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

Curriculum: Math Strategies

Course Description: The Math Strategies course is designed to work with students who need to gain skills in basic mathematics and pre-algebra. The 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. The class focuses on student participation, collaborative learning, and activities that develop students' problem solving and critical thinking skills. The course routine will have the students working on selected topics through an "activity menu" (see sample). Based on the pre-assessment results, grade seven topics that will be reinforced are:

- Topic 1: Fractions, decimals and percents.
- Topic 2: Working with percents (includes markup and discount).
- Topic 3: Equations and function tables.
- Topic 4: Probability.
- Topic 5: Geometry: Quadrilaterals, Triangles, Circles, Area and Volume
- Topic 6: Translations and Rotations (8^{th} grade CCCS, 7^{th} grade NJ Ask).

Topic 1: **Standard** 7.NS and 7.RP (Fractions, Decimals & Percents)

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. Analyze proportional relationships and use them to solve real-world and mathematical problems.

Big Ideas: *Course Objectives / Content Statement(s)*

- Add, subtract, multiply and divide rational numbers.
- Write fractions as decimals and decimals as fractions.
- Convert decimals to percents and percents to decimals.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• What are some ways to represent parts of a whole?	Students will understand that… • Changing between fractions and decimals often makes problem solving easier. • There are specific steps to follow when adding, subtracting, multiplying and dividing fractions. • Fractions and decimals can also be represented as a percent.
Areas of Focus: Proficiencies (Cumulative Progress Indicators)	**Examples, Outcomes, Assessments**
Students will: 7.NS.1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. 7.NS.2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 7.RP.1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.	Instructional Focus: • Review and practice the steps to add, subtract, multiply, divide and simplify fractions. • Tools to interchange fractions, decimals and percents in problem solving. • Compare and order fractions and decimals. Sample Assessments: • Portfolio responses – journal responses *Example: Amy bought 8 pounds of candy to fill gift bags that hold ¾ pound. How many bags will Amy be able to fill? Part I: What operation would need to be used and why? Part II: Set up an equation and solve.* • iCore Fractions & Decimals Unit Activities • Interactive Fraction Quiz (Shodor) – http://www.shodor.org/interactivate/activities/FractionQuiz/ Instructional Strategies: • Self Guided Activity List/Menu along

	with mini lessons and additional instructional support center. • IXL Site – Fraction Review – for students who need basic fraction review. http://www.ixl.com/math/grade-5 Interdisciplinary Connections • Health – Fractions are largely used in nutrition. Recipes, portion size and daily allowances are either represented in fractions or percents and sometimes in decimals. Technology Integration • Scientific calculator - calculation of equations with fractions. • Scientific calculator – conversion of fractions, decimals and percents. • Web-based activities – see above.
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** 7.RP (Percents – Including Markup and Discount)

Analyze proportional relationships and use them to solve real-world and mathematical problems.

Big Ideas: *Course Objectives / Content Statement(s)*

- The correlation between fractions, decimals and percents.
- Problem solving involving percents and proportions.
- Real-life scenarios such as commission, tax, mark-up and discount.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• How are percents used practically when solving problems dealing with sales tax, tips, and discounts?	Students will understand that… • Percents can be written as fractions. • Proportions can be used to solve percent problems. • Understand the mathematical processes involved for discount, markup, tax and commission (when to add or subtract).
Areas of Focus: Proficiencies (Cumulative Progress Indicators)	**Examples, Outcomes, Assessments**
Students will: 7.RP.3. Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.	Instructional Focus: • Demonstrate how to set up and solve 'percent of' word problems. • Key terminology associated with tax, commission, markup and discount. • Mental Math – finding benchmark percents and fractions. Sample Assessments: • Portfolio responses – journal responses *Example: You are at the store buying the newest xBox game. The signs next to the game say 20% discount and plus tax. Explain what the 20% discount and the sales tax do to the $40.00 price.* • Discount Percentage Advertisement – students will present 4 advertisements, for each they will have to estimate, set up ratios and calculate. Graded on accuracy and presentation. Instructional Strategies: • Self Guided Activity List/Menu along with mini lessons and additional instructional support center. • http://www.lessonplanspage.com/MathSSTwoMarkupAndDiscount

	Lessons7.htm – The students will work in pairs. They will be fulfilling the role of a store manager for a local department store. They have to correct the errors staff members. The errors include markup and discount errors and markup percentage and discount percentage errors. The students will be completing their work in their Journal. Interdisciplinary Connections • Social Studies – Students will learn key terminology related to economics and current events. Technology Integration • Scientific calculator - calculation of percents.
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Topic 3: **Standard** 7.EE & 7.NS (Equations and Function Tables – Negative Integers Included)

Solve real-life and mathematical problems using numerical and algebraic expressions and equations. Use properties of operations to generate equivalent expressions.

Big Ideas: *Course Objectives / Content Statement(s)*

- Solve equations that involve grouping symbols.
- Solve equations and inequalities using the addition and subtraction properties, including negative integers.
- Solve equations and inequalities using the multiplication and division properties, including negative integers.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• Why is knowing the solution(s) of a "system" of linear equations useful in the real-world?	Students will understand that… • You can use equations to help solve real life situations such as personal money savings, purchasing items or hourly earnings at your new job.
Areas of Focus: Proficiencies (Cumulative Progress Indicators)	**Examples, Outcomes, Assessments**
Students will: 7.EE.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. 7.EE.2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05." 7.EE.4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and	Instructional Focus: • How to solve equations using the distributive property (including negative integers). • How to solve equations with more than one operation. Sample Assessments: • Portfolio responses – journal responses *Example: Consider the equation 0.65p = 13. Write a short, one-paragraph problem situation that could be solved using this equation. Then solve the problem.* Instructional Strategies: • Self Guided Activity List/Menu along with mini lessons and additional instructional support center. Technology Integration • iCore – practice problems completed as class or small groups – "Equations from Word Problems". Have small groups or class break apart each word problem and restate what the question is asking. After, solve algebraically. • Algebraic Balance Scale – students can practice solving multi-step equations

interpret it in the context of the problem. For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions. 7.NS.1 Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. 7.NS.2 Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.	using algebra tiles and a balance scale. http://nlvm.usu.edu/en/nav/frames_asid_201_g_4_t_2.html?open=instructions
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Topic 4: **Standard** 7.SP (Probability)	

Investigate chance processes and develop, use, and evaluate probability models.

Big Ideas: *Course Objectives / Content Statement(s)*

- Students will be able to find the probability of simple events.
- Using a sample to predict the actions of a larger group.
- Calculate the number of possible outcomes by using the counting principle.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• How is the likelihood of an event determined and communicated?	Students will understand that… • Probability is a ratio that compares the number of favorable outcomes to the number of possible outcomes. • The counting principle can be used to find the number of possible combinations of elements

Areas of Focus: Proficiencies (Cumulative Progress Indicators)	**Examples, Outcomes, Assessments**
Students will: 7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. 7.SP.7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. • Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected. • Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the	Instructional Focus: • Find the probability of a single event. • Find the probability of compound events. • Combinations and permutations. Sample Assessments: • Portfolio responses – journal responses *Example: Compare and contrast Independent vs. Dependent Events in Probability – use words/lists, Venn diagrams, pictures or probability question.* • iCore – Assessment Module: (1) Probability of Events and (2) Probability to Make Predictions Instructional Strategies: • Self Guided Activity List/Menu along with mini lessons and additional instructional support center. • Rock-Paper-Scissors – explore the relationship between experimental and theoretical probabilities. • Probability Activity Centers – student rotation – Center 1 – coin toss; Center 2 – circle graphs; Center 3 – compound event problems. Technology Integration • Prentice Hall Video Tutor Counting Principle: http://www.phschool.com/atschool

observed frequencies? 7.SP.8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. • Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. • Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. • Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?	/academy123/english/academy 123_content/wl-book-demo/ph-120s.html Combinations: http://www.phschool.com/atschool/ academy123/english/academy123 _content/wl-book-demo/ph-928s.html Permutations: http://www.phschool.com/webcodes10 /index.cfm?fuseaction=home.goto WebCode&wcprefix=are&wcsuffix=1205
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Topic 5: **Standard** 7.G (Geometry: Area and Volume)

Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Big Ideas: *Course Objectives / Content Statement(s)*

- Estimate and calculate area and perimeter of regular and irregular figures.
- Find the area and surface area of parallelograms, triangles and trapezoids.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• How can the relationship among lines, angles and polygons be used to solve problems?	Students will understand that… • When dealing with irregular shapes, we may be able to estimate the area by dissecting the shape into the more regular figures.

Areas of Focus: Proficiencies (Cumulative Progress Indicators)	**Examples, Outcomes, Assessments**
Students will:	Instructional Focus: • Characteristics of triangles, parallelograms, trapezoids and circles. • Using the given formulas to calculate area, perimeter and circumference. Sample Assessments: • Portfolio responses – journal responses *Example: How many triangles can you make from a rectangle by drawing one line? In your own words, describe the relationship between a rectangle and triangle.* • iCore: Assessment Module: Solve Perimeter and Area Problems. Instructional Strategies: • Self Guided Activity List/Menu along with mini lessons and additional instructional support center. • Brain Pop Instructional Video and Activity: Define Key Terms – students will view the activity page first, take notes during the movie and then complete the activity. • Brain Pop Quiz – graded activity to follow. http://www.brainpop.com/math/geometryandmeasurement/areaofpolygons/ • Figure This Activity – Introduces Nets
7.G.1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. 7.G.2. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. 7.G.3. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. 7.G.4. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	
7.G.5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	
7.G.6. Solve real-world and mathematical problems involving area, volume and surface	

area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	and 3D shapes. Have students recreate the shapes given. http://www.figurethis.org /challenges/c55/challenge.htm Interdisciplinary Connections • Science – geometric shapes in nature. Examples: Angles in snowflakes and symmetry in leaves. • Social Studies & Art – Euclid – Father of Geometry. Technology Integration • Brain Pop – Video, Activity & Assessment.
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Topic 6: **Standard** 8.G (Geometry: Rotations, Reflections and Translations)
Understand congruence and similarity using physical models, transparencies, or geometry software.

Big Ideas: *Course Objectives / Content Statement(s)*

- Graphing on a coordinate plane and seeing the relationships between translations, rotations and reflections.

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 change in dimensions affect transformations?	Students will understand that… • How to draw translations, rotations and reflections on a coordinate plane. • How to read points on a coordinate plane will help identify different transformations and symmetry and will help find patterns.

Areas of Focus: Proficiencies (Cumulative Progress Indicators)	**Examples, Outcomes, Assessments**
Students will: 8.G.1. Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines. 8.G.2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. 8.G.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. 8.G.4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	Instructional Focus: • Name and graph points on a coordinate plane. • Define symmetry, rotation, reflection and translation. • Graph figures using rotations, reflections and translations. Sample Assessments: • Portfolio responses – journal responses *Example: What letters, when written in lowercase, can be read the same upside down as right side up? (http://www.figurethis.org/challenges/c05/challenge.htm#hint)* • IXL Site – Transformation Activity – student will record score to track progress http://www.ixl.com/math/grade-7/identify-reflections-rotations-translations Instructional Strategies: • Self Guided Activity List/Menu along with mini lessons and additional instructional support center. • Shodor Activity - This activity allows the user to experiment with translation, reflection and rotation in the coordinate plane. http://www.shodor.org/interactivate/activities/Transmographer/

	Interdisciplinary Connections • Science – Symmetry in nature – pinecones, snowflakes, honeycombs. • Art – Artist MC Escher – art using tessellations. Technology Integration • Symmetry Learning Video http://www.linkslearning.org/Kids/1_Math/2_Illustrated_Lessons/4_Line_Symmetry/index.html • Web-based activities – see above.
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Texts and Resources:
Prentice Hall Mathematics, Course 2
New Jersey Common Core Standards for Mathematics 2010
Various Internet Sites