Shrewsbury Borough School Mathematics Curriculum 2013
Grade 8

Marking Period 1	Marking Period 2	Marking Period 3	Marking Period 4
Topic: Rational Numbers and their Operations **Objectives:** **Students will write rational numbers in different forms.** CCSS.Math.Content.8.NS.A.1 **Mathematical Practices:** MP 8: Look for and express regularity in repeated reasoning. MP 6: Attend to precision. MP 2: Reason abstractly and quantitatively. MP 3: Construct viable arguments and critique the reasoning of others. **Students multiply fractions, mixed numbers and decimals.** **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 3: Construct viable arguments and critique the reasoning of others. MP 6: Attend to precision. MP 7: Look for and make use of structure.	**Topic: Ratios, Rates and Unit Rates** **Objectives:** **Students work with rates and ratios.** **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 6: Attend to precision. MP 8: Look for and express regularity in repeated reasoning. **Students solve proportions.** **Mathematical Practices:** MP 2: Reason abstractly and quantitatively. MP 4: Model with mathematics. MP 6: Attend to precision. MP 7: Look for and make use of structure.	**Topic: Measurement and Geometry** **Objectives:** **Students find the circumference and area of circles.** **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 4: Model with mathematics. MP 5: Use appropriate tools strategically. MP 6: Attend to precision. **Students find the volumes of prisms and cylinders.** CCSS.Math.Content.8.G.C.9 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 3: Construct viable arguments and critique the reasoning of others. MP 4: Model with mathematics. MP 5: Use appropriate tools strategically.	**Topic: Graphing Lines** **Objectives:** **Students identify and graph linear equations.** CCSS.Math.Content.8.F.B.4 CCSS.Math.Content.8.F.B.5 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 4: Model with mathematics. **Students will use points on the graph of a line and right triangles to explore the slope of a line.** CCSS.Math.Content.8.EE.B.6 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 5: Use appropriate tools strategically.

Students divide fractions and decimals. **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 6: Attend to precision. MP 7: Look for and make use of structure. **Students add and subtract fractions with unlike denominators.** **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 7: Look for and make use of structure. **Students solve equations with rational numbers.** CCSS.Math.Content.8.EE.C.7a CCSS.Math.Content.8.EE.C.7b **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 3: Construct viable arguments and critique the reasoning of others. MP 4: Model with mathematics.	**Topic: Similar Figures** **Objectives:** **Students determine whether figures are similar and find missing dimensions in similar figures.** CCSS.Math.Content.8.G.A.4 **Mathematical Practices:** MP 3: Construct viable arguments and critique the reasoning of others. MP 4: Model with mathematics. MP 7: Look for and make use of structure. MP 8: Look for and express regularity in repeated reasoning. **Topic: Dilations** **Objectives:** **Students identify and create dilations of plane figures.** CCSS.Math.Content.8.G.A.3 CCSS.Math.Content.8.G.A.4 **Mathematical Practices:** MP 2: Reason abstractly and quantitatively. MP 3: Construct viable arguments and critique the reasoning of others. MP 4: Model with mathematics. MP 5: Use appropriate tools strategically.	**Students find the volume of pyramids and cones.** CCSS.Math.Content.8.G.C.9 CCSS.Math.Content.8.EE.C.7 **Mathematical Practices:** MP 2: Reason abstractly and quantitatively. MP 4: Model with mathematics. MP 5: Use appropriate tools strategically. MP 6: Attend to precision. MP 8: Look for and express regularity in repeated reasoning. **Students find the volume and surface area of spheres.** CCSS.Math.Content.8.EE.A.2 CCSS.Math.Content.8.G.C.9 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 4: Model with mathematics. MP 5: Use appropriate tools strategically. MP 8: Look for and express regularity in repeated reasoning.	**Students find the slope of a line and use slope to understand and draw graphs.** CCSS.Math.Content.8.EE.B.5 CCSS.Math.Content.8.EE.B.6 **Mathematical Practices:** MP 2: Reason abstractly and quantitatively. MP 4: Model with mathematics. MP 5: Use appropriate tools strategically. MP 8: Look for and express regularity in repeated reasoning. **Students use slopes and intercepts to graph linear equations.** CCSS.Math.Content.8.F.B.4 CCSS.Math.Content.8.EE.B.6 CCSS.Math.Content.8.F.A.3 CCSS.Math.Content.8.F.B.5 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 3: Construct viable arguments and critique the reasoning of others. MP 7: Look for and make use of structure.

Students solve two-step equations. CCSS.Math.Content.8.EE.C.7a CCSS.Math.Content.8.EE.C.7b **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 4: Model with mathematics. MP 7: Look for and make use of structure. **Topic: Graphs and FUNctions** **Objectives:** **Students will write solutions to equations in two variables as ordered pairs.** **Mathematical Practices:** MP 3: Construct viable arguments and critique the reasoning of others. MP 5: Use appropriate tools strategically. MP 7: Look for and make use of structure. MP 8: Look for and express regularity in repeated reasoning.	**Topic: Angle Relationships** **Objectives:** **Students classify angles and find their measures.** **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 3: Construct viable arguments and critique the reasoning of others. MP 7: Look for and make use of structure. MP 8: Look for and express regularity in repeated reasoning. **Students identify parallel and perpendicular lines and the angles formed by a transversal.** CCSS.Math.Content.8.G.A.5 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 4: Model with mathematics. MP 7: Look for and make use of structure.	**Topic: Solving Equations** **Objectives:** **Students combine like terms in an expression.** CCSS.Math.Content.8.EE.C.7 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 3: Construct viable arguments and critique the reasoning of others. MP 4: Model with mathematics. **Students solve multi-step equations.** CCSS.Math.Content.8.EE.C.7 CCSS.Math.Content.8.EE.C.7a CCSS.Math.Content.8.EE.C.7b **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 7: Look for and make use of structure.	**Students find the equation of a line given one point and the slope.** CCSS.Math.Content.8.F.B.4 **Mathematical Practices:** MP 2: Reason abstractly and quantitatively. MP 5: Use appropriate tools strategically. MP 6: Attend to precision. MP 7: Look for and make use of structure. MP 8: Look for and express regularity in repeated reasoning. **Students recognize direct variation by graphing tables of data and checking for constant ratios.** CCSS.Math.Content.8.F.B.5 CCSS.Math.Content.8.F.A.1 CCSS.Math.Content.8.EE.B.5 CCSS.Math.Content.8.EE.B.6 **Mathematical Practices:** MP 2: Reason abstractly and quantitatively. MP 3: Construct viable arguments and critique the reasoning of others. MP 4: Model with mathematics.

Students graph points on the coordinate plane. **Mathematical Practices:** MP 3: Construct viable arguments and critique the reasoning of others. MP 4: Model with mathematics. MP 5: Use appropriate tools strategically. **Students interpret information given in a graph and make a graph to model a situation.** CCSS.Math.Content.8.F.B.5 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 4: Model with mathematics. MP 5: Use appropriate tools strategically. MP 7: Look for and make use of structure. **Students represent functions with tables, graphs, or equations.** CCSS.Math.Content.8.F.A.1 CCSS.Math.Content.8.EE.C.7 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 3: Construct viable	**Students find unknown angles and identify possible side lengths in triangles.** CCSS.Math.Content.8.G.A.5 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 3: Construct viable arguments and critique the reasoning of others. MP 7: Look for and make use of structure. MP 8: Look for and express regularity in repeated reasoning. **Students learn about congruence by seeing that slides, turns and flips do not change the size or shape of a figure.** CCSS.Math.Content.8.G.A.1 CCSS.Math.Content.8.G.A.2 **Mathematical Practices:** MP 4: Model with mathematics. MP 6: Attend to precision. MP 7: Look for and make use of structure. MP 8: Look for and express regularity in repeated reasoning.	**Students will solve systems of equations.** CCSS.Math.Content.8.EE.C.7 CCSS.Math.Content.8.EE.C.8 CCSS.Math.Content.8.EE.C.8b CCSS.Math.Content.8.EE.C.8c **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 3: Construct viable arguments and critique the reasoning of others. MP 5: Use appropriate tools strategically. .	**Students graph and solve systems of linear equations.** CCSS.Math.Content.8.EE.C.8 CCSS.Math.Content.8.EE.C.8a CCSS.Math.Content.8.EE.C.8b CCSS.Math.Content.8.EE.C.8c **Mathematical Practices:** MP 3: Construct viable arguments and critique the reasoning of others. MP 5: Use appropriate tools strategically. MP 6: Attend to precision. MP 8: Look for and express regularity in repeated reasoning. **Students create and interpret scatter plots.** CCSS.Math.Content.8.SP.A.1 CCSS.Math.Content.8.SP.A.2 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 4: Model with mathematics. MP 5: Use appropriate tools strategically. MP 8: Look for and express regularity in repeated reasoning.

arguments and critique the reasoning of others. MP 4: Model with mathematics. **Students generate different representations of the same data.** CCSS.Math.Content.8.F.A.1 CCSS.Math.Content.8.F.A.2 CCSS.Math.Content.8.F.B.4 CCSS.Math.Content.8.F.B.5 CCSS.Math.Content.8.EE.C.7 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 3: Construct viable arguments and critique the reasoning of others. MP 4: Model with mathematics. **Use a graphing calculator to generate multiple representations of functions.** CCSS.Math.Content.8.F.A.1 CCSS.Math.Content.8.F.A.2 CCSS.Math.Content.8.F.B.4 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 3: Construct viable arguments and critique the reasoning of others. MP 4: Model with mathematics	**Students transform plane figures using translations, rotations and reflections.** CCSS.Math.Content.8.G.A.1 CCSS.Math.Content.8.G.A.2 CCSS.Math.Content.8.G.A.3 **Mathematical Practices:** MP 3: Construct viable arguments and critique the reasoning of others. MP 5: Use appropriate tools strategically. MP 7: Look for and make use of structure. MP 8: Look for and express regularity in repeated reasoning. **Topic: Similarity and Congruence Transformations** **Objectives:** **Students identify transformations as similarity or congruence transformations.** CCSS.Math.Content.8.G.A.3 CCSS.Math.Content.8.G.A.1 **Mathematical Practices:** MP 2: Reason abstractly and quantitatively. MP 3: Construct viable arguments and critique the reasoning of others. MP 5: Use appropriate tools strategically.		**Students identify patterns in scatter plots and informally fit and use a linear model to solve problems and make predictions as appropriate.** CCSS.Math.Content.8.SP.A.3 CCSS.Math.Content.8.SP.A.1 CCSS.Math.Content.8.SP.A.2 **Mathematical Practices:** MP 2: Reason abstractly and quantitatively. MP 3: Construct viable arguments and critique the reasoning of others. MP 4: Model with mathematics. **Students will use a graphing calculator to make a scatter plot.** CCSS.Math.Content.8.SP.A.2 CCSS.Math.Content.8.SP.A.1 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 4: Model with mathematics. MP 5: Use appropriate tools strategically.

Topic: Exponents **Objectives:** **Students evaluate expressions with negative exponents and evaluate the zero exponent.** CCSS.Math.Content.8.EE.A.1 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 6: Attend to precision. MP 8: Look for and express regularity in repeated reasoning. **Students apply the properties of exponents.** CCSS.Math.Content.8.EE.A.1 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 6: Attend to precision. MP 7: Look for and make use of structure.	**Students identify the image of a figure after a combined transformation is performed, and determine whether the final image is similar or congruent to the original.** CCSS.Math.Content.8.G.A.2 CCSS.Math.Content.8.G.A.3 CCSS.Math.Content.8.G.A.4 **Mathematical Practices:** MP 2: Reason abstractly and quantitatively. MP 3: Construct viable arguments and critique the reasoning of others. MP 4: Model with mathematics. MP 8: Look for and express regularity in repeated reasoning.		**Students identify and write linear FUNctions.** CCSS.Math.Content.8.F.A.1 CCSS.Math.Content.8.F.B.4 CCSS.Math.Content.8.F.A.3 **Mathematical Practices:** MP 2: Reason abstractly and quantitatively. MP 3: Construct viable arguments and critique the reasoning of others. MP 5: Use appropriate tools strategically. MP 7: Look for and make use of structure. **Students compare linear functions represented in different ways.** CCSS.Math.Content.8.F.A.2 CCSS.Math.Content.8.EE.B.5 CCSS.Math.Content.8.F.B.4 **Mathematical Practices:** MP 2: Reason abstractly and quantitatively. MP 3: Construct viable arguments and critique the reasoning of others. MP 4: Model with mathematics.

Students express large and small numbers in scientific notation and compare two numbers written in scientific notation. CCSS.Math.Content.8.EE.A.3 CCSS.Math.Content.8.EE.A.4 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 3: Construct viable arguments and critique the reasoning of others. MP 5: Use appropriate tools strategically. **Students operate with scientific notation in real-world situations.** CCSS.Math.Content.8.EE.A.3 CCSS.Math.Content.8.EE.A.4 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 3: Construct viable arguments and critique the reasoning of others. MP 5: Use appropriate tools strategically. MP 6: Attend to precision.			

Topic: Squares and Square Roots **Objectives:** **Students find square roots.** CCSS.Math.Content.8.EE.A.2 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 3: Construct viable arguments and critique the reasoning of others. MP 4: Model with mathematics. MP 6: Attend to precision. **Students estimate square roots to a given number of decimal places and solve problems using square roots.** CCSS.Math.Content.8.NS.A.2 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 4: Model with mathematics. MP 5: Use appropriate tools strategically. MP 6: Attend to precision.			

Topic: The Real Numbers **Objectives:** **Students determine if a number is rational or irrational.** CCSS.Math.Content.8.NS.A.1 CCSS.Math.Content.8.EE.A.2 **Mathematical Practices:** MP 2: Reason abstractly and quantitatively. MP 3: Construct viable arguments and critique the reasoning of others. MP 6: Attend to precision. MP 7: Look for and make use of structure. **Topic: The Pythagorean Theorem** **Objectives:** **Students use the Pythagorean Theorem to solve problems.** CCSS.Math.Content.8.G.B.7 CCSS.Math.Content.8.G.B.6 **Mathematical Practices:** MP 1: Make sense of problems and persevere in solving them. MP 2: Reason abstractly and quantitatively. MP 5: Use appropriate tools strategically.			

Topic: Applying the Pythagorean Theorem and Its Converse **Objectives:** **Students use the Distance Formula and the Pythagorean Theorem and its converse to solve problems.** CCSS.Math.Content.8.G.B.8 **<u>Mathematical Practices:</u>** MP 2: Reason abstractly and quantitatively. MP 6: Attend to precision. MP 7: Look for and make use of structure. MP 8: Look for and express regularity in repeated reasoning.			

Lessons, Activities & Student Products:	**Lessons, Activities & Student Products:**	**Lessons, Activities & Student Products:**	**Lessons, Activities & Student Products:**
Students will write rational numbers as fractions, decimals and repeating decimals. Students will explain how to multiply each of the following: • Change mixed # to improper fraction, multiply numerators, multiply denominators and write in simplest form. • Multiply the numbers and count the total number of decimal places in the two factors. • Either write the decimal as a fraction or the fraction as a decimal and then multiply. Students will discover that recipes use fractions and demonstrate using fractions to make HALF of a batch of something. Students will create a recipe card that either increases or decreases a recipe by a scale factor of fraction or improper fraction. Students will compose a list of similarities and differences	Students will research the average dimensions of a particular type of tree. They then create a scale drawing to show what a bonsai version of the tree would look like. They use proportions and a scale factor to determine the dimensions of the scale drawing. Students will create a matching game using vocabulary of rate, ratio, unit rate, and unit price. Students will create a powerpoint slide showing the steps they use to solve a proportion. Using cross-products and examples from Science class (Mrs. D's unit conversion) will be required. Students will sketch similar triangles and leave one missing measure from a side of one triangle. They will use peers' diagrams as examples to calculate the missing side to show triangles' similarity. Using figures created on a Smartboard, students will make predictions as to what will happen when dilations are made using a scaled factor of whole numbers	Students will create a concept map and link the concepts to show relationships prior to covering solids. Students will write a poem or a play explaining the history of Pi and why it is important to us today. Students will write ideas they have for remembering the vocabulary from the lesson. Students will make a cylinder out of construction paper. They will then list easy/difficult features of the project. Students will draw conclusions based on the volumes of cones and spheres in relation to the volumes of prisms and cylinders. Students will demonstrate two examples of the uses of scientific notation: one with positive exponents and one with negative exponents. Examples might include planets or plant cells.	Students will read parts of Archimedes and the Door of Science by Jeanne Bendick and illustrate ways that math enabled Archimedes to recognize scientific principles. They will illustrate or explain one of his inventions. Students will produce a poster to review the steps for graphing a linear equation. Students will experiment with matchbox cars in the hallway in order to see slope in action and understand undefined and zero slope. Students will script a conversation that reviews the different methods used for graphing lines. Students will journal about situations in which one method of graphing lines might be more useful than another. Students will practice graphing on TI-83+ using the Zsquare vs. Zinteger functions.

regarding multiplication and division of fractions. Students will write and then perform a short skit in which they might need to divide by a fraction. Students will discuss two common methods for finding a common denominator. Students will use a graphing calculator to add and subtract fractions. Students will work in cooperative groups to complete equations using this format: x + ___ = ___ . Students will replace blanks with rational numbers and solve the equations. Students will use algebra tiles to model and solve two-step equations. Students will compose a poem explaining how to reverse the order of operations to solve equations. Students will create tables to demonstrate similarities and differences between one and two-variable equations.	and fractions. Students will create an exact copy of a cartoon using scale drawing and proportions to shrink or enlarge originals. Students will explain how to use a protractor to measure angles using a variety of hands-on tools. Students will bisect a right angle using a compass and a straightedge. Students will create a diagram with lines a and b parallel and give one measurement of one angle. They will then explain how to fill in all of the remaining measures on the diagram by listing definitions in a math journal. Students will use the distance formula to verify the estimated distances of polygons plotted on graph paper. Students will describe the steps they would take to perform each of the following transformations on a simple figure on a coordinate plane: - translation two units to the left - reflection across the y-axis	Students will create triple concentration cards to play Pythagorean triples. The player needs to pick three cards and arrange them to determine if they form a Pythagorean triple. Students will create a list of vocabulary words to use first in sentences and then use them all in a paragraph. Students will circle different families of variables (and their signs) using different colors to help organize their thought processes. Students will create a list showing reasonable a step-by-step process to solve equations. Students will journal to compare the process of solving a multi-step equation with the process of checking the solution. Students will model an equation using algebra tiles. Students will calculate answers using algebra tiles to solve the equation. Students will create a poster displaying steps for solving multi-	Students will discuss which method they would use to write an equation of the line as described below and how one method can be transformed into another: - line with a y-intercept at (0,-2) and a slope of 1 - line with a slope of 4 through the point (2,1) - line through the points (0,3) and (4,1) Students will demonstrate solving a system of equations by reviewing graphing linear equations. They should discuss the limitations of solving by graphing. Students will show examples of scatter plot data relating to their lives - positive, negative and no correlation. Students will author a newspaper article that explains the results of a study that uses a line of best fit to model the relationship between two variables. Students will create a schemata for plotting points and graphing a scatterplot on TI-83+.

Students will draw an unlabeled coordinate plane and plot points and important parts of the graph. Students will create matching games using vocabulary terms relating to functions. Students will create a bingo game related to integer exponents. They will need to simplify the expression into lowest terms. Students will write a story about travelling from Earth to the Moon. They will include estimates of the distance in scientific notation and the time it would take to get there. Create a step-by-step schemata on how to multiply and divide scientific notation problems on a graphing calculator. Students will write steps to describe how they would estimate the square root of 1000. Students will illustrate the different classifications of real numbers by creating a venn diagram. Students will create a number line with representations of many	-rotation of 180 degrees around the origin Students will construct a poster showing all types of transformations in the lesson.	step equations up to this point. Students will produce a comic strip which highlights how many solutions a one-variable equation may have.	Students will journal about why they think it might be helpful to write a rule for a function to represent a real-world situation.

different types of real numbers. Use geometric shapes to observe the visual proof of the Pythagorean theorem. Draw and label components of the right triangle with as much detail as possible. Students will write a paragraph about how they would verify, without measuring, that three points on a coordinate plane form a right triangle. Use the coordinates (2,7), (2,14),(26,14)			
21st Century Skills: ✓ **Creativity & Innovation** ✓ **Critical Thinking & Problem Solving** ✓ **Communication** ✓ **Collaboration**	**21st Century Skills:** ✓ **Creativity & Innovation** ✓ **Critical Thinking & Problem Solving** ✓ **Communication** ✓ **Collaboration**	**21st Century Skills:** ✓ **Creativity & Innovation** ✓ **Critical Thinking & Problem Solving** ✓ **Communication** ✓ **Collaboration**	**21st Century Skills:** ✓ **Creativity & Innovation** ✓ **Critical Thinking & Problem Solving** ✓ **Communication** ✓ **Collaboration**

Essential Questions:	**Essential Questions:**	**Essential Questions:**	**Essential Questions:**
What are opposite numbers? If you add 2 integers with different signs, how do you find the sign of the sum? How do you subtract integers? When multiplying 2 or more integers, how can you tell if the product is positive, negative or zero? What is the sign of the quotient of 2 integers? How do you add/subtract fractions with variables? How do you find an LCD? How do you use a reciprocal to divide a number by a fraction? How do you plot a point in a coordinate plane? How can you use an inverse operation to solve an equation? How would you solve x/2 = 1.5? How do you solve a 2-step equation?	How do you find a unit rate? How do you solve a proportion with the cross-products property? How do you dilate a polygon? How do you change the coordinates of a point when you rotate 90 degrees clockwise about the origin? What are the similarities and differences between a pair of alternate exterior angles? What distinguishes a trapezoid from a parallelogram? What are 3 ways you can show that 2 triangles are congruent? What are the differences between alternate interior angles and a pair of alternate exterior angles? How can one explain if it is possible to draw an obtuse equilateral triangle? When does a polygon tessellate?	How can you find the area of a circle if you know the radius? How can one provide the necessary steps for finding the area of a shaded region? How would you calculate the area of a block letter? What is the surface area of a solid with one circular base if the diameter of the base is 18 ft and the slant height is 16 ft.? How can one explain whether the volume of a prism changes when you rotate it? How does the volume of a prism change if you double the width of the base? How are the formulas for volume of a prism and volume of a cylinder alike? What are the pros and cons of living in a house shaped like a pyramid?	How do you write an equation in function form? How can one describe what linear means and relate it to the line? How do you graph a line? How do you find the y-intercept of a line? How does the value of the slope relate to the steepness of the line? How do you find the slope of a line? How do you know the difference between direct and indirect variation? How does the y/x ratio relate to the direct and indirect variation? Does every line have a y-intercept? What does m represent in the slope-intercept form of a line? How would you solve a system of equations by graphing?

How is the vertical line test used to tell whether a graph represents a function? When is a relation not a function? What is a perfect square? What is true about the decimal form of any irrational number? When do you multiply exponents to simplify an expression? When do you add exponents? How do you check if a number is in scientific notation? What is the Pythagorean Theorem? What is a Pythagorean triple? How does the length of the shorter leg in a 30-60-90 triangle relate to the length of the hypotenuse?		How are the volume formulas of pyramids and cones alike and different? How does a sphere differ from a circle? How do you evaluate algebraic expressions with powers? How do you evaluate with powers? How do you use the standard order of operations to evaluate an expression? How do you write equations and inequalities? How can algebra tiles be used to describe the steps of solving $3x-4=5$? If a variable appears more than once in an equation, what do you do first in order to solve the equation? To solve an equation with variables on both sides, what do you do first? How do you solve an equation with fractions?	How do you write linear equations in point-slope form?

		How do you use the transitive property to solve a system of equations? What does the solution of a system of equations look like?	
Materials: Smartboard Graphing calculator Computer to smartboard Software with text http://my.hrw.com/index.jsp various educational videos fraction bars recipe cards graph paper street maps line graphs from media sources times algebra tiles string lunch bags newspapers or magazines with large numbers index cards scissors rulers integer dice	**Materials:** Smartboard Graphing calculator Computer to smartboard Software with text http://my.hrw.com/index.jsp various educational videos different number cubes graph paper protractors metric rulers compasses customary rulers tacks rubber bands triangle cut-outs pattern blocks tangram pieces	**Materials:** Smartboard Graphing calculator Computer to smartboard Software with text http://my.hrw.com/index.jsp various educational videos rulers string graph paper calculators cans measuring tape prism models cylinder models popcorn measuring cups centimeter cubes pyramids cylinders cones spheres cutout shapes algebra tiles index cards poster boards	**Materials:** Smartboard Graphing calculator Computer to smartboard Software with text http://my.hrw.com/index.jsp various educational videos graph paper scales paper cups paper bags science books rulers

Assessment: Pre-course assessment Topic assessment Benchmark tests Timed tests Teacher observation Performance assessment Student input Projects Quarterly assessment	**Assessment:** Pre-course assessment Topic assessment Benchmark tests Timed tests Teacher observation Performance assessment Student input Projects Quarterly assessment	**Assessment:** Pre-course assessment Topic assessment Benchmark tests Timed tests Teacher observation Performance assessment Student input Projects Quarterly assessment	**Assessment:** High school placement test Pre-course assessment Topic assessment Benchmark tests Timed tests Teacher observation Performance assessment Student input Projects Quarterly assessment
CCSS: 8.NS.A.1 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. 8.NS.A.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain*	**CCSS:** 8.G.A.1 Verify experimentally the properties of rotations, reflections, and translations: 8.G.A.1a Lines are taken to lines, and line segments to line segments of the same length. 8.G.A.1b Angles are taken to angles of the same measure. 8.G.A.1c Parallel lines are taken to parallel lines. 8.G.A.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a	**CCSS:** 8.G.C.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. 8.EE.C.7a Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). 8.EE.C.7b Solve linear equations with rational number coefficients,	**CCSS:** 8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. 8.EE.B.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation $y = mx + b$ for a line

how to continue on to get better approximations. 8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$. 8.EE.A.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational. 8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 times 10^8 and the population of the world as 7 times 10^9, and determine that the world population is more than 20 times larger*. 8.EE.A.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific	sequence that exhibits the congruence between them. 8.G.A.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. 8.G.A.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. 8.G.A.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so*.	including equations whose solutions require expanding expressions using the distributive property and collecting like terms. 8.EE.C.8 Analyze and solve pairs of simultaneous linear equations. 8.EE.C.8a Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. 8.EE.C.8b Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6*. 8.EE.C.8c Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair*.	intercepting the vertical axis at *b*. 8.EE.C.8 Analyze and solve pairs of simultaneous linear equations. 8.EE.C.8a Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. 8.EE.C.8b Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6*. 8.EE.C.8c Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair*.

notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology 8.EE.C.7 Solve linear equations in one variable. 8.F.A.1Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.[1] 8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change*. 8.F.A.3 Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function* $A = s^2$ *giving the area of a square as a*			8.F.A.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.[1] 8.F.A.3 Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function* $A = s^2$ *giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line*. 8.F.B.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line. 8.F.B.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. 8.F.B.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. 8.G.B.6 Explain a proof of the Pythagorean Theorem and its converse. 8.G.B.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical			8.F.B.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. 8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. 8.SP.A.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. 8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a*

problems in two and three dimensions. 8.G.B.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.			*biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height*. 8.SP.A.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*

Mathematical Practices

MP 1: Make sense of problems and persevere in solving them.
MP 2: Reason abstractly and quantitatively.
MP 3: Construct viable arguments and critique the reasoning of others.
MP 4: Model with mathematics.
MP 5: Use appropriate tools strategically.
MP 6: Attend to precision.
MP 7: Look for and make use of structure.
MP 8: Look for and express regularity in repeated reasoning.