Summit Public Schools
Summit, New Jersey
Sixth Grade / Content Area: Mathematics
Length of Course: One Marking Period Cycle (45 Days)

Curriculum: Math Study Skills

Course Description: The Math Study Skills course will provide students with differentiated, needs based supplemental instruction and materials that will provide increased opportunities for them to work toward improving achievement by strengthening their mathematic skills and applications. This course will give students an opportunity to practice and improve their math skills, to improve their success in the regular math class and to help increase the scores on the NJ Ask. Students will build on their knowledge of key math concepts to reinforce sixth grade content. The course will work to strengthen math skills, teach students how math skills can be used interchangeably in problem solving, how to choose appropriate problem solving operations and how to apply math skills to various types of questions and scenarios. The course routine will have the students working on selected topics through an "activity menu" (see sample). Based on a pre-assessment, grade six topics that will be reinforced are:

- Topic 1: Ratios, unit rates and percent.
- Topic 2: Add, subtract, multiply, and divide fractions.
- Topic 3: Order of Operations and writing and solving equations.
- Topic 4: Geometry: Lines, Angles, Area, Perimeter, Surface Area of triangles, quadrilaterals and other polygons.
- Topic 5: Graphing on a coordinate plane.
- Topic 6: Central tendencies, data analysis & probability.

Topic 1: **Standard** 6.RP (Ratios, Proportions, Unit Rate, Percent Of)
Students will be able to understand the concept of a ratio and be able to analyze proportional relationships, unit rate and percents and use them to solve real-life scenarios.

Big Ideas: *Course Objectives / Content Statement(s)*
- Identify the question being asked and apply the correct concept.
- Set up ratios to solve ratios, comparing ratios, setting up proportions, calculating unit rate and finding the percent of a given number.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• Can you apply a proportion to a real-life situation? • How do we translate verbal ideas to the language of mathematics? • How does comparing quantities describe the relationship between them?	Students will understand that… • Proportional relationships express how quantities change in relationship to each other • Two ratios form a proportion when the cross products are equal. • Writing ratios as a fraction to find the unit rate. • Proportions can be used to solve real-world problems dealing with scale drawings, indirect measure, predictions, and money.

Areas of Focus: Proficiencies (Cumulative Progress Indicators)	**Examples, Outcomes, Assessments**
Students will:	Instructional Focus:
6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."	• Write ratios and compare them. • Calculate unit rate. • Determine if two ratios are proportional. • Solve proportions. Sample Assessments: • Portfolio responses – journal responses *Example: Related to buying songs from iTunes, describe what unit rate means when they advertise 12 songs for $10.00 and what mathematical process is associated with unit rate?*
6.RP.2 Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."	• Response to Figure This Activity – applying 'percent of' to real life situations "How Much Does It Cost" calculating percentages of a purchase.
6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line	Instructional Strategies: • Self Guided Activity List/Menu along with mini lessons and additional instructional support center.

diagrams, or equations. a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed? c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	Interdisciplinary Connections • Geography – Scale calculation on maps. Technology Integration • Scientific calculator - calculation of ratios and proportions set up by students, comparing realistic and accurate answers. • Web-based activities – Cooperative learning activity. http://www.figurethis.org/challenges /c17/challenge.htm
The following skills and themes listed to the right should be reflected in the design of units and lessons for this course or content area.	21st Century Skills: Creativity and Innovation Critical Thinking and Problem Solving Communication and Collaboration Information Literacy Media Literacy Life and Career Skills 21st Century Themes (as applies to content area): Financial, Economic, Business, and Entrepreneurial Literacy Civic Literacy Health Literacy

Topic 2: **Standard** 6.NS (Fractions: Simplify, Add, Subtract, Multiply & Divide) Students will be able to visualize and estimate when problem solving with fractions to ensure reasonable answers.

Big Ideas: *Course Objectives / Content Statement(s)*
- Students will practice adding and subtracting fractions with unlike denominators.
- Learn to multiply and divide fractions, including improper and mixed numbers.
- Determine the least common multiple (LCM).
- Simplify fractions.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• Where do we use fractions in our daily lives? • What is the relationship between fractions, decimals and percents?	Students will understand that… • When adding and subtracting fractions we need to find a common denominator. • There are several ways to simplify a fraction when problem solving. • Fractions are such an integral part of our lives.
Areas of Focus: Proficiencies (Cumulative Progress Indicators)	**Examples, Outcomes, Assessments**
Students will:	Instructional Focus:
6.NS.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for $(2/3) \div (3/4)$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(2/3) \div (3/4) = 8/9$ because 3/4 of 8/9 is 2/3. (In general, $(a/b) \div (c/d) = ad/bc$.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi? Compute fluently with multi-digit numbers and find common factors and multiples.	• Simplifying Fractions • Common Denominators • Mixed Numbers and Improper Fractions • Adding, Subtracting, Multiplying & Dividing Fractions Sample Assessments: Portfolio responses – Pre-assessment journal response *Example: Can I add ½ and ¾ together without performing any additional steps? Explain your answer.* Instructional Strategies: • Self Guided Activity List/Menu along with mini lessons and additional instructional support center. • Webquest – "Cooking With Fractions" – students will become master chefs by increasing and decreasing recipes by adding, subtracting, multiplying and dividing fractions. (3 Day Activity) http://www.district87.org/staff/powelln /Eureka/Fender/fraction_webquest.html Technology Integration • (see above)

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Topic 3: **Standard** 6.EE (Expressions & Equations)
Apply and extend understandings of writing equations and solving real life mathematical problems using numerical and one-step algebraic expressions and equations.

Big Ideas: *Course Objectives / Content Statement(s)*
- Order of Operations
- Use variables and numerical operations to write expressions with and without variables.
- Use the balance scale model when solving one-step equations.
- Identify when the distributive property is present.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
- How does solving equations apply to the real world? - How do I isolate a variable?	Students will understand that… - What algebraic and numeric expressions are and the steps need to be taken to solve or evaluate. - How order of operations & negative integers impact the steps when solving.

Areas of Focus: Proficiencies (Cumulative Progress Indicators)	**Examples, Outcomes, Assessments**
Students will:	Instructional Focus:
6.EE.1. Write and evaluate numerical expressions involving whole-number exponents.	- Understanding key vocabulary associated with writing expressions. - Order of Operations - Isolating and solving for a variable. - Checking all work.
6.EE.2. Write, read, and evaluate expressions in which letters stand for numbers. Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as $5 - y$. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression $2 (8 + 7)$ as a product of two factors; view $(8 + 7)$ as both a single entity and a sum of two terms. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas $V = s3$ and $A = 6 s2$ to find the	Sample Assessments: - Portfolio responses – journal responses *Example: What is the order of operations and how do you remember them?* Instructional Strategies: - Self Guided Activity List/Menu along with mini lessons and additional instructional support center. - Have student's model procedures using pencil/paper as well as online Algebra Balance Scale. http://mathplayground.com/algebraic_reasoning.html Technology Integration: - Video Tutors- <u>Mental Math</u> http://www.phschool.com/atschool/

volume and surface area of a cube with sides of length s = 1/2.	academy123/english/academy123_ content/wl-book-demo/ph-818s.html
6.EE.3. Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.	<u>Using Inverse Operation</u> • http://www.phschool.com/webcodes10 /index.cfm?fuseaction=home.goto WebCode&wcprefix=aqe&wcsuffix=0305 <u>Cumulative</u> • http://www.phschool.com/atschool/ academy123/english/academy123_content /wl-book-demo/ph-819s.html • Online Balance Scale – Solving One-Step Equations http://mathplayground.com/ algebraic_reasoning.html

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	   Creativity and Innovation
	
	   Critical Thinking and Problem Solving
	
	   Communication and Collaboration
	
	   Information Literacy
	
	   Media Literacy
	
	   Life and Career Skills
	
	21st Century Themes (as applies to content area):
	   Financial, Economic, Business, and Entrepreneurial Literacy
	
	   Civic Literacy
	
	   Health Literacy

Topic 4: **Standard** 6.G (Geometry)
Problem solving involving angle measure, perimeter, area and surface area.

Big Ideas: *Course Objectives / Content Statement(s)*
Solve real-world and mathematical problems involving area, surface area, and volume.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• What is the role of geometry in advertising, architecture, or fabric design? • Why is it important to use and understand common Geometric vocabulary?	• Know how to classify angles, triangles and quadrilaterals and how to apply the appropriate mathematical computations for problem solving.

Areas of Focus: Proficiencies **(Cumulative Progress Indicators)**	**Examples, Outcomes, Assessments**
Students will:	Instructional Focus:
6.G.1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	• Understanding geometry vocabulary associated with angles, perimeter, area, and surface area of triangles and other polygons. • Measuring and identifying angles. • Use formulas to calculate area and volume.
6.G.3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	Sample Assessments: • Portfolio responses – Pre-assessment journal response *Example: What is the difference between area, perimeter and volume?*
6.G.4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	Instructional Strategies: • Self Guided Activity List/Menu along with mini lessons and additional instructional support center. • Geometry Web Quest/Presentation – students will create a poster with key information related to the geometry unit. Use of the online math dictionary & eBook. http://www.amathsdictionaryforkids.com/ Technology Integration: • Web Quest – see above
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Topic 5: **Standard** 6.NS (Coordinate Plane)
Apply and extend previous understandings of numbers to the system of rational numbers.

Big Ideas: *Course Objectives / Content Statement(s)*
- Students will compare positive and negative rational numbers.
- Students will graph points on a coordinate plane to create geometric figures and see the relationships of translations and reflections.
- Students will be able to estimate area and perimeter of polygons graphed on a coordinate plane.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• How do algebra and geometry work together within the coordinate plane? • How do we use the coordinate plane to verify properties of geometric figures.	Students will understand that… • The use of a coordinate plane can help you problem solve perimeter and area computations. • The positions of positive and negative rational numbers.

Areas of Focus: Proficiencies **(Cumulative Progress Indicators)**	**Examples, Outcomes, Assessments**
Students will:	Instructional Focus:
6.NS.5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. 6.NS.6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by	• Compare and order integers • Construct a coordinate plane • Name and graph points on a coordinate plane • Graph and indentify translations and reflections • Calculate area and perimeter of shapes graphed on the coordinate plane. Sample Assessments: • Portfolio responses – Pre-assessment journal response *Example: Draw and label (with as much detail) a coordinate plane. Include number lines and all parts of the plane.* • iCore – Coordinate Plane – Pre Assessment Activity used as final assessment. Instructional Strategies: • Self Guided Activity List/Menu along with mini lessons and additional instructional support center. • Shodor Activity – students identify given points on a coordinate plane.

reflections across one or both axes. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.	Technology Integration http://www.shodor.org/interactivate/activities/GeneralCoordinates/ Interdisciplinary Connections • Science – The concept of temperature, using negative and positive numbers.
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Topic 6: **Standard** 6.SP (Central Tendencies & Probability)
Develop understanding of statistical variability and summarize and describe distributions.

Big Ideas: *Course Objectives / Content Statement(s)*
- Students will be able to define and calculate mean, median, mode & range.
- Students will be able to determine the probability of an event and determine the sample space.
- Students will be able to identify an appropriate type of chart that best displays various types of data.

Essential Questions	Enduring Understandings
What provocative questions will foster inquiry, understanding, and transfer of learning?	*What will students understand about the big ideas?*
- How can the collection, organization, and display of data help to interpret, evaluate inferences, and make predictions about real-life situations and circumstances? - How can the understanding and use of measures of central tendency be useful for interpreting and drawing conclusions about data? - How can devising and carrying out surveys and simulations help to determine the possible outcomes and probability of simple events?	Students will understand that… - Determining and understanding mean, median and mode will help the decision making process. - There are several types of graphs to choose from when representing data, but certain types make it clearer for the audience. - To calculate probability we first need to know how to determine the number of possible outcomes.

Areas of Focus: Proficiencies (Cumulative Progress Indicators)	Examples, Outcomes, Assessments
Students will:	Instructional Focus:
6.SP.1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages. 6.SP.2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. 6.SP.3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. 6.SP.4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	- Define mean, median, mode and range. - Apply data to appropriate graphs – bar, line, histograms, box and whisker & circle graphs - Calculate and use sample spaces and the counting principle to determine probabilities. Sample Assessments: - Unit project will to be to take a survey, calculate the central tendencies and graph. - Portfolio responses: *Example: Write a summary based on the information presented in your graph.* Instructional Strategies: - Self Guided Activity List/Menu along with mini lessons and additional instructional support center.

6.SP.5. Summarize numerical data sets in relation to their context, such as by: Reporting the number of observations. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	• Rock-Paper-Scissors Game – show how the outcomes of the game are related to probability. Technology Integration • Brain Pop Activity - practice with probability. http://www.brainpop.com/math/probability/basicprobability/preview.weml Interdisciplinary Connections • Social Studies – charts and graphs that represent data referencing historical and current information.

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	   Health Literacy

Texts and Resources:
Prentice Hall Mathematics, Course 1
New Jersey Common Core Standards for Mathematics 2010
Various Internet Sites