students will be able to determine if there is a correlation between bivariate data. Students will be able to make predictions based on the line of best fit. Students will be able to recognize linear, quadratic, and exponential functions given data and graphs.
Common Summative Assessments	Common Summative Mastery Assessment
Standards	CCSS.HSS.ID.B.6: Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. CCSS.HSS.ID.B.6.c: Fit a linear function for a scatter plot that suggests a linear association. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically.

Course Name: **Honors Algebra I** Grade: Eighth

Title of Unit	**Rational Expressions**
Enduring Understandings	To operate with rational expressions, you can use much of what you know about operating with fractions.
Essential Questions	Are a rational expression and its simplified form equivalent? How are rational expressions similar to rational numbers?
Content	Students will understand rational expressions. Students will understand excluded values Students will understand how to perform operations on rational expressions.
Skills	Students will be able to simplify rational expressions. Students will be able to determine excluded values. Students will be able to add, subtract, multiply and divide rational expressions.
Common Summative Assessments	Common Summative Mastery Assessment
Standards	**CCSS.**HSA.APR.D.7(+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. CCSS.MP2: Reason abstractly and quantitatively.

Course Name: **Algebra I** Grade: N/A

Title of Unit	**Foundations of Functions and Expressions**
Enduring Understanding	Relations and functions can represent real world phenomena. Variables represent numbers.
Essential Questions	How do you use variable, expressions, and equations to model real world problems? How ~~can~~ do relations and functions relate to real world problems?
Content	Students will understand verbal and algebraic expressions. Students will understand mathematical properties. Students will understand the representations of relations and graphs of relations. Students will understand functions and function notation. Students will understand solutions to equations. Students will understand the domain and range of a function.
Skills	Students will be able to translate between verbal and algebraic expressions. **Students will be able to determine whether a relation is a function.** **Students will be able to evaluate a function in function notation.** Students will be able to apply mathematical properties to simplify expressions. **Students will be able to recognize and evaluate functions.** Students will be able to identify and use the algebraic properties. Students will be able to write function rules from tables and word problems. Students will be able to determine the domain and range of various functions.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.HSF.IF.A.1: Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$. CCSS.HSF.IF.A.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. CCSS.HSF.IF.B.5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. CCSS.HSF.BF.A.1: Write a function that describes a relationship between two quantities. CCSS.HSA.SSE.A.1: Interpret expressions that represent a quantity in terms of its context. CCSS.HSA.SSE.A.1.A: Interpret parts of an expression, such as terms, factors, and coefficients. CCSS.HSA.SSE.A.2: Use the structure of an expression to identify ways to rewrite it. CCSS.MP3: Construct viable arguments and critique the reasoning of others CCSS.MP7: Look for and make use of structure

Course Name: **Algebra I** Grade: N/A

Title of Unit	**Solving Equations and Inequalities**
Enduring Understanding	Operations performed on one side of an equation must be performed on the other side(s) in order to preserve the equality. There are differences between solutions to inequalities and equations.
Essential Questions	How do you use variable, expressions, and equations to model real world problems? How can an equation or inequality be manipulated to isolate a variable while preserving the equality of the original equation/inequality?
Content	Students will understand literal and algebraic equations. Students will understand absolute value equations. Students will understand percents and proportions. Students will understand inequalities. Students will understand compound inequalities.
Skills	**Students will be able to write and solve multi-step equations with rational coefficients.** **Students will be able to write and solve multi-step one-variable inequalities.** **Students will be able to graph inequalities on a number line.** **Students will be able to solve and graph compound inequalities.** Students will be able to solve absolute value equations. Students will be able to solve literal equations. **Students will be able to write and solve proportions, including proportions with binomials in the numerator or denominator.** **Students will be able to write and solve application percent problems.**
Common Summative Assessments	Common Summative Mastery Assessment

Standards	CCSS.HSA.REI.10. Represent and solve equations and inequalities graphically. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane often forming a curve (which could be a line). CCSS.HSA.CED.1. Create equations and inequalities in one variable and use them to solve problems. CCSS.HSA.REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. CCSS.HSA.CED.A.4: Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R. CCSS.HSA.REI.D.12: Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Algebra I** Grade: N/A

Title of Unit	**Linear Relationships**
Enduring Understanding	Linear relationships have a constant rate of change. Tables, graphs, and equations are all ways of representing functions and real world phenomena. Slope can be referenced in many different forms.
Essential Questions	How can graphs be used to solve linear equations? How do you determine the appropriate form of an equation for a line when given specific characteristics? What is the relationship between slope and rate of change and how can each be used to solve real world problems?
Content	Students will understand the concept of slope and rate of change in problem solving. Students will understand direct variation equations and how to solve them. Students will understand arithmetic sequences. Students will understand equations of lines in slope-intercept form, point slope form, and standard form. Students will understand how to write equations of a line passing through a given point parallel/perpendicular to a given line. Students will understand the properties of horizontal and vertical lines.
Skills	**Students will be able to calculate slope between two points.** **Students will be able to determine the slope of a line, given an equation, table, or graph.** Students will be able to determine whether lines are parallel, perpendicular, or neither. Students will be able to find intercepts given both graphs and equations. **Students will be able to graph linear equations.** **Students will be able to write linear equations in slope-intercept and point-slope form.** Students will be able to create and interpret linear equations from real world data. Students will be able to write a rule given an arithmetic sequence.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.HSF.IF.B.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. CCSS.HSF.IF.B.6: Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. CCSS.HSF.IF.C.7.A: Graph linear and quadratic functions and show intercepts, maxima, and minima. CCSS.HSF.IF.C.8: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. CCSS.HSF.IF.C.9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). CCSS.HSA.CED.A.1: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. CCSS.HSA.CED.A.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. CCSS.HSA.REI.D.10: Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). CCSS.HSF.LE.A.2: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). CCSS.HSF.LE.A.1.A: Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. CCSS.HSF.LE.A.1.B: Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. CCSS.HSF.LE.B.5: Interpret the parameters in a linear or exponential function in terms of a context. CCSS.MP4 Model with mathematics CCSS.MP7 Look for and make use of structure

Course Name: **Algebra I** Grade: N/A

Title of Unit	**Linear Systems**
Enduring Understanding	There is more than one way to solve a system of equations. Systems of equations can be used to solve real world problems.
Essential Questions	How do you solve real world problems using systems of equations? Which method is best and why? How can systems of equations be used to represent situations and solve problems? Why can a system of equations have none, one or an infinite number of solutions?
Content	Students will understand linear systems as a model in problem solving situations. Students will understand linear inequalities and their graphical representation.
Skills	**Students will be able to write and solve linear systems by graphing, elimination, and substitution.** Students will be able to distinguish if a system of equations has one solution, no solution, or infinitely many solutions. **Students will be able to graph linear inequalities on a coordinate plane.** Students will be able to graph systems of linear inequalities on a coordinate plane. Students will create and interpret linear inequalities in one variable. Students will be able to model and solve real world situations with systems of equations.
Common Summative Assessments	Common Summative Mastery Assessment
Standards	CCSS.HSA.CED.A.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. CCSS.HSA.REI.C.5: Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. CCSS.HSA.REI.C.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Algebra I** Grade: N/A

Title of Unit	**Polynomials**
Enduring Understanding	Very large and small numbers can be represented efficiently using scientific notation. Exponent properties can be proven through expansion. Polynomial expressions may be simplified.
Essential Questions	What characteristics of a polynomial determine how to factor it completely? What are the rules of exponents and how are they applied to simplify expressions?
Content	Students will understand the degree and standard form of a polynomial. Students will understand properties of exponents. Students will understand operations with polynomials. Students will understand factoring polynomials. Students will understand scientific notation. Students will understand quadratic equations. Students will understand geometric applications. Students will understand negative exponents have a reciprocal relationship.
Skills	**Students will be able to add, subtract, multiply and simplify monomials and polynomials.** Students will be able to use the rules of exponents to simplify monomials. Students will be able to solve quadratic equations by factoring. Students will be able to find perimeter and area involving polynomials. Students will be able to factor polynomials. Students will be able to multiply and divide numbers in scientific notation.
Common Summative Assessments	Common Summative Mastery Assessment.
Standards	CCSS.HSA.SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. CCSS.HSA.SSE.B.3.a: Factor a quadratic expression to reveal the zeros of the function it defines. CCSS.HSA.APR.A.1: Understand that polynomials form a system analogous to the integers; namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP7 Look for and make use of structure.

Course Name: **Algebra I** Grade: N/A

Title of Unit	**Data Analysis**
Enduring Understanding	Visual display can model data and be used to make predictions.
Essential Questions	Why are there different ways to describe the center of a distribution? What kind of visual display is appropriate for a given set of data? What information can be gleaned from a visual display?
Content	Students will understand and interpret scatterplots. **Students will understand equations of a line of best fit.** Students will understand measures of central tendency and range. Students will understand boxplots. Students will understand correlation. Students will understand that not all data is linear.
Skills	Students will be able to represent data visually with boxplots and scatterplots Students will be able to interpret visual displays. **Students will be able to calculate the line of best fit.** Students will be able to determine if there is a correlation between bivariate data. **Students will be able to make predictions based on the line of best fit.** **Students will be able to use the line of best fit to find starting point represented by the y-intercept and to describe what the slope means.** Students will be able to calculate mean, median, mode and range. Students will be able to use measures of central tendency to solve problems. Students will be able to recognize linear, quadratic, and exponential functions given data and graphs.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.HSS.ID.A.1: Represent data with plots on the real number line (histograms, and box plots) CCSS.HSS.ID.B.6: Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. CCSS.HSS.ID.B.6.c: Fit a linear function for a scatter plot that suggests a linear association. CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically

Course Name: **College Prep Algebra I** Grade: N/A

Title of Unit	**Foundations of Functions and Expressions**
Enduring Understanding	Relations and functions can represent real world phenomena. Variables represent numbers.
Essential Questions	How do you use variables, expressions, and equations to model real world problems? How do relations and functions relate to real world problems?
Content	Students will understand verbal and algebraic expressions. Students will understand mathematical properties. Students will understand the representations of relations and graphs of relations. Students will understand functions and function notation. Students will understand solutions to equations. Students will understand the domain and range of a function.
Skills	Students will be able to translate between verbal and algebraic expressions. **Students will be able to determine whether a relation is a function.** **Students will be able to evaluate a function in function notation.** Students will be able to apply mathematical properties to simplify expressions. **Students will be able to recognize and evaluate functions.** Students will be able to identify and use the algebraic properties. Students will be able to write function rules from tables and word problems. Students will be able to determine the domain and range of various functions.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.HSF.IF.A.1: Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$. CCSS.HSF.IF.A.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. CCSS.HSF.IF.B.6: Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. CCSS.HSF.IF.C.8: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. CCSS.HSF.IF.B.5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. CCSS.HSF.BF.A.1: Write a function that describes a relationship between two quantities. CCSS.HSA.SSE.A.1: Interpret expressions that represent a quantity in terms of its context. CCSS.HSA.SSE.A.1.A: Interpret parts of an expression, such as terms, factors, and coefficients. CCSS.HSA.SSE.A.2: Use the structure of an expression to identify ways to rewrite it. CCSS.MP3: Construct viable arguments and critique the reasoning of others CCSS.MP7: Look for and make use of structure

Course Name: **CP Algebra I** Grade: N/A

Title of Unit	**Solving Equations and Inequalities**
Enduring Understanding	Operations performed on one side of an equation must be performed on the other side(s) in order to preserve the equality. There are differences between solutions to inequalities and equations.
Essential Questions	How do you use expressions and equations to model real world problems? How can an equation or inequality be manipulated to isolate a variable while preserving the equality of the original equation/inequality?
Content	Students will understand literal and algebraic equations. Students will understand absolute value equations. Students will understand percents and proportions. Students will understand inequalities. Students will understand compound inequalities.
Skills	**Students will be able to write and solve multistep equations with rational coefficients..** **Students will be able to write and solve multi-step one-variable inequalities.** **Students will be able to graph inequalities on a number line.** **Students will be able to solve and graph compound inequalities.** Students will be able to solve absolute value equations. Students will be able to solve literal equations. **Students will be able to write and solve proportions, including proportions with binomials in the numerator and denominator.** **Students will be able to write and solve application percent problems.**

Common Summative Assessments	Common Summative Mastery Assessment.
Standards	CCSS.HSA.REI.10. Represent and solve equations and inequalities graphically. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane often forming a curve (which could be a line). CCSS.HSA.REI.12. Represent and solve equations and inequalities graphically. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. CCSS.HSA.CED.1. Create equations and inequalities in one variable and use them to solve problems. CCSS.HSA.REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. CCSS.HSA.CED.A.4: Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP4 Model with mathematics CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **College Prep Algebra I** Grade: N/A

Title of Unit	**Linear Relationships**
Enduring Understandings	Linear relationships have a constant rate of change. Tables, graphs, and equations are all ways of representing functions and real world phenomena. Slope can be referenced in many different forms.
Essential Questions	How can graphs be used to solve linear equations? How do you determine the appropriate form of an equation for a line when given specific characteristics? What is the relationship between slope and rate of change and how can each be used to solve real world problems?
Content	Students will understand the concept of slope and rate of change in problem solving. Students will understand direct variation equations and how to solve them. Students will understand arithmetic sequences. Students will understand equations of lines in slope-intercept form, point slope form, and standard form. Students will understand how to write equations of the line passing through a given point parallel/perpendicular to a given line. Students will understand the properties of horizontal and vertical lines. Students will understand the four quadrants of the coordinate plane. Students will know how to solve multi-step and compound inequalities.
Skills	**Students will be able to calculate slope between two points.** **Students will be able to determine the slope of a line given an equation, table or graph.** Students will be able to determine whether lines are parallel, perpendicular, or neither. Students will be able to find intercepts given graphs and equations. **Students will be able to graph linear equations.** Students will be able to write a rule given an arithmetic sequence. **Students will be able to write equations of lines given specific characteristics.** Students will be able to create and interpret linear equations from real world data.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.HSF.IF.B.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. CCSS.HSF.IF.B.6: Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. CCSS.HSF.IF.C.7.A: Graph linear and quadratic functions and show intercepts, maxima, and minima. CCSS.HSF.IF.C.8: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. CCSS.HSF.IF.C.9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). CCSS.HSA.CED.A.1: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. CCSS.HSA.CED.A.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. CCSS.REI.D.10: Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). CCSS.HSF.LE.A.2: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). CCSS.HSF.LE.A.1.A: Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. CCSS.HSF.LE.A.1.B: Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. CCSS.HSF.LE.B.5: Interpret the parameters in a linear or exponential function in terms of a context. CCSS.MP4: Model with mathematics CCSS.MP7: Look for and make use of structure

Course Name: **CP Algebra I** Grade: N/A

Title of Unit	**Linear Systems**
Enduring Understanding	There is more than one way to solve a system of equations. Students can determine the most efficient method for solving. Systems of equations can be used to solve real world problems.
Essential Questions	How do you solve real world problems using systems of equations? Which method is best and why? How can systems of equations be used to represent situations and solve problems? Why can a system of equations have none, one or infinitely many solutions?
Content	Students will understand how to solve systems of linear equations. Students will understand how to graph linear inequalities. Students will understand how to solve systems of inequalities.
Skills	**Students will be able to write and solve linear systems by graphing, elimination, and substitution.** Students will be able to distinguish if a system of equations has one solution, no solution, or infinitely many solutions. **Students will be able to graph linear inequalities on a coordinate plane.** Students will be able to graph systems of linear inequalities on a coordinate plane. Students will create and interpret linear inequalities in one variable. Students will be able to model and solve real world situations with systems of equations.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.HSA.CED.A.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. CCSS.HSA.REI.C.5: Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. CCSS.HSA.REI.C.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. CCSS.HSA.REI.D.12: Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **CP Algebra I** Grade N/A

Title of Unit	**Polynomials**
Enduring Understanding	Very large and small numbers can be represented efficiently using scientific notation Exponent properties can be proven through expansion Polynomial expressions may be simplified.
Essential Questions	What characteristics of a polynomial determine how to factor it completely? What are the rules of exponents and how are they applied to simplify expressions?
Content	Students will understand the degree and standard form of a polynomial Students will understand properties of exponents. Students will understand operations with polynomials. Students will understand factoring polynomials. Students will understand scientific notation. Students will understand quadratic equations. Students will understand geometry applications. Students will understand negative exponents have a reciprocal relationship.
Skills	**Students will be able to add, subtract, multiply and simplify monomials and polynomials.** Students will be able to use the rules of exponents to simplify monomials. Students will be able to solve quadratic equations by factoring. Students will be able to find perimeter and area involving polynomials. Students will be able to factor polynomials. Students will be able to multiply and divide numbers in scientific notation.
Common Summative Assessments	Common Summative Mastery Assessment.

Standards	CCSS.MP7 Look for and make use of structure CCSS.HSA.SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. CCSS.HSA.SSE.B.3.a: Factor a quadratic expression to reveal the zeros of the function it defines. CCSS.HSA.APR.A.1: Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively CCSS.MP7 Look for and make use of structure

Course Name: **CP Algebra I** Grade: N/A

Title of Unit	**Radical Expressions**
Enduring Understanding	Radical expressions can be represented different ways
Essential Questions	How can finding roots help us solve problems?
Content	Students will understand operations with radical expressions. Students will understand how to apply the Pythagorean theorem to problem solving situations. Students will understand equivalent representations of radical expressions.
Skills	Students will be able to simplify radical expression. Students will be able to add, subtract, multiply, and divide radicals. Students will be able to solve problems involving the Pythagorean theorem.
Common Summative Assessments	Common Summative Mastery Assessment.
Standards	CCSS.HSA.SSE.A.2: Use the structure of an expression to identify ways to rewrite it. CCSS.HSA.SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. CCSS.HSG.SRT.C.8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. CCSS.HSN.RN.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **College Prep Algebra I** Grade: N/A

Title of Unit	Data Analysis
Enduring Understanding	Visual displays can model data and be used to make predictions.
Essential Questions	Why are there different ways to describe the center of a distribution? What kind of visual display is appropriate for a given set of data? What information can be gleaned from a visual display?
Content	Students will understand and interpret scatterplots. Students will understand equations of a line of best fit. Students will understand measures of central tendency and range. Students will understand histograms and boxplots. Students will understand correlation. Students will understand that not all data is linear.
Skills	Students will be able to represent data visually with boxplots, histograms and scatterplots. Students will be able to interpret visual displays. **Students will be able to calculate the line of best fit.** Students will be able to determine if there is a correlation between bivariate data. **Students will be able to make predictions based on the line of best fit.** **Students will be able to use the line of best fit to find starting point represented by the y-intercept and to describe what the slope means.** Students will be able to calculate mean, median, mode and range. Students will be able to use measures of central tendency to solve problems. Students will be able to recognize linear, quadratic, and exponential functions given data and graphs.
Common Summative Assessments	Common Summative Mastery Assessment.
Standards	CCSS.HSS.ID.A.1. Represent data with plots on the real number line (dot plots, histograms, and box plots). CCSS.HSS.ID.B.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. CCSS.HSS.ID.B.6.c: Fit a linear function for a scatter plot that suggests a linear association. CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically

Course Name: **Geometry** Grade: N/A

Title of Unit	**Geometric Structure**
Enduring Understanding	Geometry is the mathematics of spatial relationships. Points, lines, and planes are the undefined terms that make up the foundation of geometry. Basic geometric concepts are used to determine relationships between angles and lines. Proofs are written to validate statements using given information, a conclusion, and deductive reasoning. Inductive reasoning is used to make conjectures in geometry.
Essential Questions	What are the undefined terms in geometry and how can we represent them? How do you connect definitions, postulates, logical reasoning, and theorems in developing mathematical proofs? How do you use slopes of lines to determine geometric relationships? How are basic geometric concepts used to determine relationships between angles and lines?
Content	Students will understand models and basic postulates of points, lines, and planes. Students will understand the distance between two points and the midpoint of a segment. Students will understand measurement and classification of angles. Students will understand the characteristics of special pairs of angles. Students will understand the properties of perpendicular lines. Students will understand the characteristics of polygons. Students will understand the use of conjectures based on inductive reasoning. Students will understand conditional statements and converses. Students will understand basic postulates about points, lines, and planes. Students will understand proofs involving segment addition, congruence, supplementary and complementary angles, and right angles. Students will understand the relationship between two lines or two planes. Students will understand angle pairs formed by parallel lines and transversals. Students will understand slopes of lines and the use of slopes to identify parallel and perpendicular lines.

Skills	Students will be able to make conjectures about lines and angles and determine the validity of those conjectures using logic. Students will be able to determine the validity of a conditional statement and its converse as it connects to a definition. **Students will be able to find midpoint, length of a segment, measures of angles, and slopes of lines and use them to investigate geometric relationships.** Students will be able to use deductive reasoning to prove a statement. Students will be able to make connections between definitions, postulates, logical reasoning, and theorems. Students will be able to identify and model points, lines, and planes. **Students will be able to apply the segment addition postulate and the angle addition postulate.** **Students will be able to find all angle pairs, including the ones formed by a transversal on a set of parallel lines, and use them to solve problems.** **Students will be able to recognize the characteristics of parallel and perpendicular lines and write the equations of these lines.** Students will be able to perform basic geometric constructions by compass and straightedge as well as dynamic geometric software. **Students will be able to justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence.**
Common Summative Assessments	Common Summative Mastery Assessment

Standards	CCSS.HSG.CO.1. Know precise definitions of angle, circle, perpendicular line, parallel, line, and line segment, based on undefined notions of point, line, distance along a line, and distance around a circular arc. CCSS.HSG.CO.9. Prove theorems about lines and angles. Theorems include; vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. CCSS.HSG.CO.12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line. CCSS.HSG.GPE.5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). CCSS.HSG.GPE.7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. CCSS.HSG.MG.1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Geometry** Grade: N/A

Title of Unit	**Congruence**
Enduring Understanding	Unique properties of quadrilaterals can be identified. Triangles are fundamental structural elements. Congruent parts of congruent triangles are congruent. Proofs are written to validate statements using given information, a conclusion, and deductive reasoning. Inductive reasoning is used to make conjectures in geometry.
Essential Questions	What does it mean when two triangles are congruent? What are the ways to prove two triangles are congruent? What are the relationships between the sides and angles of triangles? What are the properties of parallelograms and how can you apply them to solve problems?
Content	Students will understand identification and classification of triangles by angle measures and side measures. Students will understand triangle congruence and its corresponding parts. Students will understand properties of isosceles and equilateral triangles. Students will understand properties of perpendicular bisectors, angle bisectors, and mid-segments in triangles. Students will understand the measures of the interior/exterior angles of a polygon. Students will understand properties of quadrilaterals.
Skills	Students will be able to identify and classify triangles. Students will be able to name and use corresponding parts of congruent triangles. Students will be able to prove triangle congruence. **Students will be able to recognize and apply properties of quadrilaterals.** **Students will be able to recognize and apply properties of triangles and other polygons.** Students will be able to identify relationships between sides and angles of triangles. **Students will be able to justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence.**
Common Summative Assessments	Common Summative Mastery Assessment

Standards	CCSS.HSG.CO.7. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. CCSS.HSG.CO.8. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. CCSS.HSG.CO.10. Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. CCSS.HSG.CO.11. Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals. CCSS.HSG. SRT.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. CCSS.HSG. GPE.4. Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point (0,2). CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Geometry** Grade: N/A

Title of Unit	**Similarity**
Enduring Understanding	Right triangles are highly useful in applications. Similar polygons have ratios, proportions, and scale factors that are used to describe and compare quantities in real world applications.
Essential Questions	How can you use ratios to solve problems involving similar triangles? What are some patterns in right triangles and how can you apply those patterns to solve meaningful problems? In what ways can you prove two triangles are similar? How do transformations connect congruency and similarity?
Content	Students will understand properties of similar polygons. Students will understand how to recognize that triangles are similar. Students will understand how the use similar triangles in solving problems. Students will understand scale factors. Students will understand that patterns from special right triangles can be used to solve problems. Students will understand congruence and similarity transformations.
Skills	**Students will be able to solve problems using the properties of similar polygons.** **Students will be able to apply the Pythagorean Theorem.** **Students will be able to identify and apply patterns from right triangles to solve meaningful problems.** Students will be able to develop and justify triangle similarity relationships, including trigonometric ratios. Students will be able to use scale factor to solve problems. Students will be able to perform congruence transformations and dilations. **Students will be able to justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence.**
Common Summative Assessments	Common Summative Mastery Assessment

Standards	CC.HSG.CO.3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. CC.HSG.CO.6. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a give rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. CC.HSG.CO.5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor. CC.HSG.SRT.2. Given two figures use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. CC.HSG.SRT.3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. CC.HSG.SRT.4. Prove theorems about triangles. Theorems include; a line parallel to one side of a triangle drives the other two proportionally, and conversely; the Pythagorean Theorem proved using triangles similarity. CC.HSG.SRT.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. CC.HSG.SRT.6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. CC.HSG.SRT.7. Explain and use the relationship between the sine and cosine of complementary angles. CC.HSG.SRT.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Geometry** Grade: N/A

Title of Unit	**Measurement**
Enduring Understanding	The measurements of geometric figures can be calculated using a variety of strategies. A change in one dimension of an object results in predictable changes in area and or volume.
Essential Questions	What is the relationship between central angles, arcs, and inscribed angles in a circle? How can you use the area of polygons to solve real life problems? How can we use lateral area, surface area, and volume to solve real world problems?
Content	Students will understand relationships between central angles, arcs, and inscribed angles in a circle. Students will understand tangents and their connections to a circle. Students will understand areas of polygons. Students will understand areas and sectors of circles. Students will understand the parts of the equation of a circle. Students will understand lateral areas, surface areas, and volumes of various solid figures. Students will understand properties of similar solids.
Skills	Students will be able to describe the relationships between central angles, arcs, and inscribed angles in a circle. Students will be able to find areas of polygons, composite figures, circles, and sectors. **Students will be able to solve problems using the properties of circles.** **Students will be able to recognize the diameter, radius, and center of a circle from its equation.** Students will be able to find the arc length. Students will be able to use scale factor of similar figures. **Students will be able to ~~find~~ use areas of 2-D objects as well as lateral areas and volumes of various solid figures to solve real world applications.** **Students will be able to use properties of similar solids, including ratios of areas and volumes, to solve real world problems.** **Students will be able to perform unit conversions for square and cubic units.** **Students will be able to justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence.**

Common Summative Assessments	Common Summative Mastery Assessment
Standards	CC.HSG.CO.13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. CC.HSG.C.1. Prove that all circles are similar. CC.HSG.C.3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. CC.HSG.C.5. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector. CC.HSG.GMD.1. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments. CC.HSG.GMD.3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. CC.HSG.MG.1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **College Prep Geometry** Grade: N/A

Title of Unit	**Geometric Structure**
Enduring Understanding	Geometry is the mathematics of spatial relationships. Points, lines, and planes are the undefined terms that make up the foundation of geometry. Basic geometric concepts are used to determine relationships between angles and lines. Proofs are written to validate statements using given information, a conclusion, and deductive reasoning. Inductive reasoning is used to make conjectures in geometry.
Essential Questions	What are the undefined terms in geometry and how can we represent them? How do you connect definitions, postulates, logical reasoning, and theorems in developing mathematical proofs? How do you use slopes of lines to determine geometric relationships? How are basic geometric concepts used to determine relationships between angles and lines?
Content	Students will understand models and basic postulates of points, lines, and planes. Students will understand distance between two points and the midpoint of a segment. Students will understand measurement and classification of angles. Students will understand, recognize and use special pairs of angles. Students will understand the properties of perpendicular lines. Students will understand the characteristics of polygons. Students will understand the use of conjecture based on inductive reasoning. Students will understand conditional statements and converses. Students will understand proofs involving segment addition, angle addition, congruence, supplementary and complementary angles, vertical angles, and right angles. Students will understand the relationship between two lines or two planes. Students will understand angle pairs formed by parallel lines and transversals. Students will understand slopes of lines and the use of slopes to identify parallel and perpendicular lines.

Skills	Students will be able to make conjectures about lines and angles and determine the validity of those conjectures using logic. **Students will be able to ~~use~~ find midpoint, length of a segment, measures of angles, and slopes of lines and use them to investigate geometric relationships.** Students will be able to determine the validity of a conditional statement and its converse as it connects to a definition. Students will be able to use deductive reasoning to prove a statement. Students will be able to make connections between definitions, postulates, logical reasoning, and theorems. Students will be able to identify and model points, lines, and planes. **Students will be able to apply the segment addition postulate and the angle addition postulate.** **Students will be able to find all angle pairs, including the ones formed by a transversal on a set of parallel lines, and use them to solve problems.** **Students will be able to recognize the characteristics of parallel and perpendicular lines and write the equations of these lines.** Students will be able to perform basic geometric constructions by compass and straightedge as well as dynamic geometric software. **Students will be able to justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence.**
Common Summative Assessments	Summative Assessments on Mastery.

Standards	CC.HSG.CO.1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on undefined notions of point, line, distance along a line, and distance around a circular arc. CC.HSG.CO.9. Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. CC.HSG. CO.12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line. CC.HSG.GPE.5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a give line that passes through a given point). CC.HSG.GPE.7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g. using the distance formula. CC.HSG. MG.1. use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **College Prep Geometry** Grade: N/A

Title of Unit	**Congruence**
Enduring Understanding	Unique properties of quadrilaterals can be identified. Triangles are fundamental structural elements. Congruent parts of congruent triangles are congruent. Proofs are written to validate statements using given information, a conclusion, and deductive reasoning. Inductive reasoning is used to make conjectures in geometry.
Essential Questions	What does it mean when two triangles are congruent? What are the ways to prove two triangles are congruent? What are the relationships between the sides and angles of triangles? What are the properties of quadrilaterals and how can you apply them to solve problems?
Content	Students will understand identification and classification of triangles by angle measures and side measures. Students will understand triangle congruence and its corresponding parts. Students will understand properties of isosceles and equilateral triangles. Students will understand perpendicular bisectors, angle bisectors, and mid-segments in triangles. Students will understand the measures of the interior/exterior angles of a polygon. Students will understand properties of quadrilaterals.
Skills	Students will be able to identify and classify triangles. **Students will be able to name and use corresponding parts of congruent triangles.** **Students will be able to prove triangle congruence.** **Students will be able to recognize and apply properties of quadrilaterals ~~parallelograms~~.** **Students will be able to identify relationships between sides and angles of triangles.** **Students will be able to recognize and apply properties of triangles and other polygons.** Students will be able to find interior and exterior angles of regular polygons. **Students will be able to use coordinates in conjunction with geometric properties to determine the specific quadrilateral.** **Students will be able to justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence.**
Common Summative Assessments	Summative Assessments to Mastery.

Standards	CC.HSG.CO.7. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. CC.HSG.CO.8. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. CC.HSG.CO.10. Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180º; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. CC.HSG.CO.11. Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals. CC.HSG.SRT.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. CC.HSG.GPE.4. Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point (0,2). CC.HSG.GPE.7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **College Prep Geometry** Grade: N/A

Title of Unit	**Similarity**
Enduring Understanding	Right triangles are highly useful in applications. Similar polygons have ratios, proportions, and scale factors that are used to describe and compare quantities in real world applications. Knowledge of transformations connects congruency and similarity.
Essential Questions	How can you use ratios to solve problems involving similar triangles? What are some patterns in right triangles and how can you apply those patterns to solve meaningful problems? In what ways can you prove two triangles are similar? How do transformations connect congruency and similarity?
Content	Students will understand properties of similar polygons. Students will understand how to recognize that triangles are similar. Students will understand the use of similar triangles in solving problems. Students will understand scale factors. Students will understand that patterns from special right triangles can be used to solve problems. Students will understand the connection between triangle similarity relationships and trigonometric ratios Students will understand congruence and similarity transformations.
Skills	**Students will be able to solve problems using the properties of similar polygons.** **Students will be able to apply the Pythagorean Theorem.** **Students will be able to identify and apply patterns from right triangles to solve meaningful problems.** **Students will be able to develop, apply, and justify triangle similarity relationships, including trigonometric ratios** Students will be able to use scale factor to solve problems. Students will be able to perform congruence transformations and dilations. **Students will be able to justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence.**
Common Summative Assessments	Common Summative Mastery Assessments

Standards	CC.HSG.CO.3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. CC.HSG.CO.6. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a give rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. CC.HSG.CO.5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor. CC.HSG.SRT.2. Given two figures use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. CC.HSG.SRT.3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. CC.HSG.SRT.4. Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity. CC.HSG.SRT.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. CC.HSG.SRT.6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. CC.HSG.SRT.7. Explain and use the relationship between the sine and cosine of complementary angles. CC.HSG.SRT.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **College Prep Geometry** Grade: N/A

Title of Unit	**Measurement**
Enduring Understanding	The measurements of geometric figures can be calculated using a variety of strategies. A change in one dimension of an object results in predictable changes in area and or volume.
Essential Questions	What is the relationship between central angles, arcs, and inscribed angles in a circle? How can you use the area of polygons to solve real life problems? How can we use lateral area, surface area, and volume to solve real world problems?
Content	Students will understand relationships between central angles, arcs, and inscribed angles in a circle. Students will understand tangents and their connections to a circle. Students will understand the parts of the equation of a circle. Students will understand lateral areas, surface areas, and volumes of various solid figures. Students will understand properties of similar solids. Students will understand the connection between degrees and radians.
Skills	**Students will be able to describe the relationships between central angles, arcs, and inscribed angles in a circle.** Students will be able to find areas of polygons, composite figures, circles and sectors. **Students will be able to solve problems using the properties of circles.** **Students will be able to recognize the diameter, radius, and center of a circle from its equation.** Students will be able to find the arc length. **Students will be able to ~~find~~ use areas of 2-D objects as well as lateral areas, surface areas, and volumes of various solid figures to solve real world applications.** **Students will be able to use properties of similar solids, including ratios or areas and volumes, to solve real world problems.** **Students will be able to perform unit conversions for square and cubic units.** Students will be able to convert between degrees and radians. **Students will be able to justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence.**
Common Summative Assessments	Summative Assessments of Mastery.

Standards	CC.HSG.CO.13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. CC.HSG.C.1. Prove that all circles are similar. CC.HSG.C2. Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle. CC.HSG.C.3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. CC.HSG.C.5. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector. CC.HSG.GMD.1. Give an informal argument for the formulas for cylinders, pyramids, cones, and spheres to solve problems. CC.HSG. MG.1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Honors Geometry** Grade: N/A

Title of Unit	**Geometric Structure**
Enduring Understanding	Geometry is the mathematics of spatial relationships. Points, lines, and planes are the undefined terms that make up the foundation of geometry. Proofs are written to validate statements using given information, a conclusion, and deductive reasoning. Inductive reasoning is used to make conjectures in geometry. Students will understand the four steps of problem solving.
Essential Questions	What are the undefined terms in geometry and how can we represent them? How do you connect definitions, postulates, logical reasoning, and theorems in developing mathematical proofs? How do you use slopes of lines to determine geometric relationships including the distance between a point and a line? How are linear and quadratic equations connected to geometric patterns? What is the relationship between square foot, square inches, and square yards? How are basic geometric concepts used to determine relationships between angles and lines?
Content	Students will understand models and basic postulates of points, lines, and planes. Students will understand distance between two points and the midpoint of a segment. Students will understand measurement and classification of angles. Students will understand, recognize and use special pairs of angles. Students will understand the properties of perpendicular lines. Students will understand the characteristics of polygons. Students will understand conjectures based on inductive reasoning. Students will understand conditional statements and converses. Students will understand the Law of Detachment and the Law of Syllogism. Students will understand basic postulates about points, lines, and planes. Students will understand proofs involving segment addition, angle addition, congruence, supplementary and complementary angles, vertical angles, and right angles. Students will understand the relationship between two lines or two planes. Students will understand angle pairs formed by parallel lines and transversals. Students will understand slopes of lines and the use of slopes to identify parallel and perpendicular lines. Students will understand distance between a point and a line and the distance between two parallel lines. Students will understand the conversion between square inches, square feet, and square yards. Students will understand the connection between a geometric pattern and its representative equation.

Skills	Students will be able to develop the structure of a mathematical system, connecting definitions, postulates, logical reasoning, and theorems. **Students will be able to develop proofs involving segment addition, angle addition, congruence, supplementary and complementary angles, vertical angles, and right angles.** Students will be able to identify and model points, lines, and planes. Students will be able to make conjectures about lines and angles and determine the validity of those conjectures using logic. **Students will be able to use midpoint, length of a segment, measures of angles, and slopes of lines to investigate geometric relationships.** Students will be able to determine the validity of a conditional statement and its converse as it connects to a definition. Students will be able to use deductive reasoning to prove a statement. **Students will be able to apply the segment addition postulate and the angle addition postulate.** **Students will be able to find all angle pairs, including the ones formed by a transversal on a set of parallel lines, and use them to solve problems.** **Students will be able to recognize the characteristics of parallel and perpendicular lines and write the equations of these lines.** Students will be able to perform basic geometric constructions by compass and straightedge as well as dynamic geometric software. Students will be able to convert from square inches to square feet to square yards. Students will be able to solve real world problems that require the use of square unit conversions. Students will be able to make conjectures and write linear or quadratic equations for some geometric patterns. Students will be able to find distance on a coordinate grid. Students will be able to find the area of triangles using the distance formula to find the needed lengths. Students will be able to find the distance between parallel lines and a point and a line. **Students will be able to justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence.**
Common Summative Assessments	Common Summative Mastery Assessment

Standards	CC.HSG.CO.1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on undefined notions of point, line, distance along a line, and distance around a circular arc. CC.HSG.CO.9. Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. CC.HSG.CO.12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line. CC.HSG.GPE.5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). CC.HSG.GPE.7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. CC.HSG.MG.1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Honors Geometry** Grade: N/A

Title of Unit	**Congruence**
Enduring Understanding	Proofs are written to validate statements using given information, a conclusion and deductive reasoning. Inductive reasoning is used to make conjectures in geometry. Unique properties of quadrilaterals can be identified. Triangles are fundamental structural elements. Congruent parts of congruent triangles are congruent.
Essential Questions	What does it mean when two triangles are congruent? What are the ways to prove two triangles are congruent? What are the special segments and points related to triangles? What are the relationships between the sides and angles of triangles? What are the properties of quadrilaterals and how can you apply these properties to solve problems?
Content	Students will understand identification and classification of triangles by angle measures and side measures. Students will understand triangle congruence and its corresponding parts. Students will understand properties of isosceles and equilateral triangles. Students will understand perpendicular bisectors, angle bisectors, mid-segments, medians, and altitudes in triangles. Students will understand properties of inequalities in triangles. Students will understand the measures of the interior and exterior angles of a polygon. Students will understand properties of quadrilaterals.

Skills	Students will be able to identify and classify triangles. **Students will be able to name and use corresponding parts of congruent triangles.** **Students will be able to prove triangle congruence.** **Students will be able to recognize and apply properties of quadrilaterals.** **Students will be able to recognize and apply properties of triangles and other polygons.** **Students will be able to identify relationships between sides and angles of triangles.** Students will be able to find interior and exterior angles of regular polygons. Students will be able to use coordinates to construct perpendicular bisectors, angle bisectors, and altitudes of triangles to explore more relationships. **Students will be able to use coordinates in conjunction with geometric properties to determine the specific quadrilateral.** Students will be able to find the number of sides, number of diagonals, interior angles, and exterior angles of regular polygons. **Students will be able to justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence.**
Common Summative Assessments	Common Summative Mastery Assessment

Standards	CC.HSG.CO.3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. CC.HSG.CO.6. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. CC.HSG.CO.7. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. CC.HS.G.CO.8. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. CC.HSG.CO.10. Prove theorems about triangles. Theorems include: measure of interior angles of a triangle sum to 180º; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. CC.HSG.CO.11. Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals. CC.HSG. SRT.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. CC.HSG.GPE.4. Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point (0,2). CC.HSG.GPE.7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Honors Geometry** Grade: N/A

Title of Unit	**Similarity**
Enduring Understanding	Right triangles are highly useful in applications. Similar polygons have ratios, proportions, and scale factors that are used to describe and compare quantities in real world applications. Knowledge of transformations connects congruency and similarity.
Essential Questions	How can you use ratios to solve problems involving similar triangles? What are some patterns in right triangles and how can you apply those patterns to solve meaningful problems? In what ways can you prove two triangles are similar? How do transformations connect congruency and similarity?
Content	Students will understand properties of similar polygons. Students will understand the properties of similar triangles. Students will understand the use of similar triangles in solving problems. Students will understand scale factors and their use. Students will understand that patterns from special right triangles can be used to solve problems. Students will understand triangle similarity relationships, such as trigonometric ratios using a variety of methods. Students will understand congruence transformations.
Skills	**Students will be able to solve problems using the properties of similar polygons.** **Students will be able to ~~use~~ apply the Pythagorean Theorem.** **Students will be able to identify and apply patterns from right triangles to solve meaningful problems.** **Students will be able to develop, apply, and justify triangle similarity relationships, including trigonometric ratios and the law of sines and cosines.** Students will be able to use scale factor to solve problems and to create drawings. Students will be able to perform transformations on and off a coordinate grid. **Students will be able to justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence.**
Common Summative Assessments	Common Summative Mastery Assessment

Standards	CC.HSG.CO.3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. CC.HSG.CO.6. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a give rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. CC.HSG.CO.5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor. CC.HSG.SRT.2. Given two figures use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. CC.HSG. SRT.3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. CC.HSG. SRT.4. Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity. CC.HSG.SRT.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. CC.HSG.SRT.6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. CC.HSG.SRT.7. Explain and use the relationship between the sine and cosine of complementary angles. CC.HSG.SRT.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Honors Geometry** Grade: N/A

Title of Unit	**Measurement**
Enduring Understanding	The measurements of geometric figures can be calculated using a variety of strategies. A change in one dimension of an object results in predictable changes in area and or volume.
Essential Questions	What is the relationship between central angles, arcs, and inscribed angles in a circle? How can you use the area of polygons to solve real life problems? How can we use lateral area, surface area, and volume to solve real world problems?
Content	Students will understand relationships between central angles arcs, and inscribed angles in a circle. Students will understand secants and tangents. Students will understand areas of polygons. Students will understand areas and sectors of circles. Students will understand the parts of the equations of a circle. Students will understand lateral areas, surface areas, and volumes of various solid figures. Students will understand properties of similar solids. Students will understand perimeter, circumference, and area of composite two-dimensional figures. Students will understand surface area and volume of three-dimensional figures, including cones, pyramids, and spheres.
Skills	**Students will be able to describe the relationships between central angles, arcs, and inscribed angles in a circle.** Students will be able to find areas of polygons, composite figures, circles, and sectors. **Students will be able to solve problems using the properties of circles.** **Students will be able to recognize the diameter, radius, and center of a circle from its equation.** **Students will be able to ~~find~~ use areas of 2-D objects as well as lateral areas, surface areas, and volumes of various solid figures.** **Students will be able to use properties of similar solids, including ratios or areas and volumes, to solve real world problems.** **Students will be able to perform unit conversions for square and cubic units.** Students will be able to convert between degrees and radians. **Students will be able to justify one's reasoning by use of informal proofs, justifications, logical reasoning, and proof of evidence.**
Common Summative Assessments	Common Summative Mastery Assessment

Standards	CC.HSG.CO.13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. CC.HSG. C. 1. Prove that all circles are similar. CC.HS.G.C.2. Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle. CC.HSG.C.3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. CC.HSG.C.5. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector. CC.HSG.GMD.1. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments. CC.HSG.GMD.3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. CC.HSG. MG.1. use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Algebra II with Advanced Functions A** Grade: N/A

Title of Unit	**Properties and Transformations of Functions**
Enduring Understanding	Patterns, relations, and functions can be described with tables, graphs, and equations to analyze patterns of change. Relations and functions can be represented numerically, graphically, algebraically, and/or verbally. Properties of functions and function operations are used to model and analyze real world applications and quantitative relationships.
Essential Questions	How are functions used to simulate the world we live in? How does changing the function affect the graph?
Content	Students will understand characteristics of a graph. Students will understand function notation and composition. Students will understand transformations of $f(x)=x^2$. Students will understand transformations of $f(x)=\|x\|$. Students will understand piecewise functions. Students will understand absolute value inequalities.
Skills	**Students will be able to find the domain and range** given a graph, equation, table, or mapping diagram. Students will be able to compose and combine all types of functions. **Students will be able to recognize function notation and evaluate functions.** **Students will be able to recognize a graph by its characteristics.** **Students will be able to solve and graph absolute value inequalities on a number line.** **Students will be able to use transformations to graph quadratic** and absolute value functions. **Students will be able to describe transformations on any type of function.** Students will be able to transform functions on the coordinate plane. Students will be able to graph piecewise functions. Students will be able to explain the correspondence between verbal descriptions, equations, tables, and graphs of functions. Students will be able to find the mathematical error in written and oral explanations. Students will be able to utilize a graphing calculator or online calculator to model functions and their transformations. Students will be able to attend to precision when graphing transformations by hand. Students will be able to recognize patterns of transformations of known functions and apply them to unknown functions. Students will be able to develop rules for transformations of functions given a variety of examples and applying those rules to other functions.

Common Summative Assessments	Summative Mastery Assessment
Standards	CCSS.HSF.IF.A.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. CCSS.HSF.IF.A.1: Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$. CCSS.HSF.IF.B.5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. CCSS.HSF.IF.C.7.B: Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. CCSS.HSF.BF.B.3: Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. CCSS.HSF.IF.B.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. CCSS.HSF.IF.C.7: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases* CCSS.HSF.BF.A.1: Write a function that describes a relationship between two quantities* CCSS.HSF.BF.A.1.B: Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model*. CCSS.HSF.BF.A.1.C: (+) Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time*. CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision

Course Name: **Algebra II with Advanced Functions Part A** Grade: 11 and 12

Title of Unit	**Linear Relations and Functions**
Enduring Understandings	Linear functions can be used to describe, interpret, and predict real world phenomena. Table, graphs, and equations are ways for depicting and analyzing patterns of change in data. Linear relationships have a constant rate of change.
Essential Questions	How do you solve real world applications using linear equations, inequalities, and compound inequalities? What information do you need to calculate the rate of change?
Content	Students will understand the properties of equality. Students will understand how to solve absolute value equations. Students will understand how to solve linear inequalities, compound inequalities, and absolute value inequalities. Students will know linear equations in slope intercept form, point slope form, and standard form. Students will know linear and absolute value graphs.
Skills	Students will be able to solve equations, inequalities, compound inequalities, and absolute value inequalities. Students will be able to graph linear and absolute value inequalities. Students will be able to write equations of lines in slope-intercept, point-slope, and standard forms. Students will be able to calculate the rate of change and its associated meaning.

Common Summative Assessments	Summative Mastery Assessment
	CC.9-12.A.REI.3. Solve equations and inequalities in one variable. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. CC.9-12.A.REI.10. Represent and solve equations and inequalities graphically. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). CC.9-12.A.REI.11. Represent and solve equations and inequalities graphically. Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. CC.9-12.A.REI.12. Represent and solve equations and inequalities graphically. Graph the solutions to a linear inequality in two variables and half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. CC.9-12.A.CED.1. Create equations that describe numbers or relationships, create equations inequalities in one variable and use them to solve problems. CC.9-12.A.CED.2. Create equations that describe numbers or relationships. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Course Name: **Algebra II with Advanced Functions A** Grade: N/A

Title of Unit	**Systems of Equations and Inequalities**
Enduring Understanding	Systems of equations and inequalities can be used to model and solve problems.
Essential Questions	How are systems of linear equations and inequalities useful? What situations would be represented by a system of equations or inequalities instead of a single equation or inequality?
Content	Students will understand find solution(s) to a system of equations. Students will understand solution(s) to a system of inequalities. Students will understand modeling and analyzing optimization problems (linear programming).
Skills	**Students will be able to solve a system of linear and/or nonlinear equations graphically, or algebraically using elimination or substitution.** **Students will be able to solve a system of inequalities by graphing.** Students will be able to write and graph constraints using a linear programming model, and analyze the graph to find solutions. Students will be able to choose the most efficient and effective method to solve systems. Students will be able to check the solution for reasonableness of the answer and find a new solution if needed. Students will be able to represent a word description symbolically by a system of equations/inequalities.
Common Summative Assessments	Summative Mastery Assessment

Standards	CCSS.HSA.CED.A.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. CCSS.HSA.CED.A.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*. CCSS.HSA.REI.C.5: Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. CCSS.HSA.REI.C.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. CCSS.HSA.REI.C.7: Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$. CCSS.HSA.REI.D.11: Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. * CCSS.HSA.REI.D.12: Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP4 Model with mathematics CCSS.MP6 Attend to precision

Course Name: **Algebra II with Advanced Functions A** Grade: N/A

Title of Unit	**Quadratics**
Enduring Understanding	The characteristics of quadratic functions and their representations are useful in solving real-world problems. Imaginary numbers exist and can be used to describe solutions.
Essential Questions	How can we use the quadratic formula to solve real world application problems? What are the characteristics of rational and irrational numbers? What is an imaginary number and what is its value? How does factoring and finding roots of a polynomial give me solutions to application problems?
Content	Students will understand how to analyze quadratic equations and inequalities using graphs, tables, and algebraic methods, including factoring, square root property, and the quadratic formula. Students will understand real world application formulas using the quadratic formula. Students will understand complex numbers. Students will understand the meaning of complex solutions. Students will understand the characteristics of a quadratic function. Students will understand the vertex and standard form of a quadratic function. Students will understand that quadratics model everyday situations.
Skills	**Students will be able to identify the vertex, axis of symmetry, direction, maximum or minimum, x and y intercepts, domain and range.** Students will be able to write and graph quadratic equations in vertex and standard form. **Students will be able to solve quadratics involving real and complex solutions by factoring, completing the square, square root property, and/or quadratic formula.** **Students will be able to factor using GCF, difference of squares, sum/difference of cubes, leading coefficient ≠1, leading coefficient =1.** **Students will be able to identify characteristics of a quadratic function.** **Students will be able to compare vertex and standard form of a quadratic function.** Students will be able to choose the most efficient and effective method for solving quadratics. Students will be able to determine the reasonableness of the answer and find a new solution if needed. Students will be able to model quadratic problems that arise in everyday life. Students will be able to use a graphing calculator or online calculator to represent given quadratics. **Students will be able to perform operations of complex numbers.**

Common Summative Assessments	Summative Mastery Assessment
Standards	CCSS.HSA.SSE.A.2: Use the structure of an expression to identify ways to rewrite it. CCSS.HSA.SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* CCSS.HSA.SSE.B.3.A: Factor a quadratic expression to reveal the zeros of the function it defines. CCSS.HSA.REI.B.4: Solve quadratic equations in one variable. CCSS.HSA.REI.B.4.B: Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b. CCSS.HSF.IF.C.7.A: Graph linear and quadratic functions and show intercepts, maxima, and minima. CCSS.HSF.IF.C.8.A: Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. CCSS.HSN.CN.A.1: Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real. CCSS.HSN.CN.A.2: Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. CCSS.HSN.CN.A.3: (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers. CCSS.HSN.CN.B.5: (+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. CCSS.HSN.CN.C.7: Solve quadratic equations with real coefficients that have complex solutions. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP4 Model with mathematics CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Algebra II with Advanced Functions B** Grade: N/A

Title of Unit	**Properties of Exponents and Operations on Polynomials**
Enduring Understanding	Understand the relationship between zeros and factors of polynomials
Essential Questions	How do factoring and finding roots of a polynomial yield solutions to application problems?
Content	Students will understand properties of exponents. Students will understand synthetic division. Students will understand polynomial long division. Students will understand the relationship between factors, roots, and zeros.
Skills	**Students will be able to multiply and divide polynomials including synthetic and long division.** **Students will be able to perform arithmetic operations on polynomials.** Students will be able to use the properties of exponents to transform expressions. Students will be able to flexibly use different properties of exponents. Students will be able to determine the most effective way to divide a polynomial based on if it is linear, coefficient ≠1, quadratic, etc. even though it may have multiple possible approaches. Students will understand that a function models a relationship between two quantities by linking factors, zeros, and roots. Students will be able to use a graphing calculator or online calculator to represent given polynomials and analyze the graph.
Common Summative Assessments	Summative Mastery Assessment

Standards	CCSS.HSA.APR.A.1: Understand that polynomials form a system analogous to the integers; namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. CCSS.HSA.APR.B.2: Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$. CCSS.HSA.APR.D.6: Rewrite simple rational expressions in different forms; write ${}^{a(x)}/_{b(x)}$ in the form $q(x) + {}^{r(x)}/_{b(x)}$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system. CCSS.HSF.IF.C.7.C: Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision

Course Name: **Algebra II with Advanced Functions B** Grade: N/A

Title of Unit	**Radical and Rational Expressions and Equations**
Enduring Understanding	Understand the connection between rational exponents and radicals Use inverse operations to solve radical and/or rational exponent equations
Essential Questions	How can we make sense of exponents that are not integers? Why do rational equations sometimes have extraneous solutions?
Content	Students will understand rational exponents and solve rational equations. Students will understand radical expressions and solve radical equations. Students will understand rational expressions and solve rational equations.
Skills	**Students will be able to simplify expressions and solve equations with integer and rational exponents.** **Students will be able to simplify numeric and algebraic radical expressions up to the 5th degree.** **Students will be able to solve radical equations.** **Students will be able to solve basic exponential functions.** **Students will be able to simplify rational expressions** and solve rational equations. Students will be able to convert between rational exponent and radical form. Students will be able to understand that simplifying radicals are flexible in the order of steps, and understand there are many routes to the same correct answer.
Common Summative Assessments	Summative Mastery Assessment
Standards	CCSS.HSA.APR.D.7: (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. CCSS.HSA.REI.A.2: Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. CCSS.HSN.RN.A.1: Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.* CCSS.HSN.RN.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Algebra II with Advanced Functions Part B** Grade: N/A

Title of Unit	**Descriptive Statistics (potential pathway)**
Enduring Understanding	Data can be collected, displayed, described, and summarized in response to a question that has been raised.
Essential Questions	How is data used in the real world? When is data normal?
Content	Students will understand graphical displays for categorical and quantitative data. Students will understand how to describe features of a distribution. Students will understand Summary Statistics Students will understand normal distribution. Students will understand least squares regression line.
Skills	Students will be able to identify types of data. Students will be able to create appropriate graphical displays of data. Students will be able to interpret graphical displays. Students will be able to summarize center and spread of univariate data. Students will be able to calculate percentages with the normal distribution. Students will be able to make predictions using the least squares regression line.
Common Summative Assessments	Common Summative Mastery Assessment Statistical Project
Standards	CCSS.HSS.ID.A Summarize, represent and interpret data on a single count or measurement variable. Summarize, represent, and interpret data on two categorical and quantitative variables. CCSS.HSS.ID.B Interpret linear models. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics.

Course Name: **Algebra II with Advanced Functions Part B** Grade: N/A

Title of Unit	**Trigonometric Functions (potential pathway)**
Enduring Understandings	Advanced mathematics and trigonometry can be used to model and solve real-world problems.
Essential Questions	How are sine, cosine, and tangent functions related? How do you solve real-world applications using trigonometric functions? How do you use trigonometric identities to simplify and evaluate expressions? How do you sue the laws of trigonometry to solve real-world problems?
Content	Students will understand angles and radian measure. Students will understand right triangle trigonometry. Students will understand reference angles. Students will understand trigonometric functions and their graphs. Students will understand law of Sines and Cosines.
Skills	Students will be able to evaluate trigonometric functions of any angle. Students will be able to use reference angles to evaluate trigonometric functions. Using graphing technology, students will explore the graphs of sine, cosine, and tangent functions. Students will be able to solve real life problems using right triangle trigonometry, law of sines and law of cosines.
Common Summative Assessments	Common Summative Mastery Assessment

Standards	CCSS.HSF.TF.1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. CCSS.HSF.TF.2. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. CCSS.HSF.TF.3. Use special triangles to determine geometrically the values of sine, cosine and tangent for $\pi/3$, $\pi/4$, $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for π-x, π+x, and 2 π - x in terms of their values for x, where x is any real number. CCSS.HSG.SRT.11. Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Algebra II with Advanced Functions Part B** Grade: N/A

Title of Unit	**Financial Mathematics (optional pathway)**
Enduring Understandings	Investments and loans are fundamentally governed by the laws of compound interest and exponential growth. A comprehensive budget must include all cash flow in and out of your account.
Essential Questions	How do time, interest rate, principal, down payment, periodic payment, conversion period affect loans and investments? How do we create an accurate, useful, comprehensive budget?
Content	Students will understand interest rates for both loans and investment opportunities. Students will understand why payments primarily go towards interest in the beginning and principal at the end of a loan. Students will understand gross pay, net pay, and income taxes. Students will understand the effects of a down payment, interest rate, and duration of a loan on a mortgage. Students will understand the factors to be included in a monthly budget.
Skills	Students will be able to calculate interest-using technology. Students will be able to determine monthly car payments. Students will be able to calculate the total car payment including both principal and interest paid. Students will be able to determine educational finances. Students will be able to create a monthly budget using technology. Students will be able to calculate gross pay and take home pay. Students will be able to discuss the mortgage options and process.
Common Summative Assessments	Summative Assessment Budget Project
Standards	CCSS.HSF.LE.A.1.C Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. CCSS.HSF.LE.B.5 Interpret the parameters in a linear or exponential function in terms of a context. MP1 Make sense of problems and persevere in solving them MP4 Model with mathematics MP5 Use appropriate tools strategically MP6 Attend to precision.

Course Name: **CP Algebra II** Grade: N/A

Title of Unit	**Properties of Transformations and Functions**
Enduring Understanding	Relations, and functions can be described with tables, graphs, and equations to analyze patterns of change. Relations and functions can be represented numerically, graphically, algebraically, and/or verbally. Properties of functions and function operations are used to model and analyze real world applications and quantitative relationships.
Essential Questions	How are functions used to represent/simulate the world we live in, and why are they so important? How do multiplying and/or adding a constant to a function change the graph?
Content	Students will understand the characteristics of a graph. Students will understand function notation and composition. Students will understand transformations of $f(x)=x^2$ Students will understand transformations of $f(x)=\|x\|$. Students will understand piecewise functions. Students will understand absolute value inequalities.
Skills	**Students will be able to find the domain and range given a graph, equation, table, or mapping diagram.** Students will be able to compose and combine all types of functions using addition, subtraction, and multiplication. Students will be able to solve and graph absolute value inequalities on a number line. **Students will be able to use transformations to graph quadratics.** **Students will be able to recognize functional notation and evaluate functions.** **Students will be able to use transformations to graph absolute value functions.** **Students will be able to describe transformations on any type of function.** Students will be able to transform generic functions on the coordinate plane. Students will be able to graph piecewise functions. Students will be able to explain the correspondence between verbal descriptions, equations, tables, and graphs of functions. Students will be able to utilize a graphing calculator or online calculator to model functions and their transformations. Students will be able to attend to precision when graphing transformations by hand. Students will be able to recognize patterns of transformations of known functions and apply them to unknown functions. Students will be able to develop rules for transformations of functions given a variety of examples and applying those rules to other functions.
Common Summative	Summative Mastery Assessment.

Assessments	
Standards	CCSS.HSF.IF.A.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. CCSS.HSF.IF.A.1: Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$. CCS.HSF.IF.B.5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. CCSS.HSF.IF.C.7.B: Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. CCSS.HSF.BF.B.3: Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. CCSS.HSF.IF.B.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. CCSS.HSF.IF.C.7: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* CCSS.HSF.BF.A.1: Write a function that describes a relationship between two quantities* CCSS.HSF.BF.A.1.B: Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model*. CCSS.HSF.BF.A.1.C: (+) Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time*. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **CP Algebra II** Grade: N/A

Title of Unit	**Systems of Equations and Inequalities**
Enduring Understanding	Systems of equations and inequalities can be used to model and solve problems.
Essential Questions	How are systems of linear equations and inequalities useful? What situations would be represented by a system of equations or inequalities instead of a single equation or inequality?
Content	Students will understand the possible solution(s) to a system of equations. Students will understand the possible solution(s) to a system of inequalities.
Skills	**Students will be able to solve a system of linear and/or nonlinear equations graphically and algebraically using elimination or substitution.** **Students will be able to solve a system of inequalities by graphing.** Students will be able to solve a system of 2 quadratic functions. Students will be able to write and graph constraints using a linear programming model, and analyze the graph to find solutions. Students will be able to choose the most efficient and effective method to solve systems. Students will be able to determine the reasonableness of their answer and find a new solution if needed. Students will be able to represent a word description symbolically by a system of equations/inequalities.
Common Summative Assessments	Summative Mastery Assessment.

Standards	CCSS.HSA.CED.A.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. CCSS.HSA.CED.A.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*. CCSS.HSA.REI.C.5: Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. CCSS.HSA.REI.C.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. CCSS.HSA.REI.C.7: Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$. CCSS.HSA.REI.D.11: Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. * CCSS.HSA.REI.D.12: Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP4 Model with mathematics CCSS.MP6 Attend to precision

Course Name: **College Prep Algebra II** Grade: N/A

Title of Unit	**Quadratics**
Enduring Understanding	The characteristics of quadratic functions and their representations are useful in solving real-world problems. Imaginary numbers exist and can be used to describe solutions.
Essential Questions	How can we use the quadratic formula to solve real world application problems? What are the characteristics of rational and irrational numbers? What is an imaginary number and what is its value? How does factoring and finding roots of a quadratic give me solutions to application problems?
Content	Students will understand how to analyze quadratic equations and inequalities using graphs, tables, and algebraic methods, including factoring, completing the square, square root property, and the quadratic formula. Students will understand real world application formulas using the quadratic formula. Students will understand the operations of complex numbers. Students will understand the meaning of complex solutions. Students will understand the characteristics of a quadratic function. Students will understand the vertex and standard form of a quadratic function. Students will understand that quadratics model everyday situations.
Skills	**Students will be able to identify the vertex, axis of symmetry, direction, maximum or minimum, x and y intercepts, domain and range of quadratic functions.** Students will be able to write and **graph quadratic equations in vertex and standard form**. **Students will be able to solve quadratics by factoring, completing the square, square root property, and/or quadratic formula.** **Students will be able to factor using GCF, difference of squares,** sum/difference of cubes**, trinomials leading coefficient ≠1, and leading coefficient =1.** Students will be able to choose the most efficient and effective method to solve quadratics. Students will be able to determine the reasonableness of their answer and determine a new answer if needed. **Students will be able to model quadratic problems that arise in everyday life.** Students will be able to use a graphing calculator or online calculator to represent given quadratics. Students will be able to use a graphing calculator to compare linear, quadratic, and exponential growth. **Students will be able to perform operations with complex numbers.**
Common Summative	Summative Mastery Assessment

Assessments	
Standards	CCSS.HSA.SSE.A.2: Use the structure of an expression to identify ways to rewrite it. CCSS.HSA.SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression* CCSS.HSA.SSE.B.3.A: Factor a quadratic expression to reveal the zeros of the function it defines. CCSS.HSA.REI.B.4: Solve quadratic equations in one variable. CCSS.HSA.REI.B.4.B: Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b. CCSS.HSF.IF.C.7.A: Graph linear and quadratic functions and show intercepts, maxima, and minima. CCSS.HSF.IF.C.8.A: Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. CCSS.HSN.CN.A.1: Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real. CCSS.HSN.CN.A.2: Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. CCSS.HSN.CN.A.3: (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers. CCSS.HSN.CN.B.5: (+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. CCSS.HSN.CN.C.7: Solve quadratic equations with real coefficients that have complex solutions. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP4 Model with mathematics CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **CP Algebra II** Grade: N/A

Title of Unit	**Properties of Exponents and Operations of Polynomials**
Enduring Understanding	Understand the relationship between zeros and factors of polynomials
Essential Questions	How do factoring and finding roots of a polynomial yield solutions to application problems?
Content	Students will understand the properties of exponents. Students will understand synthetic division. Students will understand polynomial long division. Students will understand the relationship between factors, roots, and zeros.
Skills	**Students will be able to divide polynomials including synthetic and long division.** **Students will be able to perform arithmetic operations on polynomials.** Students will be able to use the properties of exponents to transform expressions. Students will be able to fluently use different properties of exponents. Students will be able to determine the most effective way to divide a polynomial based on if it is linear, coefficient $\neq 1$, quadratic, etc. even though it may have multiple possible approaches. Students will understand that a function models a relationship between two quantities by linking factors, zeros, and roots. Students will be able to use a graphing calculator or online calculator to represent given polynomials and analyze said graph.
Common Summative Assessments	Summative Mastery Assessment.

Standards	CCSS.HSA.APR.A.1: Understand that polynomials form a system analogous to the integers; namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. CCSS.HSA.APR.B.2: Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$. CCSS.HSA.APR.D.6: Rewrite simple rational expressions in different forms; write ${}^{a(x)}/_{b(x)}$ in the form $q(x) + {}^{r(x)}/_{b(x)}$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system. CCSS.HSF.IF.C.7.C: Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision

Course Name: **CP Algebra II** Grade: N/A

Title of Unit	**Radical and Rational Expressions and Equations**
Enduring Understanding	Understand the connection between rational exponents and radicals. Use inverse operations to solve radical and/or rational exponent equations.
Essential Questions	How can we make sense of exponents that are not integers? Why do rational equations sometimes have extraneous solutions?
Content	Students will understand rational exponents. Students will understand radical expressions and solutions of radical equations. Students will understand rational expressions and solutions of rational equations.
Skills	**Students will be able to simplify expressions and solve equations with integer and rational exponents.** **Students will be able to simplify numeric and algebraic radical expressions up to the 4^{th} degree.** **Students will be able to solve radical equations.** **Students will be able to solve basic exponential functions.** **Students will be able to add, subtract, multiply, divide and simplify rational expressions.** Students will be able to solve rational equations. Students will be able to convert between rational exponent and radical form. Students will be able to understand that simplifying radicals are flexible in the order of steps, and understand there are many routes to the same correct answer.
Common Summative Assessments	Summative Mastery Assessment.
Standards	CCSS.HSA.APR.D.7: (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. CCSS.HSA.REI.A.2: Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. CCSS.HSN.RN.A.1: Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.* CCSS.HSN.RN.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Honors Algebra II** Grade: N/A

Title of Unit	**Properties and Transformations of Functions**
Enduring Understanding	Relations, and functions can be described with tables, graphs, and equations to analyze patterns of change. Relations and functions can be represented numerically, graphically, algebraically, and/or verbally. Properties of functions and function operations are used to model and analyze real world applications and quantitative relationships.
Essential Questions	How are functions used to represent/simulate the world we live in, and why are they so important? How do multiplying and/or adding a constant to a function change the graph?
Content	Students will understand characteristics of a graph. Students will understand function notation and composition. Students will understand transformations of $f(x)=x^2$. Students will understand transformations of $f(x)=\|x\|$. Students will understand piecewise functions. Students will understand absolute value inequalities.
Skills	**Students will be able to find the domain and range given a graph, equation, table, or mapping diagram.** Students will be able to compose and combine all types of functions with addition, subtraction, and multiplication. **Students will be able to solve and graph absolute value inequalities on a number line.** **Students will be able to use transformations to graph quadratic** and absolute value functions. **Students will be able to describe transformations on any type of function.** **Students will be able to transform generic functions on the coordinate plane.** Students will be able to graph piecewise functions. Students will be able to explain the correspondence between verbal descriptions, equations, tables, and graphs of functions. Students will be able to utilize a graphing calculator or online calculator to model functions and their transformations. Students will be able to attend to precision when graphing transformations by hand. Students will be able to recognize patterns of transformations of known functions and apply them to unknown functions. Students will be able to develop rules for transformations of functions given a variety of examples and applying those rules to other functions.
Common Summative Assessments	Summative Mastery Assessment

Standards	CCSS.HSF.IF.A.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. CCSS.HSF.IF.A.1: Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$. CCSS.HSF.IF.B.5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. CCSS.HSF.IF.C.7.B: Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. CCSS.HSF.BF.B.3: Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. CCSS.HSF.IF.B.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. CCSS.HSF.IF.C.7: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* CCSS.HSF.BF.A.1: Write a function that describes a relationship between two quantities.* CCSS.HSF.BF.A.1.B: Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model*. CCSS.HSF.BF.A.1.C: (+) Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time*. CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision

Course Name: **Honors Algebra II** Grade: N/A

Title of Unit	Systems of Equations and Inequalities
Enduring Understanding	Systems of equations and inequalities can be used to model and solve problems.
Essential Questions	How are systems of linear equations and inequalities useful? What situations would be represented by a system of equations or inequalities instead of a single equation or inequality?
Content	Students will understand the possible solution(s) to a system of equations. Students will understand the possible solution(s) to a system of inequalities. Students will understand the modeling and analysis of optimization problems through linear programming.
Skills	**Students will be able to solve a system of linear and/or nonlinear equations graphically, or algebraically using elimination or substitution.** **Students will be able to solve a system of inequalities by graphing.** **Students will be able to solve a system of 2 quadratic functions.** Students will be able to write and graph constraints using a linear programming model, and analyze the graph to find solutions. Students will be able to choose the most efficient and effective method to solve a system. Students will be able to determine the reasonableness of the answer and determine another answer if needed. Students will be able to represent a word description symbolically by a system of equations/inequalities.
Common Summative Assessment	Common Summative Mastery Assessment

Standards	CCSS.HSA.CED.A.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. CCSS.HSA.CED.A.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*. CCSS.HSA.REI.C.5: Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. CCSS.HSA.REI.C.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. CCSS.HSA.REI.C.7: Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$. CCSS.HSA.REI.D.11: Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.* CCSS.HSA.REI.D.12: Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP4 Model with mathematics CCSS.MP6 Attend to precision

Course Name: **Honors Algebra II** Grade: N/A

Title of Unit	**Quadratics**
Enduring Understanding	The characteristics of quadratic functions and their representations are useful in solving real-world problems. Imaginary numbers exist and can be used to describe solutions.
Essential Questions	How can we use the quadratic formula to solve real world application problems? What are the characteristics of rational and irrational numbers? What is an imaginary number and what is its value? How does factoring and finding roots of a quadratic give me solutions to application problems?
Content	Students will understand how to analyze quadratic equations and inequalities using graphs, tables, and algebraic methods, including factoring, completing the square, square root property, and the quadratic formula. Students will understand real world application formulas using the quadratic formula. Students will understand the operations of complex numbers. Students will understand the meaning of complex solutions. Students will understand the characteristics of a quadratic function. Students will understand the vertex and standard form of a quadratic function. Students will understand that quadratics model everyday situations.
Skills	**Students will be able to identify the vertex, axis of symmetry, direction, maximum or minimum, x and y intercepts, domain and range of quadratics.** Students will be able to write and **graph quadratic equations in vertex and standard form.** **Students will be able to solve quadratics involving real and complex solutions by factoring, completing the square, square root property, and/or quadratic formula.** **Students will be able to factor using GCF, difference of squares, sum/difference of cubes, leading coefficient ≠1, leading coefficient =1.** Students will be able to choose the most efficient and effective method to solve quadratics. Students will be able to determine the reasonableness of the answer and find another solution if needed. **Students will be able to model quadratic problems that arise in everyday life.** Students will be able to use a graphing calculator or online calculator to represent given quadratics. Students will be able to use a graphing calculator to compare linear, quadratic, and exponential growth. **Students will be able to perform operations with complex numbers.**
Common Summative Assessments	Summative Mastery Assessment

Standards	CCSS.HSA.SSE.A.2: Use the structure of an expression to identify ways to rewrite it. CCSS.HSA.SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* CCSS.HSA.SSE.B.3.A: Factor a quadratic expression to reveal the zeros of the function it defines. CCSS.HSA.SSE.B.3.B: Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. CCSS.HSA.REI.B.4: Solve quadratic equations in one variable. CCSS.HSA.REI.B.4.A: Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. CCSS.HSA.REI.B.4.B: Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b. CCSS.HSF.IF.C.7.A: Graph linear and quadratic functions and show intercepts, maxima, and minima. CCSS.HSF.IF.C.8.A: Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. CCSS.HSN.CN.A.1: Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real. CCS.HSN.CN.A.2: Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. CCSS.HSN.CN.A.3: (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers. CCSS.HSN.CN.B.5: (+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. CCS.HSN.CN.C.7: Solve quadratic equations with real coefficients that have complex solutions. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP4 Model with mathematics CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Honors Algebra II** Grade: N/A

Title of Unit	**Properties of Exponents and Operations on Polynomials**
Enduring Understanding	Understand the relationship between zeros and factors of polynomials
Essential Questions	How do factoring and finding roots of a polynomial yield solutions to application problems?
Content	Students will understand properties of exponents. Students will understand synthetic division. Students will understand polynomial long division. Students will understand the relationship between factors, roots, and zeros.
Skills	**Students will be able to multiply and divide polynomials including synthetic and long division.** **Students will be able to perform arithmetic operations on polynomials.** Students will be able to use the properties of exponents to transform expressions. Students will be able to fluently use different properties of exponents. Students will be able to determine the most effective way to divide a polynomial based on if it is linear, coefficient $\neq 1$, quadratic, etc. even though it may have multiple possible approaches. Students will understand that a function models a relationship between two quantities by linking factors, zeros, and roots. Students will be able to use a graphing calculator or online calculator to represent given polynomials and analyze said graph.
Common Summative Assessments	Summative Mastery Assessment
Standards	CCSS.HSA.APR.A.1: Understand that polynomials form a system analogous to the integers; namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. CCSS.HSA.APR.B.2: Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$. CCSS.HSA.APR.D.6: Rewrite simple rational expressions in different forms; write ${}^{a(x)}/_{b(x)}$ in the form $q(x) + {}^{r(x)}/_{b(x)}$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system. CCSS.HSF.IF.C.7.C: Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision

Course Name: **Honors Algebra II** Grade: N/A

Title of Unit	**Radical and Rational Expressions and Equations**
Enduring Understanding	Understand the connection between rational exponents and radicals Use inverse operations to solve radical and/or rational exponent equations
Essential Questions	How can we make sense of exponents that are not integers? Why do rational equations sometimes have extraneous solutions?
Content	Students will understand rational exponents. Students will understand radical expressions and the solutions to radical equations. Students will understand rational expressions and the solutions to rational equations.
Skills	**Students will be able to simplify expressions and solve equations with integer and rational exponents.** **Students will be able to simplify numeric and algebraic radical expressions up to the 5th degree.** **Students will be able to solve radical equations.** **Students will be able to solve basic exponential functions.** **Students will be able to add, subtract, multiply, divide and simplify rational expressions**. **Students will be able to solve rational equations.** Students will be able to convert between rational exponent and radical form. Students will be able to understand that simplifying radicals are flexible in the order of steps, and understand there are many routes to the same, correct, answer.
Common Summative Assessments	Summative Mastery Assessment
Standards	CCSS.HSA.APR.D.7: (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. CCSS.HSA.REI.A.2: Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. CCSS.HSN.RN.A.1: Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.* CCSS.HSN.RN.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Honors Algebra II** Grade: N/A

Title of Unit	**Sequences, Series & Set Theory**
Enduring Understanding	Arithmetic and geometric series represents patterns and can be used to solve real-life problems. Relationships can be represented using set theory.
Essential Questions	What situations require arithmetic sequences versus geometric sequences? How does set theory help to identify relationships and solve problems?
Content	Students will understand the relationships of arithmetic sequences to linear functions and geometric series to exponential functions. Students will understand the terms and sums of arithmetic and geometric series. Students will understand set theory. Students will understand Venn Diagrams.
Skills	Students will be able to draw and interpret Venn Diagram to solve real life problems. Students will be able to use arithmetic, geometric, and other sequences and series to solve real life problems. Students will be able to identify and describe sets, subsets, complements, unions, and intersections of sets.
Common Summative Assessments	Summative Mastery Assessment
Standards	CCSS.HSF.IF.A.3: Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by* $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ *for* $n \geq 1$. CCSS.HSF.BF.A.2: Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. CCSS.HSA.SSE.B.4: Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments** CCSS.MP2 Reason abstractly and quantitatively CCSS.MP4 Model with mathematics

Course Name: **Honors Algebra II** Grade: N/A

Title of Unit	**Logarithmic and Exponential Functions**
Enduring Understanding	There is a relationship between exponential and logarithmic functions.
Essential Questions	How can we solve real world application problems using exponential and logarithmic functions? How are logarithmic and exponential functions related?
Content	Students will understand the relationship between logarithmic functions and exponential functions. Students will understand the basic properties of logarithms and logarithmic equations. Students will understand application word problems using exponential and logarithm functions.
Skills	Students will be able to solve application problems using exponential and logarithmic functions including: appreciation, depreciation, compound interest, half time, and double-time problems. Students will be able to apply the power, quotient, and product properties of logarithms. Students will be able to solve logarithmic equations.
Common Summative Assessments	Summative Mastery Assessment
Standards	CCSS.HSF.BF.B.5: (+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. CCSS.HSF.LE.A.4: For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and $d$are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. CCSS.HSA.SSE.B.3.C: Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.* CCSS.HSF.IF.C.8.B: Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)12^t$, $y = (1.2)^t/10$, and classify them as representing exponential growth or decay. CCSS.MP4 Model with mathematics CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Pre Calculus** Grade: N/A

Title of Unit	**Relations, Functions and Graphs**
Enduring Understanding	Characteristics within and across families of functions define the shape of a graph and application.
Essential Questions	What attributes are important for defining and graphing a function or relation? How can the properties of functions be used to model and analyze real-world applications and quantitative relationships?
Content	Students will understand the characteristics of a function. Students will understand the domain and range of a function. Students will understand linear equation in standard form. Students will understand the inverses of relations and functions. Students will understand rigid and non-rigid graphical transformations. Students will understand higher degree polynomial functions. Students will understand roots or polynomial equations.
Skills	Students will be able to write equations for linear and quadratic functions. **Students will be able to graph higher degree polynomials and other functions.** Students will be able to graphically manipulate functions and expressions to convey meaning. **Students will be able to determine zeros, domain, and range of polynomial functions.** **Students will be able to find the inverse of a function.** Students will be able to graph piecewise functions. Students will be able to interpret results and reflect on reasonableness of their solutions and others. Students will be able to model problems algebraically, graphically, and with table and charts. Students will use technology appropriately to solve mathematical problems. Students will be able to distinguish between types of functions given tables, equations, or graphs.
Common Summative Assessments	Summative Assessment on Linear and Quadratic Functions. Summative Assessment on Higher Degree Polynomials.

Standards	CCSS.HSA.APR.2. Know and apply the Remainder Theorem. CCSS.HSA.APR.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the functions defined by the polynomial. CCSS.HSF.IF.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. CCSS.HSF.IF.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. CCSS.HSF.IF.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. CCSS.HSF .IF.6. Calculate and interpret the average rate of change of a function presented symbolically or as a table over a specified interval. CCSS.HSF.IF.7. Graph functions expressed symbolically and show key features of the graph by hand in simple cases and using technology for more complicated cases. CCSS.HSF.BF.3Identify 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 (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. CCSS.HSF.FB.4. Find inverse functions. CCSS.HSN.NC.8. Extend polynomial identities to the complex numbers. CCSS.HSN.NC.9. Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomial. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP7 Look for and make use of structure.

Course Name: **Pre Calculus** Grade: N/A

Title of Unit	**Rational Expressions and Equations**
Enduring Understanding	Specific characteristics within a function define the shape of a graph and application.
Essential Questions	What is a rational function and how do you graph it? How do you identify asymptotes and holes in the graphs of rational functions? How do the zeroes and undefined values help to find a solution set for non-linear inequalities?
Content	Graphs of Rational Functions. Horizontal and Vertical Asymptotes. Non-Linear and Rational Inequalities.
Skills	**Graph rational functions by determining domain restrictions, horizontal and vertical asymptotes, x and y-intercepts, holes, and other critical points.** Students will be able to interpret results and reflect on reasonableness of their solutions and others. Students will be able to model problems algebraically, graphically, and with table and charts. Students will use technology appropriately to solve mathematical problems. **Students will attend to precision when graphing the key features of a rational function.** Determine solution sets for non-linear and rational inequalities algebraically and graphically by looking for general methods and shortcuts.
Common Summative Assessment	Summative Assessment on Rational Functions and Non-Linear Inequalities.

Standards	CCSS.HSA.APR. Rewrite simple rational expressions in different forms. CCSS.HSA.APR.7. Understand the rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression: add, subtract, multiply, and divide rational expressions. CCSS.HSF.IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Pre Calculus** Grade: N/A

Title of Unit	**Exponential and Logarithmic Functions**
Enduring Understandings	The characteristics of exponential and logarithmic functions and their representations are useful in solving real-world problems.
Essential Questions	What is the relationship between exponential and logarithmic functions? How do exponential and logarithmic functions model real-world problems and their solutions?
Content	Students will understand logarithmic and exponential functions. Students will understand natural base e and the natural ln. Students will understand real-world applications with common logarithmic and exponential functions. Students will understand the properties of logarithms.
Skills	**Students will be able to graph logarithmic and exponential functions.** **Students will be able to model real world applications functions with exponential and logarithmic expressions.** **Students will be able to identify a common log and a natural log and determine their base.** **Students will be able to solve expressions and equations where the variable is the exponent.** **Students will be able to make a change of base using the definition of logarithm.** Students will be able to interpret results and reflect on reasonableness of their solutions and others. Students will use technology appropriately to solve mathematical problems. Students will recognize patterns associated with properties of exponents to determine the analogous properties of logarithms.
Common Summative Assessments	Summative Assessment on Exponential and Logarithmic Functions.

Standards	CCSS.HSA.SSE.2. Use the structure of an expression to identify ways to rewrite it. CCSS.HSA.SSE.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. CCSS.HSF.BF.5. Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. CCSS.HSF.LE.1. Distinguish between situations that can be modeled with linear functions and with exponential functions. CCSS.HSF.LE.4. For exponential models, express as a logarithm the solution to $ab^c = d$ where a, c, and d are numbers and the base b is 2, 10 or e; evaluate the logarithm using technology CCSS.HSF.IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Pre Calculus** Grade: N/A

Title of Unit	**Trigonometric Functions**
Enduring Understandings	Advanced mathematics and trigonometry can be used to model and solve real-world problems.
Essential Questions	How are sine, cosine, and tangent functions related? How do you solve real-world applications using trigonometric functions? How do you use trigonometric identities to simplify and evaluate expressions? How do you sue the laws of trigonometry to solve real-world problems?
Content	Students will understand angles and radian measure. Students will understand right triangle trigonometry. Students will understand reference angles. Students will understand trigonometric functions and their graphs. Students will understand amplitude, phase shift, and period components of trigonometric functions graphically and algebraically. Students will understand sum, difference, double angle, and half-angle trigonometric identities. Students will understand law of Sines and Cosines and how to determine the area of a triangle.
Skills	**Students will be able to evaluate trigonometric functions of any angle.** **Students will be able to use reference angles to evaluate trigonometric functions.** **Students will be able to sketch graphs of sine, cosine, and tangent and their inverse accurately and precisely.** **Students will be able to solve real life problems using right triangle trigonometry.** **Students will be able to recognize and write fundamental trigonometric identities.** **Students will be able to verify trigonometric identities.** **Students will be able to use standard algebraic techniques to solve trigonometric equations.** **Students will be able to use sum, difference, double angle, half-angle formulas to verify and solve trigonometric equations.** **Students will be able to find the area of an oblique triangle using the law of sine or cosine.** Students will be able to interpret results and reflect on reasonableness of their solutions and others. Students will use technology appropriately to solve mathematical problems. Students will be able to recognize patterns in amplitude, phase shift, and period components of trigonometric functions to generalize a formula for any trigonometric function.

Common Summative Assessments	Summative Assessment on Right Triangle Trigonometry and Trigonometric Graphs. Summative Assessment on Trigonometric Identities, Solving Trig Equations. Summative Assessment on Law of Sines and Cosines.
Standards	CCSS.HSF.TF.1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. CCSS.HSF.TF.2. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. CCSS.HSF.TF.3. Use special triangles to determine geometrically the values of sine, cosine and tangent for $\pi/3$, $\pi/4$, $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for π-x, π+x, and 2 π - x in terms of their values for x, where x is any real number. CCSS.HSF.TF.4. Use the unit circle to explain symmetry and periodicity of trigonometric functions. CCSS.HSF.TF.5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. CCSS.HSF.TF.6. Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed. CCSS.HSF.TF.7. Use the inverse functions to solve trigonometric equations. CCSS.HSF.TF.8. Prove the Pythagorean identity $\sin^2(X) + \cos^2(X) = 1$ and use it to find sin(X), cos (X), or tan (X) given sin(X), cos(X), or tan(X) and the quadrant of the angle. CCSS.HSF.TF.9. Prove the addition and subtraction formulas for sine cosine, and tangent and use them to solve problems. CCSS.HS.G.SRT.9. Derive the formula (A = ½ absinC) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. CCSS.HSG.SRT.10. Prove the Laws of Sines and Cosines and use them to solve problems. CCSS.HSG.SRT.11. Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Pre Calculus** Grade: N/A

Title of Unit	**Conic Sections**
Enduring Understandings	Conic sections represent a branch of analytical geometry and can model real-world applications**.**
Essential Questions	How is each conic section related to a cone? How are conic sections used to model real-world situations?
Content	Students will understand the general forms of the equation of a circle. Students will understand the general forms of the equation of an ellipse. Students will understand circle and ellipse graphs. Students will understand the standard and general forms of the equation of a hyperbola. Students will understand the Hyperbola graph. Students will understand the standard and general forms of the equation of a parabola. Students will understand the parabola graph.
Skills	Students will apply mathematical concept and computation skills to real world situations. Students will algebraically model a conic section. Students will graph a conic section from the equation that analytically describes it with accuracy. Students will recognize and solve for the different variables that represent characteristics of a conic section. Students will use technology appropriately to solve mathematical problems. Students will be able to recognize structure and patterns associated with graphing circles, ellipses, hyperbolas, and parabolas.
Common Summative Assessments	Summative Assessment on Conic Sections

Standards	CCSS.HSG.GPE.1. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. CCSS.HSG.GPE.2. Derive the equation of a parabola given a focus and directrix. CCSS.HSG.GPE.3. Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Pre Calculus** Grade: N/A

Title of Unit	**Relations, Functions and Graphs**
Enduring Understandings	Characteristics within and across families of functions define the shape of a graph and application.
Essential Questions	What attributes are important for defining and graphing a function or relation? How can the properties of functions be used to model and analyze real-world applications and quantitative relationships?
Content	Students will understand the characteristics of a function. Students will understand the domain and range of a function. Students will understand linear equation in standard form. Students will understand the inverses of relations and functions. Students will understand rigid and non-rigid graphical transformations. Students will understand higher degree polynomial functions. Students will understand the roots of polynomial equations.
Skills	Students will be able to write equations for linear and quadratic functions. **Students will be able to graph higher degree polynomials and other functions.** **Students will be able to graphically manipulate functions and expressions to convey meaning.** **Students will be able to determine zeros, domain, and range of polynomial functions.** **Students will be able to find the inverse of a function.** **Students will be able to graph piecewise functions.** Students will be able to interpret results and reflect on reasonableness of their solutions and others. Students will be able to model problems algebraically, graphically, and with table and charts. Students will use technology appropriately to solve mathematical problems. Students will be able to distinguish between types of functions given tables, equations, or graphs.
Common Summative Assessments	Summative Assessment on Linear and Quadratic Functions. Summative Assessment on Higher Degree Polynomials.

Standards	CCSS.HSA.APR.2. Know and apply the Remainder Theorem. CCSS.HSA.APR.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the functions defined by the polynomial. CCSS.HSF.IF.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. CCSS.HSF.IF.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. CCSS.HSF.IF.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. CCSS.HSF.IF.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. CCSS.HSF.IF.7. Graph functions expressed symbolically and show key features of the graph by hand in simple cases and using technology for more complicated cases. CCSS.HSF.BF.3.-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 (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. CCSS.HSF.FB.4. Find inverse functions. CCSS.HSN.NC.8. Extend polynomial identities to the complex numbers. CCSS.HSN.NC.9. Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.

Course Name: **Honors Pre Calculus** Grade: N/A

Title of Unit	**Rational Numbers and Equations**
Enduring Understandings	Specific characteristics within a function define the shape of a graph and application.
Essential Questions	What is a rational function and how do you graph it? How do you identify asymptotes and holes in the graphs of rational functions? How do the zeroes and undefined values help to find a solution set for non-linear inequalities?
Content	Students will understand graphs of Rational Functions. Students will understand horizontal, Vertical, and Slant Asymptotes. Students will understand Non-Linear and Rational Inequalities.
Skills	**Graph rational functions by determining domain restrictions; horizontal, vertical, and slant asymptotes; x and y-intercepts; holes; and other critical points.** Determine solution sets for non-linear and rational inequalities, algebraically and graphically by looking for general methods and for shortcuts. Students will be able to interpret results and reflect on reasonableness of their solutions and others. **Students will attend to precision when graphing the key features of a rational function.** Students will be able to model problems algebraically, graphically, and with table and charts. Students will use technology appropriately to solve mathematical problems.
Common Summative Assessments	Summative Assessment on Rational Functions and Non-Linear Inequalities.
Standards	CCSS.HSA.APR.6. Rewrite simple rational expressions in different forms. CCSS.HSA.APR.7. Understand the rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression: add, subtract, multiply, and divide rational expressions. CCSS.HSF.IF.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

Course Name: **Honors Pre Calculus** Grade: N/A

Title of Unit	**Exponential and Logarithmic Functions**
Enduring Understandings	The characteristics of exponential and logarithmic functions and their representations are useful in solving real-world problems.
Essential Questions	What is the relationship between exponential and logarithmic functions? How do exponential and logarithmic model real-world problems and their solutions?
Content	Students will understand logarithmic and exponential functions. Students will understand natural base e and natural ln. Students will understand the properties of logarithms. Students will understand real world applications with common logarithmic and exponential functions.
Skills	**Students will be able to graph logarithmic and exponential functions.** **Students will be able to model real world applications functions with exponential and logarithmic expressions.** **Students will be able to identify a common log and a natural log and determine their base.** **Students will be able to solve expressions and equations where the variable is the exponent.** **Students will be able to make a change of base using the definition of logarithm.** Students will be able to interpret results and reflect on reasonableness of their solutions and others. Students will use technology appropriately to solve mathematical problems. Students will recognize patterns associated with properties of exponents to determine the analogous properties of logarithms.
Common Summative Assessments	Summative Assessment on Exponential and Logarithmic Functions.

Standards	CCSS.HSA.SSE.2. Use the structure of an expression to identify ways to rewrite it. CCSS.HSA.SS.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. CCSS.HSF.BF.5. Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. CCSS.HSF.LE1. Distinguish between situations that can be modeled with linear functions and with exponential functions. CCSS.HSF.LE.4. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10 or e. Evaluate the logarithm using technology. CCSS.HSF.IF.1. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

Course Name: **Honors Pre Calculus** Grade: N/A

Title of Unit	**Trigonometric Functions**
Enduring Understandings	Advanced mathematics and trigonometry can be used to model and solve real-world problems.
Essential Questions	How are sine, cosine, and tangent functions related? How do you solve real-world applications using trigonometric functions? How do you use trigonometric identities to simplify and evaluate expressions? How do you use the laws of trigonometry to solve real-world problems?
Content	Students will understand angles and radian measure. Students will understand right triangle trigonometry. Students will understand reference angels. Students will understand trigonometric functions and their graphs. Students will understand amplitude, phase shift, and period components of trigonometric functions graphically and algebraically. Students will understand sum, difference, double angle, and half-angle trigonometric identities. Students will understand the Laws of Sine and Cosine, and how to determine the area of a triangle accurately and precisely.
Skills	**Students will be able to evaluate trigonometric functions of any angle.** **Students will be able to use reference angles to evaluate trigonometric functions.** **Students will be able to sketch graphs of sine, cosine, and tangent graphs and their inverse.** **Students will be able to sketch the translations of trigonometric graphs.** **Students will be able to solve real life problems using right triangle trigonometry.** **Students will be able to recognize and write fundamental trigonometric equations.** **Students will be able to verify trigonometric identities.** **Students will be able to use standard algebraic techniques to solve trigonometric equations.** **Students will be able to use sum, difference, double angle, half-angle formulas to verify and solve trigonometric equations.** **Students will be able to find the area of an oblique triangle using the law of sine or cosine.** Students will be able to interpret results and reflect on reasonableness of their solutions and others. Students will use technology appropriately to solve mathematical problems. Students will be able to recognize patterns in amplitude, phase shift, and period components of trigonometric functions to generalize a formula for any trigonometric function.
Common Summative	Summative Assessment on Right Triangle Trigonometry and Trigonometric Graphs. Summative Assessment on Trigonometric Identities, Solving Trig Equations,

Assessments	Summative Assessment on Laws of Sines and Cosines
Standards	CCSS.HSF.TF.1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. CCSS.HSF.TF.2. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. CCSS.HSF.TF.3. Use special triangles to determine geometrically the values of sine, cosine and tangent for $\pi/3$, $\pi/4$, $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for π-x, π+x, and 2 π - x in terms of their values for x, where x is any real number. CCSS.HSF.TF.4. Use the unit circle to explain symmetry and periodicity of trigonometric functions. CCSS.HSF.TF.5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. CCSS.HS.F.TF.6. Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed. CCSS.HSF.TF.7. Use the inverse functions to solve trigonometric equations. CCSS.HSF.TF.8. Prove the Pythagorean identity $\sin^2(X) + \cos^2(X) = 1$ and use it to find sin(X), cos (X), or tan (X) given sin(X), cos(X), or tan(X) and the quadrant of the angle. CCSS.HSF.TF.9. Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems. CCSS.HSG.SRT.9. Derive the formula for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. CCSS.HSG.SRT.10. Prove the Laws of Sines and Cosines and use them to solve problems. CCSS.HSG.SRT.11. Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles.

Course Name: **Honors Pre Calculus** Grade: N/A

Title of Unit	**Conic Section**
Enduring Understandings	Conic sections represent a branch of analytical geometry and can model real-world applications.
Essential Questions	How is each conic section related to a cone? How are conic sections used to model real-world situations?
Content	Students will understand the general forms of the equation of a circle. Students will understand the general forms of the equation of an ellipse. Students will understand circle and ellipse graphs. Students will understand the Standard and general forms of the equation of a hyperbola. Students will understand the Hyperbola graph. Students will understand the Standard and general forms of the equation of a parabola. Students will understand the Parabola graph.
Skills	Students will be able to apply mathematical concept and computation skills to real world situations. Students will be able to algebraically model a conic section. **Students will be able to graph a conic section from the equation that analytically describes it with accuracy.** Students will be able to recognize and solve for the different variables that represent characteristics of a conic section. Students will use technology appropriately to solve mathematical problems. Students will be able to recognize structure and patterns associated with graphing circles, ellipses, hyperbolas, and parabolas.
Common Summative Assessments	Summative Assessment on Conic Sections.
Standards	CCSS.HSG.GPE.1. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. CCSS.HS.G.GPE.2. Derive the equation of a parabola given a focus and directrix. CCSS.HSG.GPE.3. Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.

Course Name: **Honors Pre Calculus** Grade: N/A

Title of Unit	**Limits**
Enduring Understandings	The concept of a limit is one of the foundations of calculus.
Essential Questions	What role do limits play in laying the foundation of Calculus? How does the limit of a function relate the value approached by f(x) as x approaches a given value or infinity?
Content	Students will understand limits of functions and sequences graphically and algebraically. Students will evaluate a limit to a given number using the definition of a limit. Students will evaluate a limit to a given number that makes the denominator zero. Students will evaluate a limit at positive or negative infinity. Students will evaluate limits of complex fractions and square roots using the definition of a limit.
Skills	Students will be able to evaluate a limit using properties of limits. Students will be able to evaluate when a limit can fail to exist. Students will be able to interpret results and reflect on reasonableness of their solutions and others. Students will use technology appropriately to solve mathematical problems.
Common Summative Assessments	Summative Assessment on Limits.
Standards	There are no common core content standards at this level. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others. CCSS.MP5 Use appropriate tools strategically.

Course Name: **Calculus** Grade: N/A

Title of Unit	**Limits**
Enduring Understanding	Limits are the basis to the study of Calculus.
Essential Questions	How is the study of limits integral to the concepts in Calculus?
Content	Students will understand and be able to find limits graphically and numerically. Students will understand how to evaluate limits analytically. Students will understand how to evaluate continuity and one-sided limits. Students will understand how to infinite limits.
Skills	Students will be able to evaluate a limit using properties of limits. Students will be able to learn different ways that a limit can fail to exist. Students will be able to determine continuity at a point and continuity on an open interval. Students will be able to use properties of continuity. Students will be able to use the Intermediate Value Theorem. Students will be able to determine infinite limits from the left and from the right Students will be able to find and sketch vertical asymptotes of the graph of a function.
Common Summative Assessments	Summative Assessment on Limits.
Standards	There are no common core content standards at this level. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP6 Attend to precision.

Course Name: **Calculus** Grade: N/A

Title of Unit	**Differentiation**
Enduring Understanding	Derivatives can be used to solve real world applications Derivatives are used to analyze and sketch the graphs of functions.
Essential Questions	How can we solve real world applications of related rates using derivatives? How are derivatives used to analyze and sketch the graphs of functions? How do derivatives apply to real world optimization problems?
Content	Students will understand basic differentiation rules, product and quotient rules, the chain rule, and implicit differentiation. Students will understand real world related rates problems. Students will understand and know how to find maximum and minimum values of various functions. Students will understand the uses of first and second derivative in terms of analyzing and sketching graphs of functions. Students will understand applied minimum and maximum problems.
Skills	Students will be able to understand the relationship between differentiability and continuity. Students will be able to understand the meaning of and evaluate derivatives of various functions using basic differentiation rules. Students will be able to distinguish between functions written in implicit form and explicit form and use implicit differentiation to find the derivative of functions. Students will be able to use related rates to solve real-life problems Students will be able to find extrema of a function. Students will be able to understand and use Rollie's Theorem and Mean-Value Theorem. Students will be able to determine intervals on which a function is increasing, decreasing, concave up of down, and find points of inflection in order to analyze and sketch the graph of a function. Students will be able to solve applied minimum and maximum problems using derivatives.
Common Summative Assessments	Summative Assessment on Derivatives. Summative Assessment on Applications of Derivatives.
Standards	There are no common core content standards at this level. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP 4 Model with mathematics. CCSS.MP 5 Use appropriate tools strategically. CCSS.MP 6 Attend to precision.

Course Name: **Calculus** Grade: N/A

Title of Unit	**Integration**
Enduring Understandings	The Fundamental Theorem of Calculus can be used to solve real-world applications. Integrals can be used to find the area under the curve, the area between two curves and the volume of solids of revolution.
Essential Questions	What is the difference between indefinite and definite integrals? Why do we need to use integrals to find the area under a curve? How do we find that area? How is the Fundamental Theorem of Calculus used to solve real-world applications? How is the integral used to find the volume of solids of revolution?
Content	Students will understand how to find anti-derivatives and indefinite integration. Students will understand how to find the area under a curve. Students will understand how to find Riemann Sums. Students will understand how to use the Fundamental Theorem of Calculus. Students will understand how to find derivatives and integrals of the natural logarithmic functions and exponential functions. Students will understand how to find derivatives and integrals of inverse trigonometric functions. Students will understand slope fields, growth and decay problems using differential equations. Students will understand how to find the area of a region between two curves. Students will understand how to find the volume of solids of revolution. Students will understand the concept of slope fields. Students will understand indeterminate forms and L'Hopital's Rule.

Skills	Students will be able to use basic integration rules to find anti-derivatives. Students will be able to find a particular solution of a differential equation. Students will be able to understand the definition of Riemann sums. Students will be able to evaluate a definite integral using the Fundamental Theorem of Calculus. Students will be able to understand and use the Mean Value Theorem for Integrals. Students will be able to find derivatives and integrals of natural logarithms and exponential functions. Students will be able to use exponential functions to model compound interest and exponential growth. Students will be able to differentiate and integrate inverse trigonometric functions. Students will be able to use slope fields to approximate solutions of differential equations. Students will be able to find the area between two curves using integration. Students will be able to find the volume of a solid of revolution. Students will be able to recognize limits that produce the indeterminate form. Students will be able to apply L'Hopital's Rule to evaluate a limit.
Common Summative Assessments	Summative Assessment on Integration. Summative Assessment on Derivatives and Integrals of Exponential and Logarithmic Functions. Summative Assessment on Slope Fields and Differential Equations. Summative Assessment on Area Between Two Curves and Volumes of Solids of Revolution.
Standards	There are no common core content standards at this level. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics. CCSS.MP5 Use appropriate tools strategically. CCSS.MP6 Attend to precision.

Course Name: **Advanced Placement Calculus** Grade: N/A

Title of Unit	**Limits**
Enduring Understandings	Limits are the basis to the study of Calculus.
Essential Questions	How is the study of limits integral to the concepts in Calculus?
Content	Students will understand and be able to find limits graphically and numerically. Students will understand how to evaluate limits analytically. Students will understand the concept of continuity and one-sided limits. Students will understand infinite limits and limits at infinity.
Skills	Students will be able to evaluate a limit using properties of limits. Students will be able to learn different ways that a limit can fail to exist. Students will be able to determine continuity at a point and continuity on an open interval. Students will be able to use properties of continuity. Students will be able to determine infinite limits from the left and from the right. Students will be able to find limits as x approaches infinity.
Common Summative Assessments	Summative Assessment on Limits.
Standards	There are no common core content standards at this level. The standards below are AP Calculus Mathematical Practices Standards MPAC 1: Reasoning with definitions and theorems. MPAC 2: Connecting concepts. MPAC 3: Implementing algebraic and computational processes. MPAC 4: Connecting multiple representations. MPAC 5: Building notational fluency. MPAC 6: Communicating

Course Name: **Advanced Placement Calculus** Grade: N/A

Title of Unit	**Differentiation**
Enduring Understandings	Derivatives can be used to solve real world applications. Derivatives are used to analyze and sketch the graphs of functions.
Essential Questions	How can we solve real world related rates applications using derivatives? How are derivatives used to analyze and sketch the graphs of functions? How do derivatives apply to real world optimization problems?
Content	Students will understand basic differentiation rules, product and quotient rules, the chain rule, and implicit differentiation. Students will understand real world related rates problems. Students will understand and know how to find maximum and minimum values of various functions. Students will understand applied minimum and maximum problems. Students will understand the characteristics of motion using derivatives. Students will understand Rolle's Theorem, Mean Value Theorem, and the Intermediate Value Theorem. Students will understand and make connections between the graphs of functions and their derivatives. Students will understand the relationship between differentiability and continuity.
Skills	Students will understand the relationship between differentiability and continuity. Students will understand the meaning of and evaluate derivatives of various functions including polynomial, trigonometric, exponential, and logarithmic using basic differentiation rules. Students will be able to distinguish between functions written in implicit form and explicit form and use implicit differentiation to find the derivative of functions. Students will be able to use related rates to solve real-life problems. Students will be able to find extremes of a function. Students will understand and be able to use Rolle's Theorem, Mean-Value Theorem and Intermediate Value Theorem. Students will be able to determine intervals on which a function is increasing decreasing, concave up or down, and find points of inflection in order to analyze and sketch the graph of a function. Students will be able to solve applied minimum and maximum problems using derivatives. Students will be able to recognize limits that produce indeterminate forms and be able to apply L'Hoptial's Rule to evaluate limits. Students will be able to use derivatives to understand the motion of particles. Students will be able to graph derivative functions given the graph of the function. Students will be able to use the limit definition of the derivative to find derivatives of polynomial functions.

Common Summative Assessments	Summative Assessment on Derivatives. Summative Assessment Applications of Derivatives.
Standards	There are no common core content standards at this level. The standards below are AP Calculus Mathematical Practices Standards MPAC 1: Reasoning with definitions and theorems. MPAC 2: Connecting concepts. MPAC 3: Implementing algebraic and computational processes. MPAC 4: Connecting multiple representations. MPAC 5: Building notational fluency. MPAC 6: Communicating

Course Name: **Advanced Placement Calculus** Grade: N/A

Title of Unit	**Integration**
Enduring Understanding	The Fundamental Theorem of Calculus can be used to solve real-world applications. Integrals can be used to find the area under the curve, the area between two curves, and the volume of solids of revolution.
Essential Questions	What is the difference between indefinite and definite integrals? Why do we need to use integrals to find the area under a curve? How is the Fundamental Theorem of Calculus used to solve real-world applications? How is the integral used to find the volume of solids of revolution?
Content	Students will understand the concepts of the anti-derivatives and indefinite integration. Students will know how to find the area under a curve. Students will understand the concept of Riemann Sums and Trapezoid Rule. Students will understand the Fundamental Theorem of Calculus. Students will know how to find integrals of the natural logarithmic function, exponential functions, and inverse trigonometric functions. Students will understand the concept of slope fields. Students will understand and know how to solve growth and decay problems using differential equations. Students will know how to find the area of a region between two curves. Students will understand solids of revolution and know how to find volumes of them. Students will understand how integrals fit in with the analysis of the motion of a particle.

Skills	Students will be able to use basic integration rules to find anti-derivatives of various functions including trigonometric, polynomial, exponential, and logarithmic. Students will be able to find a particular solution of a differential equation. Students will be able to evaluate area under curves using Riemann sums and Trapezoid Rule. Students will be able to evaluate a definite integral using the Fundamental Theorem of Calculus. Students will be able to use exponential functions to model compound interest and exponential growth. Students will be able to use slope fields to approximate solutions of differential equations. Students will be able to use separation of variables to solve a simple differential equation. Students will be able to find the area between two curves using integration. Students will be able to find the volume of a solid of revolution. Students will be able to use the graphing calculator to evaluate definite integrals. Students will be able to use integrals to further their analysis of the motion of particles. Students will be able to use integrals to find the average value of a function. Students will be able to find volumes using cross-sectional areas.
Common Summative Assessments	Summative Assessment on Integration. Summative Assessment on Derivatives and integrals of Exponential and Logarithmic Functions. Summative Assessment on Slope Fields and Differential Equations. Summative Assessment on Area Between Two Curves and Volumes of Solids of Revolution.
Standards	There are no common core content standards at this level. The standards below are AP Calculus Mathematical Practices Standards MPAC 1: Reasoning with definitions and theorems. MPAC 2: Connecting concepts. MPAC 3: Implementing algebraic and computational processes. MPAC 4: Connecting multiple representations. MPAC 5: Building notational fluency. MPAC 6: Communicating

Course Name: **Advanced Placement Statistics** Grade: N/A

Title of Unit	**Descriptive Statistics**
Enduring Understandings	Data can be collected, displayed, described, and summarized in response to a question that has been raised.
Essential Questions	How is data used in the real world? When is data normal?
Content	Students will understand graphical displays for categorical and quantitative data. Students will understand how to describe features of a distribution. Students will understand Summary Statistics. Students will understand Z-scores. Students will understand normal distribution. Students will understand least squares regression line.
Skills	Students will be able to identify types of data. Students will be able to create appropriate graphical displays of data. Students will be able to interpret graphical displays. Students will be able to summarize center and spread of univariate data. Students will be able to write comparisons of distributions of univariate data. Students will be able to standardize and compare scores from different contexts. Students will be able to calculate percentages with the normal distribution. Students will be able to make predictions using the least squares regression line. Students will be able to linearize data with transformations.
Common Summative Assessments	Summative Assessment on univariate Data Summative Assessment on Bivariate Data Culminating Project
Standards	CCSS.HSS-ID Summarize, represent, and interpret data on a single count or measurement variable. Summarize, represent, and interpret data on two categorical and quantitative variables. CCSS.HSS.IC.6. Evaluate reports based on data. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics.

Course Name: **Advanced Placement Statistics** Grade: N/A

Title of Unit	**Inferential Statistics**
Enduring Understandings	You can infer something about the population by taking a sample. You can decide the significance of a statistic.
Essential Questions	What is a sampling distribution? What is the importance of a hypothesis test? What is the importance of a confidence interval?
Content	Students will understand sampling distributions. Students will understand Central Limit Theorem. Students will understand different distributions are used for different types of inference (normal, t, chi-square). Students will understand hypothesis tests. Students will understand Confidence Intervals. Students will understand the language of Hypothesis tests and types of errors.
Skills	Students will be able to describe different sampling distributions. Students will be able to use sampling distributions to find the likelihood of getting a certain statistic. Students will be able to calculate test statistics, p-values and draw conclusions in hypothesis tests. Students will be able to construct confidence intervals and interpret them in context.
Common Summative Assessments	Summative Assessment on Means. Summative Assessment on Proportions. Summative Assessment on Slope of Regression Line. Culminating Project.
Standards	

Course Name: **Advanced Placement Statistics** Grade: N/A

Title of Unit **Enduring Understandings**	**Experimental Design** Proper techniques of experimentation and sampling can decrease or eliminate bias and confounding variables.
Essential Questions	What are good ways of collecting data? Why is randomization/random sampling important? What is the difference between an experiment and an observational study?
Content	Students will understand types of data collection. Students will understand planning and conducting surveys. Students will understand planning and conducting experiments. Students will understand generalizing results. Students will understand the usefulness of simulating an event.
Skills	Students will be able to explain whether a situation is an experiment, survey or observational study. Students will be able to incorporate randomness into surveys, studies and experiments. Students will be able to plan surveys and experiments to reduce or eliminate bias or confounding variables. Students will be able to explain the scope of the results of survey or experiment. Students will be able to plan and run a simulation.
Common Summative Assessments	Summative Assessment on Experiments and Surveys. Culminating Project.
Standards	CCSS.HSS.IC.B.3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies, explain how randomization relates to each. CCSS.HSS.IC.B.5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. CCSS.MP 5 Use appropriate tools strategically. CCSS.MP 7 Look for and make use of structure.

Course Name: **Advanced Placement Statistics** Grade: N/A

Title of Unit	**Probability**
Enduring Understanding	Probabilities of random events can be calculated with rules or estimated with simulation.
Essential Questions	Why is it important to understand the likelihood of an event? How do you calculate theoretical probability? How can you simulate a situation? What value can you expect to have over the long term if an experiment is repeated many times?
Content	Students will understand the likelihood of an event occurring using laws of probability and simulation. Students will understand expected Value. Students will understand how to tell whether variables are independent or not.
Skills	Students will be able to calculate various probabilities using the laws of probability. Students will be able to conduct a simulation to estimate a probability or expected value.
Common Summative Assessments	Summative Assessment on Probability and Simulation Culminating Project.
Standards	CCSS.HSS.IC.A.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. CCSS.HSS.CP Understand independence and conditional probability and use them to interpret data. Use the rules of probability to compute probabilities of compound events in a uniform probability model. CCSS.HSS.MD Calculate expected values and use them to solve problems. Use probability to evaluate outcomes of decisions. CCSS.MP 1 Make sense of problems and persevere in solving them. CCSS.MP 5 Use appropriate tools strategically. CCSS.MP 7 Look for and make use of structure. CCSS.MP 8 Look for and express regularity in repeated reasoning.

Course Name: **Statistics (Semester)** Grade: N/A

Title of Unit	**Descriptive Statistics**
Enduring Understanding	Data can be collected, displayed, described, and summarized in response to a question that has been raised.
Essential Questions	How is data used in the real world? When is data normal?
Content	Students will understand graphical displays for categorical and quantitative data. Students will understand how to describe features of a distribution. Students will understand Summary Statistics Students will understand Z-scores. Students will understand normal distribution. Students will understand least squares regression line.
Skills	Students will be able to identify types of data. Students will be able to create appropriate graphical displays of data. Students will be able to interpret graphical displays. Students will be able to summarize center and spread of univariate data. Students will be able to write comparisons of distributions of univariate data. Students will be able to standardize and compare scores from different contexts. Students will be able to calculate percentages with the normal distribution. Students will be able to make predictions using the least squares regression line.
Common Summative Assessments	Formative Assessment on Univariate Data. Formative Assessment on Bivariate Data. Formative Assessment on Normal Distributions. Project on Normal Distributions
Standards	CCSS.HSS.ID.A Summarize, represent and interpret data on a single count or measurement variable. Summarize, represent, and interpret data on two categorical and quantitative variables. CCSS.HSS.ID.B Interpret linear models. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics.

Course Name: **Statistics (Semester)** Grade: N/A

Title of Unit	**Experimental Design**
Enduring Understanding	Proper techniques of experimentation and sampling can decrease or eliminate bias and confounding.
Essential Questions	What are good ways of collecting data? Why is randomization / random sampling important? What is the difference between an experiment and an observational study?
Content	Students will understand types of data collection. Students will understand planning and conducting surveys. Students will understand planning and conducting experiments. Students will understand generalizing results. Students will understand the usefulness of simulating an event.
Skills	Students will be able to explain whether a situation is an experiment, survey or observational study. Students will be able to incorporate randomness into surveys and experiments. Students will be able to plan surveys and experiments to reduce or eliminate bias. Students will be able to explain the scope of the results of survey or experiment. Students will be able to plan and run a simulation.
Common Summative Assessments	Formative assessment on sampling techniques. Formative assessment on designing experiments. Formative assessment on simulations. Project on experiments, surveys, and/or studies.
Standards	CCSS.HSS.IC.B.3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies, explain how randomization relates to each. CCSS.HSS.IC.B.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

Course Name: **Statistics (Semester)** Grade: N/A

Title of Unit	**Probability**
Enduring Understandings	Probabilities of random events can be calculated with rules or estimated with simulation.
Essential Questions	Why is it important to understand the likelihood of an event? How do you calculate theoretical probability? How can you simulate a situation?
Content	Students will understand the likelihood of an event occurring using laws of probability and simulation. Students will understand expected Value. Students will understand whether variables are independent or not.
Skills	Students will be able to calculate various probabilities using the laws of probability. Students will decide if events are independent based on their probabilities. Students will be able to conduct a simulation to estimate a probability or expected value.
Common Summative Assessments	Summative Assessment on Probability and Simulation.
Standards	CCSS.HSS.IC.A.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. CSSC.HSS.CP.A Understand independence and conditional probability and use them to interpret data. CCSS.HSS.CP.B Use the rules of probability to compute probabilities of compound events in a uniform probability model. CCSS.HSS.MD.A Calculate expected values and use them to solve problems. CCSS.HSS.MD.B Use probability to evaluate outcomes of decisions. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP5 Use appropriate tools strategically. CCSS.MP7 Look for and make use of structure. CCSS.MP8 Look for and express regularity in repeated reasoning.

Course Name: **Statistics (Semester)** Grade: N/A

Title of Unit	**Straight Lines and Linear Models**
Enduring Understandings	Linear functions and systems of equations are mathematical models that describe concrete situations.
Essential Questions	How can we model real-life applications with linear equations, interpret solutions, and make inferences? What does slope/rate of change mean in context?
Content	Students will understand the Cartesian coordinate system. Students will understand slope in context. Students will understand x- and y-intercepts in context. Students will understand straight lines. Students will understand linear functions Students will understand linear models Students will understand the intersection of two lines in context including break even analysis, market equilibrium, and linear depreciation. Students will understand scatter plots. Students will understand linear regression by hand using method of least squares Students will understand linear regression using Excel
Skills	Students will be able to determine the linear equation that models a given set of data. Students will be able to determine and interpret slope as average rate of change in a context. Students will be able to find and interpret the intercepts given a context. Students will be able to algebraically determine the equation that best models a set of data. Students will be able to use Excel to determine the equation that best models a set of data. Students will be able to use graphing calculator to determine the equation that best models a set of data. Students will be able to model a system and solve using substitution method.
Common Summative Assessments	Summative Assessment Excel Assignment on Linear Regression Spring Lab, Car Lab

Standards	**CCSS.HSA.SSE.A.1** Interpret expressions that represent a quantity in terms of its context **CCSS.HSF.S.ID.7: Interpreting linear models-** Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. **CCSS.HSF.S.ID.8 Interpreting linear models-**Compute (using technology) and interpret the correlation coefficient of a linear fit. **CCSS.HSF.S.ID.9 Interpreting linear models-**Distinguish between correlation and causation. **CCSS.HSF.A.REI.1: Understand solving equations as a process of reasoning and explain the reasoning-** Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. **CCSS.HSF.A.REI.3: Solve equations and inequalities in one variable-** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **CCSS.HSF.A.REI.6: Solve systems of equations-** Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. **CCSS.HSF.A.REI.10: Represent and solve equations and inequalities graphically-** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). **CCSS.HSF.A.REI.11: Represent and solve equations and inequalities graphically-** Explain why the *x-coordinates* of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. **CCSS.HSF.F.BF.1:** Write a function that describes a relationship between two quantities. **CCSS.HSF.IF.F.1: Understand the concept of a function and use function notation-** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$. **CCSS.HSF.IF.F.2: Understand the concept of a function and use function notation-** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. **CCSS.HSF.IF.F.4: Interpret functions that arise in applications in terms of the context-** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities,

	and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* **CCSS.HSF.IF.F.5: Interpret functions that arise in applications in terms of the context-** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.* **CCSS.HSF.IF.F.6: Interpret functions that arise in applications in terms of the context-** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. **CCSS.HSF.IF.F.7: Analyze functions using different representations-** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. **CCSS.HSF.A.SSE.1: Interpret the structure of expressions-** Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients. **CCSS.HSF.S.ID.6c:** Fit a linear function for a scatter plot that suggests a linear association. **CCSS.HSF.S.ID.7:** Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. **CCSS.HSF.A.CED.1: Create equations that describe numbers or relationships-** Create equations and inequalities in one variable and use them to solve problems. **CCSS.HSF.A.CED.2: Create equations that describe numbers or relationships-** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **CCSS.HSF.A.CED.3: Create equations that describe numbers or relationships-** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* **CCSS.HSF.A.CED.4: Create equations that describe numbers or relationships-** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. MP1 Make sense of problems and persevere in solving them MP2 Reason abstractly and quantitatively. MP4 Model with mathematics MP5 Use appropriate tools strategically MP6 Attend to precision.

Course Name: **Finite Math** Grade: 11 and 12

Title of Unit	**Systems of Linear Equations**
Enduring Understandings	Linear functions and systems of equations and equalities are the mathematical models that describe concrete situations. Systems can have zero, one, or infinite solutions.
Essential Questions	How do we model real-life applications with multiple variables using systems of equations? How do we represent 2-variable and 3-variable systems of equations geometrically? Can we determine the number and type of solutions to a n-variable system of equations?
Content	Students will understand solving systems using substitution method. Students will understand solving systems using elimination method. Students will understand types of solutions (independent, dependent, inconsistent). Students will understand over-determined and underdetermined systems. Students will understand supply and demand functions. Students will understand market equilibrium. Students will understand graphs of 3-variable systems and their solutions. Students will understand applications of systems of equations. Students will understand finding the equation of a unique parabola using 3 data points. Students will understand augmented matrices. Students will understand solving systems using reduced echelon form.
Skills	Students will be able to model various real-world applications using systems of equations. Students will be able to solve systems of equations in 2 variables algebraically. Students will be able to solve n-variable systems of by various methods. Students will be able to classify systems and their solutions based on a graph. Students will be able to classify systems and their solutions based on a reduced augmented matrix. Students will be able to interpret their solution in context. Students will be able to use various technologies to solve systems (Excel, Grapher.app, and graphing calculator).

Common Summative Assessments	Summative Assessment Hands-on Model of a 3-variable system with 2 equations.
Standards	**CCSS.HSA.REI.5: Solve systems of equations-** Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. **CCSS.HSA.REI.6: Solve systems of equations-** Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. **CCSS.HSA.REI.10: Represent and solve equations and inequalities graphically-** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). **CCSS.HSA.REI.11: Represent and solve equations and inequalities graphically-** Explain why the *x-coordinates* of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. **CCSS.HSF.BF.1:** Write a function that describes a relationship between two quantities. **CCSS.HSF.LE.1b:** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. **CCSS.HSIF.F.1: Understand the concept of a function and use function notation-** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$. **CCSS.HSIF.F.2: Understand the concept of a function and use function notation-** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. **CCSS.HSIF.F.4: Interpret functions that arise in applications in terms of the context-** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*

	CCSSHSIF.F.5: Interpret functions that arise in applications in terms of the context- Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.* **CCSS.HSIF.F.6: Interpret functions that arise in applications in terms of the context-** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. **CCSS.HSIF.F.7a: Analyze functions using different representations-** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. **CCSS.HSA.SSE.1a: Interpret the structure of expressions-** Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients. **CCSS.HSA.CED.1: Create equations that describe numbers or relationships-** Create equations and inequalities in one variable and use them to solve problems. **CCSS.HSA.CED.2: Create equations that describe numbers or relationships-** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **CCSS.HSA.CED.3: Create equations that describe numbers or relationships-** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* **CCSS.HSA.CED.4: Create equations that describe numbers or relationships-** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. MP1 Make sense of problems and persevere in solving them MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others MP4 Model with mathematics MP5 Use appropriate tools strategically

Course Name: **Finite Math** Grade: 11 and 12

Title of Unit	**Matrix Operations and Applications**
Enduring Understandings	Matrix analysis is the method that enables technology integration to aid in modeling real life scenarios and solving systems.
Essential Questions	How do matrices help to organize large sets of data? How can we solve systems of equations using the properties of matrices? What other applications of matrices are there.
Content	Students will understand matrix operations (add, subtract, scale, multiply). Students will understand applications of matrices to model real-world problems. Students will understand interpretation of the solutions to applied matrix operations problems. Students will understand matrix inverses. Students will understand solving systems using matrix inverses. Students will understand Leontief input-output matrices. Students will understand using matrices for encryption.
Skills	Students will be able to perform matrix operations by hand. Students will be able to apply matrices to model real-world problems. Students will be able to interpret the solutions to applied matrix operations problems. Students will be able to solve systems using matrix inverses. Students will be able to perform all operations using TI-Graphing calculator. Students will be able to perform all operations using excel. Students will be able to encrypt a message and decode an encrypted message using matrices. Students will be able to interpret Leontief input-output matrices.
Common Summative Assessments	Summative Assessment Project: Matrices with Excel
Standards	**CCSS.HSN.VM.6** Use matrices to represent and manipulate data **CCSS.HSN.VM.7** Multiply matrices by scalars to produce new matrices

	CCSS.HSN.VM.8 Add, subtract, and multiply matrices of appropriate dimensions **CCSS.HSN.VM.9** Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties. **CCSS.HSN.VM.10** Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse. **CCSS.HSA.REI.3: Solve equations and inequalities in one variable-** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **CCSS.HSA.REI.5: Solve systems of equations-** Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. (linear combinations) **CCSS.HSA.REI.6: Solve systems of equations-** Solve systems of linear equations exactly and approximately **CCSS.HSA.REI.8: Solve systems of equations-** Represent a system of linear equations as a single matrix equation in a vector variable **CCSS.HSA.REI.10: Represent and solve equations and inequalities graphically-** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). **CCSS.HSF.BF.1:** Write a function that describes a relationship between two quantities. **CCSS.MATH.CONTENT.HSF.LE.1b:** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. **CCSS.HSIF.F.2: Understand the concept of a function and use function notation-** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. **CCSS.HSIF.F.5: Interpret functions that arise in applications in terms of the context-** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. **CCSS.HSIF.F.7: Analyze functions using different representations-** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. **CCSS.HSA.SSE.1a: Interpret the structure of expressions-** Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients. **CCSS.HSA.SSE.1b: Interpret the structure of expressions-** Interpret expressions that represent a quantity in terms of its context. Interpret complicated expressions by viewing one or more of their parts as a single entity. **CCSS.HSA.CED.1: Create equations that describe numbers or relationships-** Create equations and inequalities

	in one variable and use them to solve problems. **CCSS.HSA.CED.2: Create equations that describe numbers or relationships-** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **CCSS.HSA.CED.3: Create equations that describe numbers or relationships-** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. **CCSS.HSA.CED.4: Create equations that describe numbers or relationships-** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. MP1 Make sense of problems and persevere in solving them MP4 Model with mathematics MP5 Use appropriate tools strategically MP6 Attend to precision. MP7 Look for and make use of structure

Course Name: **Finite Math** Grade: 11 and 12

Title of Unit	**Linear Programming A Geometric Approach**
Enduring Understandings	Linear systems of equalities in two variables are a useful tool in optimization problems involving several constraints.
Essential Questions	How do I model and solve an optimization problem involving several constraints? How do I analyze the sensitivity and limitations of my solution?
Content	Students will understand the graphs of linear inequalities. Students will understand the graphs of systems of linear inequalities. Students will understand the development of a system of constraints given a real-world application. Students will understand the development of an optimization equation. Students will understand determining critical points of feasible regions. Students will understand the analysis of unbounded feasible regions. Students will understand the optimal solution. Students will understand the sensitivity analysis of the parameter of the optimization function. Students will understand the sensitivity analysis of the constraints,
Skills	Students will be able to develop a system of linear constraints, an optimization function, and determine the optimum solution to a linear programming problem. Students will be able to perform sensitivity analysis of optimization function and constraints algebraically. Students will be able to apply linear programming to model real-world optimization problems.
Common Summative Assessments	Summative Assessment

Standards	**CCSS.HSA.REI.1: Understand solving equations as a process of reasoning and explain the reasoning**- Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. **CCSS.HSA.REI.3: Solve equations and inequalities in one variable-** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **CCSS.HSA.REI.5: Solve systems of equations-** Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. **CCSS.HSA.REI.6: Solve systems of equations-** Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. **CCSS.HSA.REI.10: Represent and solve equations and inequalities graphically-** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). **CCSS.HSA.REI.12: Represent and solve equations and inequalities graphically-** Graph the solutions to a linear inequality in two variables as a half- plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. **CCSS.HSIF.F.1: Understand the concept of a function and use function notation-** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$. **CCSS.HSIF.F.2: Understand the concept of a function and use function notation-** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. **CCSS.HSIF.F.5: Interpret functions that arise in applications in terms of the context-** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. **CCSS.HSF.BF.3: Build new functions from existing functions-** Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. **CCSS.HSA.SSE.1a: Interpret the structure of expressions-** Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients. **CCSS.HSA.SSE.1b: Interpret the structure of expressions-** Interpret expressions that represent a quantity in

	terms of its context. Interpret complicated expressions by viewing one or more of their parts as a single entity. **CCSS.HSA.CED.2: Create equations that describe numbers or relationships-** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **CCSS.HSA.CED.3: Create equations that describe numbers or relationships-** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. **CCSS.HSA.CED.4: Create equations that describe numbers or relationships-** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. MP1 Make sense of problems and persevere in solving them MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others MP4 Model with mathematics MP5 Use appropriate tools strategically MP6 Attend to precision. MP7 Look for and make use of structure

Course Name: **Finite Math** Grade: 11 and 12

Title of Unit	**Mathematics of Finance and Exponential Functions**
Enduring Understandings	Exponential functions can be used to model and solve problems involving exponential growth/decay and compound interest.
Essential Questions	What is the difference between a linear and exponential function/model? What is compound interest and how is it related to loans and investments?
Content	Students will understand exponential functions as a model for growth and decay. Students will understand the use of logarithms in solving exponential growth equations. Students will understand the logistic growth model. Students will understand simple interest. Students will understand compound interest. Students will understand continuously compounded interest/growth. Students will understand annuities. Students will understand amortization. Students will understand mortgages and loans. Students will understand the use of the TI-Graphing Calculator TVM Solver app in compound interest problems. Students will understand the exponential Regression in Excel.
Skills	Students will be able to determine if a collected data set is exponential. Students will be able to perform exponential regression analysis using excel. Students will be able to solve for any parameter in a compound interest function (with aid of graphing calculator). Students will be able to apply compound interest functions to real-world investment and loan problems. Students will be able to calculate the savings of a loan refinance.
Common Summative Assessments	Summative Assessment Exponential Growth and Decay Lab Logistic Model for Population Growth Lab
Standards	**CCSS.HSF-LE-1** Distinguish between situations that can be modeled with linear functions and with exponential functions.

	CCSS.HSF.LE.2: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table.) **CCSS.HSF.LE.3:** Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically or (more generally) as a polynomial function **CCSS.HSF.LE.4:** For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where *a, c, and d,* are numbers and the base *b* is 2, 10, *e*; evaluate the logarithm using technology. **CCSS.HSF.LE.5:** Interpret the parameters in a linear, quadratic, or exponential function in terms of a context. **CCSS.HSA.SSE.1:** Interpret expressions that represent a quantity in terms of its context.★ Interpret parts of an expression, such as terms, factors, and coefficients. **CCSS.HSA-SSE.3.c** Use properties of exponents to transform expressions for exponential functions. **CCSS.HSA-SSE.4:** Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. **CCSS.HSF-BF.2:** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. **CCSS.HSF-BF.5:** Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving and exponents. **CCSS..HSA.CED.2: Create equations that describe numbers or relationships-** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. MP1 Make sense of problems and persevere in solving them MP4 Model with mathematics MP5 Use appropriate tools strategically MP7 Look for and make use of structure MP8 Look for and express regularity in repeated reasoning

Course Name: **Finite Math** Grade: 11 and 12

Title of Unit	**Sets, Counting, and Probability**
Enduring Understandings	Counting and combinatorics are the fundamental tools of probability. Probability helps us to determine the likelihood of certain outcomes and make decisions.
Essential Questions	How do we use counting methods for counting in complicated situations? How do we determine the likelihood of various outcomes?
Content	Students will understand set theory and set operations. Students will understand Venn diagrams. Students will understand the number of elements in a finite set. Students will understand the multiplication principle. Students will understand permutations and combinations. Students will understand experiments, sample spaces, and events. Students will understand the definition of probability. Students will understand the rules of probability. Students will understand the counting techniques in probability. Students will understand conditional probability. Students will understand independent events.
Skills	Students will be able to solve counting problems using set theory, multiplication principle, permutations and combinations. Students will be able to use counting techniques to solve probability problems. Students will be able to determine whether events are independent. Students will be able to solve conditional probability problems.
Common Summative Assessments	Summative Assessment Project: Probability Carnival Game (and Write Up

Standards	**CCSS.HSCP.A.1** Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). **CCSS.HSCP.A.2** Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. **CCSS.HSCP.A.3** Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. **CCSS.HSCP.A.5** Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.* **CCSS.HSCP.B.6** Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A*, and interpret the answer in terms of the model. **CCSS.HSCP.B.7** Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model. **CCSS.HSCP.B.8** (+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model. **CCSS.HSCP.B.9** (+) Use permutations and combinations to compute probabilities of compound events and solve problems. MP1 Make sense of problems and persevere in solving them MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others MP4 Model with mathematics MP5 Use appropriate tools strategically MP6 Attend to precision. MP7 Look for and make use of structure MP8 Look for and express regularity in repeated reasoning

Course Name: **Math Modeling (semester)** Grade: 11 and 12

Title of Unit	**Exploring Fractals**
Enduring Understandings	Draw a connection between pure mathematics, fractals, art, and natural phenomena.
Essential Questions	Where do fractals come from? How can we make our own? What are the connections between fractals and the natural world?
Content	Students will understand who Benoit Mandelbrot is. Students will understand how the Mandelbrot set is generated. Students will understand the complex plane and arithmetic with complex numbers. Students will understand concepts of non-Euclidian dimension and roughness. Students will understand the idea of similarity over scale. Students will understand the history of fractals and the Mandelbrot set.
Skills	Students will be able to add, subtract, multiply complex numbers. Students will be able to compute several iterations of the Mandelbrot formula. Students will be able to create their own fractal art with Xaos.app. Students will be able to create a fractal by hand.
Common Summative Assessments	Complex Number Quiz Projects: Original Student Fractals
Standards	CCSS.MATH.CONTENT.HSG.MG.A.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder) CCSS.MATH.CONTENT.HSN.CN.A.1 Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real. CCSS.MATH.CONTENT.HSN.CN.A.2 Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. CCSS.MATH.CONTENT.HSN.CN.B.4 Represent complex numbers on the complex plane in rectangular and polar

	form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number. MP2 Reason abstractly and quantitatively. MP4 Model with mathematics MP8 Look for and express regularity in repeated reasoning

Course Name: **Math Modeling (semester)** Grade: 11 and 12

Title of Unit	**Programming Models with Netlogo**
Enduring Understandings	Netlogo.app is free agent-based programming language that models many real-life phenomena
Essential Questions	How can we model real-life phenomena using Netlogo? How can we assess and revise our model to be a more accurate description of reality?
Content	Students will understand the fundamentals of agent-based programming. Students will understand the properties of 'Turtles' and 'Patches'. Students will understand how to program simple models using Netlogo.
Skills	Students will be able to identify key aspects of phenomena to be modeled and make appropriate simplifying assumptions. Students will be able to define variables appropriately. Students will be able to create basic programs from scratch. Students will be able to analyze more sophisticated models and make alterations appropriate to the context
Common Summative Assessments	Original Student Program Project Existing Program – Revision and Write Up - Project
Standards	CCSS.HSA.CED.A.1 Create equations and inequalities in one variable and use them to solve problems. CCSS.HSA.CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. CCSS.HSA.CED.A.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. CCSS.HSA.CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving

	equations. *For example, rearrange Ohm's law V = IR to highlight resistance R*. CCSS.HSF.BF.A.1 Write a function that describes a relationship between two quantities. CCSS.HSF.BF.A.1.A Determine an explicit expression, a recursive process, or steps for calculation from a context. CCSS.HSF.BF.A.1.B Combine standard function types using arithmetic operations. CCSS.HSF.BF.A.1.C Compose functions. CCSS.HSF.LE.A.1.B Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Math Modeling (semester)** Grade: 11 and 12

Title of Unit	**Budgets, Loans, and Investing**
Enduring Understandings	Investments and loans are fundamentally governed by the laws of compound interest and exponential growth. A comprehensive budget must include all cash flow in and out of your account.
Essential Questions	How do time, interest rate, principal, down payment, periodic payment, conversion period affect loans investments? How do we create an accurate, useful, comprehensive budget?
Content	Students will understand the effects of a down payment, interest rate, and duration of a loan, annuity, or investment Students will understand the exponential growth nature of compound interest Students will understand an amortization schedule. Students will understand why payments primarily go towards interest in the beginning and principal at the end of a loan. Students will understand the factors to be included in a monthly budget.
Skills	Students will be able to use appropriate technology to calculate a future value, present value, or payment for a loan or investment. Students will be able to calculate the effects of a loan refinance. Students will be able to calculate total actual repayment and total interest for a loan. Students will be able to create an organized monthly budget in excel using realistic values. Students will be able to make a monthly budget.
Common Summative Assessments	Summative Assessment Project: Budget with Excel (or Google Sheets)

Standards	CCSS.HSF.LE.A.1.C Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. CCSS.HSF.LE.B.5 Interpret the parameters in a linear or exponential function in terms of a context. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision.

Course Name: **Math Modeling (semester)** Grade: 11 and 12

Title of Unit	**Creating and Solving Mathematical Models**
Enduring Understandings	A mathematical model is a representation of a system or scenario that is used to gain qualitative and/or quantitative understanding of some real-world problems and to predict future behavior.
Essential Questions	How do we use our mathematical toolkit to develop a useful mathematical model?
Content	Students will understand the difference between a mathematical model and "word problems". Students will understand the mathematical modeling process.
Skills	Students will be able to define the problem statement. Students will be able to make appropriate simplifying assumptions. Students will be able to define variables. Students will be able to distinguish between independent variables, dependent variables, and model parameters. Students will be able to get a solution. Students will be able to apply appropriate technology. Students will be able to analyze and assess their model and make revisions as is necessary and time permits. Students will be able to report results in written, visual, and/or verbal form. Students will be able to generalize their model solution to model similar situations.
Common Summative Assessments	Projects: Models are typically developed in groups and submitted or presented in written, visual, and/or verbal formats. Each semester we develop numerous models for various problems and situations. These may include but are not limited to

Standards	No specific common core content standards exist. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Fundamentals of Mathematics** Grade: 9 and 10

Title of Unit	**Whole Numbers and Decimals**
Enduring Understanding	Decimals have place values related by groups (powers) of 10. Strategies for adding, subtracting, multiplying, or dividing decimals are the same strategies we have always used with whole numbers.
Essential Questions	How does knowledge of place value help in rounding whole numbers and decimals? How are operations of whole numbers and decimals connected?
Content	Students will understand whole numbers and decimals. Students will understand place value of whole numbers and decimals.
Skills	Students will be able to read and write whole numbers and decimals. Students will be able to round whole and decimal numbers. Students will be able to add, subtract, multiply, and divide whole numbers and decimals.
Common Summative Assessments	Common summative assessments
Standards	CCSS.6.NS.B.2 Fluently divide multi-digit numbers using the standard algorithm. CCSS.6.NS.B.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure

Course Name: **Fundamentals of Mathematics** Grade: 9 and 10

Title of Unit	**Fractions and Mixed Numbers**
Enduring Understanding	Students will fluently compute with fractions and mixed numbers. Students will use their knowledge of fractions to successfully solve problems.
Essential Questions	Why can't we add and subtract fractions with unlike denominators without finding a common denominator? What real world situations and problems involve computing with fractions? Why is the quotient bigger than the divisor and dividend when dividing a whole number by a fraction less than 1?
Content	Students will understand the divisibility rules. Students will understand prime and composite numbers. Students will understand proper and improper fractions. Students will understand the connection between improper fractions and mixed numbers.
Skills	Students will be able to find the greatest common of factor of two or more numbers. Students will be able to simplify fractions. Students will be able to add, subtract, multiply, and divide fractions. Students will be able to add, subtract, multiply, and divide mixed numbers.
Common Summative Assessments	Common summative assessments
Standards	CCSS.MATH.CONTENT.6.NS.B.4 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).*. CCSS.MATH.CONTENT.6.NS.A.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure

Course Name: **Fundamentals of Mathematics** Grade: 9 and 10

Title of Unit	**Integers and Algebraic Expressions**
Enduring Understanding	Integers are useful for noting relative changes or values. Every numerical operation has an inverse. Students will understand the use of variables in algebraic expressions. Students will apply and extend previous understandings of arithmetic to algebraic expressions.
Essential Questions	What do integers represent? What is x? What is the connection between arithmetic and expressions?
Content	Students will understand integers. Students will understand exponents. Students will understand numerical and algebraic expressions. Students will understand the order of operations. Students will understand like terms in an expression. Students will understand the distributive property.
Skills	Students will be able to add, subtract, multiply, and divide integers. Students will evaluate numerical expressions containing exponents. Students will simplify numerical expressions using the order of operations. Students will be able to write algebraic expressions. Students will be able to evaluate algebraic expressions. Students will be able to simplify algebraic expressions including the use of the distributive property.
Common Summative Assessments	Common summative assessments
Standards	CCSS.6.NS.5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values 9e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. CCSS.7.NS.1. a. Describe situations in which quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* CCSS.7.NS.2.b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of

	integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers by describing real-world contexts. CCSS.6.EE.A.1 Write and evaluate numerical expressions involving whole-number exponents. CCSS.6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers. CCSS.6.EE.A.3 Apply the properties of operations to generate equivalent expressions. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision CCSS.MP7 Look for and make use of structure

Course Name: **Fundamentals of Mathematics** Grade: 9 and 10

Title of Unit	**Equations and Inequalities**
Enduring Understanding	An equation represents two quantities that are equal and can be used as a tool to find an unknown value. The understanding that solving equations is a process of working backwards. The solutions to equations and inequalities can be represented on a number line.
Essential Questions	How are equations used as a problem-solving tool? How does solving a linear equation compare to solving a linear inequality? How could we tell if a number was a solution to an inequality from looking at the graph of its solution?
Content	Students will understand the difference between the solutions of equations and inequalities. Students will understand like terms. Students will understand the distributive property.
Skills	Students will be able to solve one-step equations. Students will be able to solve two-step equations. Students will be able to solve equations by combining like terms. Students will be able to solve equations using the distributive property. Students will be able to solve equations with variables on both sides. Students will be able to graph inequalities on a number line. Students will be able to solve inequalities using addition and subtraction.
Common Summative Assessments	Common Summative Assessment
Standards	CCSS.MATH.CONTENT.8.EE.C.7 Solve linear equations in one variable. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP7 Look for and make use of structure

Course Name: **Fundamentals of Mathematics** Grade: 9 and 10

Title of Unit	**Exponents and Scientific Notation**
Enduring Understanding	Exponential and scientific notation are efficient ways of expressing numbers.
Essential Questions	What is the purpose of exponents? How do you simplify expressions using the laws of exponents? How do the rules of exponents help in multiplying numbers in scientific notation?
Content	Students will understand the product, quotient, and power rules of exponents. Students will understand scientific notation.
Skills	Students will be able to simplify expressions using the product, quotient, and power rules of exponents. Students will be able to read and write very large and very small numbers in scientific notation. Students will multiply numbers using scientific notation.
Common Summative Assessments	Common summative assessments
Standards	CCSS.MATH.CONTENT.8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3-5 = 3-3 = 1/33 = 1/27. CCSS.MATH.CONTENT.8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. CCSS.MATH.CONTENT.8.EE.A.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure

Course Name: **Fundamentals of Mathematics** Grade: 9 and 10

Title of Unit	**Ratios, Proportions, and Percents**
Enduring Understanding	Proportional relationships express how quantities change in relationship to each other. Students will understand that proportional reasoning can be useful in solving real life situations. Proportions are a tool for calculating percents and finding missing pieces of information. A part of a whole can be expressed as a decimal, fraction, or percent. Real life data is often represented as percentages.
Essential Questions	What kinds of relationships can proportions represent? How can solving percentages be applied to real world situations?
Content	Students will understand when two ratios form a proportion. Students will understand the equivalency of fractions, decimals, and percents. Students will understand mark-up, tax, and discount.
Skills	Students will be able to determine if two ratios create a proportion. Students will be able to solve proportions. Students will be able to use proportions to solve problems. Students will be able to convert between fractions, decimals, and percents. Students will be able to solve percent equations. Students will be able to solve word problems using percents. This includes, but is not limited to, mark-up, tax, discount, and percent of change.
Common Summative Assessments	Common summative assessment
Standards	CCSS.MATH.CONTENT.7.RP.A.2 Recognize and represent proportional relationships between quantities. CCSS.MATH.CONTENT.7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure

Course Name: **Fundamentals of Mathematics** Grade: 9 and 10

Title of Unit	**Graphing Linear Equations**
Enduring Understanding	Understand slope is a constant rate of change. Understand linear equations describe the association between two quantities in bivariate data.
Essential Questions	How can you recognize a linear equation? How can the slope of a line be used to describe the line? How can you describe the graph of y = mx +b? How are equations and graphs related?
Content	Students will understand ordered pair, coordinate plane, origin, x-axis, y-axis, and quadrants. Students will understand the slope of a line. Students will understand the slope-intercept and standard forms of a linear equation.
Skills	Students will be able to plot points on the coordinate plane. Students will be able to find the slope of a line given a graph, 2 points, and a linear equation. Students will be able to graph linear equations given an equation in slope-intercept form and standard form.
Common Summative Assessments	Common Summative Assessments
Standards	CCSS.MATH.CONTENT.6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. CCSS.HSF.IF.B.6: Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. CCSS.HSF.IF.C.7.A: Graph linear and quadratic functions and show intercepts, maxima, and minima. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP7 Look for and make use of structure

Course Name: **Fundamentals of Mathematics** Grade: 9 and 10

Title of Unit	**Geometry**
Enduring Understanding	Geometry and spatial sense offer ways to interpret and reflect on our physical environment. Analyzing geometric relationships develops reasoning and justification skills. The special properties of right triangles can be used to solve real world problems. Geometric transformations are functional relationships.
Essential Questions	How are geometric shapes and objects classified? How are the areas of polygons and circles related and applied? How are the surface areas and volumes of solids related and applied?
Content	Students will understand the types of angles: acute, obtuse, right, and straight. Students will understand the angle relationships formed when parallel lines are intersected by a transversal. Students will understand the types of triangles: acute, obtuse, and right. Students will understand the characteristics of quadrilaterals. Students will understand the difference between rotations, translations, and reflections. Students will understand the parts of a circle: radius, diameter, circumference, and area. Students will understand the characteristics of different quadrilaterals: parallelograms, rectangles, squares, and trapezoids. Students will understand the characteristics of prisms, pyramids, cylinders, cones, and spheres. Students will understand the Pythagorean theorem. Students will understand the distance formula.
Skills	Students will be able to draw and measure angles. Students will be able to find the congruent angles formed when parallel lines are intersected by a transversal. Students will be able to find the sum of the angles of a triangle and quadrilateral. Students will be able to transform figures using rotations, translations, and reflections. Students will be able to find the diameter given the radius of a circle. Students will be able to find the circumference and area of a circle. Students will be able to find the area of parallelograms, triangles, and trapezoids. Students will be able to find the surface area and volume of prisms, pyramids, cylinders, cones, and spheres. Students will be able to approximate square roots using a calculator. Students will be able to estimate a square root between two whole numbers. Students will be able to solve problems using the Pythagorean theorem. Students will be able to find the distance between two points.

Common Summative Assessments	Common Summative Assessments Geometry Project
Standards	CCSS.MATH.CONTENT.8.G.A.1 Verify experimentally the properties of rotations, reflections, and translations: CCSS.MATH.CONTENT.8.G.A.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. CCSS.MATH.CONTENT.8.G.B.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. CCSS.MATH.CONTENT.8.G.B.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. CCSS.MATH.CONTENT.8.G.C.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. CCSS.MATH.CONTENT.7.G.B.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. CCSS.MATH.CONTENT.7.G.B.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. CCSS.MATH.CONTENT.6.G.A.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. CCSS.MATH.CONTENT.6.G.A.2 Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\ w\ h$ and $V = b\ h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure

Course Name: **Individualized Math Curriculum - Algebra** Grade: 11 and 12

Title of Unit	**Numbers and Operations**
Enduring Understanding	There is a specific order in which numerical calculations must be completed. There are equivalent forms for writing every real number.
Essential Questions	Why are numbers written in a variety of forms? Where do we see numbers in the real world? How are the mathematical operations connected?
Content	Students will understand the magnitude of real numbers. Students will understand that numbers have multiple equivalent forms. Students will understand integers and rational numbers.
Skills	Students will be able to order and compare real numbers written in a variety of forms. Students will be able to add, subtract, multiply, and divide integers. Students will be able to simplify numerical exponential expressions. Students will be able to simplify numerical expressions containing absolute value. Students will be able to evaluate numerical expressions using order of operations. Students will be able to evaluate algebraic expressions. Students will be able to use real numbers in authentic applications. Students will be able to check answers of large numbers by estimating.
Common Summative Assessments	Common Summative Assessments
Standards	CCSS.HSA.SSE.A.1.A Interpret parts of an expression, such as terms, factors, and coefficients. CCSS.8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3-5 = 3-3 = 1/33 = 1/27. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP4 Model with mathematics

Course Name: **Individualized Math Curriculum - Algebra** Grade: 11 and 12

Title of Unit	**Algebraic Equations**
Enduring Understanding	An equation can be seen as a tool to find an unknown value. Proportional reasoning can be useful in solving real life situations.
Essential Questions	How can we utilize equations to solve problems? When is it appropriate to reason proportionally? How do linear equations, slopes, intercepts, and points on a line help us solve relevant problems and make predictions?
Content	Students will understand proportion and ratio. Students will understand, percent, tax, tip, discount. Students will understand that not all expressions are equivalent.
Skills	Students will be able to solve one-step equations involving addition and subtraction. Students will be able to solve one-step equations involving multiplication and division. Students will be able to solve two-step equations. Students will be able to solve equations using the distributive property. Students will be able to solve equations by combining like terms on both sides of the equal sign. Students will be able to determine if two ratios form a proportion. Students will be able to solve equations involving proportional relationships. Students will be able to convert between fractions, decimals, and percents using a calculator. Students will be able to apply proportional reasoning to solve percent problems including discount, tax, and tip. Students will be able to use the concept of equations to solve real world applications. Students will be able to check answers by determining if an answer is reasonable. Students will be able to solve and graph on a number line one-step and two-step inequalities.
Common Summative Assessments	Common Summative Assessments

Standards	CCSS.MATH.CONTENT.HSA.CED.A.1 Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions*. CCSS.HSA.REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. CCSS.HSF.LE.A.1.B: Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. CCSS.7.RP.A.2 Recognize and represent proportional relationships between quantities. CCSS.7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics

Course Name: **Individualized Math Curriculum - Algebra** Grade: 11 and 12

Title of Unit	**Patterns and Functions**
Enduring Understanding	Patterns provide insights into potential relationships. Relations and functions can be represented numerically, graphically, algebraically, and/or verbally.
Essential Questions	How can you recognize when a pattern in real life is linear or nonlinear? How can patterns be used to describe relationships in mathematical situations? How can functions be identified? How do functions differ from relations? How are linear functions distinguished from nonlinear?
Content	Students will understand scatterplots. Students will understand linear and nonlinear functions. Students will understand functional notation. Students will understand relations and functions.
Skills	Students will be able to recognize linear and nonlinear patterns from graphs, scatterplots, equations, and tables. Students will be able to complete the pattern for simple arithmetic patterns. Students will be able to understand the difference between a relation and a function from a table and from graph. Students will be able to demonstrate a conceptual understanding of linear and nonlinear functions through the use of a graphing calculator or computer program given real-world data. Students will be able to evaluate functions Students will be able to show understanding with explanation that some equations are relations and not functions, with the use of a graphing utility.
Common Summative Assessments	Common Summative Assessments

Standards	CCSS.MATH.CONTENT.HSF.IF.A.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. CCSS.MATH.CONTENT.HSF.IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. CCSS.MATH.CONTENT.HSF.LE.A.1 Distinguish between situations that can be modeled with linear functions and with exponential functions. CCSS.HSF.IF.C.9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). MP1 Make sense of problems and persevere in solving them MP3 Construct viable arguments and critique the reasoning of others MP4 Model with mathematics MP5 Use appropriate tools strategically MP7 Look for and make use of structure

Course Name: **Individualized Math Curriculum - Algebra** Grade: N/A

Title of Unit	**Graphs of Linear and Nonlinear Functions**
Enduring Understanding	Real-world data can model both as linear and nonlinear functions. Systems of linear equations can be used to model problems.
Essential Questions	How does graphing linear and nonlinear functions help us solve real-world applications? The graphs of systems of equations
Content	Students will understand slope. Students will understand slope-intercept form of a linear equation. Students will understand the parts of a linear graph: slope, y-intercept, x-intercept, domain, and range. Students will understand the parts of a nonlinear graph: x-intercepts, y-intercept, domain, range, maximum value, and minimum value.
Skills	Students will be able to find slope of a line given graph, points, and equation in slope-intercept form. Students will be able to graph a line by hand (table, point and slope and slope-intercept equation). Students will be able to graph a line on a graphing calculator. Students will be able to analyze a linear function with the use of a graphing calculator (slope, y-intercept, x-intercept, domain, range). Students will be able to solve a system of equations by graphing (on calculator). Be able to explain the significance of the intersection point. Students will be able to graph a nonlinear function on a graphing calculator. Students will be able to analyze a nonlinear function with the use of a graphing calculator. This includes (but is not limited to) x- and y-intercepts, maximum and minimum (when applicable), domain, range. Students will be able to use the graphing calculator to model data using a scatterplot; write a linear regression equation; and predict future data.
Common Summative Assessments	Common Summative Assessment

Standards	CCSS.HSA.REI.10. Represent and solve equations and inequalities graphically. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane often forming a curve (which could be a line). CCSS.8.EE.C.8.A Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. CCSS.8.F.B.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. CCSS.HSF.IF.B.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. CCSS.HSF.IF.C.7.A: Graph linear and quadratic functions and show intercepts, maxima, and minima. CCSS.HSA.CED.A.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. CCSS.HSA.REI.D.10: Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). MP1 Make sense of problems and persevere in solving them MP4 Model with mathematics MP5 Use appropriate tools strategically MP7 Look for and make use of structure

Course Name: **Individualized Math Curriculum - Algebra** Grade: N/A

Title of Unit	**Polynomials**
Enduring Understanding	The properties of integers apply to polynomials. Multiplying and factoring polynomials are related.
Essential Questions	How are the operations and properties of real numbers related to polynomials? How can two algebraic expressions that appear to be different be equivalent?
Content	Students will understand the properties of exponents. Students will understand like terms in an expression. Students will understand the distributive property. Students will understand the term polynomial. Students will understand the greatest common factor of a polynomial.
Skills	Students will be able to simplify expressions using the properties of exponents. Students will be able to combine like terms in an expression. Students will be able to use the distributive property to simplify expressions. Students will be able to add, subtract, and multiply polynomials Students will be able to factor expressions using greatest common factor.
Common Summative Assessments	Common Summative Assessments
Standards	CCSS.HSA.SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. CCSS.HSA.APR.A.1: Understand that polynomials form a system analogous to the integers; namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP7 Look for and make use of structure.

Course Name: **Individualized Math Curriculum - Algebra** Grade: N/A

Title of Unit	**Geometry and Measurement**
Enduring Understanding	The measurements of geometric figures can be calculated using a variety of strategies. A change in one dimension of an object results in predictable changes in area and or volume.
Essential Questions	How can you use the area of polygons to solve real life problems? How can we use lateral area, surface area, and volume to solve real world problems?
Content	Students will understand scale factor. Students will understand areas of polygons. Students will understand areas and sectors of circles. Students will understand lateral areas, surface areas, and volumes of various solid figures.
Skills	Students will be able to use scale factor to shrink or enlarge figures. Students will be able to find areas of polygons, composite figures, circles, and sectors. Students will be able to find lateral areas, surface areas, and volumes of various solid figures.
Common Summative Assessments	Common Summative Assessments Geometric Project
Standards	CC.HSG.GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. CC.HSG.MG.1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder) CCSS.MP1 Make sense of problems and persevere in solving them CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP3 Construct viable arguments and critique the reasoning of others CCSS.MP4 Model with mathematics CCSS.MP5 Use appropriate tools strategically CCSS.MP6 Attend to precision. CCSS.MP7 Look for and make use of structure CCSS.MP8 Look for and express regularity in repeated reasoning

Course Name: **Individualized Math Curriculum - Algebra** Grade: N/A

Title of Unit	**Statistics and Probability**
Enduring Understanding	Data can be collected, displayed, described, and summarized in response to a question that has been raised. Probability helps us to determine the likelihood of certain outcomes and make decisions.
Essential Questions	How is data used in the real world? How do we determine the likelihood of various outcomes?
Content	Students will understand graphical displays for categorical and quantitative data. Students will understand how to describe features of a distribution. Students will understand experiments, sample spaces, and events. Students will understand the definition of probability. Students will understand the rules of probability. Students will understand conditional probability. Students will understand independent events.
Skills	Students will be able to create appropriate graphical displays of data. Students will be able to interpret graphical displays. Students will be able to summarize center and spread of univariate data. Students will be able to determine probability of basic and compound events.
Common Summative Assessments	Common Summative Mastery Assessment Statistical Project
Standards	CCSS.HSS.ID.A Summarize, represent, and interpret data on a single count or measurement variable. Summarize, represent, and interpret data on two categorical and quantitative variables. **CCSS.HSCP.A.2** Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. **CCSS.HSCP.A.3** Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. **CCSS.HSCP.B.7** Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model. **CCSS.HSCP.B.8** (+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model. CCSS.MP1 Make sense of problems and persevere in solving them. CCSS.MP2 Reason abstractly and quantitatively. CCSS.MP4 Model with mathematics.