

**Math Curriculum**  
**Kindergarten**

Focus: Counting skills, 1-1 correspondence, written numbers, recognizing and creating patterns.

Purpose: Kindergarten students will demonstrate an understanding of counting skills, show one-to-one correspondence, distinguish written numbers, recognize and create patterns.

***Numeration:***

Outcome: **M.K.1** Students will demonstrate knowledge and use of numbers in counting, and showing one to one correspondence.

Component: **M.K.1.1** – Count manipulatives using one to one correspondence to 20.  
6.A.Ka, 6.A.Kb

**M.K.1.2** – Rote count 0-100, by ones, tens, and fives.  
6.A.Ka

**M.K.1.3** – Rote count backwards from 21 to 0.  
6.A.Ka

**M.K.1.4** – Identify and write numbers 0-100 in random sequence (4,10,84.)  
6.A.Ka

**M.K.1.5** – Define and apply the concept of zero.  
6.A.Kb

**M.K.1.6** – Place objects in ordinal positions 1<sup>st</sup> through 5<sup>th</sup> and use appropriate vocabulary.  
6.A.Ka

**M.K.1.7** – Use terms more and less in comparative analysis.  
6.D.K

***Operations:***

Outcome: **M.K.2** Students will compute simple addition and subtraction problems using manipulatives.

Component: **M.K.2.1** – Compare two or more sets using manipulatives to solve problems (i.e., unifix cubes, bar graphs, tally marks.)  
6.B.Kab, 6.D.K

**M.K.2.2** – Solve one step addition problems with manipulatives to the sum of 10.

6.B.Kb, 8.C.K

**M.K.2.3** – Solve one step subtraction problems with manipulatives starting with 10 or less.

6.B.Ka, 8.C.K

**M.K.2.4** – Identify and recognize the symbols of operations: +, -, =.

6.B.Kb

***Geometry:***

Outcome: **M.K.3** Students will identify and name basic shapes in their environment. They will recognize, extend, and create patterns.

Component: **M.K.3.1** – Identify and name geometric shapes: Circle, square, rectangle, and triangle.

9.A.Ka, 9.A.Kb

**M.K.3.2** – Describe an attribute of two and three dimensional shapes.

9.A.Kc

**M.K.3.3** – Sort objects into groups by size, number, or other properties, and identify rationale for grouping.

8.A.Ka, 6.D.K

**M.K.3.4** – Identify, duplicate, create, and extend patterns with manipulatives and visuals.

8.A.Kb

**M.K.3.5** – Use spatial vocabulary appropriately (i.e., above, below, behind, big, bigger, biggest.)

9.B.K

***Measurement & Data Collection:***

Outcome: **M.K.4** Students will use non-standard measurement units to measure and compare length, weight and volume. Students will collect data, create graphs, and interpret data using graphs.

Component: **M.K.4.1** – Demonstrate measurement using non-standard units.

7.A.Ka

**M.K.4.2** – Measure length, weight and volume using appropriate non-standard measurement units.

7.A.Ka, 7.C.K

**M.K.4.3** – Demonstrate a sense of time through participation in daily activities (i.e., daily calendar.)

7.A.Kc

**M.K.4.4** – Compare qualitative change (i.e., student growth.)  
8.D.K

**M.K.4.5** – Reproduce a bar graph using simple data from the classroom.  
10.A.Ka

**M.K.4.6** – Create a bar graph using manipulatives (i.e., unifix cubes.)  
8.B.K

**M.K.4.7** – Gather and organize data from class bar graphs to answer questions.  
10.B.K, 10.A.Kb

**M.K.4.8** – Develop an understanding of time to the unit of an hour, on analog and digital clocks.  
7.A.Kc

**M.K.4.9** – Identify coins by their names (penny, nickel, dime, quarter.)  
7.A.Kc

**Math Curriculum**  
***1<sup>st</sup> Grade***

Focus: Students will complete addition and subtraction facts (0-9), use units of time using instruments: calendars and clocks, identify and recognize coins, extend number and visual patterns.

Goal: ***Operations and Computation***

Outcome: **M.1.1** Students will compute whole numbers to determine addition and subtraction operations and demonstrate fluency counting coins.

Component: **M.1.1.1** – Identify and use the symbols of operations. (+,-,=)  
8.C.1

**M.1.1.2** – Demonstrate fluency of addition and subtraction facts 0-9.  
8.C.1

**M.1.1.3** – Identify and use single digit fact families.  
8.C.1

**M.1.1.4** – Identify and use strategies to solve number stories.  
6.C.1a

**M.1.1.5** – Create and identify compliments of ten. (Ex.  $5+5=10$ ,  $2+8=10$ )  
8.C.1

**M.1.1.6** – Compare, count and exchange coins (penny, nickel, dime, quarter) with common denominations.  
7.A.1c

Goal: ***Measurement and Reference Frames***

Outcome: **M.1.2** Students will tell time using a calendar and a clock to obtain information for real life purposes.

Component: **M.1.2.1** – Locate, label and identify the minute and hour hand on an analog clock.  
7.A.1b

**M.1.2.2** – State time to the hour and half hour on an analog and digital clock.  
7.A.1b

**M.1.2.3** – Tell time using a calendar identifying days, dates, weeks, months and year.  
7.A.1b

**M.1.2.4** – Sequence the days of the week.  
7.A.1b

**M.1.2.5** – Measure temperature in Fahrenheit to the nearest two degrees.  
7.A.1d

**M.1.2.6** – Identify an inch, foot, and centimeter as a unit of measure.  
7.B.1d

**M.1.2.7** – Identify inches and centimeters on a ruler.  
7.A.1a

**M.1.2.8** – Make a reasonable estimate of measurement using non standard units.  
7.B.1a

**M.1.2.9** – Identify values of pennies, nickels, dimes and quarters.  
7.A.1c

Goal: ***Numeration***

Outcome: **M.1.3** Students will use and compare numbers up to 110 orally and in written form and identify equal and unequal parts.

Component: **M.1.3.1** – Compare and order numbers up to 110 in sequence and random order.  
6.A.2

**M.1.3.2** – Demonstrate fluency in counting by even numbers, 2's and 25's to 100 using a visual aid.  
6.A.1a

**M.1.3.3** – Identify place value up to the hundreds place and use manipulatives to model.  
6.A.1a

**M.1.3.4** – Use words and symbols to describe number relationships greater than, less than and equal to.  
6.A.1a

**M.1.3.5** – Identify whole and half using manipulatives.  
6.A.1b

**M.1.3.6** – Compare fractions using visual aids for a half and a whole.  
6.A.1b

**M.1.3.7** – Identify equal and unequal portions. (Ex. Cut an apple in half, recognizing if the parts are equal or unequal)  
6.A.1b

**M.1.3.8** – Identify and create patterns using odd and even numbers.  
8.B.1

Goal: ***Geometry and Graphing***

Outcome: **M.1.4** Students will identify, compare and sort geometric shapes and utilize a graph for obtaining information.

Component: **M.1.4.1** – Identify, compare and sort two dimensional figures by similarities; triangle, square, trapezoid, rhombus, hexagon, circle and rectangle.

9.B.1a

**M.1.4.2** – Create patterns with two dimensional shapes.

9.A.1a

**M.1.4.3** – Identify and compare the three dimensional shapes: spheres, cylinders, cones and cubes.

9.A.1a

**M.1.4.4** – Create and explore symmetry by completing half of a simple design.

9.B.1c

**M.1.4.5** – Cover a defined area with geometric manipulatives without gaps.

7.C.1

**M.1.4.6** – Gather and organize data for graphing.

10.A.1a

**M.1.4.7** – Interpret and analyze data from a pictograph or bar graph.

10.B.1d

**M.1.4.8** – Interpret tally charts and find corresponding information.

10.A.1b

Goal: ***Patterns, Functions and Algebra***

Outcome: **M.1.5** Students will use addition and subtraction and geometric shapes to identify, produce and extend patterns.

Component: **M.1.5.1** – Identify and extend number and visual patterns with geometric shapes and numbers.

8.A.1a

**M.1.5.2** – Identify and describe missing units within a pattern using geometric shapes and numbers.

8.B.1

**M.1.5.3** – Construct one and two step word problems.

6.B.1

**M.1.5.4** – Create addition and subtraction number sentences to solve word problems.

8.A.1b

**Math Curriculum**  
***2<sup>nd</sup> Grade***

Focus: Second grade students will apply strategies to solve one and two digit addition and subtraction problems, determine the value of currency, and tell time.

Goal: ***Operation and Computation***

Outcome: **M.2.1** Students will solve addition and subtraction problems with whole numbers and money values.

Component: **M.2.1.1** – Compute the value of coins and bills (\$1 & \$5) up to \$10.00.  
7.A.1c

**M.2.1.2** – Determine amount of change from a given set of coins up to \$1.00.  
7.A.1c, 7.A.2b

**M.2.1.3** – Solve 2 digit number story problems.  
8.C.1, 6.C.1a

**M.2.1.4** – Choose correct symbols for comparing whole numbers up to 1,000 (<, >, =).  
6.A.1

**M.2.1.5** – Demonstrate fluency for basic addition and subtraction math facts 0-12.  
6.B.1, 8.D.1

**M.2.1.6** – Demonstrate fluency with fact family operations from 0-20.  
6.B.1, 8.A.1b

**M.2.1.7** – Solve 2 digit addition and subtraction problems using whole numbers and money with and without regrouping.  
6.B.1

**M.2.1.8** – Compute addition using 3 single digit numbers.  
6.B.1

Goal: ***Measurement and Reference***

Outcome: **M.2.2** Students will demonstrate and record measurements involving standard units and apply these skills to real life situations.

Component: **M.2.2.1** – Identify the value of coins and bills in combination.  
7.A.1

**M.2.2.2** – List the sequence of the months of the year.

7.A.1b

**M.2.2.3** – Tell time to the nearest 5 minutes and the quarter hour on a clock.

7.A.1b

**M.2.2.4** – Read and show temperatures for both °C and °F to the nearest degree.

7.A.1d

**M.2.2.5** – Measure objects to the nearest unit (inch, foot, yard, centimeter, meter) using customary and metric units of measurement beginning at the zero mark.

7.B.1a, 7.A.1a

**M.2.2.6** – Identify appropriate measuring tool to use in various situations.

7.B.1b

**M.2.2.7** – Find the area and perimeter of a shape using a grid or manipulatives.

7.C.1

Goal: ***Numeration***

Outcome: **M.2.3** Students will demonstrate the ability to use numbers and their representations in a broad range of settings.

Component: **M.2.3.1** – Estimate sums and differences using rounding 2 digit numbers.  
6.C.1

**M.2.3.2** – Demonstrate multiple ways to represent a number. (For example tally marks, money, words, addition problems, etc.)

6.A.1a

**M.2.3.3** – Demonstrate fluency of skip counting by 2s, 5s, and 10s starting at a given number with visual aides to 110.

6.A.1

**M.2.3.4** – Identify place value of whole numbers to thousands place.

6.A.1

**M.2.3.5** – Identify and describe parts of a set using  $\frac{1}{2}$ ,  $\frac{1}{3}$  and  $\frac{1}{4}$ .

6.A.1b

**M.2.3.6** – Construct and interpret bar graphs in simple increments.

10.B.1b, 10.A.1a, 10.A.1b

**M.2.3.7** – Construct and interpret tally charts.

10.A.1a, 10.B.1

Goal: ***Geometry***

Outcome: **M.2.4** Students will compare, contrast, classify and construct two- and three- dimensional shapes.

Component: **M.2.4.1** – Identify, describe and create shapes that have lines of symmetry.  
9.B.1c

**M.2.4.2** – Identify more complex three-dimensional shapes. (For example: rectangular prisms, pyramids, etc.)  
9.A.1a, 9.B.1a

**M.2.4.3** – Identify attributes of two and three-dimensional objects using appropriate vocabulary.  
9.A.1a

**M.2.4.4** – Discriminate between left and right.  
9.A.1a

**M.2.4.5** – Identify characteristics of and draw polygons up to 4 sides.  
9.A.1b

Goal: ***Patterns, Functions and Algebra***

Outcome: **M.2.5** Students will identify, extend and use number patterns to solve problems in a variety of ways.

Component: **M.2.5.1** – Use number grid to explore patterns and solve addition and subtraction problems.  
8.A.1a

**M.2.5.2** – Investigate and apply rules for solving addition and subtraction problems.  
8.D.1

**M.2.5.3** – Read and construct addition and subtraction number sentences using story problems, money and measurement.  
8.A.1b

**M.2.5.4** – Compare to determine if number models are  $<$ ,  $>$  or  $=$ .  
8.A.1b

**Math Curriculum**  
**3<sup>rd</sup> Grade**

Goal: ***Patterns, Functions, and Algebra***

Outcome: **M.3.1** Students will describe numerical relationships using variables and patterns.

Components: **M.3.1.1** – Describe, extend, and make generalizations about geometric and numeric patterns.

8.A.1a

**M.3.1.2** – Identify commutative and associative properties and use them for computation with whole numbers.

8.C.1, 8.C.2

**M.3.1.3** – Write and solve number sentences with missing addends.

8.A.1b, 8.D.1

**M.3.1.4** – Solve number sentences that incorporate parenthesis.

8.C.2

Goal: ***Geometry***

Outcome: **M.3.2** Students will apply geometric concepts to two- and three-dimensional shapes, polygons, and lines.

Components: **M.3.2.1** – Identify, draw, and build polygons including pentagons, hexagons, and octagons.

9.A.2a

**M.3.2.2** – Compare and contrast attributes of two- and three-dimensional objects using appropriate vocabulary (cube, pyramid, prism, cylinders, cones, spheres.)

9.B.1a

**M.3.2.3** – Identify, and draw right angles,  $<$  and  $>$  angles, parallel and intersecting lines.

9.B.2

**M.3.2.4** – Identify faces, edges, vertices, and bases.

9.B.1a, 9.B.1b

Goal: ***Measurement***

Outcome: **M.3.3** Students will measure and compare quantities using appropriate units, instruments and methods.

Components: **M.3.3.1** – Identify pounds as a unit of weight and gallons as a unit of capacity.

7.A.1a

**M.3.3.2** – Measure objects to the nearest  $\frac{1}{2}$  unit in the U.S. customary and metric system.

7.A.1a

**M.3.3.3** – Define perimeter.

7.C.2b

**M.3.3.4** – Calculate the perimeter of polygons, including irregular shapes, with given dimensions.

7.C.1

**M.3.3.5** – Show and explain the area of an object by counting square units.

7.C.1

**M.3.3.6** – Tell time to the minute, using an analog clock and use quarter after and half past to describe time.

7.A.1b

**M.3.3.7** – Solve number stories using time and temperature.

6.B.1, 7.A.1b, 7.A.1d

Goal: ***Data and Chance***

Outcome: **M.3.4** Students will organize and analyze data and predict results.

Components: **M.3.4.1** – Construct and interpret bar graphs, line graphs, and pictographs with more complex increments.

10.A.1a

**M.3.4.2** – Identify and make up examples of likely, unlikely, and impossible probability events.

10.C.1a

**M.3.4.3** – Explain probability as a fractional part of a group (a penny should land on its tail  $\frac{1}{2}$  of the time.)

10.C.1a

**M.3.4.4** – Distinguish between fair and unfair games based on the probability of a certain outcome.

10.C.1a, 10.C.2a

**M.3.4.5** – Make predictions based on the results received from a probability experiment.

10.A.1b

Goal: ***Operations and Computations***

Outcome: **M.3.5** Students will solve problems using all math operations with whole numbers and decimals.

- Components: **M.3.5.1** – Recognize x, ●, \*, and both division signs.  
6.C.1a
- M.3.5.2** – Add and subtract dollars and cents.  
7.A.1c
- M.3.5.3** – Add and subtract 2 and 3 digit numbers with and without regrouping.  
6.B.1
- M.3.5.4** – Compute change for a dollar.  
7.A.1c
- M.3.5.5** – Solve one and two-step addition and subtraction word problems.  
6.B.1
- M.3.5.6** – Memorize multiplication and division facts from 0 – 5.  
6.C.2b
- M.3.5.7** – Demonstrate fluency with multiplication and division fact families.  
6.C.2b
- M.3.5.8** – Solve one step multiplication and division problems.  
6.B.1

Goal: ***Numeration***

Outcome: **M.3.6** Students will demonstrate knowledge and use of numbers in a broad range of settings.

Components: **M.3.6.1** – Demonstrate fluency of skip counting by 3's, 4's, and 100's.  
6.A.2, 8.A.1a

**M.3.6.2** – Represent, order and compare whole numbers and decimals to demonstrate an understanding of place value to hundredths and ten-thousand.  
6.A.2

**M.3.6.3** – Label familiar fractions (1/4, 1/3/ 1/2.)  
6.A.1b

**M.3.6.4** – Order and compare fractions given visuals.  
6.A.1b

**M.3.6.5** – Describe relationships between whole numbers and decimals using comparison notation (<,>, =).  
6.A.1a

**M.3.6.6** – Estimate sums and differences using rounding to 4-digit numbers.  
6.C.1b

**Math Curriculum**  
**4<sup>th</sup> Grade**

Focus: ***Operations & Computation***

Outcome: **M.4.1** Students will solve multi-digit problems using all math operations with whole numbers and decimals.

Components: **M.4.1.1** – Solve addition, subtraction, multiplication and division one and two step number stories.

6.C.2a

**M.4.1.2** – Demonstrate fluency in multiplication/division facts 6 to 12.

6.C.1a

**M.4.1.3** – Calculate the sum of 3 four digit numbers.

6.C.2a

**M.4.1.4** – Calculate the difference of 2 four digit numbers.

6.C.2a

**M.4.1.5** – Divide 3 digit number by a 2 digit number, writing the remainder with “R.”

6.C.2a

**M.4.1.6** – Add and subtract dollars and cents up to \$1,000.

7.A.2b

**M.4.1.7** – Subtract 4 and 5 digit numbers with and without regrouping.

6.C.2a

**M.4.1.8** – Decide the best buy when given 2 choices.

**M.4.1.9** – Apply associative and commutative properties appropriately with addition and multiplication.

8.C.2

**M.4.1.10** – Multiply 1, 2, and 3 digit numbers by 1 and/or 2 digit numbers.

6.C.2a

Focus: ***Numeration***

Outcome: **M.4.2** Students will solve problems using addition and subtraction operations with decimals to the thousandths place and be able to manipulate fractions with like denominators.

Components: **M.4.2.1** – Read and write decimals to the millions and thousandths place value.

6.A.2

**M.4.2.2** – Add and subtract decimals.

6.C.2a

**M.4.2.3** – Identify the place and value of a digit in a whole number and a decimal number.

6.A.2

**M.4.2.4** – Compare and order whole numbers to millions and decimals to thousandths.

6.A.2

**M.4.2.5** – Identify a mixed number.

6.A.2

**M.4.2.6** – Add and subtract fractions with like denominators.

6.A.2

**M.4.2.7** – Compare and order fractions with like denominators.

6.A.2

**M.4.2.8** – Identify fractions equivalent to  $\frac{1}{2}$ .

6.A.2

**M.4.2.9** – Match basic equivalent percents, decimals and fractions ( $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1.)

6.A.2

**M.4.2.10** – Demonstrate rounding up to millions.

6.C.2b

Focus: ***Geometry***

Outcome: **M.4.3** Students will identify, construct and illustrate basic geometric figures using geometric concepts.

Components: **M.4.3.1** – Identify and label a point, line, line segment and a ray.

9.A.2c

**M.4.3.2** – Identify basic properties of 2-dimensional figures (sides and number of angles.)

9.B.2

**M.4.3.3** – Construct basic geometric figures with given perimeters (kite, triangle, square, rhombus, rectangle, parallelogram and trapezoid.)

7.C.2b, 9.A.2c

**M.4.3.4** – Construct 3-dimensional figures (rectangular prism, cylinder, triangular prism, cone, sphere, and square prism.)

9.A.2a

**M.4.3.5** – Identify and illustrate lines of symmetry.

9.A.2c, 9.B.2

**M.4.3.6** – Identify and define perpendicular lines.  
9.B.2

**M.4.3.7** – Define congruent.  
9.C.2

Focus: ***Measurement***

Outcome: **M.4.4** Students will recognize, measure, draw and calculate quantities using appropriate units, instruments and methods.

Components: **M.4.4.1** – Recognize, measure and draw (within  $5^\circ$ ) angles (acute, obtuse, right, straight and reflex.)  
7.C.2a, 9.A.2c

**M.4.4.2** – Draw and measure line segments to the nearest  $\frac{1}{4}$  inch.  
7.C.2b

**M.4.4.3** – Perform and explain unit conversions, within the U.S. Customary System of Measurement, for length and time.  
7.A.2a

**M.4.4.4** – Discriminate between weight units and capacity units.  
7.A.2a

**M.4.4.5** – Calculate area of 2-dimensional shapes when given the measurements and formula.  
7.A.2a

**M.4.4.6** – Calculate the volume of a rectangular prism when given the measurements and formula.  
7.A.2a

**M.4.4.7** – Read and plot ordered pairs of numbers in quadrant 1 of the Cartesian plane.  
8.A.2a

**M.4.4.8** – Calculate elapsed time to the hour and  $\frac{1}{2}$  hour using number stories.  
7.A.1b

Focus: ***Data and Chance***

Outcome: **M.4.5** Students will collect and organize data; construct graphs; compare, interpret, analyze and make predictions using the data.

Components: **M.4.5.1** – Select appropriate method to organize data.  
10.B.2b, 10.A.2a

**M.4.5.2** – Collect and organize data using observations, surveys and experiments.  
10.A.2a, 10.B.2a

**M.4.5.3** – Determine mean, mode and range of a given set of data, up to two-digit whole numbers.

10.A.2b, 10.B.2c

**M.4.5.4** – Compute the median, with easily divisible numbers, when given an odd set of numbers.

10.A.2b

**M.4.5.5** – Represent data using tables and graphs: bar graphs, pictographs and line graphs.

10.A.2a

**M.4.5.6** – Calculate probability of a simple event and give results as a fraction.

10.C.2a

**M.4.5.7** – Propose and justify conclusions/predictions that are based on data.

10.A.2c

**M.4.5.8** – Read and interpret graphs (bar, line and pictographs.)

10.B.2d

**M.4.5.9** – Describe events as likely or unlikely and discuss the degree of likelihood using such words as always, never, impossible, more likely and less likely.

10.A.2c, 10.C.2b

Focus: ***Patterns, Functions and Algebra***

Outcome: **M.4.6** Students will describe and solve numerical relationships using variables and patterns.

Components: **M.4.6.1** – Describe, extend and make generalizations about numeric patterns.

8.A.2a

**M.4.6.2** – Represent the idea of a variable as an unknown quantity using a letter or a symbol, and solve for the variable using inverse operations.

8.A.2b

**M.4.6.3** – Write and solve number sentences using all operations.

8.A.2b

**M.4.6.4** – Compare expressions using greater than, less than, and equal to. (Ex:  $3*7 > 4*5$ )

6.A.2

**Math Curriculum**  
**5<sup>th</sup> Grade**

Purpose: Students will demonstrate knowledge of basic geometry, decimals, fractions, and central tendencies concepts. Students will apply these concepts to construct and solve equations and word problems.

Focus: ***Number and Operations***

Outcome: **M.5.1** Students will solve problems with whole numbers using order of operations, use the Commutative, Identity, Associate, and Zero properties. They will determine the estimated and exact answers, justifying the choice and reasonability of that choice.

Components: **M.5.1.1** – Determine if estimate or exact answers are appropriate.  
6.C.2b

**M.5.1.2** – Define Order of Operations.  
6.B.2

**M.5.1.3** – Solve problems using all operations through hundred billions following the rules for order of operations.  
6.B.2

**M.5.1.4** – Represent a remainder in a division problem as a fraction.  
6.B.2

**M.5.1.5** – Compute exponents (square and cube) with whole numbers only.  
6.A.2

**M.5.1.6** – Represent and understand the value of any digit in a number through billions and thousandths in standard, word, and expanded form.  
6.A.2

**M.5.1.7** – Describe and justify a pattern given a table of input/output numbers.  
6.B.2

**M.5.1.8** – Determine whether a number is composite or prime.  
6.B.3b

**M.5.1.9** – Identify all the prime and composite numbers up through 50.  
6.B.3b

Focus: ***Algebra***

Outcome: **M.5.2** Students will apply number properties to solve real-life word problems and they will create one-step linear equations with one missing value using variables.

Components: **M.5.2.1** – Solve one-step linear equations with one variable ( $n + 30 = 72$ ).  
8.A.2b, 8.A.3b

**M.5.2.2** – Demonstrate equality of two expressions with variables ( $38 + 6 = 6 + n$ ).  
8.D.2

**M.5.2.3** – Express properties of numbers and operations using variables and define commutative, associative, zero, identity properties.  
8.A.2a

**M.5.2.4** – Solve linear equations involving whole numbers using inverse operations (+/-).  
6.B.3a

Focus: ***Fractions & Decimals***

Outcome: **M.5.3** Students will compare and order fractions and decimals and be able to solve number sentences and word problems using addition, subtraction, multiplication and division. Students will show equivalent representations of decimals to fractions, percentages, and ratios; compare and order decimals to thousandths; solve number sentences and word problems using all operations.

Components: **M.5.3.1** – Solve word problems and number sentences using addition and subtraction fractions and mixed numbers with like and unlike denominators, always express in simplest form.  
6.B.2

**M.5.3.2** – Solve word problems and number sentences using multiplication and division of fractions and mixed numbers, always express in simplest form.  
6.A.2, 6.B.2

**M.5.3.3** – Identify the equivalencies from one form to another (fraction to decimal, decimal to fraction and decimal to percent).  
6.A.3

**M.5.3.4** – Explain and demonstrate the meaning of percents (50/100).  
6.A.3

**M.5.3.5** – Students will compare and order fractions and decimals.  
6.A.2

**M.5.3.6** – Show equivalent representations of a number by converting mixed to improper, improper to mixed.

6.A.2, 6.A.3

**M.5.3.7**– List Greatest Common Factor and Least Common Multiple of a pair of numbers.

6.B.3b

**M.5.3.8** – Apply fractions using real life setting of fractions (doubling a recipe).

6.A.2

Focus: ***Geometry – Angles, Lines, and Circles***

Outcome: **M.5.4** Students will examine, construct, and measure plane figures and circles in order to evaluate basic geometric concepts; use formula to determine circumference.

Components: **M.5.4.1** – Identify, represent, draw parallel lines, scalene, isosceles, equilateral, right, acute, and obtuse triangles.

9.A.2c

**M.5.4.2** – Select and apply appropriate tools to measure, draw, and construct figures (ruler, protractor, and compass).

9.B.2

**M.5.4.3** – Use a protractor to measure angles. (30,45,60,90,180).

9.B.2

**M.5.4.4** – Calculate the unknown angle of a triangle when given two angles (Triangle Sum Theory).

9.C.2

**M.5.4.5** – Label and identify the following of a circle: radius, diameter, chord and circumference.

9.B.2

**M.5.4.6** – Use a compass and a ruler to construct a circle with a specified radius or diameter.

9.B.2

Focus: ***Geometry – Two & Three Dimensional Figures***

Outcome: **M.5.5** Students will determine the fundamental characteristics of two and three dimensional shapes; sort and classify both plane and solid figures; use formula to determine the perimeter and area of a plane figure as well as the volume of rectangular prisms.

Components: **M.5.5.1** – Determine the relationships between the number of sides and the number of vertices in a polygon, the sum of its angles in a triangle, and the number of diagonals.

9.B.3

**M.5.5.2** – Identify polygons by the number of sides (up to 8 sides).

9.B.3

**M.5.5.3** – Identify translations (slides), rotations (turns), and reflections (flips).

9.A.3b

**M.5.5.4** – Apply memorized formulas to determine the area and perimeter of a square or a rectangle.

7.A.3b

**M.5.5.5** – Apply memorized formula to calculate volume of a rectangular prism.

7.A.3a

**M.5.5.6** – Determine the 3-dimensional object from its net. (pyramid, prisms, cube).

9.A.2c

Focus: ***Measurement***

Outcome: **M.5.6** Students will solve word problems that reflect real-life situations by computing U.S. customary and linear metric measurement conversions (within its system).

Outcome: **M.5.6.1** – Perform and explain unit conversions within the same system (smaller to larger, larger to smaller units).

7.A.2a

**M.5.6.2** – Use metric scale to measure centimeters accurately.

7.B.3

**M.5.6.3** – Use U.S. customary ruler to measure to the nearest  $\frac{1}{8}$  of an inch.

7.B.3

**M.5.6.4** – Demonstrate fluency in understanding  $100 \text{ cm} = 1 \text{ meter}$ ;  $10 \text{ mm} = 1 \text{ cm}$ ;  $4 \text{ quarts} = 1 \text{ gallon}$ .

7.A.2a

Focus: ***Data Analysis and Probability***

Outcome: **M.5.7** The student will collect data for a given problem; they will arrange, interpret and justify conclusions and predictions in real-life situations as well as demonstrate, predict, test, and represent simple probabilities.

Components: **M.5.7.1** – Sort given data; least to greatest, calculate, median, mode, mean, range using whole numbers when given an even or odd data set.  
10.A.3a, 10.A.3b

**M.5.7.2** – Evaluate, interpret and predict data from a graph (stem & leaf, bar, pie, line, and line plot).  
10.A.2b

**M.5.7.3** – Determine an appropriate graph format for the data given.  
10.A.3a, 10.B.2b

**M.5.7.4** – Predict the probability of outcomes using simple experiments and test the predictions. (Spinning a spinner or flipping a coin)  
10.C.2a, 10.C.2b

**M.5.7.5** – Understand and state probabilities in decimal, fraction, percent, ratio or word form. ( $\frac{3}{4}$ , 75%, 3:4, .75, 3 to 4, 3 out of 4)  
6.D.2, 6.D.3

**M.5.7.6** – Recognize there are 4 quadrants on a coordinate plane.  
6.C.3a

**M.5.7.7** – Plot ordered pairs using x and y axis on quadrant 1 only (x,y).  
6.C.3a

**Math Curriculum**  
**6<sup>th</sup> Grade**

Purpose: Sixth grade students will create and set-up proportions, manipulate integers (all operations), divide decimals, and demonstrate fluency in fraction including borrowing.

Focus: ***Number Operations***

Outcome: **M.6.1** Students will choose appropriate properties and proper order of operations to manipulate numeric expressions.

Components: **M.6.1.1** – Define square and cube.  
6.A.3

**M.6.1.2** – Solve problems using the commutative, associative, and identity properties.  
8.A.3a

**M.6.1.3** – Create problems using the commutative, associative, and identity properties.  
8.A.3a

**M.6.1.4** – Apply the order of operations to problems including parentheses and their applications.  
6.C.3a

**M.6.1.5** – Compute exponents to powers higher than 3 (including powers of 10).  
6.A.3

**M.6.1.6** – Order and compare integer values.  
6.B.3a

**M.6.1.7** – Apply rules of integers to multiplication and division sequences.  
6.B.3a

**M.6.1.8** – Demonstrate fluency in squares up to 10.  
6.A.3

Focus: ***Algebra***

Outcome: **M.6.2** Students will evaluate algebraic expressions and write and solve single step whole number equations.

Components: **M.6.2.1** – Evaluate expressions for a given whole number value.  
(Example:  $6n$  where  $n=12$ )  
8.A.3b, 8.D.3b

**M.6.2.2** – Define and utilize the concepts of isolating the variable and inverses.

8.D.3b

**M.6.2.3** – Solve one-step positive whole number, decimal, and fraction equations.

8.A.2b, 8.A.3b

**M.6.2.4** – Compose equations and number stories modeled from real world situations.

8.D.3b

Focus: ***Fractions***

Outcome: **M.6.3** Students will compute fractions using all operations including borrowing.

Components: **M.6.3.1** – Name and apply divisibility rules for numbers 2,3,4,5,6,9 and 10.

6.B.3b

**M.6.3.2** – Illustrate prime factorization.

6.B.3b

**M.6.3.3** – Utilize prime factorization to find greatest common factors.

6.B.3b

**M.6.3.4** – Solve fraction problems including mixed numbers using addition, subtraction, multiplication, and division.

6.A.3, 6.B.2

**M.6.3.5** – Use the least common multiple to find the least common denominator.

6.B.3b

**M.6.3.6** – Apply the concept of borrowing to mixed fractions.

6.A.3

**M.6.3.7** – Formulate word problems using fractions.

6.A.3, 6.B.2, 8.D.3b

Focus: ***Decimals***

Outcome: **M.6.4** Students will interpret decimal remainders and manipulate decimals with all operations.

Components: **M.6.4.1** – Compute whole number division problems and represent remainders using decimals.

6.B.2

**M.6.4.2** – Solve word problems and interpret decimal remainders using rounding and estimation.

6.B.2, 8.D.3b

**M.6.4.3** – Complete number sentences and problem solve using addition, subtraction, multiplication, and division of decimals.

6.B.2

**M.6.4.4** – Define and use symbols to represent repeating and terminating decimals.

6.B.2

Focus: ***Geometry***

Outcome: **M.6.5** Students will recognize and analyze two and three-dimensional figures and transform shapes.

Components: **M.6.5.1** – Construct an obtuse, acute, right, and straight angle within 3 degrees.

9.B.3

**M.6.5.2** – Define regular and irregular polygons.

9.B.4

**M.6.5.3** – Define and compute the supplement and complement of an angle.

9.A.2a

**M.6.5.4** – Estimate measures of angles.

9.B.3

**M.6.5.5** – Analyze different characteristics of types of triangles.

9.B.3

**M.6.5.6** – Categorize quadrilaterals by their sides and angles in a variety of ways.

9.B.3

**M.6.5.7** – Select most specific classification for quadrilaterals.

9.B.4

**M.6.5.8** – Recognize transformations of shapes.

9.A.3b

**M.6.5.9** – Perform rotations on a shape related to degrees and clock directions.

9.A.3b

**M.6.5.10** – Identify and name a plane.

9.D.3

**M.6.5.11** – Given a radius, compute area and circumference of a circle given a formula.

7.A.2a

**M.6.5.12** – Construct congruence statements with sides and angles using congruence symbols.

9.C.3b

**M.6.5.13** – Identify points, lines, line segments, and rays in a complex figure.

9.B.3

Focus: ***Proportions and Percents***

Outcome: **M.6.6** Students will construct and apply proportions to solve practical problems.

Components: **M.6.6.1** – Define proportion, ratio, and rate as comparisons.

6.D.3, 8.D.3b

**M.6.6.2** – Given amounts, represent a comparison by setting up a proportion.

6.D.3

**M.6.6.3** – Compute the percent of a number by using a proportion.

6.A.3

**M.6.6.4** – Estimate and find 10% using a variety of methods.

6.A.3

**M.6.6.5** – Set up unit conversions to convert U.S. customary measurements using proportions.

7.A.2a

**M.6.6.6** – Perform and explain unit conversions.

7.A.2a

**M.6.6.7** – Demonstrate gallon, pint, quart and cup fluency using equivalencies.

7.A.2a

**M.6.6.8** – Define and identify similar figures by setting up proportions.

6.D.4

**M.6.6.9** – Convert between fraction, decimal, and percent and identify the appropriate use of each in a variety of situations.

6.A.3

Focus: ***Data Analysis***

Outcome: **M.6.7** Students will organize and analyze data in several graphic formats.

Components: **M.6.7.1** – Define and identify parts of the coordinate plane and quadrants.  
6.C.3a

**M.6.7.2** – Plot points and read coordinates from a graph of a point using all four quadrants.  
6.C.3a

**M.6.7.3** – Analyze graphs of data represented in bar, line, and circle graphs for misleading characteristics or inappropriate data.  
6.C.3a

**M.6.7.4** – Construct a circle graph given percentages of data.

**M.6.7.5** – Collect data and select appropriate measure of central tendency and range for a given situation.  
10.A.3a

Focus: ***Measurement***

Outcome: **M.6.8** Students will measure using appropriate instruments and apply formulas to measure two-dimensional objects.

Components: **M.6.8.1** – Use metric measurement and represent in decimals.  
7.A.3b

**M.6.8.2** – Use a U.S. customary ruler to measure to the nearest sixteenth of an inch.  
7.B.3

**M.6.8.3** – Find perimeter of an object by identifying the missing measurement.  
7.A.3b

**M.6.8.4** – Calculate the area of complex figures by breaking into smaller parts.  
7.A.3b, 8.D.3b

**M.6.8.5** – Given a formula, find the area of a triangle and parallelogram.  
7.A.3b

**M.6.8.6** – Solve the area of a shape by finding a missing measurement and setting up an equation to solve.  
7.A.3b

**Math Curriculum**  
**7<sup>th</sup> Grade**

Purpose Evaluate algebraic expressions, solve 1 step equations and inequalities, solve problems with rational numbers (including percents, proportions, and similar figures), and solve problems using geometric formulas.

Outcome: **M.7.1** Students will solve problems containing positive and negative rational numbers.

Components: **M.7.1.1** – Convert mixed numbers to fractions.  
6.A.3

**M.7.1.2** – Compare and order positive and negative rational numbers (decimals, mixed numbers, and fractions).  
6.A.3

**M.7.1.3** – Graph rational numbers on a number line.  
6.A.3

**M.7.1.4** – Solve word problems with mixed numbers and fractions.  
6.B.3a

**M.7.1.5** – Analyze rational numbers to identify equivalence.  
6.A.3

**M.7.1.6** – Estimate the square root of a number less than 1000 between two whole numbers with or without technology.  
6.B.3c

**M.7.1.7** – Identify and apply the following properties: commutative, associative, identity, multiplicative zero.  
8.A.3a

**M.7.1.8** – Demonstrate fluency of squares up to 15.  
6.B.3c

**M.7.1.9** – Demonstrate fluency of square roots up to  $\sqrt{225}$  .  
6.B.3c

Outcome: **M.7.2** Students will investigate number patterns and represent numbers in exponential form.

Components: **M.7.2.1** – Read, write and analyze equivalent representations of positive powers of 10.  
6.A.3

**M.7.2.2** – Multiply whole numbers and decimals by positive powers of 10.  
6.A.3

**M.7.2.3** – Convert standard notation to scientific notation (positive exponents only).

6.A.3

**M.7.2.4** – Convert scientific notation to standard notation (positive exponents only).

6.A.3

**M.7.2.5** – Find greatest common factor of three numbers using prime factorization.

6.B.3b

**M.7.2.6** – Find least common multiple of two numbers using prime factorization.

6.B.3b

**Outcome:** **M.7.3** Students will integrate all math operations with positive and negative numbers and select the correct algorithms to use for each operation.

**Components:** **M.7.3.1** – Evaluate expressions containing positive and negative rational numbers and select the appropriate algorithm to evaluate.

6.C.3a

**M.7.3.2** – Evaluate simple expressions containing absolute value.

6.C.3a

**M.7.3.3** – Identify the quadrant of a point by the coordinates (without graphing).

8.B.3

**M.7.3.4** – Evaluate algebraic expressions with given values for variables (including negative numbers).

8.D.3a

**Outcome:** **M.7.4** Students will apply ratios and proportions to solve practical problems.

**Components:** **M.7.4.1** – Analyze word problems comparing two quantities using ratios or rates (reduced, three formats).

6.D.3

**M.7.4.2** – Analyze word problems to create and solve proportions.

6.D.3

**M.7.4.3** – Calculate unit rate and apply to real-world situations such as finding the better buy.

6.D.3

**M.7.4.4** – Evaluate ratios to determine equivalence.

6.A.3, 6.C.3a

**M.7.4.5** – Create and solve proportions to find unknown values for similar figures.  
6.D.3

Outcome: **M.7.5** Students will apply percents to solve practical problems.

Components: **M.7.5.1** – Analyze numbers and convert between fractions, decimals and percents (including numbers greater than 100%).  
6.A.3

**M.7.5.2** – Solve word problems with percents using proportions.  
6.D.3

**M.7.5.3** – Calculate the percent of a number.  
6.C.3a

**M.7.5.4** – Apply percent knowledge to solve practical problems such as calculating tax, tip, and sale prices.  
6.D.3

Outcome: **M.7.6** Students will evaluate numeric and algebraic expressions and solve simple (one and two-step) equations and inequalities.

Components: **M.7.6.1** – Evaluate expressions including nested parentheses using order of operations.  
8.A.3a

**M.7.6.2** – Evaluate algebraic expressions with given values for two variables (positive numbers).  
8.D.3a

**M.7.6.3** – Translate multi-step word problems to multi-step algebraic expressions.  
8.D.3a

**M.7.6.4** – Simplify algebraic expressions involving like terms.  
8.A.3a

**M.7.6.5** – Solve one-step equations with integers.  
8.A.3b

**M.7.6.6** – Solve two-step equations with whole numbers using inverse operations.  
8.A.3b

**M.7.6.7** – Solve one-step inequalities with whole numbers.  
8.A.3b

**M.7.6.8** – Solve word problems involving unknown quantities by writing one-step equations.  
8.A.3b

**M.7.6.9** – Analyze a sequence and recognize a missing term or determine the rule that generates the sequence.

8.D.3a

Outcome: **M.7.7** Students will apply knowledge of angles and polygons to solve problems.

Components: **M.7.7.1** – Define and identify complementary and supplementary angles and solve problems for unknown angle values.

9.C.3b

**M.7.7.2** – Define and identify vertical angles and solve problems for unknown angle values with transversals and parallel lines.

9.C.3b

**M.7.7.3** – Classify polygons up to 12 sides.

9.B.3

**M.7.7.4** – Determine the sum of the angle measures in a regular polygon with less than 8 sides by drawing triangles from a common vertex.

9.C.3b

**M.7.7.5** – Translate and reflect a figure on the coordinate plane.

9.A.3b

**M.7.7.6** – Recognize and apply symbols for parallel and perpendicular lines ( $\parallel$   $\perp$ ).

9.C.3b

Outcome: **M.7.8** Students will apply appropriate formulas to determine measurements for two and three-dimensional objects.

Components: **M.7.8.1** – Select the appropriate formula and calculate area of triangles, parallelograms, trapezoids, and circles with or without technology.

7.A.3b, 7.C.3b

**M.7.8.2** – Calculate perimeter of any polygon, including complex figures.

7.A.3b, 7.C.3b

**M.7.8.3** – Given the diameter or the radius, calculate the circumference of a circle using the appropriate formula.

7.A.3b, 7.C.3b

**M.7.8.4** – Find an unknown side length if given the area of a polygon.

7.A.3b, 7.C.3b

**M.7.8.5** – Calculate the area of a composite figure that can be divided into rectangles and triangles.

7.C.3b

**M.7.8.6** – Calculate the volume of a rectangular prism using the formula  $V=Bh$ .

7.C.3b

**M.7.8.7** – Calculate the surface area of a rectangular prism as a composite of the area of the faces.

7.C.3b

**M.7.8.8** – Solve word problems by selecting the appropriate formula, such as area for covering and perimeter or circumference for going around something.

7.A.3b

**M.7.8.9** – Distinguish between congruence and similarity ( $\cong, \approx$ ).

9.A.3c

**M.7.8.10** – Identify cylinders and cones from their nets.

9.A.3a

**Outcome:** **M.7.9** Students will analyze data displays to interpret and predict results.

**Components:** **M.7.9.1** – Make predictions based on bar graphs, line graphs, circle graphs, charts and tables.

10.A.3a, 10.B.3

**M.7.9.2** – Analyze a scatter plot and determine the line of best fit.

10.A.3a

**M.7.9.3** – Create circle graphs and tables for a given set of data with or without technology.

10.A.3a

**M.7.9.4** – Analyze the effect of outliers on mean and median.

10.A.3a

**Outcome:** **M.7.10** Students will analyze events to determine probability for one and two events.

**Components:** **M.7.10.1** – Calculate probability for a simple event.

10.C.3a

**M.7.10.2** – Calculate probability for a compound (two) event.

10.C.3a

**M.7.10.3** – Represent probability as a fraction and percent.

10.C.3a

**M.7.10.4** – Analyze a simple event and represent all possible outcomes.

10.C.3a, 10.C.3b

**M.7.10.5** – Analyze dependent and independent events and calculate the probability. 10.C.3a, 10.C.3b

**Math Curriculum**  
**8<sup>th</sup> Grade – Pre-Algebra**

Focus: ***Numeration and Operation***

Outcome: **M.8.1** Students will use operations, properties, and correct order of operations to evaluate expressions and solve problems.

Components: **M.8.1.1** – Evaluate expressions with a calculator with expressions in the

denominator (ex.  $\frac{6}{2+8}$  as compared to  $\frac{6}{2} + 8$ )

6.C.3a

**M.8.1.2** – Simplify expressions containing integers using order of operations, grouping symbols and properties including the commutative, associative, distributive, zero, and identity properties.

6.A.4, 8.A.3a

**M.8.1.3** – Identify and apply the distributive property to simplify expressions.

6.B.3c

Focus: ***Algebra***

Outcome: **M.8.2** Students will use real number properties to solve one- and two-step equations and inequalities including those with integers.

Components: **M.8.2.1** – Solve one-step algebraic equations with integers.

6.B.3a, 8.D.3

**M.8.2.2** – Solve inequalities by using the Addition and Subtraction Properties of Inequality.

8.D.3

**M.8.2.3** – Solve inequalities by multiplying or dividing by positive and negative numbers.

8.D.3

**M.8.2.4** – Graph solutions to integer inequalities on a number line.

8.A.4b

Focus: ***Algebra***

Outcome: **M.8.3** Students will use real number properties to solve one- and two-step equations and inequalities with all forms of rational numbers other than integers.

Components: **M.8.3.1** – Simplify expressions by combining like terms.  
8.A.3a

**M.8.3.2** – Define and describe rules for operating with rational numbers.  
8.A.3a

**M.8.3.3** – Apply the basic properties of commutative, associative, distributive, transitive, inverse, identity, zero, equality and order of operations to solve problems.  
8.A.3a

**M.8.3.4** – Define real numbers and identify a number as rational or irrational.  
6.B.3c

**M.8.3.5** – Solve one- and two-step algebraic equations with fractions and decimals.  
6.B.3a

**M.8.3.6** – Solve equations with variables on both sides of the equation.  
8.A.3a

**M.8.3.7** – Graph solutions for inequalities on a number line.  
8.D.4

Focus: ***Algebra***

Outcome: **M.8.4** Students will use properties to evaluate expressions containing powers, exponents and/or square roots with and without technology.

Components: **M.8.4.1** – Evaluate and simplify expressions with exponents.  
8.D.3c

**M.8.4.2** – Apply the power and quotient rules to exponents to simplify basic expressions such as  $\frac{a^5}{a^2}$  or  $a^5 * a^2$ .  
8.D.3c

**M.8.4.3** – Apply the zero power property of exponents.  
8.D.3c

**M.8.4.4** – Solve problems using perfect square roots.  
8.D.3c

**M.8.4.5** – Identify the two consecutive integers that a number is between when taking a square root of a number that is not a perfect square without use of a calculator. 8.D.3c

**M.8.4.6** – Identify and find square and cube roots of rational numbers using calculators. 6.B.3c

**M.8.4.7** – Write and evaluate large and small numbers in scientific notation. 6.A.3

**M.8.4.8** – Convert numbers in scientific notation to standard form. 6.A.3

Focus: ***Data Analysis***

Outcome: **M.8.5** Students will use measures of central tendencies and measures of variability to describe patterns, analyze data, to predict results and to create graphs that depict a real world situation.

Components: **M.8.5.1** – Identify the dependent and independent variables on a graph. 10.A.3a

**M.8.5.2** – Gather data and construct graphs using dependent and independent variables. 10.A.3a

**M.8.5.3** – Compare data using the measures of central tendency (mean, median & mode) using rational numbers. 10.A.3b

**M.8.5.4** – Display and interpret data in a histogram. 10.A.3a

**M.8.5.5** – Evaluate data using the measures of variability (range and quartiles) by constructing a box and whiskers graph. 10.A.4a

Focus: ***Geometry***

Outcome: **M.8.6** Students will apply geometric concepts to categorize polygons and to draw conclusions about points, lines, angles, and polygons.

Components: **M.8.6.1** – Use properties to classify two and three dimensional shapes. 9.B.3

**M.8.6.2** – Write congruency statements comparing two polygons. 9.A.3c

**M.8.6.3** – Solve problems involving congruent polygons. 9.A.3c

**M.8.6.4** – Determine the relationship among angles formed by intersecting lines. 9.B.4

**M.8.6.5** – Identify, describe, and calculate the measure of an unknown angle, where the unknown angle is expressed as a variable or a simple expression, using angle relationships and properties of polygons.

9.C.3b

**M.8.6.6** – Identify and draw transformations involving a reflection across an axis or a rotation around the origin.

9.A.3b

**M.8.6.7** – Determine the sum of angle measure in regular polygons by using the formula  $(n-2)180$ .

9.C.3b

**M.8.6.8** – Apply the Angle Sum Theorem to determine an unknown angle where angles are expressed as an expression such as  $2x$  or  $(x+1)$ .

9.C.3b

Focus: ***Geometry***

Outcome: **M.8.7** Students will apply geometric concepts and formulas including Pythagorean Theorem to solve problems involving area, surface area and volume of two and three dimensional objects.

Components: **M.8.7.1** – Apply the Pythagorean Theorem to find any side of a right triangle.

9.D.3

**M.8.7.2** – Apply the Pythagorean Theorem to calculate the area of a triangle with a missing dimension.

9.D.3

**M.8.7.3** – Apply circumference formula to calculate a radius given a circumference.

8.D.3b

**M.8.7.4** – Determine if a triangle is a right triangle by using the Pythagorean Theorem using decimal approximations.

9.D.3

**M.8.7.5** – Given coordinates, graph a plane figure and calculate its area.

7.A.3b, 9.A.3a

**M.8.7.6** – Calculate area of composite figures which is composed of combinations of the following shapes: triangles, squares, rectangles, parallelograms, trapezoids, and/or semicircles. 7.A.3b

**M.8.7.7** – Identify a base of a 3-dimensional shape. 9.B.3

**M.8.7.8** – Apply an appropriate strategy to calculate the surface area of a prism, cylinder or pyramid.

7.A.3b, 7.C.3b

Focus: ***Numeration and Operation – Ratios, Percents and Proportions***

Outcome: **M.8.8** Students will solve a variety of problems by applying ratios, percents and proportions.

Components: **M.8.8.1** – Solve equations using ratios and proportions.  
8.D.3b

**M.8.8.2** – Write and solve algebraic equations to solve percent problems.  
6.D.3

**M.8.8.3** – Write and solve algebraic equations to solve real world percent problems.  
6.D.4

**M.8.8.4** – Construct a simple scale drawing given a relationship described by a scale factor.  
8.C.3

**M.8.8.5** – Determine the scale factor of similar objects.  
7.A.4a

**M.8.8.6** – Apply unit multiplier (unit analysis) method to convert from one unit to another.  
7.A.4a

**M.8.8.7** – Apply unit multiplier method to convert from one rate to another.  
7.A.4a

**M.8.8.8** – Use mental math to compute and estimate percents (15% and 5%).  
6.C.3b

**M.8.8.9** – Calculate percent increase and decrease.  
6.D.3

Focus: ***Probability***

Outcome: **M.8.9** Students will be able to organize and analyze data using concepts of probability.

Components: **M.8.9.1** – Use a tree diagram to count outcomes to find the probability of an event.  
10.C.3a

**M.8.9.2** – Apply the Fundamental Counting Principle to count outcomes and to find the probability of an event.  
10.C.3a

**M.8.9.3** – Analyze situations to make predictions using experimental probability.

10.C.3b

**M.8.9.4** – Evaluate expressions containing factorials.

10.C.3a

**M.8.9.5** – Analyze the difference between the odds of an event as compared to the probability of an event.

10.C.3a

**M.8.9.6** – Calculate the permutation and combination of events.

10.C.4a

Focus: ***Algebra***

Outcome: **M.8.10** Students will solve multi-step equations and inequalities, including those with variables on both sides, and to use formulas to solve real world problems.

Components: **M.8.10.1** – Represent real world problems by using variables and algebraic equations.

8.A.3b

**M.8.10.2** – Solve equations with variables on both sides of the equation.

8.A.3b

**M.8.10.3** – Identify equations that have no solution or an infinite number of solutions.

8.B.3

**M.8.10.4** – Represent real world problems by using variables and algebraic inequalities.

8.A.3b

Focus: ***Algebra***

Outcome: **M.8.11** Students will solve and graph linear equations and identify functions of a line.

Components: **M.8.11.1** – Identify and graph linear equations.

8.D.4

**M.8.11.2** – Use a graph to determine the slope of a line.

8.B.3

**M.8.11.3** – Use two points on a line to calculate the slope of the line.

8.B.3

**M.8.11.4** – Use slope and the y-intercept to write an equation for a line.

8.B.3

**M.8.11.5** – Find the y-intercept to graph a linear equation.  
8.B.3

**M.8.11.6** – Use the slope and a point on the line to write an equation for the line.  
8.B.3

**Essentials of Algebra**  
**(Grades 9 – 12)**

Focus: Mathematics Connections: Integrated and Applied

Purpose: Students will review basic mathematical principles and perform operations that will culminate into an introduction to Algebra.

Outcome: **EOA.1** Students will review place value, exponents, comparing numbers, rounding and estimation to form a foundation for computation and problem solving to come.

Components: **EOA.1.1** – Find place value with whole numbers and decimals.

**EOA.1.2** – Write numbers in expanded form using exponents.

**EOA.1.3** – Compare whole-numbers and decimals.

**EOA.1.4** – Round whole numbers and decimals.

**EOA.1.5** – Estimate whole numbers and decimals using operations.

**EOA.1.6** – Find the value of an expression using the order of operations.

**EOA.1.7** – Write and evaluate expressions using variables.

**EOA.1.8** – Solve equations using addition, subtraction, multiplication or division.

**EOA.1.9** – Write an equation to solve a problem.

Outcome: **EOA.2** Students will review the addition and subtraction of whole numbers and decimals.

Components: **EOA.2.1** – Add whole numbers and decimals.

**EOA.2.2** – Subtract whole numbers and decimals.

**EOA.2.3** – Write a check and balance a check register using addition and subtraction.

**EOA.2.4** – Identify arithmetic sequences by finding the pattern.

**EOA.2.5** – Find the perimeter of polygons.

Outcome: **EOA.3** Students will review the multiplication and division of whole numbers and decimals.

Components: **EOA.3.1** – Multiply whole numbers and decimals.

**EOA.3.2** – Divide whole numbers and decimals.

**EOA.3.3** – Convert numbers from standard form to scientific notation and vice-versa.

**EOA.3.4** – Identify geometric sequences by finding the pattern.

**EOA.3.5** – Calculate area and solve problems using the formula for rectangles and squares.

**EOA.3.6** – Calculate arithmetic mean median and mode.

Outcome: **EOA.4** Students will perform operations using fractions.

Components: **EOA.4.1** – Find the prime factorization of whole numbers.

**EOA.4.2** – Find the greatest common factor and least common multiple of two or more numbers.

**EOA.4.3** – Write equivalent fractions and fractions in simplest form to order and compare them.

**EOA.4.4** – Change improper fractions to mixed numbers.

**EOA.4.5** – Add and subtract fractions and mixed numbers.

**EOA.4.6** – Multiply and divide fractions and mixed numbers.

**EOA.4.7** – Use fractions in real-world applications to solve problems.

**EOA.4.8** – Convert fractions to decimals and vice-versa.

Outcome: **EOA.5** Students will use definitions and symbols concerning the basic elements of geometry.

Components: **EOA.5.1** – Identify, name, and draw the undefined terms (points, lines, and planes).

**EOA.5.2** – Name, draw, measure and classify angles.

**EOA.5.3** – Make constructions using compass and straightedge.

**EOA.5.4** – Identify parallel and perpendicular lines.

**EOA.5.5** – Identify various types of polygons and three dimensional figures.

**EOA.5.6** – Calculate circumference and area of circles.

**EOA.5.7** – Calculate area of parallelograms and triangles.

**EOA.5.8** – Calculate volume of various types of 3 dimensional figures.

Outcome: **EOA.6** Students will use the number line to work with positive and negative integers and absolute value.

Components: **EOA.6.1** – Identify, order, and compare integers.

**EOA.6.2** – Add, subtract, multiply and divide using integers.

**EOA.6.3** – Calculate absolute value.

Outcome: **EOA.7** Students will use beginning Algebra to solve and graph equations.

Components: **EOA.7.1** – Solve one step equations.

**EOA.7.2** – Name and graph points on the coordinate plane.

**EOA.7.3** – Solve two step equations.

**EOA.7.4** – Graph linear equations.

**EOA.7.5** – Write linear equations.

## *Pre-Algebra – Double Block*

Purpose: Pre-Algebra students will perform operations on rational numbers, solve 2-step equations and inequalities, graph equations, use geometric concepts to solve problems, analysis of data and probability.

Outcome: **PA.1** Students will perform basic algebraic expressions containing integers.

Components: **PA.1.1** – Identify numerical expressions and variable expressions.

**PA.1.2** – Use order of operations including grouping symbols.

**PA.1.3** – Evaluate variable expressions.

**PA.1.4** – Use models to establish rules for adding, subtracting, multiplying and dividing integers.

**PA.1.5** – Find number patterns and write rules to make predictions and conjectures.

Outcome: **PA.2** Students will solve one step equations and inequalities.

Components: **PA.2.1** – Identify properties of addition and multiplication and use them to simplify an expression.

**PA.2.2** – Use distributive property to simplify algebraic expressions.

**PA.2.3** – Identify variable expressions and combine like terms.

**PA.2.4** – Solve one-step equations.

**PA.2.5** – Graph inequalities.

**PA.2.6** – Solve one-step inequalities.

Outcome: **PA.3** Students will solve algebraic equations containing decimals.

Components: **PA.3.1** – Find mean, median and mode, determine which best describes the problem using any rational number.

**PA.3.2** – Use formulas to evaluate real life situations by substitution.

**PA.3.3** – Solve one-step equations resulting in rational solutions.

**PA.3.4** – Identify appropriate metric measure and convert within the system.

Outcome: **PA.4** Students will simplify algebraic expressions containing exponents.

Components: **PA.4.1** – Use divisibility test and find factors.

**PA.4.2** – Use order of operations with exponents.

**PA.4.3** – Find prime factorization to find greatest common factor.

**PA.4.4** – Find equivalent fractions.

**PA.4.5** – Write fractions in simplest form.

**PA.4.6** – Identify and graph rational numbers.

**PA.4.7** – Evaluate fractions containing variables.

**PA.4.8** – Use exponential rules to simplify expressions.

**PA.4.9** – Write and evaluate number in scientific notation.

Outcome: **PA.5** Students solve algebraic equations containing fractions.

Components: **PA.5.1** – Find the least common multiple.

**PA.5.2** – Compare, add, subtract, multiply and divide fractions.

**PA.5.3** – Convert fractions to decimals and decimals to fractions.

**PA.5.4** – Identify and convert appropriate and customary units within the system.

Outcome: **PA.6** Students will solve algebraic equations containing ratios, proportion, and percents.

Components: **PA.6.1** – Write and simplify ratios.

**PA.6.2** – Find rate and unit rates.

**PA.6.3** – Solve proportions and use in real life problem solving situations.

**PA.6.4** – Find probability and odds.

**PA.6.5** – Write percents as decimals and fractions.

**PA.6.6** – Write decimals and fractions as percents.

**PA.6.7** – Write and solve percent equations.

**PA.6.8** – Use percents in real life problem solving applications.

Outcome: **PA.7** Students will write and solve multi-step equations and inequalities.

Components: **PA.7.1** – Solve two-step equations.

**PA.7.2** – Simplify and solve equations by combining like terms and using the distributive property.

**PA.7.3** – Solve multi-step equations with solutions which result in fractions and decimals.

**PA.7.4** – Write an equation to solve problem.

**PA.7.5** – Solve an equation with variables on both sides.

**PA.7.6** – Solve two-step inequalities.

Outcome: **PA.8** Students will solve algebraic equations containing linear functions and graphing.

Components: **PA.8.1** – Determine whether a relation is a function.

**PA.8.2** – Graph functions and linear equations with two variables.

**PA.8.3** – Find and verify solutions of equations with two variables.

**PA.8.4** – Find the slope and y-intercept of a line.

**PA.8.5** – Write a function rule from a word relationship, table or graph.

**PA.8.6** – Interpret and draw scatter plots and solve problems by drawing conclusions.

**PA.8.7** – Solve systems of linear equations by graphing.

**PA.8.8** – Graph linear inequalities.

**PA.8.9** – Solve systems of linear inequalities by graphing.

Outcome: **PA.9** Students will be able to work basic geometric fundamentals.

Components: **PA.9.1** – Identify basic geometric figure.

**PA.9.2** – Recognize properties of lines and angles.

**PA.9.3** – Classify triangles and identify corresponding parts.

**PA.9.4** – Determine whether triangles are congruent.

**PA.9.5** – Classify quadrilaterals.

**PA.9.6** – Find circumference.

Outcome: **PA.10** Students will determine area, surface area and volume given formulas.

Components: **PA.10.1** – Find the area of polygons.

**PA.10.2** – Find area of circles.

**PA.10.3** – Identify space figures from nets.

**PA.10.4** – Find surface areas of three dimensional figures.

**PA.10.5** – Find volumes of three dimensional figures.

Outcome: **PA.11** Students will use irrational numbers with real life applications.

Components: **PA.11.1** – Find square roots of numbers.

**PA.11.2** – Classify real numbers.

**PA.11.3** – Use Pythagorean Theorem and identify right triangles.

**PA.11.4** – Use distance and midpoint formulas.

## Algebra I

Focus: Algebraic skills; evaluate, solve and graph algebraic expressions, equalities, and inequalities using appropriate problem solving techniques.

Outcome: **A1.1** Students will perform basic algebraic operations using real numbers.  
6.A, 6.B, 6.C, 8.A, 8.B, 8.D, 9.C

Components: **A1.1.1** – Translate sentences and phrases into mathematical statements and equations.

**A1.1.2** – Identify all types of real numbers.

**A1.1.3** – Perform all four operations with real numbers (this includes fractions) with results being expressed in simplest form.

**A1.1.4** – Define and use exponents and the order of operations.

**A1.1.5** – Identify and apply properties of real numbers.

Outcome: **A1.2** Students will solve equations and inequalities using real numbers and apply them to life situations.  
6.A, 6.B, 6.D, 8.A, 8.B, 8.C, 8.D

Components: **A1.2.1** – Simplify algebraic expressions.

**A1.2.2** – Model the properties of equality.

**A1.2.3** – Solve linear equations.

**A1.2.4** – Use formulas and percents to problem solve.

**A1.2.5** – Solve linear inequalities.

**A1.2.6** – Solve absolute value equations.

**A1.2.7** – Solve absolute inequalities.

Outcome: **A1.3** Students will graph, analyze, and write equations and inequalities.  
6.A, 6.B, 6.C, 7.C, 8.A, 8.B, 8.D

Components: **A1.3.1** – Graph linear equations and inequalities.

**A1.3.2** – Identify intercepts and slope.

**A1.3.3** – Graph and interpret both slope intercept and point slope form of a line.

**A1.3.4** – Define domain, range and vertical line test.

**A1.3.5** – Write linear equations in standard form.

Outcome: **A1.4** Students will perform operations involving exponents and polynomials.  
6.A, 6.B, 7.B, 8.A, 8.B, 8.D, 9.A

Components: **A1.4.1** – Use exponential rules to simplify expressions.  
**A1.4.2** – Add and subtract polynomials.  
**A1.4.3** – Multiply polynomials including special products.  
**A1.4.4** – Interpret negative exponents and scientific notation.  
**A1.4.5** – Divide polynomials.

Outcome: **A1.5** Students will factor polynomial expressions.  
6.A, 6.B, 6.D, 8.D

Components: **A1.5.1** – Identify greatest common factors.  
**A1.5.2** – Factor binomials.  
**A1.5.3** – Factor trinomials with lead coefficient of one.  
**A1.5.4** – Factor trinomials with lead coefficient of a number other than 1.  
**A1.5.5** – Choose factoring strategies.  
**A1.5.6** – Solve quadratic equations by factoring.  
**A1.5.7** – Solve problems that can be modeled by quadratics.

Outcome: **A1.6** Students will simplify and perform operations involving rational expressions.  
6.A, 6.B, 6.D, 8.A, 8.B, 8.C, 9.A, 10.C

Components: **A1.6.1** – Simplify rational expressions.  
**A1.6.2** – Multiply and divide rational expressions.  
**A1.6.3** – Add and subtract rational expressions with unlike denominators.  
**A1.6.4** – Simplify complex fractions.  
**A1.6.5** – Solve equations containing rational expressions.  
**A1.6.6** – Use ratio and proportion to solve equations.  
**A1.6.7** – Use rational equations to solve real world problems (work & distance).

Outcome: **A1.7** Students will solve systems of linear equations and inequalities.  
6.A, 6.B, 6.D

Components: **A1.7.1** – Solve systems of linear equations and inequalities by graphing.

**A1.7.2** – Solve systems of linear equations and inequalities by substitution.

**A1.7.3** – Solve systems of linear equations and inequalities by elimination.

**A1.7.4** – Use systems of linear equations to solve real world problems (mixture).

**Outcome:** **A1.8** Students will simplify and perform operations with expressions containing roots and radicals.  
6.A, 6.B, 6.C, 6.C, 8.A, 8.B, 8.C, 8.D, 9.B, 9.D

**Components:** **A1.8.1** – Identify and simplify radicals.

**A1.8.2** – Add and Subtract radicals.

**A1.8.3** – Multiply and Divide radicals.

**A1.8.4** – Solving equations containing radicals including real life applications.

**Outcome:** **A1.9** Students will solve quadratic equations.  
6.A, 6.B, 8.C, 8.D, 9.A, 9.B, 10.A

**Components:** **A1.9.1** – Solving quadratic equations by factoring.

**A1.9.2** – Solve quadratic equations using square root method.

**A1.9.3** – Solve quadratic equations using quadratic formula.

## Algebra II

Focus: Algebraic skills; evaluate, solve and graph algebraic expressions, equalities, and inequalities using appropriate problem solving techniques.

Outcome: **A2.1** Students will perform operations using real numbers.  
6.A, 6.B, 6.C, 8.A, 8.B, 8.D, 9.C

Components: **A2.1.1** – Evaluate expressions using order of operations.  
**A2.1.2** – Distinguish different types of real numbers.  
**A2.1.3** – Apply the properties of real numbers.

Outcome: **A2.2** Students will solve equations and inequalities using real numbers and apply them to life situations.  
6.A, 6.B, 6.D, 8.A, 8.B, 8.C, 8.D, 9.C

Components: **A2.2.1** – Simplify expressions and solve equations and inequalities.  
**A2.2.2** – Use expressions to solve verbal problems (mixture & distance).  
**A2.2.3** – Solve compound sentences.  
**A2.2.4** – Solve equations and inequalities involving absolute value.

Outcome: **A2.3** Students will graph, analyze, and write equations and inequalities.  
6.A, 6.B, 6.C, 7.C, 8.A, 8.B, 8.D, 10.A

Components: **A2.3.1** – Identify slope and intercepts of a line within the rectangular coordinate system.  
**A2.3.2** – Calculate the equation of a line in using three distinct forms (point slope, slope intercept, standard).  
**A2.3.3** – Graph linear functions and inequalities.  
**A2.3.4** – Find parallel or perpendicular lines from a given equation.

Outcome: **A2.4** Students will solve systems of linear equations and inequalities.  
6.A, 6.B, 6.C, 7.C, 8.A, 8.B, 8.D, 9.C

Components: **A2.4.1** – Solve system of linear equations in two variables (graphing, substitution, elimination, and Cramer's rule).  
**A2.4.2** – Solve system of linear equations in three variables.  
**A2.4.3** – Application of systems of equations to solve real world problems.

Outcome: **A2.5** Students will perform operations involving exponents and polynomials. 6.A, 6.B, 7.B, 8.A, 8.B, 8.D, 9.A

Components: **A2.5.1** – Apply the product and quotient rule for exponents with expressions.

**A2.5.2** – Evaluate expressions with negative exponents.

**A2.5.3** – Convert and compute between scientific notation and standard notation.

**A2.5.4** – Apply power rules for exponents.

**A2.5.5** – Simplify exponential expressions.

**A2.5.6** – Apply operations to polynomials.

Outcome: **A2.6** Students will factor polynomial expressions. 6.A, 6.B, 6.D, 8.D

Components: **A2.6.1** – Identify greatest common factors in polynomial expressions.

**A2.6.2** – Factor binomials (squares and cubes).

**A2.6.3** – Factor trinomials.

**A2.6.4** – Factor using substitution.

**A2.6.5** – Factor by grouping.

**A2.6.6** – Solve equations by factoring.

Outcome: **A2.7** Students will simplify and perform operations involving rational expressions. 8.B, 8.D, 9.C

Components: **A2.7.1** – Simplify rational expressions.

**A2.7.2** – Perform operations on rational expressions.

**A2.7.3** – Simplify complex fractions.

**A2.7.4** – Perform long and synthetic division with polynomials.

Outcome: **A2.8** Students will simplify and perform operations with expressions containing radicals, and complex numbers. 6.A, 6.B, 7.C, 8.D, 9.C

Components: **A2.8.1** – Simplify radicals.

**A2.8.2** – Simplify using rational exponents.

**A2.8.3** – Perform operations on radical expressions.

**A2.8.4** – Solve radical equations.

**A2.8.5** – Perform operations on complex numbers.

Outcome: **A2.9** Students will solve and graph quadratic equations. 8.B, 8.D, 9.C

Components: **A2.9.1** – Solve quadratic equation (factor, square root method, completing the square, quadratic formula).

**A2.9.2** – Solve equations using quadratic methods.

**A2.9.3** – Solve non linear inequalities in one variable.

**A2.9.4** – Graph quadratic functions identifying the vertex, focal point and directrix.

Outcome: **A2.10** Students will graph and analyze conic sections.  
8.B, 9.C

Components: **A2.10.1** – Apply the distance and midpoint formulas.

**A2.10.2** – Identify the equation of circle and find the center and radius.

**A2.10.3** – Graph the equation of a circle.

**A2.10.4** – Identify the equation of an ellipse and find the center, focal points, major and minor axis.

**A2.10.5** – Graph the equation of an ellipse.

**A2.10.6** – Identify the equation of a hyperbola and find the center, vertices, focal points and asymptotes.

**A2.10.7** – Graph the equation of a hyperbola.

Outcome: **A2.11** Students will determine the roots of polynomial functions.  
6.A, 6.B, 7.A, 7.B, 8.B, 8.D, 9.B, 9.D

Components: **A2.11.1** – Evaluate a polynomial function.

**A2.11.2** – Find the factors of polynomial using factor theorem and synthetic division.

**A2.11.3** – Identify all zeros real and complex.

**A2.11.4** – Determine the inverse of a function.

**A2.11.5** – Calculate the composites of functions.

Outcome: **A2.12** Students will work with exponential and logarithmic functions and apply them to real life. 6.B, 6.D, 7.A, 8.B, 8.C, 9.C

Components: **A2.12.1** – Translate from logarithmic form to exponential form.

**A2.12.2** – Evaluate logarithmic expressions.

**A2.12.3** – Apply the properties of logarithms.

**A2.12.4** – Solve logarithmic equations.

**A2.12.5** – Apply the change of base formula.

**A2.12.6** – Apply exponential and logarithmic functions (compound interest and growth and decay).

**Accelerated Algebra II**  
***(Grades 9 – 12)***

- Purpose:** Accelerated Algebra II students will apply problem solving skills to demonstrate knowledge of quadratics, systems of linear equations, logarithmic and exponential functions, complex numbers and conic sections.
- Outcome:** **AA2.1** Students will perform operations using real numbers.
- Components:** **AA2.1.1** – Evaluate expressions using order of operations.  
**AA2.1.2** – Distinguish different types of real numbers.  
**AA2.1.3** – Apply the properties of real numbers.
- Outcome:** **AA2.2** Students will solve equations and inequalities using real numbers and apply them to life situations.
- Components:** **AA2.2.1** – Simplify expressions and solve equations and inequalities.  
**AA2.2.2** – Use expressions to solve verbal problems (mixture and distance).  
**AA2.2.3** – Solve compound sentences.  
**AA2.2.4** – Solve equations and inequalities involving absolute value.
- Outcome:** **AA2.3** Students will factor polynomial expressions.
- Components:** **AA2.3.1** – Identify greatest common factors in polynomial expressions.  
**AA2.3.2** – Factor binomials (squares and cubes).  
**AA2.3.3** – Factor trinomials.  
**AA2.3.4** – Factor using substitution.  
**AA2.3.5** – Factor by grouping.  
**AA2.3.6** – Solve equations by factoring.
- Outcome:** **AA2.4** Students will solve systems of linear equations and inequalities.
- Components:** **AA2.4.1** – Solve system of linear equations in two variables (graphing, substitution, elimination, and Cramer’s rule).  
**AA2.4.2** – Solve system of linear equations in three variables.

**AA2.4.3** – Application of systems of equations to solve real world problems.

Outcome: **AA2.5** Students will perform operations involving exponents and polynomials.

Components: **AA2.5.1** – Apply the product and quotient rule for exponents with expressions.

**AA2.5.2** – Evaluate expressions with negative exponents.

**AA2.5.3** – Convert and compute between scientific notation and standard notation.

**AA2.5.4** – Apply power rules for exponents.

**AA2.5.5** – Simplify exponential expressions.

**AA2.5.6** – Apply operations to polynomials.

Outcome: **AA2.6** Students will graph, analyze, and write equations and inequalities.

Components: **AA2.6.1** – Identify slope and intercepts of a line within the rectangular coordinate system.

**AA2.6.2** – Calculate the equation of a line in using three distinct forms (point slope, slope intercept, standard).

**AA2.6.3** – Graph linear functions and inequalities.

**AA2.6.4** – Find parallel or perpendicular lines from a given equation.

Outcome: **AA2.7** Students will simplify and perform operations involving rational expressions.

Components: **AA2.7.1** – Simplify rational expressions.

**AA2.7.2** – Perform operations on rational expressions.

**AA2.7.3** – Graph rational expressions.

**AA2.7.4** – Simplify complex fractions.

**AA2.7.5** – Perform long and synthetic division with polynomials.

Outcome: **AA2.8** Students will simplify and perform operations with expressions containing radicals, and complex numbers.

Components: **AA2.8.1** – Simplify radicals.

**AA2.8.2** – Simplify rational exponents.

**AA2.8.3** – Perform operations on radical expressions.

**AA2.8.4** – Solve radical equations.

**AA2.8.5** – Perform operations on complex numbers.

Outcome: **AA2.9** Students will solve and graph quadratic equations.

Components: **AA2.9.1** – Solve quadratic equation (factor, square root method, completing the square, quadratic formula).

**AA2.9.2** – Solve equations using quadratic methods.

**AA2.9.3** – Solve non linear inequalities in one variable.

**AA2.9.4** – Graph quadratic functions identifying the vertex, focal point and directrix.

Outcome: **AA2.10** Students will graph and analyze conic sections.

Components: **AA2.10.1** – Apply the distance and midpoint formulas.

**AA2.10.2** – Identify the equation of circle and find the center and radius.

**AA2.10.3** – Graph the equation of a circle.

**AA2.10.4** – Identify the equation of an ellipse and find the center, focal points, major and minor axis.

**AA2.10.5** – Graph the equation of an ellipse.

**AA2.10.6** – Identify the equation of a hyperbola and find the center, vertices, focal points and asymptotes.

**AA2.10.7** – Graph the equation of a hyperbola.

Outcome: **AA2.11** Students will determine the roots of polynomial functions.

Components: **AA2.11.1** – Evaluate a polynomial function.

**AA2.11.2** – Find the factors of polynomial using factor theorem and synthetic division.

**AA2.11.3** – Identify all zeros real and complex.

**AA2.11.4** – Determine the inverse of a function.

**AA2.11.5** – Calculate the composites of functions.

Outcome: **AA2.12** Students will work with exponential and logarithmic functions and apply them to real life.

Components: **AA2.12.1** – Translate from logarithmic form to exponential form.

**AA2.12.2** – Evaluate logarithmic expressions.

**AA2.12.3** – Apply the properties of logarithms.

**AA2.12.4** – Solve logarithmic equations.

**AA2.12.5** – Apply the change of base formula.

**AA2.12.6** – Apply exponential and logarithmic functions (compound interest and growth and decay).

## Geometry

- Focus: Recognize, apply and develop relationships between undefined terms, apply knowledge of triangles, lines, circles, polygons, and polyhedrons.
- Outcome: **G.1** Students will identify and recognize basic geometric terms.  
8.D, 9.A, 9.B, 9.C
- Components: **G.1.1** – Identify the undefined terms (points, lines, planes and space).  
**G.1.2** – Identify and represent segments, rays, planes.  
**G.1.3** – Identify and represent parallel, intersecting and skew lines as well as parallel and intersecting planes.  
**G.1.4** – Finding midpoint and lengths of segments.  
**G.1.5** – Classify and find the measure of angles.  
**G.1.6** – Recognize special angle pairs angle bisector.
- Outcome: **G.2** Students will analyze and interpret parallel and perpendicular lines.  
8.B, 8.D, 9.A, 9.B, 9.C
- Components: **G.2.1** – Identify angles formed by two lines and a transversal.  
**G.2.2** – Apply theorems of parallel lines.  
**G.2.3** – Prove lines are parallel.
- Outcome: **G.3** Students will apply their knowledge of angles and the triangle sum theorem to find measures of the angles of polygons.  
8.D, 9.A, 9.B, 9.C
- Components: **G.3.1** – Classify triangles.  
**G.3.2** – Calculate the measures of the angles in triangles.  
**G.3.3** – Classify and calculate the interior and exterior angle measures of regular polygons.  
**G.3.4** – Apply theorems of polygons in real life situations.
- Outcome: **G.4** Students will apply necessary definitions, postulates and theorems to prove polygons congruent. 8.D, 9.A, 9.B, 9.C
- Components: **G.4.1** – Recognize congruent figures and their corresponding parts.

**G.4.2** – Construct and use an “If – Then” statement.

**G.4.3** – Construct a converse statement.

**G.4.4** – Prove triangles are congruent (SSS, SAS, ASA, AAS, HL.)

**G.4.5** – Apply triangle congruence with CPCTC to prove parts of triangles are congruent.

**G.4.6** – Use and Apply properties of isosceles and equilateral triangles.

Outcome: **G.5** Students will analyze and interpret relationships within triangles.  
8.D, 9.B, 9.C

Components: **G.5.1** – Identify and use properties of the midsegment of a triangle.

**G.5.2** – Apply the properties of angle bisectors and perpendicular bisectors.

**G.5.3** – Apply the properties of medians and altitudes of a triangle.

**G.5.4** – Use inequalities involving angle and sides of triangles.

Outcome: **G.6** Students will identify, classify, and apply properties of quadrilaterals.  
9.A, 9.B, 9.C

Components: **G.6.1** – Define and classify special types of quadrilaterals.

**G.6.2** – Apply properties of parallelograms.

**G.6.3** – Prove that a quadrilateral is a parallelogram.

**G.6.4** – Apply properties of rectangles.

**G.6.5** – Apply properties of rhombuses.

**G.6.6** – Apply properties of trapezoids.

**G.6.7** – Apply properties of kites.

Outcome: **G.7** Students will calculate the exact area of polygons and circles over the set of real numbers. 8.D, 9.A, 9.B, 9.C, 9.D

Components: **G.7.1** – Calculate perimeter of polygons and circles.

**G.7.2** – Calculate the area of a rectangle and parallelogram.

**G.7.3** – Calculate the area of a triangle.

**G.7.4** – Identify and use the Pythagorean Theorem.

**G.7.5** – Identify and perform operations with special right triangles.

**G.7.6** – Calculate the area of a Trapezoid.

**G.7.7** – Calculate the area of Rhombus or Kites.

**G.7.8** – Calculate the area of a Regular Polygon.

**G.7.9** – Calculate the area of a circle.

**G.7.10** – Using area and circumference of a circle find arc length and areas of sectors.

Outcome: **G.8** Students will use their knowledge of ratios and proportions in the application of similar polygons. 8.D, 9.B, 9.C

Components: **G.8.1** – Write ratios and solve proportions.

**G.8.2** – Identify similar polygons and apply principles.

**G.8.3** – Proving triangles are similar (SSS,SAS,AA).

**G.8.4** – Calculate the geometric mean and apply it to right triangles within right triangles.

**G.8.5** – Calculate perimeters and areas of similar figures using proportions.

Outcome: **G.9** Students will develop and apply the formulas for surface area and volume of polyhedrons. 9.A

Components: **G.9.1** – Use the properties of polygons and circles to identify 3-dimensional figures.

**G.9.2** – Calculate Surface Area of Prisms and Cylinders.

**G.9.3** – Calculate Surface Area of Pyramids and Cones.

**G.9.4** – Calculate Volume of Prisms and Cylinders.

**G.9.5** – Calculate Volume of Pyramids and Cones.

**G.9.6** – Calculate Surface Area and Volume of sphere.

**G.9.7** – Calculate areas and volumes of similar solids.

Outcome: **G.10** Students will study, prove and establish properties of segments, angles, and arcs of circles. 8.D, 9.A, 9.C

Components: **G.10.1** – Define the components of a circle (radius, diameter, chord, tangent, secant).

**G.10.2** – Apply the properties of a tangent line to a circle.

**G.10.3** – Define and calculate central angles and arcs of a circle.

**G.10.4** – Apply the properties of chords and arcs.

**G.10.5** – Identify inscribed angles and calculate their measure.

**G.10.6** – Identify and calculate the measure of angles inside and outside of the circle formed by chords secants and tangents.

**G.10.7** – Calculate the lengths of segments associated within the circle.

## Accelerated Geometry

Purpose: Accelerated Geometry students will value, reason, solve and communicate the relationships between triangles, lines, polygons, circles, polyhedrons and their perspective parts.

Outcome: **AGEO.1** Students will identify and recognize basic geometric terms. (State goals: 8D, 9A, 9B, 9C)

Components: **AGEO.1.1** – Use the undefined terms point, line, and plane.

**AGEO.1.2** – Use the terms collinear, coplanar, equidistant, and intersection.

**AGEO.1.3** – Use the symbols for lines, segments, rays and distances.

**AGEO.1.4** – Calculate distance.

**AGEO.1.5** – Classify angles.

**AGEO.1.6** – Apply postulates and theorems relating to angles, points, lines, and planes.

Outcome: **AGEO.2** Students will recognize and apply deductive reasoning through writing proofs. (State goals: 10A, 9C)

Components: **AGEO.2.1** – Recognize the hypothesis and conclusion of an if-then statement.

**AGEO.2.2** – State a converse, inverse and contrapositive of a statement.

**AGEO.2.3** – Apply the midpoint, angle bisector, vertical angle, complementary, supplementary, and congruence theorems to problem solve and to write two-column proofs.

Outcome: **AGEO.3** Students will distinguish and apply theorems of parallel and perpendicular lines. (State goals: 8D, 9A, 9B, 9C)

Components: **AGEO.3.1** – Distinguish between intersecting, parallel, and skew lines.

**AGEO.3.2** – Identify angles formed when two lines are cut by a transversal.

**AGEO.3.3** – State and apply postulates and theorems about parallel and perpendicular lines.

**AGEO.3.4** – Classify triangles according to sides and to angles.

**AGEO.3.5** – State and apply the theorems and the corollaries about the sum of the interior and exterior angles of a triangle.

**AGEO.3.6** – Recognize and name convex polygons and regular polygons.

**AGEO.3.7** – Find the measures of interior and exterior angles of convex polygons.

Outcome: **AGEO.4** Students will extend the concepts of congruence, moving from the segments and angles to triangles and other polygons. (State goals: 8D, 9A, 9B, 9C, 10A)

Components: **AGEO.4.1** – Identify the corresponding parts of congruent figures.

**AGEO.4.2** – Prove two triangles are congruent by using SSS, SAS, ASA, AAS, HL Postulates and Theorems.

**AGEO.4.3** – Prove two overlapping triangles are congruent.

**AGEO.4.4** – Apply the theorems of corollaries about isosceles triangles.

**AGEO.4.5** – Prove two triangles congruent by first proving two other triangles congruent.

**AGEO.4.6** – Apply the definitions of the segments of triangles (median, altitude, angle bisector and perpendicular bisector).

Outcome: **AGEO.5** Students will recognize and apply the properties of quadrilaterals. (State goals: 9A, 9C)

Components: **AGEO.5.1** – Apply and define the properties and theorems of a parallelogram.

**AGEO.5.2** – Prove that certain quadrilaterals are parallelograms.

**AGEO.5.3** – Apply theorems about parallel lines.

**AGEO.5.4** – Apply the midpoint theorems for triangles.

**AGEO.5.5** – Apply and define the properties and theorems of a rhombus, rectangle, and square.

**AGEO.5.6** – Apply and define the properties and theorems of kites, and trapezoids.

Outcome: **AGEO.6** Students will learn to recognize inequalities in Geometry. (State goals: 9C)

Components: **AGEO.6.1** – Apply properties of inequality to positive numbers, lengths of segments, and measures of angles.

**AGEO.6.2** – Write indirect proofs in paragraph form.

**AGEO.6.3** – State and apply the inequality theorems and corollaries for one triangle.

**AGEO.6.4** – State and apply the inequality theorems for two triangle.

Outcome: **AGEO.7** Students will express, solve and state properties, postulates and theorems related to similar polygons. (State goal: 8D, 9B, 9C)

Components: **AGEO.7.1** – Express a ratio and given proportions in simplest and equivalent form.

**AGEO.7.2** – State and apply the properties of similar polygons.

**AGEO.7.3** – Use AA, SAS and SSS postulates and theorems to prove triangles similar.

**AGEO.7.4** – State and apply the Triangle Proportionality Theorem.

**AGEO.7.5** – State and apply the Triangle Angle Bisector Theorem.

Outcome: **AGEO.8** Students will calculate, state, and apply Right Triangle postulates and theorems. (State goals: 9D)

Components: **AGEO.8.1** – Calculate geometric mean.

**AGEO.8.2** – State and apply the Pythagorean Theorem and its converse.

**AGEO.8.3** – Determine the lengths of two sides of 45-45-90 and 30-60-90 triangles when a third side is known.

**AGEO.8.4** – Define the tangent, sine, and cosine ratios for acute triangles.

**AGEO.8.5** – Solve right triangle problems by using the sine, cosine and tangent ratios.

Outcome: **AGEO.9** Students will establish the numerical relationships between arcs, angles, and segments of a circle. (State goals: 8D, 9A, 9C, 9D)

Components: **AGEO.9.1** – Define a circle, sphere and terms related to them.

**AGEO.9.2** – Apply theorems that relate tangents and radii.

**AGEO.9.3** – Define and apply properties of arcs and central angles.

**AGEO.9.4** – Apply theorems about the chords of a circle.

**AGEO.9.5** – Solve problems and prove statements involving inscribed angles, circumscribed angles and angles formed by chords, secants and tangents.

**AGEO.9.6** – Solve problems involving lengths of chords, secant segments, and tangent segments.

Outcome: **AGEO.10** Students will understand and use formulas to find various areas of plane figures. (State goals: 8D, 9A, 9B, 9C, 9D)

Components: **AGEO.10.1** – Memorize and use the formulas for the areas of rectangles, parallelograms, triangles, and rhombuses.

**AGEO.10.2** – Memorize and use the formulas for the areas of trapezoids, kites, and regular polygons.

**AGEO.10.3** – Memorize and use the formulas for circumferences and areas of circles.

**AGEO.10.4** – Memorize and use the formulas for arc length, areas of sectors, and area of segments of a circle.

**AGEO.10.5** – Find the ratio of the areas of two triangles.

**AGEO.10.6** – Understand and apply the relationship between scale factors, perimeters, and areas of similar figures.

Outcome: **AGEO.11** Students will identify and calculate Area and Volumes of Solids. (State goals: 9!)

Components: **AGEO.11.1** – Identify the parts of prisms, pyramids, cylinders, cones and spheres.

**AGEO.11.2** – Find the lateral areas, total areas, and volumes of right and oblique prisms.

**AGEO.11.3** – Find the lateral areas, total areas, and volumes of right and oblique pyramids.

**AGEO.11.4** – Find the lateral areas, total areas, and volumes of cylinders.

**AGEO.11.5** – Find the lateral areas, total areas, and volumes of cones.

**AGEO.11.6** – Find the total area and volumes of spheres and hemispheres.

## Trigonometry

Purpose: Trigonometry students will use definitions and principles of trigonometry as they relate to; angles, right triangles and circular functions. Students will graph the trigonometric functions, apply identities, evaluate inverse trig functions, and solve triangles and trigonometric equations.

Outcome: **TRIG.1** Students will identify types of angles, graph angles in standard position, and define the six trigonometric ratios as they relate to the rectangular coordinate plane.

Components: **TRIG.1.1** – Calculate radian and degree measure of an angle.  
**TRIG.1.2** – Apply trigonometric functions using the unit circle.  
**TRIG.1.3** – Calculate trigonometric functions of any angle.

Outcome: **TRIG.2** Students will graph the six trigonometric functions.

Components: **TRIG.2.1** – Graph sine and cosine with and without shifts.  
**TRIG.2.2** – Graph secant and cosecant.  
**TRIG.2.3** – Graph tangent and cotangent.

Outcome: **TRIG.3** Students will identify, prove, and apply trigonometric identities.

Components: **TRIG.3.1** – Use fundamental identities.  
**TRIG.3.2** – Verify trigonometric identities.  
**TRIG.3.3** – Apply sum and difference formulas.  
**TRIG.3.4** – Apply multiple angle identities.

Outcome: **TRIG.4** Students will solve trigonometric equations.

Components: **TRIG.4.1** – Solve trigonometric equations.  
**TRIG.4.2** – Solve inverse trigonometric functions.

Outcome: **TRIG.5** Students will solve right triangles.

Components: **TRIG.5.1** – Calculate angles and sides using right angle trigonometry.  
**TRIG.5.2** – Apply right triangle trigonometry to real world problems.

Outcome: **TRIG.6** Students will solve oblique triangles using the Law of Sines and the Law of Cosines.

Components: **TRIG.6.1** – Solve triangles using the Sine Law.

**TRIG.6.2** – Solve triangles using the Cosine Law.

**TRIG.6.3** – Finding area in oblique triangles.

## College Algebra

Purpose: College Algebra will include an in-depth review of previously learned algebraic concepts, solving systems of equations including those with three variables, and solving linear, rational, polynomial, quadratic, logarithmic, and exponential equations.

Outcome: **CA.1** Students will use properties and operations to work with the real numbers.

Components: **CA.1.1** – Define and apply properties of real numbers.

**CA.1.2** – Evaluate using order of operations and absolute value.

Outcome: **CA.2** Students will simplify, perform operations, and factor algebraic expressions.

Components: **CA.2.1** – Simplify polynomials.

**CA.2.2** – Apply the binomial theorem to expand a binomial.

**CA.2.3** – Factor polynomials.

**CA.2.4** – Simplify rational expressions.

**CA.2.5** – Simplify rational exponents.

**CA.2.6** – Simplify radical expressions.

Outcome: **CA.3** Students will simplify and solve Linear equations.

Components: **CA.3.1** – Solve linear equations.

**CA.3.2** – Apply and model linear equations.

**CA.3.3** – Evaluate absolute value equations.

Outcome: **CA.4** Students will solve all types of quadratic equations.

Components: **CA.4.1** – Solve quadratic equations using Complex numbers.

**CA.4.2** – Use factoring and the square root method to solve quadratic equations.

**CA.4.3** – Use completing the square and the quadratic formula to solve quadratics.

**CA.4.4** – Solve equations of quadratic type.

**CA.4.5** – Solve rational equations.

**CA.4.6** – Solve radical equations.

Outcome: **CA.5** Students will solve all types of inequalities.

Components: **CA.5.1** – Solve linear inequalities.

**CA.5.2** – Solve quadratic inequalities.

**CA.5.3** – Solve rational inequalities.

**CA.5.4** – Solve absolute value inequalities.

Outcome: **CA.6** Students will solve all types of systems of equations.

Components: **CA.6.1** – Solve systems of equations by substitution.

**CA.6.2** – Solve systems by linear combination.

**CA.6.3** – Solve equations of three or more variables.

**CA.6.4** – Solve nonlinear systems of equations.

Outcome: **CA.7** Students will solve exponential and logarithmic equations.

Components: **CA.7.1** – Apply properties of logarithmic and exponential equations.

**CA.7.2** – Simplify logarithmic and exponential equations.

**CA.7.3** – Solve logarithmic equations.

**CA.7.4** – Solve exponential equations.

## *Transition to College Mathematics*

Purpose: Transition to College Mathematics students will apply problem solving skills to graph and solve linear equations, systems of linear equations, and quadratic equations.

Outcome: **TCM.1** Students will graph, analyze, and solve linear equations and inequalities in two variables.

Components: **TCM.1.1** – Graph and interpret linear equations in two variables.

**TCM.1.2** – Calculate the slope of a line.

**TCM.1.3** – Find and apply equations of a line.

**TCM.1.4** – Graph linear inequalities in two variables.

**TCM.1.5** – Identify functions.

Outcome: **TCM.2** Students will graph, analyze, and solve systems of linear equations and inequalities.

Components: **TCM.2.1** – Solve systems of linear equations by graphing.

**TCM.2.2** – Solve systems of linear equations by substitution.

**TCM.2.3** – Solve systems of equations by elimination.

**TCM.2.4** – Applications of linear equations to word problems.

**TCM.2.5** – Solve systems of linear inequalities.

Outcome: **TCM.3** Students will simplify polynomials.

Components: **TCM.3.1** – Apply product rule and power rule for exponents.

**TCM.3.2** – Simplify polynomials using integer exponents and quotient rule.

**TCM.3.3** – Apply operations (add, subtract, multiply and divide) polynomials.

**TCM.3.4** – Recognize and apply special products.

Outcome: **TCM.4** Students will apply factoring methods.

Components: **TCM.4.1** – Factor using greatest common factor and grouping.

**TCM.4.2** – Factor trinomials.

**TCM.4.3** – Apply special factoring rules.

**TCM.4.4** – Solve quadratic equations by factoring.

**TCM.4.5** – Apply factoring of quadratic equations to real world problems.

Outcome: **TCM.5** Students will simplify rational expressions and solve rational equations.

Components: **TCM.5.1** – Apply the fundamental property of rational expressions.

**TCM.5.2** – Multiply and divide rational expressions.

**TCM.5.3** – Solve or simplify using least common denominators.

**TCM.5.4** – Add and subtract rational expressions.

**TCM.5.5** – Solve and simplify complex fractions.

**TCM.5.6** – Solve equations with rational expressions.

**TCM.5.7** – Apply rational expressions to real world problems.

**TCM.5.8** – Solve direct and inverse variation problems.

Outcome: **TCM.6** Students will simplify and solve equations with roots and radicals.

Components: **TCM.6.1** – Evaluate roots.

**TCM.6.2** – Multiplying, dividing, and simplifying radicals.

**TCM.6.3** – Add and subtract radicals.

**TCM.6.4** – Rationalize radical expressions.

**TCM.6.5** – Solve equations with radicals.

**TCM.6.6** – Define and apply numbers with rational exponents.

Outcome: **TCM.7** Students will graph and solve quadratic equations.

Components: **TCM.7.1** – Solve quadratic equations by the square root method.

**TCM.7.2** – Solve quadratic equations by completing the square.

**TCM.7.3** – Solve quadratic equations by the quadratic formula.

**TCM.7.4** – Add, subtract, multiply and divide using the complex numbers.

**TCM.7.5** – Graph quadratic equations and functions.

**Pre-Calculus**  
***(Grades 11 & 12)***

**Purpose:** Pre-Calculus students will graph, analyze, and solve polynomial, exponential, and logarithmic equations. Students will apply more advanced trigonometric identities and use them to solve trigonometric equations. Students will use the Laws of Sines and Cosines to solve oblique triangles. Students will study the properties of matrices, and use these properties to perform operations, find inverses and determinants, and investigate applications of matrices and determinants with and without technological aides. Students will analyze mathematical sequences, series, and probability.

**Outcome:** **PC.1** Students will analyze, graph, and find inverses of functions.

**Components:** **PC.1.1** – Definition of functions.

**PC.1.2** – Graphs of functions.

**PC.1.3** – Shifting, reflecting, and stretching functions.

**PC.1.4** – Combinations of functions.

**PC.1.5** – Inverse functions.

**Outcome:** **PC.2** Students will analyze, graph, and find the zeros of polynomial functions.

**Components:** **PC.2.1** – Quadratic functions.

**PC.2.2** – Polynomial functions of higher degree.

**PC.2.3** – Real zeros of polynomial functions.

**PC.2.4** – Complex numbers.

**PC.2.5** – Fundamental theorem of algebra.

**PC.2.6** – Rational functions and asymptotes.

**PC.2.7** – Graphs of rational functions.

**Outcome:** **PC.3** Students apply, graph, and solve exponential and logarithmic equations.

**Components:** **PC.3.1** – Exponential functions and their graphs.

**PC.3.2** – Logarithmic functions and their graphs.

**PC.3.3** – Properties of logarithms.

**PC.3.4** – Solving exponential and logarithmic equations.

**PC.3.5** – Exponential and logarithmic models.

Outcome: **PC.4** Students analyze and graph trigonometric functions.

Components: **PC.4.1** – Radian and degree measure.

**PC.4.2** – Graphs of sine and cosine functions.

**PC.4.3** – Graphs of other trigonometric functions.

Outcome: **PC.5** Students will verify trigonometric identities and use them to solve trigonometric equations.

Components: **PC.5.1** – Using fundamental identities.

**PC.5.2** – Solving trigonometric equations.

**PC.5.3** – Sum and difference formulas.

**PC.5.4** – Multiple angle and product sum formulas.

Outcome: **PC.6** Students will apply the Laws of Sines and Cosines and apply these laws to vectors in a plane.

Components: **PC.6.1** – Law of sines.

**PC.6.2** – Law of cosines.

**PC.6.3** – Vectors in the plane.

**PC.6.4** – Vectors and dot products.

Outcome: **PC.7** Students will apply the properties of matrices and use them to solve problems and make applications.

Components: **PC.7.1** – Matrices and systems of equations.

**PC.7.2** – Operations with matrices.

**PC.7.3** – The inverse of a square matrix.

**PC.7.4** – The determinant of a square matrix.

**PC.7.5** – Applications of matrices and determinants.

Outcome: **PC.8** Students will apply and solve problems involving mathematical sequences, series, and probability.

Components: **PC.8.1** – Sequences and series.

**PC.8.2** – Arithmetic sequences and partial sums.

**PC.8.3** – Geometric sequences and series.

**PC.8.4** – Mathematical induction.

**PC.8.5** – The binomial theorem.

**PC.8.6** – Counting principles.

**PC.8.7** – Probability.

**Calculus**  
***(Grades 11 – 12)***

Purpose: Calculus students will learn the concepts and mechanics of the derivative and integral along with their applications. The course will address all topics of Calculus delineated by the College Board.

Outcome: **CALC.1** Students will interpret and calculate Limits and Continuity.

Components: **CALC.1.1** – How High? How Fast?

**CALC.1.2** – Finding the Limits Graphically and Numerically

**CALC.1.3** – Where does the limit fail to exist?

**CALC.1.4** – Finding Limits Analytically

**CALC.1.5** – Continuity

**CALC.1.6** – Continuity of Trigonometric Functions

**CALC.1.7** – One and two sided Limits

**CALC.1.8** – Infinite Limits

Outcome: **CALC.2** Students will interpret and calculate the Derivative of a Function.

Components: **CALC.2.1** – The Tangent Line Problem

**CALC.2.2** – The Derivative

**CALC.2.3** – Differentiability and Continuity

**CALC.2.4** – Basic Differentiation and Rates of Change

**CALC.2.5** – The Product and Quotient Rules

**CALC.2.6** – Higher Order Derivatives

**CALC.2.7** – The Chain Rule

**CALC.2.8** – Trigonometric Functions and their Derivatives

**CALC.2.9** – Implicit Differentiation

Outcome: **CALC.3** Students will apply the Derivative to a variety of problems.

Components: **CALC.3.1** – Related Rates of Change.

**CALC.3.2** – Extrema on an Interval

**CALC.3.3** – Rolle's and Mean Value Theorems.

**CALC.3.4 – Graphing:**

- First Derivative Test
- Second Derivative Test
- Rational Functions

**CALC.3.5 – Optimization**

**CALC.3.6 – Newton’s Method**

Outcome: **CALC.4** Students will interpret and calculate the integral of functions.

Components: **CALC.4.1 – Antiderivatives and Basic Integration Rules**

**CALC.4.2 – Initial Condition Problems and Introduction to Slope Fields**

**CALC.4.3 – Area:**

- Sigma Notation
- Upper and Lower Sums
- Riemann Sums
- Definite Integrals

**CALC.4.4 – Fundamental Theorems of Calculus**

**CALC.4.5 – Definite Integrals**

**CALC.4.6 – Mean and Average Value Theorems**

**CALC.4.7 – Integration by Substitution**

**CALC.4.8 – Trapezoidal Rule**

Outcome: **CALC.5** Student will apply differential and integral calculations to Logarithmic, Exponential and Transcendental Functions.

Components: **CALC.5.1 – Differentiation of Natural Logarithm Functions**

**CALC.5.2 – Integration of Natural Logarithmic Functions**

**CALC.5.3 – Integrals of Trigonometric Functions**

**CALC.5.4 – Derivatives of inverse Functions**

**CALC.5.5 – Derivatives of Exponential Functions**

**CALC.5.6 – Integration of Exponential Functions**

**CALC.5.7 – Derivatives for Bases other than e**

**CALC.5.8 – Integrating an Exponential Function to another Base**

**CALC.5.9 – Differential Equations: Growth and Decay**

**CALC.5.10** – Differential Equations: Separation of Variables

**CALC.5.11** – Integration of Inverse Trigonometric Functions

Outcome: **CALC.6** Students will calculate area and Volume by integration.

Components: **CALC.6.1** – Area of region bounded between two curves.

**CALC.6.2** – Volume of solids using Disk and Washer Method.

**CALC.6.3** – Solids with Known Cross Sections

*(Regular Calculus may or may not get thru objective 5 and 6. This will depend on skill level of class each year.)*

## *AP AB Calculus*

**Purpose:** Calculus students will learn the concepts and mechanics of the derivative and integral along with their applications. The course will address all topics of Calculus delineated by the College Board.

### **Calculus High Outcome Objectives:**

1. Students will interpret and calculate Limits and Continuity.

Components:

- a. How High? How Fast?
- b. Finding the Limits Graphically and Numerically
- c. Where does the limit fail to exist?
- d. Formal Definition using delta/epsilon
- e. Finding Limits Analytically
- f. Continuity
- g. Continuity of Trigonometric Functions
- h. One and two sided Limits
- i. Infinite Limits

2. Students will interpret and calculate the Derivative of a Function.

Components:

- a. The Tangent Line Problem
- b. The Derivative
- c. Differentiability and Continuity
- d. Basic Differentiation and Rates of Change
- e. The Product and Quotient Rules
- f. Higher Order Derivatives
- g. The Chain Rule
- h. Trigonometric Functions and their Derivatives
- i. Implicit Differentiation

3. Students will apply the Derivative to a variety of problems.

Components:

- a. Velocity and Acceleration
- b. Related Rates of Change
- c. Extrema on an Interval
- d. Rolle's and Mean Value Theorems
- e. Graphing
  - First Derivative Test
  - Second Derivative Test
  - Rational Functions
- f. Optimization
- g. Newton's Method

4. Students will interpret and calculate the integral of functions.

Components:

- a. Antiderivatives and Basic Integration Rules
  - b. Initial Condition Problems and Introduction to Slope Fields
  - c. Area
    - Sigma Notation
    - Upper and Lower Sums
    - Riemann Sums
    - Definite Integrals
  - d. Fundamental Theorems of Calculus
  - e. Definite Integrals
  - f. Mean and Average Value Theorems
  - g. Integration by Substitution
  - h. Trapezoidal Rule
5. Student will apply differential and integral calculations to Logarithmic, Exponential and Transcendental Functions.

Components:

- a. Differentiation of Natural Logarithm Functions
  - b. Integration of Natural Logarithmic Functions
  - c. Integrals of Trigonometric Functions
  - d. Derivatives of inverse Functions
  - e. Derivatives of Exponential Functions
  - f. Integration of Exponential Functions
  - g. Derivatives for Bases other than e
  - h. Integrating an Exponential Function to another Base
  - i. Differential Equations: Growth and Decay
  - j. Differential Equations: Separation of Variables
  - k. Integration of Inverse Trigonometric Functions
6. Students will calculate area and Volume by integration.

Components:

- a. Area of region bounded between two curves
- b. Volume of solids using Disk and Washer Method
- c. Solids with Known Cross Sections

\*\*\*This Material must be covered by early May in order for the students to be prepared to take the AP Exam. Regular Calculus covers almost the same material. Several concepts are excluded from their curriculum; they are the Formal Definition of the Limit (1d) and Newton's Method (3a). The regular Calculus will continue to progress thru the same program but, may or may not get thru objective 5 and 6. This will depend on skill level of class each year.

**Probability and Statistics**  
***(Grades 11 – 12)***

Purpose: Probability and Statistics students will apply reasoning using a collection of tools and methods designed to help them understand the world.

Outcome: **PAS.1** Students will explore data with graphs and numerical summaries.

Components: **PAS.1.1** – Identify the types of Data.  
**PAS.1.2** – Identify and display categorical data with graphical summaries.  
**PAS.1.3** – Identify and display quantitative data with graphical summaries.  
**PAS.1.4** – Describe and compare distribution shape, center spread.  
**PAS.1.5** – Describe skewed data.  
**PAS.1.6** – Compute measures of center, mean, median, and mode.  
**PAS.1.7** – Compute measures of spread, range, IQR, variance and standard deviation.  
**PAS.1.8** – Apply 68-95-99.7 Rule and Normal Model.  
**PAS.1.9** – Interpret Sample statistics vs. population parameters.  
**PAS.1.10** – Apply 5 Number summaries and construct box plots.

Outcome: **PAS.2** Students will explore Association: Contingency, Correlation and Regression.

Components: **PAS.2.1** – Examine how outcome on the Response variable depends on the value of the Explanatory variable.  
**PAS.2.2** – Identify the association between variables.  
**PAS.2.3** – Interpret and form Contingency tables.  
**PAS.2.4** – Construct a Scatterplot.  
**PAS.2.5** – Identify trends in scatterplots.  
**PAS.2.6** – Use Correlation to summarize the association between two quantitative variables.  
**PAS.2.7** – Calculating Z scores.  
**PAS.2.8** – Calculate Lines of best fit.  
**PAS.2.9** – Interpreting slope and y – intercepts.  
**PAS.2.10** – Calculate the Residual.

**PAS.2.11** – Recognize Lurking and Confounding Variables.

Outcome: **PAS.3** Students will use techniques to Gather Data.

Components: **PAS.3.1** – Perform Experiments and Observational Studies.

**PAS.3.2** – Conduct Sample surveys.

**PAS.3.3** – Perform Sampling Methods.

**PAS.3.4** – Identify and use Methods of collecting data.

**PAS.3.5** – Approximate margin of error.

**PAS.3.6** – Identify Potential sources of bias.

**PAS.3.7** – Identify statistically significant results.

**PAS.3.8** – Conduct Experimental Design.

Outcome: **PAS.4** Students will use several techniques to determine Probability of an Event.

Components: **PAS.4.1** – Find the long run behavior of random events.

**PAS.4.2** – Use Law of Large Numbers

**PAS.4.3** – Calculate a Sample space.

**PAS.4.4** – Calculate Probabilities of sample spaces.

**PAS.4.5** – Determine the Complement events.

**PAS.4.6** – Calculate the Probability of Union and Disjoint events.

**PAS.4.7** – Calculate the Intersection and Union of two events.

**PAS.4.8** – Calculate the Intersection of two independent events.

**PAS.4.9** – Calculate Probability using the Tree Diagram.

**PAS.4.10** – Identify and determine Conditional probability.

**AP Statistics Syllabus**  
***(Grades 11 – 12)***  
***College Board Approved***

Purpose: AP Statistics students will apply problem solving skills to demonstrate knowledge of data analysis, statistical techniques, and statistical literacy that is vital in today's society.

**Part I**

**Chapter 1: Stats Starts Here (1/2 Day)**

- What is statistics?

**Chapter 2: Data (1 ½ days)**

- Data Tables
- Categorical and quantitative variables
- Counts
- Investigative Task

**Chapter 3: Displaying and Describing Categorical Data (3 Days)**

- Frequency Tables
- Proportions
- Distributions
- Bar Charts
- Contingency Tables
- Marginal Distributions
- Conditional Distributions
- Segmented Bar Charts
- Simpson's Paradox
- Investigative Task

**Chapter 4: Displaying Quantitative Data (2 Days)**

- Histograms
- Relative Frequency Histograms
- Dotplots
- Shape, Center, and Spread of Distributions
- Outliers

- Comparing Distributions
- Timeplots
- Introduction to Re-expressing Skewed Data
- Investigative Task

#### Chapter 5: Describing Distributions Numerically (3 Days)

- Range
- Interquartile Range
- 5 Number Summary
- Box Plots
- Using Box Plots for Comparison
- Mean vs. Median
- Standard Deviation and Variance
- Investigative Task

#### Chapter 6: The Standard Deviation as a Ruler and the Normal Model (2.5 Days)

- Z-Scores
- Shifting and Rescaling Data
- Introduction to the Normal Model
- 68-95-99.7 Rule
- Finding Normal Percentiles by Hand and Using Technology
- Investigative Task

#### Review of Part I and Part I Test (2 Days)

### **Part II**

#### Chapter 7: Scatterplots, Association, and Correlation (2.5 Days)

- Scatterplots
- Positive, negative, and no association
- Identifying outliers on scatterplots
- Correlation
- Conditions of Correlation
- Outlier effects on correlations
- The difference between association and correlation
- Lurking variables

- Correlation vs. Causation

#### Chapter 8: Linear regression (5 days, including project)

- What is a linear model?
- Predicted value from a linear model
- Residuals
- Equations of regression lines
- Meaning of slope and intercept of regression lines
- Conditions of regressions lines
- Calculating regression lines
- Residual plots
- R Squared
- Linear regression project  
(Written report, oral presentation with PowerPoint)

#### Linear Regression Test (1 Day)

#### Chapter 9: Regression Wisdom (2 Days)

- Subsets
- Dangers of extrapolation
- More on outliers, leverage points, and influential points
- Lurking variables

#### Chapter 10: Re-expressing data (3 Days)

- Goals of re-expression
- Ladder of powers
- Re-expression using Logarithms

#### Review of Part I and Part II Test (2 Days)

### **Part III**

#### Chapter 11: Understanding Randomness (2 days)

- Generating random numbers
- Running simulations

#### Chapter 12: Sample Surveys (2 Days)

- Sample Bias

- Randomizing
- The importance of sample size
- Population parameters vs. Statistics
- Types of sampling

Chapter 13: Experiments and Observational Studies (2.5 Days)

- Observational studies
- Four principals of experimental design
- Experimental design
- Confounding

Part III Review and Test (2 Days)

Part III Project (2 Days)

Students will be required to collect and analyze data using the following sampling

**Part IV**

Project: Data Collection and Analysis

Chapter 14: From Randomness to Probability (2 Days)

- Long run frequency
- Law of large number's
- Formal Probability

Chapter 15:Probability Rules! (2.5 Days)

- General addition rule
- General multiplication rules
- Independent and disjoint events
- Drawing without replacement
- Reverse conditioning

Chapter 16: Random Variables (2.5 Days)

- What is a discrete random variable?
- Expected value
- Variance and standard deviation of random variables
- Operations with means and variances
- Continuous random variables

Chapter 17: Probability Models (2 Days)

- Bernoulli Trials
- Geometric probability models
- Binomial probability model
- Using the normal model
- Continuous random variables

Part IV Review and Test (2 days)

**Part V**

Chapter 18: Sampling Distribution Models (2 Days)

- Modeling sample distributions
- Assumptions and conditions for a sample distribution model.
- Sampling distribution of a mean
- Central Limit Theorem
- Assumptions and conditions for CLT
- Standard Error

Chapter 19: Confidence Intervals for Proportions (2.5 Days)

- What is a confidence interval?
- Confidence intervals in context
- Margin of error
- Critical Values
- Assumptions and conditions
- Constructing confidence intervals

Chapter 20: Testing Hypotheses about Proportions (2 Days)

- Introduction to hypotheses
- P-value
- Null hypothesis
- One-proportion z-test
- When to reject null hypothesis
- Two-tailed z test vs. one tailed z-test
- Writing conclusions from a one proportion z-test

Chapter 21: More About Tests (1.5 Days)

- More on P-Values
- Alpha Levels
- Type I and Type II errors
- Power
- Reducing Type I and Type II errors

Chapter 22: Comparing Two Proportions (2 Days)

- Standard deviation for the difference of two proportions
- Assumptions and Conditions for a two proportion z-test
- Two proportion z-interval
- Two proportion z-tests

Part V Review and Test (2 Days)

**Part VI**

Chapter 23: Inferences About Means (1.5 Days)

- Review CLT
- Student's  $t$ -models
- Degrees of freedom
- Finding  $t$ -values using a chart
- Assumptions and conditions for means
- One sample  $t$ -intervals
- One sample  $t$ -tests for the mean

Chapter 24: Comparing Means (2 days)

- Standard error for two means
- Assumptions and conditions
- Two sample  $t$ -intervals
- Two sample  $t$ -test for means
- Turkey's quick test

Chapter 25: Paired Samples and Blocks (2 Days)

- What are paired data?
- Assumptions and conditions

- Paired t-test

#### Chapter 26: Comparing Counts (2 Days)

- Goodness of fit
- Chi-Square Models
- Chi-Square calculations
- Assumptions and conditions for Chi-Squared
- Chi-Square test of homogeneity

#### Chapter 27: Inferences for Regression (2 days)

- Review linear regressions
- Assumptions and conditions
- Reading computer printouts for regression inference
- Confidence intervals for inference
- Regression slope t-test

#### Part VI Review and Test (2 Days)

#### Review for AP Test (5 Days)

- Review 2 “Parts” per class
- Practice AP exam over two class periods

#### Final Project (5 Days including 2 for Presentations)

- The final project will consist of three parts:
  - 1.) A written proposal including the research question, method of collecting data, and statistical inference methods that will be used.
  - 2.) A written report including an introduction, description of data collection, summary statistics, all components of a hypothesis test, confidence interval, chi square test or regression inference, proper conclusions in context, and a reflection section describing problems that arose in during their project, what they could do better, and questions for further research.
  - 3.) Power Point presentation encompassing the items covered in the w