Grade 8 Math	Unit 1: Real Numbers and Algebra		Suggested Length: 10 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
1. How do you simplify expressions and solve equations? 2. Why are integers important in our lives? 3. What relationships can be drawn between fractions, and decimals? 4. How do you use the Pythagorean Theorem?	**Program of Studies** ❑ *NC-1 use percents, decimals, integers, and fractions (include percents less than 1).* ❑ *NC-3 use irrational numbers (e.g., square roots).* ❑ *NC-4 relate irrational and rational numbers (e.g., magnitude, order on a number line).* ❑ *NC-5 determine the inverse relationship between addition and subtraction, multiplication and division, or raising to an exponent and taking the root of a number.* ❑ *GM-1 discover and apply the Pythagorean theorem.* ❑ *A-4 use a variety of methods and representations to create and solve one- and two-variable linear equations that require two steps.* ❑ *A-5 simplify algebraic expressions.* ❑ *A-8 organize data into tables, plot points onto all four quadrants of a coordinate (Cartesian) system/grid, interpret resulting patterns or trends.* **Core Content** ❑ **MA-08-1.1.1 Students will provide examples of and identify rational numbers and irrational numbers (square roots and π only). DOK 1** ❑ MA-08-1.1.2 Students will describe and provide examples of representations of numbers (rational, square roots, and π) and operations in a variety of equivalent forms using models, diagrams, and symbols (e.g., number lines, 10 by 10 grids, rectangular arrays, number sentences) based on real-	❑ Variable ❑ Algebraic expression ❑ Order of operations ❑ Commutative property ❑ Associative property ❑ Distributive property ❑ Identity property ❑ Inequality ❑ Inverse operations ❑ Rational number ❑ One-step equation ❑ Two-step equation ❑ Irrational number ❑ Hypotenuse ❑ Pythagorean theorem ❑ Coordinate plane ❑ Origin ❑ Axes ❑ Ordered pair	❑ Evaluate numerical and algebraic expressions using the order of operations. 1.3.1 DOK 2 ❑ Identify mathematical properties (commutative, associative, distributive, and identity). 1.5.2 DOK 1 ❑ Write integers to describe everyday situations, such as: a 15-yard loss in football, or 3° above zero. 1.1.1 DOK 1 ❑ Compare integers using a number line. 1.3.1 DOK 1 ❑ Order integers from least to greatest using record low temperatures from 9 states. 1.3.1 DOK 1 ❑ Find the absolute value of expressions by playing the game Absolutely! 1.1.1 DOK 1 ❑ Add two or more integers by using a number line and by using counters. 1.1.1 DOK 1 ❑ Subtract two or more integers by using counters. 1.1.1 DOK 1 ❑ Multiply integers by using counters and divide integers by realizing that divide is the inverse of multiply. 1.1.1 DOK 1 ❑ Write algebraic expressions and equations from verbal phrases and sentences. For example, the zoo added three camels to its Asian exhibit bringing the total to nine: x + 3 = 9. 5.2.1a ❑ Solve simple equations using the subtraction and addition properties of equality. 5.2.1 DOK 2 ❑ Solve simple equations using the division and multiplication properties of equality. 5.2.1 DOK 2 ❑ Review using Mind Jogger Video Quiz. ❑ Open Response: Theo's Math Test - Explain how to calculate and calculate the average of 5 test scores. Graph the scores and the average on a number line. Find the difference between each test score and the average. Describe characteristics of the test scores for which the difference was negative. Find the sum of the differences. DOK 2 ❑ Test: Integers

Grade 8 Math	Unit 1: Real Numbers and Algebra		Suggested Length: 10 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and <u>Assessment</u> Student will:
	world and mathematical problems. ❑ **MA-08-1.1.3 Students will convert, compare and order multiple numerical representations (e.g., fractions, decimals, percentages) of rational numbers and irrational numbers (square roots and π only). DOK 3** ❑ **MA-08-1.2.1 Students will estimate to solve real-world and mathematical problems with rational numbers, checking for reasonable and appropriate computational results DOK 2** ❑ **MA-08-1.3.1 Students will add, subtract, multiply and divide rational numbers to solve real-world problems and apply order of operations (including positive whole number exponents) to simplify numerical expressions. DOK 2** ❑ MA-08-1.3.2 Students will explain how operations (additions and subtraction; multiplication and division; squaring and taking the square root of a number) are inversely related. ❑ **MA-08-1.5.2 Students will identify the use of properties (the commutative properties of addition and multiplication, the associative properties of addition and multiplication, the identity properties for addition and multiplication, inverse properties and the distributive property of multiplication over addition and subtraction) to justify a given step in solving problems. DOK 1** ❑ **MA-08-2.1.6 Students will apply the Pythagorean theorem to determine the length of a hypotenuse. DOK 2** ❑ **MA-08-3.3.1 Students will identify and graph ordered pairs on a coordinate system, correctly identifying the origin,**		❑ Express rational numbers as decimals and decimals as fractions by answering various questions about a table that shows the top ten places in the Northern Hemisphere to watch whales. 1.1.1 DOK 1 ❑ Compare and order rational numbers by either the common denominator method or the decimal method. Data will include ride times for nine roller coasters. 1.1.2 DOK 2 ❑ Multiply fractions by using an area model. For example, to show 1/3 of 2/5. Start with a sheet of paper and fold it into 5 equal columns and shade in 2 of the columns blue. Then divide the paper into 3 equal rows and shade in 1 of the rows yellow. The overlapping green area represents the product of 1/3 x 2/5 = 2/15. 1.3.1 DOK 2 ❑ Divide fractions. Introduce by show 2 ¼ ÷ ¾ = 3. Draw 2 ¼ circles divided into fourths and using different colored chalk, shade in three ¼ sections at a time to show there are 3 complete sets of ¾. After several problems students will soon realize that to divide by a fraction, you just multiply by its multiplicative inverse. 1.3.1 DOK 2 ❑ Use powers and exponents in expressions by using the 2 biological parent problem. 1.3.1a ❑ Express numbers in scientific notation. 1.3.1a ❑ Add and subtract fractions with like denominators by using a bread recipe that lists various amounts and ingredients. 1.3.1 DOK 2 ❑ Play the game ”Plug It In” to practice addition, subtraction, multiplication, and division of fractions. 1.3.1 DOK 2 ❑ Solve equations involving rational numbers by using the subtraction, addition, multiplication, and division properties of equality. Balance scale. 5.2.1 ❑ <u>Open Response: School Bake Sale</u> – Students work with rational numbers in various forms to answer questions about a batch of cookies. 1.1.2 DOK 3 ❑ Problem Solving Strategy – Look for a Pattern (Rich Learning Task on Total Rectangles). DOK 3

Grade 8 Math	Unit 1: Real Numbers and Algebra		Suggested Length: 10 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
	axes and ordered pairs; and will apply graphing in the coordinate system to solve real-world and mathematical problems. DOK 2 ❑ **MA-08-5.2.1 Students will evaluate and simplify algebraic expressions applying the order of operations. DOK 2** ❑ MA-08-5.2.2 Students will describe, define and provide examples of variables and expressions with a missing value based on real-world and mathematical problems. ❑ **MA-08-5.3.1 Students will model and solve single variable, first-degree real-world and mathematical problems (e.g., 4x+2=22, x-4<-60). DOK 2**		❑ Look at square arrangements of tiles to find square roots of perfect squares. 1.1.1a ❑ Use a Venn diagram or a web to identify and classify numbers in the real number system. 1.1.1a ❑ Investigate the Pythagorean Theorem using a 3-4-5 triangle and squares with sides of 3, 4, and 5. 2.1.4 DOK 2 ❑ Practice finding missing lengths in a right triangle. For example, a pool table is 8 feet by 4 feet wide. How far is it from one corner pocket to the diagonally opposite corner pocket? 2.1.4 DOK 2 ❑ Using right triangles found in the classroom, students will practice finding the hypotenuse of a right triangle. For example, students will measure the length and width of a computer screen and then sketch and label the dimensions. They will then compute the distance from corner to opposite corner. Once they have the length they will check their computation by measuring the diagonal. 2.1.4 DOK 2 ❑ Plot points on the coordinate plane and determine the distance between the two points. If the two points are diagonal of each other, students will use the Pythagorean Theorem to determine the distance. 2.1.4 3.3.1 DOK 2 ❑ Review using Mind Jogger Video Quiz ❑ Test: Rational Numbers and The Pythagorean Theorem. ❑ Open Response: Theme Park Graph and label three given points on the coordinate plane. Use the Pythagorean Theorem to determine the distance between the three points and answer questions about the distances. 2.1.4 3.3.1 DOK

Grade 8 Math	Unit 2: Statistics		Suggested Length: 4 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Students will:
	Program of Studies		

Grade 8 Math	Unit 2: Statistics		Suggested Length: 4 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Students will:
1. What type of graph/plot is appropriate for representing your data? 2. How are mean, median, and mode related? 3. How should outliers be handled when interpreting data?	❑ *PS-1 collect, organize, analyze, and interpret data in a variety of graphical methods (e.g., circle graphs, scatter plots, box and whisker plots, histograms).* ❑ *PS-2 make predictions, draw conclusions, and verify results from statistical data and probability experiments.* ❑ *PS-3 select an appropriate graph to represent given data and justify its use.* ❑ *PS-4 compare data from various types of graphs.* ❑ *PS-5 recognize that statistics can be interpreted in many ways.* ❑ *PS-12 determine and interpret clusters, quartiles, gaps, and outliers in data.* **Core Content** ❑ **MA-08-4.1.1 Students will analyze and make inferences from data displays (drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs, stem-and-leaf plots, scatter plots, histograms, box-and-whiskers plots). DOK 3** ❑ MA-08-4.1.2 Students will explain how different representations of data (e.g., tables, graphs, diagrams, plots) are related. ❑ **MA-08-4.1.4 Students will:** ❑ **construct data displays (Venn diagrams, tables, line graphs, stem-and-leaf plots, circle graphs, scatter plots);** ❑ **explain why the type of display is appropriate for the data and** ❑ **explain how misleading representations affect interpretations and conclusions about data (e.g.,**	❑ Drawings ❑ Tables/charts ❑ Pictographs ❑ Bar graphs ❑ Circle graph ❑ Line plot ❑ Venn diagram ❑ Line graph ❑ Stem-and-leaf plot ❑ Scatter plot ❑ Histogram ❑ Box-and-whisker plot ❑ Mean ❑ Median ❑ Mode ❑ Range ❑ Clusters ❑ Gaps ❑ Outliers ❑ Bias	❑ Examine data collected from the audience of a comedy movie and organize the data into a frequency table. Use the table to answer questions about the audience. 4.1.2 DOK 2 ❑ Construct a histogram using the frequency table that was made with the data from the audience of a comedy movie. Use the histogram to answer questions about the audience. 4.1.2 DOK 2 ❑ Measure their height in inches and use the data to make a line plot using x's on the board of the class heights. Once the plot is complete students will be asked to analyze the data. For an extension, the x's will be changed to G's and B's (girls and boys) and then the data will be analyzed. 4.1.2 DOK 2 ❑ Use the data collected on student heights to construct a stem-and-leaf plot. Once the plot is complete students will be asked to analyze the data. For an extension, the students will use the same data to construct a back-to-back stem-and-leaf plot in order to compare the heights of the girls and boys. 4.1.2 DOK 2 ❑ Make a circle graph, without a protractor, using a table that displays the major influences for teens on music choices (USA WEEKEND) – data is given in percent form. Make a circle graph using a table that shows the top 5 largest American Indian Tribes – data is given in number form and must be converted to percent. 4.1.2 DOK 2 ❑ Assess situations involving data in order to choose an appropriate type of display. 4.1.2 DOK 2 ❑ Use data from surveys to calculate the measures of central tendency. Students will then determine which measure of central tendency is most representative of the data and support their choice in writing. 4.2.1 DOK 2 ❑ Use data from surveys to calculate the measures of variation. 4.2.1 DOK 2 ❑ Construct a box-and-whisker plot using data collected on student heights. Analyze the distribution by comparing the spread of the quartiles. 4.1.2 ❑ Compare two graphs in order to determine which graph

Grade 8 Math	Unit 2: Statistics		Suggested Length: 4 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Students will:
	changing the scale on a graph). DOK 2 ❑ MA-08-4.1.5 Students will construct box-and-whiskers plots. ❑ **MA-08-4.2.1 Students will:** ❑ **determine the mean, median, mode and range of a set of data;** ❑ **identify clusters, gaps and outliers and** ❑ **apply these concepts to compare sets of data. DOK 2** ❑ MA-08-4.3.1 Students will explain how data gathering, bias issues and faulty data analysis can affect the results of data collection.		is misleading. Assess the misleading graph to determine what was manipulated on the graph to make it misleading. 4.1.1 DOK 3 ❑ Work in groups to organize and analyze data collected from the Loud Music Store. The final product will be a large post-it note that contains as many of the different statistical methods that each group can come up with to present the information. 4.2.1 DOK 3 ❑ Test Statistics ❑ Open Response: Math Club Attendance – Students are given data on the number of students who attended math club meetings last school year and asked to describe how to calculate and calculate the measures of central tendency and measures of variation. The students must present the data in a box-and-whisker plot. 4.1.2 4.2.1 DOK 2

Grade 8 Math	Unit 3: Probability		Suggested Length: 4 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Students will:
1. How can you use theoretical and experimental probabilities to make predications and draw conclusions based on data collection? 2. What mathematical tools can be used to analyze	**Program of Studies** ❑ *PS-2 make predictions, draw conclusions, and verify results from statistical data and probability experiments.* ❑ *PS-6 analyze situations, such as games of chance, board games, or grading scales, and make predictions using knowledge of probability.* ❑ *PS-7 identify and describe the number of possible arrangements of several objects, using a tree diagram or the basic counting principle, and make a sample space represented in the form of a list, picture, chart, or a tree diagram.* ❑ *PS-8 investigate and explain the role of probability in everyday decision making.* ❑ *PS-9 design and conduct probability*	❑ Counting technique ❑ Sample space ❑ Theoretical probability ❑ Simple event ❑ Experimental probability ❑ Area model	*Middle Grades Mathematics Project: Probability* ❑ Determine probabilities using a bag of colored blocks or marbles (Blocks and Marbles). 4.4.2 DOK 2 ❑ Use probability to determine if three games developed by a toy manufacture are fair. Game 1 involves coins and chips are used for Games 2 & 3. This simulation allows students to begin to see the effect of small samples of data versus larger samples. *tree diagrams* (Fair & Unfair Games I) 4.4.1 4.4.2 DOK 2 ❑ Use probability to determine if two games that involve dice are fair. The first game is based on the sum of the two numbers on the dice and the second game is based on the product. Since a tree diagram or list would be a cumbersome way to find all possible outcomes an alternate method is chosen. *chart or table* (Fair & Unfair Games II) 4.4.1 4.4.2 DOK 2 ❑ Use probability to determine if a board game called The

Grade 8 Math	Unit 3: Probability		Suggested Length: 4 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and <u>Assessment</u> Students will:
games of chance?	*experiments and interpret the results.* ❑ *PS-10 explore concepts of randomness and independent events.* ❑ *PS-11 determine theoretical (mathematical) probabilities, compare that to experimental results, and explain reasons why there might be differences (e.g., express probability as a ratio, decimal, percent as appropriate for a given situation).* **<u>Core Content</u>** ❑ **MA-08-4.4.1 Students will apply counting techniques to determine the size of a sample space for real-world or mathematical situation. DOK 2** ❑ **MA-08-4.4.2 Students will:** • **determine theoretical probabilities of simple events, including compound events (e.g. dependent, independent);** • **determine probabilities based on the results of an experiment and** • **make inferences from probability data. DOK 3** ❑ MA-08-4.4.3 Students will tabulate experimental results from simulations and explain how theoretical and experimental probabilities are related. ❑ MA-08-4.4.4 Students will determine theoretical probabilities and represent them using area models.		Hare & The Tortoise is fair, and determine probabilities of various circles (spinners) that are partitioned into parts and labeled A, B, C, D, etc. *tree diagrams and dividing area into equal sections* Fair & Unfair Games III 4.4.2 DOK 2 ❑ Survey classmates on a specific topic (favorite sport, favorite lunch, etc.) and use the information to make predictions. This is the first time students have been exposed to situations in which there is no theoretical probability. They will need to gather their experimental data carefully. (Surveys) 4.4.2 DOK 2 ❑ Use probability to determine which room at the end of a maze is most likely to be entered and which arrangement of hats and marbles will yield a high probability of drawing a specified colored marble from a hat. (Area Models) 4.4.2 DOK 2 ❑ Use probability to determine the expected value involving a basketball free throw shooter in a one-and-one situation. *area model and tree diagram* (Exp.Value) 4.4.2 DOK 2 ❑ Explore binomial probabilities using the Smith Families of Smithville all of which have 5 children. Students will generate some example families and then complete a list of all possible families. *organized list* (Smith. Families) 4.4.2 DOK 2 ❑ Extend the Smithville Families problem to include the World Series problem and use data collected from earlier in the unit to fill in the first few rows of Pascal's Triangle and the observe patterns to complete the triangle. Students will solve probability problems by taking data from the appropriate row of the triangle. (Pascal's Triangle) 4.4.2 DOK 2 ❑ <u>Test: Probability</u> ❑ <u>Open Response Spinners</u> ❑ <u>Open Response It's Not Fair!</u> DOK 3

Grade 8 Math	Unit 4: Proportional Reasoning		Suggested Length: 6 weeks
Essential Questions	Program of Studies and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
1. Compare ratios and rates. 2. What is rate of change and how do you determine it? 3. How are corresponding parts of similar polygons related? 4. What relationships can be drawn between fractions, decimals, and percents? 5. How can the rate and amount of time affect the interest return/paid on an investment/debt ?	**Program of Studies** ❑ *NC-1 use percents, decimals, integers, and fractions (include percents less than 1).* ❑ *NC-2 use percentages and proportions in consumer applications (e.g., simple interest, percentages of increase or decrease, discounts, unit pricing, sale prices).* ❑ *GM-2 derive and use formulas for various rates (e.g., distance/time, miles per hour).* ❑ *GM-4 develop and apply proportionality and relationships between scale models and actual figures* ❑ *GM-5 investigate transformations' congruence, proportionality, and similarity (e.g., enlargements, reductions, proportional triangles) in a coordinate plane.* ❑ *A-10 graph linear functions in a four quadrant (Cartesian) system/grid and interpret the results.* ❑ *A-11 determine the slope and equation of a line by analyzing the line (e.g., Y = mx + b; m is rise/run, b is y - intercept).* **Core Content** ❑ **MA-08-1.4.1 Students will apply ratios and proportional reasoning to solve real-world problems (e.g., percents, constant rate of change, unit pricing, percent of increase or decrease). DOK 3** ❑ **MA-08-3.1.4 Students will:** ❑ **provide examples of congruent and similar figures;** ❑ **apply congruent and similar figures to solve real-world and mathematical problems and** ❑ **apply proportional reasoning to solve**	❑ Ratio ❑ Unit pricing ❑ Rate of change ❑ Proportion ❑ Similar figures ❑ Scale drawing ❑ Dilation ❑ Percent ❑ Percent of increase ❑ Percent of decrease	❑ Give examples of ratios and rates that apply to their own lives. 1.4.1 DOK 2 ❑ Explain in writing how to find the rate of change when given a graph or table. 1.4.1 DOK 3 ❑ Find the slope of a line given a graph of the line. Students have trouble grasping the concept of slope and most are amazed that you can find the slope of the line using any two points on the line and that your starting point is not important. Students will extend their knowledge of slope in order to find the slope of a line that is given in table form. 1.4.1 DOK 3 ❑ Using cut outs of similar polygons, students will measure the angles and sides of each polygon and compare their results in order to determine how corresponding parts of similar polygons are related. 3.1.4 DOK 3 ❑ Measure a room and make a scale drawing of its contents. 3.1.4 DOK 4 ❑ Use shadow reckoning to determine the height of a flagpole. (utility pole, building, etc.) 3.1.4 DOK 3 ❑ Use Morris, Boris and Doris activity to practice dilations. 3.2.2 DOK 3 ❑ Open Response: Labor Charges DOK 3 ❑ Test: Proportions, Algebra, and Geometry ❑ Use models (shaded squares) to identify the fraction that is shaded. Then write each fraction as a decimal, and then convert each decimal to a percent. 1.4.1 DOK 2 ❑ Use 10 x 10 squares to model fractions, decimals, and percents. Students will be given a number in one of the three forms and must find the two missing forms and shade in the appropriate number of squares. 1.4.1 DOK 2 ❑ Solve word problems using the percent proportion and the percent equation. 1.4.1 DOK 2 ❑ Determine percent of increase or decrease of various items. Gasoline prices, school lunch prices, stocks, etc.

Grade 8 Math	Unit 4: Proportional Reasoning		Suggested Length: 6 weeks
Essential Questions	Program of Studies and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
	problems involving scale drawings and proportional figures. DOK 3 ❑ **MA-08-3.2.2 Students will transform (translations, reflections, and dilations with the center of dilation at the origin) figures in a coordinate plane and determine the new coordinates of the shape after the transformation. DOK 2** ❑ **MA-08-3.3.1 Students will identify and graph ordered pairs on a coordinate system, correctly identifying the origin, axes and ordered pairs; and will apply graphing in the coordinate system to solve real-world and mathematical problems. DOK 2**		1.4.1 DOK 3 ❑ Determine the investment differences of a CD and a regular savings account. Students will look at various amounts, rates, and times. Students will write a paragraph describing how amount, rate, and time affect interest. 1.4.1 DOK 3 ❑ Open Response: Camping Equipment Prices DOK 3 ❑ Test: Percent

Grade 8 Math	Unit 5: Geometry and Measurement		Suggested Length: 6 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
1. What are transformations ? 2. How do you derive and use formulas? **3.** How are measures and characteristics of three-dimensional shapes alike or different?	**Program of Studies** ❑ *GM-3 develop and apply formulas for volume and surface area of cubes, cylinders, and rectangular prisms; and investigate relationships between and among them.* ❑ *GM-4 develop and apply proportionality and relationships between scale models and actual figures.* ❑ *GM-5 investigate transformations' congruence, proportionality, and similarity (e.g., enlargements, reductions, proportional triangles) in a coordinate plane.* ❑ *GM-6 investigate counting techniques through shortest paths (e.g., networks).* ❑ *A-7 solve problems involving substitutions and formulas.*	❑ Angles ❑ Regular ❑ Irregular ❑ Triangles ❑ Quadrilaterals ❑ Congruent figures ❑ Rotational symmetry ❑ Reflection ❑ Translation ❑ Rotation ❑ Perimeter ❑ Area ❑ Circle ❑ Circumference ❑ Volume ❑ Prism	❑ Draw two parallel lines cut by a transversal and label the angles formed with the numbers 1-8. Find and record the measure of each angle. Color angles that have the same measure. The diagram will then be used to explore different types of angles. (acute, right, obtuse, straight, vertical, adjacent, supplementary, alternate interior, alternate exterior, and corresponding) 2.1.2 DOK 2 ❑ Investigate the relationship among the measures of the angles of a triangle by exploring the sum of the angle measure of various triangles. The angles can be measured and then added together and/or the angles can be torn off and arranged to form a straight angle. 2.1.2 DOK 2 ❑ Work in groups using a string to construct various types of triangles and quadrilaterals. (Triangles: acute, right,

Grade 8 Math	Unit 5: Geometry and Measurement		Suggested Length: 6 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and <u>Assessment</u> Student will:
	<u>Core Content</u> ❑ **MA-08-2.1.1 Students will measure lengths (to the nearest sixteenth of an inch or the nearest millimeter) and will determine and use in real-world or mathematical problems:** • **area and perimeter of triangles and quadrilaterals;** • **area and circumference of circles;** • **area perimeter of compound figures composed of triangles, quadrilaterals and circles;** • **area DOK 2** ❑ MA-08-2.1.2 Students will estimate measurements in standard units in real world and mathematical situations. ❑ **MA-08-2.1.3 Students will evaluate the measures of angles by estimation, measurement with a protractor or angle ruler and determine angle measures in mathematical and/or real-world situations (e.g., supplementary, external, vertical). DOK 2** ❑ **MA-08-2.1.4 Students will apply formulas to determine the volume of right rectangular prisms in real-world problems. DOK 2** ❑ MA-08-2.1.5 Students will use formulas to find surface area of right rectangular prisms in real world and mathematical problems. ❑ MA-08-3.2.1 Students will describe, provide examples of and apply to real world and mathematical problems rotational symmetry (90º, 180º, 360º). ❑ **MA-08-2.2.1 Students will convert units within the same measurement system and use these units to solve real-world**	❑ Right rectangular prism ❑ Pyramid ❑ Cylinder ❑ Cone ❑ Surface area ❑ Sphere	obtuse, scalene, isosceles, equilateral, right scalene, right isosceles, acute scalene, acute isosceles, obtuse scalene, and obtuse isosceles) (Quadrilaterals: trapezoid, parallelogram, rectangle, rhombus, and square) 3.1.2 DOK 2 ❑ Investigate the relationship among the measures of the angles of a quadrilateral by exploring the sum of the angle of various quadrilaterals. The angles can be measured and then added together and/or the angles can be torn off and arranged to form a circle. 3.1.2 DOK 2 ❑ Use a square and an equilateral triangle to investigate the relationship between the sides in a 45°-45°-90° triangle and a30°-60°-90° triangle. Pythagorean's theorem will also be used to find the remaining side. 2.1.4 DOK 2 ❑ Determine if a given figure has line symmetry by using tracing paper to trace the figure and then fold the paper to see if the two halves match. Students will also use the tracing to determine if the figure has rotational symmetry and if it does then they will calculate the angle(s) of rotation. ❑ Use graph paper to graph various triangles and quadrilaterals. Then use the figures to show translations, reflections, and rotations. 3.2.2 DOK 2 ❑ <u>Test: Geometry</u> ❑ Look at several circular objects that are found in the classroom or at home. They will measure the diameter and/or radius and circumference with string and rulers. The relationship between radius/diameter and circumference/diameter or radius will be discovered based on measurements. 2.1.1 DOK 3 ❑ Practice finding the perimeter or circumference and area of various polygons and circles by working in groups with a packet of shapes. Each student will identify the shape, sketch and label the necessary dimensions, find the perimeter or circumference and find the area. 2.1.1 DOK 3 ❑ Use common area formulas that have been discovered

Grade 8 Math	Unit 5: Geometry and Measurement		Suggested Length: 6 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
	problems. DOK 2 ❑ MA-08-3.1.1 Students will describe and provide examples of, basic geometric elements that include points, segments, rays, lines, angles and planes, and will use these elements in real-world and mathematical problems. ❑ **MA-08-3.1.2 Students will identify and compare properties of two-dimensional figures (circles, triangles [acute, right, obtuse, scalene, isosceles, equilateral], quadrilaterals [square, rectangle, rhombus, parallelogram, trapezoid], regular/irregular polygons) and will apply these properties and figures to solve real-world and mathematical problems. DOK 2** ❑ **MA-08-3.1.3 Students will compare properties of three-dimensional figures (spheres, cones, cylinders, prisms, pyramids) and will apply these properties and figures to solve real-world and mathematical problems. DOK 2** ❑ **MA-08-3.1.4 Students will:** ❑ **provide examples of congruent and similar figures;** ❑ **apply congruent and similar figures to solve real-world and mathematical problems and** ❑ **apply proportional reasoning to solve problems involving scale drawings and proportional figures. DOK 3** ❑ MA-08-3.2.1 Students will describe, provide examples of and apply to real world and mathematical situations rotational symmetry (90º, 180º, 360º). ❑ **MA-08-3.2.2 Students will transform (translations, reflections and dilations with the center of dilation at the origin) figures in a coordinate plane and determine the**		during the unit to find the area of complex figures. Some of the complex figures are made up of two or more shapes added together and some are made up of shapes that will need to be subtracted. 2.1.1 DOK 3 ❑ Look at models of solids and identify the solid by name, and determine the number of faces, vertices, and edges. 3.1.3 DOK 2 ❑ Investigate the relationship between the volume of a pyramid and the volume of a prism with the same base area and height. 2.1.3 DOK 2 ❑ Find the surface area of a rectangular prism by first sketching a two-dimensional pattern of the solid and labeling all of its dimensions. Then students will find the area of each piece and then add the areas together to get the surface area. This same process will be extended to include triangular prisms, cylinders, square pyramids, triangular pyramids, and cones. 2.1.3 ❑ Test: Measuring Area and Volume ❑ Open Response: Alex's Garden DOK 3 ❑ Open Response: Kid City Park DOK 3

Grade 8 Math	Unit 5: Geometry and Measurement		Suggested Length: 6 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
	new coordinates of the shape after the transformation. DOK 2 ❑ MA-08-3.2.3 Students will identify rotations (clockwise or counterclockwise) of figures about the origin in a coordinate plane.		

Grade 8 Math	Unit 6: Algebra: Linear and Nonlinear Functions		Suggested Length: 8 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
1. What is a function? 2. How can I tell the difference between a linear and nonlinear function?	**Program of Studies** ❑ *PS-1 collect, organize, analyze, and interpret data in a variety of graphical methods (e.g., circle graphs, scatter plots, box and whisker plots, histograms).* ❑ *A-1 recognize, create, and continue patterns (generalize the pattern by giving the rule for the nth term and defend the generalization).* ❑ *A-2 represent, interpret, and describe functional relationships through tables, graphs, and symbolic rules (input/output).* ❑ *A-3 explain how change in one variable affects change in another variable (e.g., in distance equals rate times time, increasing time, increases distance).* ❑ *A-4 use a variety of methods and representations to create and solve one- and two-variable linear equations that require two steps.* ❑ *A-5 simplify algebraic expressions.* ❑ *A-6 investigate inequalities using a variety of methods and representations.* ❑ *A-8 organize data into tables, plot points onto all four quadrants of a coordinate (Cartesian) system/grid, interpret resulting patterns or trends.* ❑ *A-9 interpret and explain relationships*	❑ One-step equation ❑ Two-step equation ❑ One-step inequality ❑ Two-step inequality ❑ Function ❑ Function table ❑ Independent variable ❑ Dependent variable ❑ Linear function ❑ System of equations ❑ Nonlinear function ❑ Quadratic function ❑ Monomial ❑ Polynomial	❑ Model and solve one-step equations using algebra tiles. 5.3.1 DOK 2 ❑ Investigate with algebra tiles to rewrite algebraic expressions like 2(x + 3). 5.2.1 DOK 2 ❑ Manipulate and investigate with algebra tiles in order to solve two-step equations. 5.3.1 DOK 2 ❑ Use algebra tiles to solve equations that have variables on each side of the equation. 5.3.1 DOK 2 ❑ Write 5 algebraic expressions or sentences using 5 different verbs. Then have another student read and identify the sentences as an expression, equation, or inequality. If the sentence is an equation or inequality, then solve the equation or inequality and check the solution. 5.3.1 DOK 3 ❑ Test Equation and Inequalities ❑ Use Pattern Blocks to construct pattern trains to investigate relationships between train number, perimeter, and area. Students will begin to generalize for a train n polygons long in order to determine the perimeter and area. 5.1.1 ❑ Use Square Tiles to construct four figures in a series. After looking at the number of tiles needed to construct the first four figures, students will generalize a rule for the nth figure. 5.1.1 ❑ Open Response: Block Figures 5.1.2 DOK 2

Grade 8 Math	Unit 6: Algebra: Linear and Nonlinear Functions		Suggested Length: 8 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
	between tables, graphs, verbal rules, and equations. ❑ *A-10 graph linear functions in a four quadrant (Cartesian) system/grid and interpret the results.* **Core Content** ❑ **MA-08-3.3.1 Students will identify and graph ordered pairs on a coordinate system, correctly identifying the origin, axes and ordered pairs; and will apply graphing in the coordinate system to solve real-world and mathematical problems. DOK 2** ❑ **MA-08-4.1.1 Students will analyze and make inferences from data displays (drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs, stem-and-leaf plots, scatter plots, histograms, box-and-whiskers plots). DOK 3** ❑ MA-08-5.1.1 Students will use variables to describe numerical patterns based on arithmetic sequences in real world and mathematical situations (i.e. $f(N)=2N+3$). ❑ **MA-08-5.1.2 Students will represent, analyze and generalize simple first and second degree functional relationship using tables, graphs, words and algebraic notations and will apply the first degree relationship to solve real-world and mathematical problems. DOK 2** ❑ **MA-08-5.1.5 Students will explain how the change in one variable affects the change in another variable (e.g., if rate remains constant, an increase in time results in an increase in distance). DOK 2**		❑ Open Response: The Exercise Schedule 5.1.2 DOK 2 ❑ Graph three given points, find the equation for the function, and give two more ordered pairs that would be solutions for the function. 5.1.2 DOK 2 ❑ Graph a function given in $y = mx + b$ form by finding three points that are solutions of the equation. 5.1.2 DOK 2 ❑ Investigate a relationship between the number of pennies in a cup and how far the cup will stretch a rubber band. Graphing Relationships. 5.1.3 DOK 2 ❑ Graph a function in $y = mx + b$ form using the y-intercept and slope. 5.1.2 DOK 2 ❑ Graph linear equation (one in y=mx+b form and the other in ac + by =c form) using each of three techniques. Table of values, slope/intercept , and x and y intercept. Students must defend which technique is best/easiest for each form. 5.1.2 DOK 3 ❑ Work with a partner to collect data on their height in inches and their arm span in inches. These measurements will be written as ordered pairs (height, arm span) on the chalkboard. Students will then graph each ordered pair and examine the graph to see if a relationship exists. This activity will be extended so that students will be able to analyze various types of scatter plots and decide the trend, if any, which relates to each scatter plot. Then write a real world model that could be represented by each plot. 3.3.1 4.1.1 DOK 3 ❑ Use student desk to designate a set near the middle as (0,0). Each student will then identify his/her coordinate in relation to the seat (0,0). Then give the following equations A) $x + y = 3$, B) $x – y = 1$. Ask students to stand if his/her seat is a solution to equation A. Point out that these students form a straight line. Then ask students to stand if their seat is a solution to equation B. Again a straight line. How many students stood up both times? ONE Two lines intersect at one point, and this point will be the solution to the system. Equation A and B can be changed and the activity can be repeated. 5.2.1 DOK 2

Grade 8 Math	Unit 6: Algebra: Linear and Nonlinear Functions		Suggested Length: 8 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
	❑ MA-08-5.2.2 Students will describe, define and provide examples of variables and expressions with a missing value based on real-world and mathematical problems. ❑ **MA-08-5.3.1 Students will model and solve single variable, first-degree real-world and mathematical problems (e.g., 5x+2 = x+22, x-4<-60). DOK 2**		❑ Model expression with algebra tiles (ex. $2x^2 + 5x - 6$). 5.2.1 DOK 2 ❑ Simplify polynomials by using algebra times (ex. $2x^2 + 4 - x^2 = x^2 + 4$). 5.2.1 DOK ❑ Use algebra tiles to add polynomials. (ex. $3x^2 - 2x + 1$ and $-x^2 + 3x - 4$) Students will first model each polynomial separately and then combine the tiles that have the same shape. After removing any zero pairs the remaining tiles will represent the polynomial. 5.2.1 DOK 2 ❑ Use algebra tiles to subtract polynomials. (ex. $(x+4) - (-2x+3)$) Step 1: Model the polynomial $x + 4$. Step 2: To subtract you need to remove 2 negative x-tiles and 3 1-tiles. Step 3: Since there are no negative x-tiles to remove, add 2 zero pairs of x-tiles. Then remove 2 negative x-tiles and 3 1-tiles. Step 4: From the tiles that remain, determine the value. This is a tuff concept for students to grasp, they will need a lot of practice. 5.2.1 DOK 2