

Summit Public Schools

Summit, New Jersey

Grade Level 7/ Content Area: Mathematics

Length of Course: Full Academic Year

Curriculum: Math 7

Revised 2017

Developed by:
Tiffany Bennett
Emily Hitchen
Tonya Ramsay

Course Description: The Math 7 course will prepare the student for the Pre-Algebra 8 course. Students will build on their knowledge of the number system using algebraic properties and number sense to compare, order, and compute with rational numbers. Order of operations will be extended to simplify expressions with exponents. They will solve one- and two-step equations with rational numbers. Students will write, solve and graph one- and two-step inequalities. Ratios, proportions, and percents will be represented using tables, graphs and equations in real-world contexts. Students will extend their work in two-dimensional geometry by learning properties of lines, rays, segments, special angle pairs, and polygons. Students will find area of triangles, quadrilaterals, and compound shapes. Three-dimensional geometry will include identifying various solids and their properties, classifying solids, and finding surface area and volume. The statistics and probability units will include comparative analysis of similar data sets, theoretical and experimental probability, random sampling, tree diagrams showing possible outcomes, and graphs. Throughout the course, technology, interdisciplinary activities, media literacy and global perspectives will be integrated.

Texts and Resources:

Mathematics Course 2 (Prentice-Hall © 2008)

Pre-Algebra (Prentice-Hall © 2001)

Kuta Software

Mathworksheets4kids.com

math-aids.com

math-drills.com

Standards:

New Jersey Student Learning Standards (2016)

<http://www.state.nj.us/education/cccs/2016/math/standards.pdf>

Scope & Sequence for Math 7

Unit 1: The Number System

Topic	Standard	Time Frame
Comparing and Ordering Integers/Absolute Value 1.6	7.NS.A.1.b, c	2
Modeling Integer Addition and Subtraction (<i>Using Additive Inverse Property</i>)1.7a Activity Lab	7.NS.A.1.a, c	1
Adding and Subtracting Integers 1.7	7.NS.A.1.d	3
Review / Quiz 1		2
Multiplying and Dividing Integers 1.8	7.NS.A.2a, b	1
Order of Operations with Integers 1.9	6.EE.A.2.c	2
Review/Quiz 2		2
Review Coordinate graphing basics - create an x-y table, plot points	6.NS.C.6.b,c	3
Review/Test-Integer Operations		3
Changing Fractions and Decimals 2.6	7.NS.A.2.d	2
Order and Compare Signed Fractions and Decimals 2.7	7.NS.A.2.d	1
Adding and Subtracting Rational Numbers (fractions) (PHPA 2001: 5.3) (<i>use improper instead of regrouping</i>)	7.NS.A.1.d	3
Review/Quiz 1		2
Multiplying and Dividing Rational Numbers (fractions) (PHPA: 5.4)	7.NS.A.2.a,b,c	2
Review/Test – Rational Number Operations (Fractions)		3
Adding and Subtracting Rational Numbers 1.2 (decimals)	7.NS.A.1.d	1
Multiplying Rational Numbers 1.3 (decimals)	7.NS.A.2.a,b,c	1
Dividing Rational Numbers 1.4 (decimals)	7.NS.A.2.b,c	2
Decimal operations - signed decimals (review integer rules)	6.EE.A.2.c	2
Review/Quest-Rational Number Operations (Decimals)		2
Total		40 days

Unit 2: Expressions and Equations

Topic	Standard	Time Frame
Evaluating and Writing Algebraic Expressions 4.1	7.EE.A.1	2
Number Properties (PHPA 2.1)	7.EE.A.1	2
Apply Distributive Property to simplify and factor algebraic expressions (PHPA 2.2)	7.EE.A.1, 2 7.EE.B.4	3
Review/ Quiz 1		2
Solving Equations by Adding or Subtracting Rational Numbers (Decimals and Integers) 4.3 (additive inverse property PHPA 2001: 2.5)	7.EE.B.3, 4a	3
Solving Equations by Adding or Subtracting Rational Numbers (Fractions) PHPA 2001 5.7	7.EE.3, 4a	2
Review/ Quiz 2		2
Solving Equations by Multiplying or Dividing Rational Numbers (Decimals and Integers) 4.4	7.EE.B.3, 4a	2

Solving Equations by Multiplying or Dividing Rational Numbers (Fractions) PHPA 2001 5.8	7.EE.B.3, 4a	2
Review/Test -Solving One Step Equations and Distributive Property		3
Solving two-step equations 4.6,PHPA 2001: 7.1	7.EE.B.4a	2
Graphing and Writing Inequalities 4.7	7.EE.B.4b	2
Solving Inequalities by Adding or Subtracting 4.8	7.EE.B.4b	1
Solving Inequalities by Multiplying or Dividing 4.9	7.EE.B.4b	2
Solve two-step inequalities PHPA 7.6	7.EE.B.4b	2
Review/Quest Two step equations and Inequalities		2
Total		33 Days

Unit 3: Ratios and Proportional Relationships

Topic	Standard	Time Frame
Ratios 5.1	7.RP.A.1	1
Unit Rates and Proportional Reasoning 5.2	7.RP.A.1,2	2
Constant of Proportionality - tables, graphs, equations	7.RP.A.2b, d	4
Review/Quiz 1		2
Proportions 5.3b <i>Algebra Thinking: Interpreting Rates Visually</i>	7.RP.A.2b	1
Solving Proportions 5.4a & 5.4	7.RP.A.2a, c	2
Review/ Quiz 2		2
Using Similar Figures 5.5a & 5.5	7.G.A.1	2
Maps and Scale Drawings 5.6	7.G.A.1	2
Review/Test		2
Understanding Percents 6.1	7.RP.A.3	1
Percents, Fractions, and Decimals 6.2	7.NS.A.2.d	2
Solving Percent Problems Using Equations 6.6	7.RP.A.2c	2
Review/Quiz 1		2
Applications of Percent 6.7: Tax, Tip, Commission	7.RP.A.3	3
Finding Percent of Change 6.8: Discount/sale price, Markup	7.RP.A.3	2
Review/ Test		2
Total		35 Days

Unit 4: Statistics and Probability- Use Common Core Support Coach

Topic	Standard	Time Frame
Theoretical Probability 12.1	7.SP.C.5	2
Experimental Probability 12.2	7.SP.C.6 7.SP.C.7b	2
Sample Spaces 12.3	7.SP.C.8b	2

Compound Events 12.4	7.SP.C.8a,b, ,c	2
Review/Quiz 1		2
Measures of Central Tendency PHPA 2001: 3.3 (Picking the best measure to describe a data set)	7.SP.B.4	2
Mean absolute deviation	7.SP.B.3	2
IQR - measure of variability - use outside resources	7.SP.B.4	1
Review/Quiz 2		2
Comparative inferences - difference of means divided by MAD to measure overlap of two data sets, common core support coach	7.SP.B.4	1
Random Samples and Surveys 11.4, common core support coach p.164	7.SP.A.1,2	2
Review/ Test		3
	Total	23 Days

Unit 5: Geometry

Topic	Standard	Time Frame
Lines and planes 7.1	7.G.A.2	1
Identifying and Classifying Angles 7.2 (including writing/solving equations to find unknown angles)	7.G.A.2 7.G.B.5	2
Writing/solving equations to find unknown angle measures (vertical and supp/comp angles)	7.G.B.5	2
Using a protractor to construct and measure angles 7.2a	7.G.A.2	2
Classifying triangles/quadrilaterals 7.3/7.4	(Review) 7.G.A.3	2
Review/Quiz 1		2
Area of Rectangles/Parallelograms/Triangles 8.2	7.G.B.6	1
Area of a Trapezoid 8.4	7.G.B.6	1
Area of a Circle 8.5	7.G.B.4	1
Review/ Quiz 2		2
Circumference of a Circle 8.5	7.G.B.4	1
Compound area	6.G.A.1	1
Shaded area	6.G.A.1	1
Review/ Test 2-D Figures		3
Space Figures 10.4 (PHPA 2001)	7.G.A.3	2
Surface Area of Cubes and Rectangular Prisms 8.9	7.G.B.6	2
Surface Area of Right Prisms 10.5 (PHPA 2001)	7.G.B.6	2
Review/Quiz 1		2
Volume of Cubes and Rectangular Prisms 8.10	7.G.B.6	2
Volume of Right Prisms 10.7 (PHPA 2001)	7.G.B.6	2
Review/Quest 3-D Figures		3

	Total	34 Days
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Unit 1: The Number System

The Number System Students will be able to apply and extend previous understandings of operations with fractions.	
Big Ideas: Rational Number Operations PHC2: 1.2-1.9, 2.6-2.7, PHPA 2001: 5.3-5.4 <ul style="list-style-type: none"> ● Understand and convert rational numbers ● Students will compare and order positive and negative rational numbers and find absolute values. ● Apply properties of operations as strategies to add, subtract, multiply and divide rational numbers ● Solve and model real-world problems/situations involving rational numbers. 	
Essential Questions <i>What provocative questions will foster inquiry, understanding, and transfer of learning?</i>	Enduring Understandings <i>What will students understand about the big ideas?</i>
<ul style="list-style-type: none"> ● In what ways are positive and negative numbers used in the real world? ● How can adding, subtracting, multiplying and dividing rational numbers help me in my career or life? ● How can rational numbers help solve real world problems involving area/perimeter, cooking, remodeling, etc.? 	Students will understand that... <ul style="list-style-type: none"> ● In order to solve problems with positive and negative integers, you must know how to do all four operations. ● Absolute value is the distance a number is from zero. ● It is important to know how to add, subtract, multiply and divide rational numbers in order to balance finances, plan for home remodeling, and modifying recipes.

Areas of Focus: Proficiencies (Cumulative Progress Indicators)	Examples, Outcomes, Assessments
Students will:	Instructional Focus:
<p>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.</p>	<ul style="list-style-type: none"> ● Compare and order integers. Using models to describe real-world situations in which rational numbers are combined. ● Find absolute values of integers.
<p>7.NS.2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.</p>	<ul style="list-style-type: none"> ● Add, subtract, multiply, and divide integers using models and rules.
<p>7.NS.3. Solve real-world and mathematical problems involving the four operations with rational numbers.</p>	<ul style="list-style-type: none"> ● Apply order of operations with rational numbers. <p>Sample Assessment:</p> <ul style="list-style-type: none"> ● Enter debits and credits into a sample checkbook page and find the balance. <p><u>Instructional Strategies:</u></p> <p>Interdisciplinary Connections</p> <p>Science: Use integers to find the change in daily temperatures for a specific location.</p> <p>Physical Education: In many games, positive and negative numbers are needed.</p> <p>Technology Integration</p> <p>Spreadsheet – banking and credit card usage spreadsheet on deposits & withdrawals</p> <p>Brainpop videos – use an alternate medium for reinforcement of skills</p> <p>Global Perspectives</p> <ul style="list-style-type: none"> ● Graph temperatures for various locations in the world on a horizontal and vertical number line. <p>Research: Germany-Carl Friedrich Gauss & Chinese: Jiu-zhang Suanshu</p>

Unit 2: Expressions and Equations

Equations and Expressions	
<p>Students will be able to use properties of operations to generate equivalent expressions. Students will be able to solve real-life and mathematical problems using numerical and algebraic expressions and equations.</p>	
<p>Big Ideas: PHC2 (2008) 4.1-4.4, 4.7-4.9 and PHPA 2001 2.1, 5.7-5.8</p> <ul style="list-style-type: none"> ● To use the properties of addition and multiplication to add, subtract, multiply and divide rational numbers. ● To write and evaluate algebraic expressions. ● To solve one-step equations using substitution, mental math and estimation. ● Recognize rational numbers in the context of one-step equations. ● Solve one and two-step equations/inequalities with rational numbers using inverse operations. ● Write and graph one and two-step inequalities. 	
Essential Questions	Enduring Understandings
<p><i>What provocative questions will foster inquiry, understanding, and transfer of learning?</i></p>	<p><i>What will students understand about the big ideas?</i></p>
<ul style="list-style-type: none"> ● When do we use equations to solve everyday problems? ● Why do we use inverse operations to solve equations? ● How does the solution to an equation differ from the solution to an inequality? 	<p>Students will understand that...</p> <ul style="list-style-type: none"> ● You can use equations to help solve everyday problems. Equations can be used to find how much change you will receive after purchasing certain items, how much money you will make in a day/per hour, etc. Equations can be used in many different professional fields as well. ● Inverse operations are used to isolate the variable. When you use inverse operations you using the additive identity and multiplicative identity to isolate the variable. ● Percents can be written as equivalent fractions and decimals. ● To understand the equivalences of each type of number when presented in real-world situations

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Areas of Focus: Proficiencies (Cumulative Progress Indicators)	Examples, Outcomes, Assessments
Students will:	<p>Instructional Focus:</p> <ul style="list-style-type: none"> ● Evaluating and Writing Algebraic Expressions ● Using Number Sense to Solve Equations/Inequalities ● Solving Equations/Inequalities by Adding, Subtracting, Multiplying and Dividing. <p>Sample Assessments:</p> <ul style="list-style-type: none"> ● 3 unit quizzes ● 1 unit test ● Solve the equation $2.5x = 42.5$ and check your solution. <p>Instructional Strategies:</p> <p>Interdisciplinary Connections</p> <p>Science – Write inequalities to represent the freezing point of different elements</p> <p>Technology Integration</p> <ul style="list-style-type: none"> ● Khan Academy – video clips on solving equations ● Portal Activity – utilize a scenario & have students comment on how it should be solved
7.EE.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	
7.EE.3. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.	
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.	

Unit 3: Ratios and Proportional Reasonings

Ratios and Proportional Reasonings Students will be able to analyze proportional relationships and use them to solve real-world and mathematical problems.	
Big Ideas: Ratio and Proportion (PHC2 5.1-5.6 and 6.6 to 6.8)	
<ul style="list-style-type: none"> ● Students will find equivalent ratios to see which ones form proportions. ● Students will calculate unit rates associated with ratios of fractions. ● Students will represent unit rate (constant of proportionality) in tables, graphs (the point $(1, r)$), and equations ($y = kx$) ● Students will decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin ● Students will write and solve proportions in relation to problems involving similar figures, scale models, and maps. ● Students will solve problems involving real-world applications of percent. 	
Essential Questions <i>What provocative questions will foster inquiry, understanding, and transfer of learning?</i>	Enduring Understandings <i>What will students understand about the big ideas?</i>
<ul style="list-style-type: none"> ● How can ratios and proportions allow you to determine your travel time on a road trip? ● How can you identify a proportional relationship from a table? Graph? Equation? ● How can understanding unit rate, markup, and discount make you a smart and thrifty consumer? ● When you get a job, why is it important to know the difference between a fixed salary or a salary based only on commission? ● How do proportions help determine measurements of very tall objects? 	Students will understand that... <ul style="list-style-type: none"> ● Two ratios form a proportion when their cross products are equal. ● The graph of a proportional relationship is a straight line through the origin. ● The unit rate, or constant of proportionality, is k in the equation $y = kx$, and r in the point $(1, r)$ ● A unit rate can be used to determine which products constitute the better buy. ● Proportions and similar figures are used to find heights of tall trees and other objects that are not easy to measure directly. ● A proportion can be used to find actual distances from a map or sizes of actual objects from a scale model. ● Proportions are used to solve basic

	<p>percent problems and applications of percent.</p> <ul style="list-style-type: none"> Knowing applications of percent such as discount, sales tax, and markup can help one to be an informed consumer and make good purchasing decisions.
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Areas of Focus: Proficiencies (Cumulative Progress Indicators)	Examples, Outcomes, Assessments
Students will:	<p>Instructional Focus:</p> <hr/> <ul style="list-style-type: none"> Find unit rates. Determine if two ratios form a proportion. Solve proportions. Use proportions to find parts of similar figures, and to solve problems involving maps and scale drawings. Use proportions to find percent of a number <p>Sample Assessments:</p> <ul style="list-style-type: none"> 3 unit quizzes 2 unit tests Given a recipe for four, determine what amount of each ingredient is needed for six. Compare different groups of people in a survey using ratios. Students are broken into groups. Each group is given a menu and a blank bill slip. Students will “dine” with their groups, then find the total, tip, and tax for the bill. <p>Instructional Strategies:</p> <p>Interdisciplinary Connections</p> <ul style="list-style-type: none"> Geography: use unit rate to find
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.	
7.RP.2. Recognize and represent proportional relationships between quantities.	
7.RP.3. Use proportional relationships to solve multistep ratio and percent problems.	

	<p>population density.</p> <ul style="list-style-type: none"> ● Career: automotive engineers use math skills to design, develop, and test vehicles. ● Social Studies: In elections, delegates are proportional to the population in each state. <p>Technology Integration</p> <ul style="list-style-type: none"> ● Search epicurious.com: use constant of proportionality to convert recipes to make more or less servings ● YouTube clips on ratio & proportions – have students search for clips & find best teaching/tutorial clip
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Unit 4: Statistics and Probability

<p>Statistics and Probability</p> <p>Students will be able to use random sampling to draw inferences about a population. Students will be able to draw informal comparative inferences about two populations. Students will be able to investigate chance processes and develop, use, and evaluate probability models.</p>	
<p>Big Ideas: Probability (PH 11.4, 11.5, and 12.1-12.4)</p> <ul style="list-style-type: none"> ● Identify random samples, how to write a survey question, and how to estimate population sizes using proportions. ● Use measures of central tendency to best describe a data set. ● Use measures of variability to make conclusion about data sets. ● Students will become familiar with theoretical and experimental probability and be able to make a sample space to show the outcomes in an experiment. ● Draw informal comparative inferences about two populations. 	
<p>Essential Questions</p>	<p>Enduring Understandings</p>

<p><i>What provocative questions will foster inquiry, understanding, and transfer of learning?</i></p>	<p><i>What will students understand about the big ideas?</i></p>
<ul style="list-style-type: none"> ● What relationships can you find between sports and probability? ● How can probability be used to predict future increases or decreases in populations of animals in specific areas? ● Do you think it is practical to survey every student in a school about the kind of music they like? If not, why not, and how would you go about the survey? ● How do forecasters predict extreme weather conditions? What kinds of tools help them? 	<p>Students will understand that...</p> <ul style="list-style-type: none"> ● The sum of a probability and its complement is one. ● Theoretical probability is the actual probability of an event and experimental is based on the results of an experiment. ● All possible outcomes of an experiment constitute the sample space. ● Random samples and surveys are used to understand an entire group's preferences and to estimate and predict. ● One measure of central tendency may give a better representation of a data set than another measure of central tendency.
<p>Areas of Focus: Proficiencies (Cumulative Progress Indicators)</p>	<p>Examples, Outcomes, Assessments</p>
<p>Students will:</p>	<p>Instructional Focus:</p>
<p>7.SP.1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.</p>	<ul style="list-style-type: none"> ● Estimate a population size using proportions and random samples. ● Find the probability and complement of an event. ● Find experimental probability. ● Construct and use a sample space and the counting principle to find probabilities.
<p>7.SP.2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.</p>	<p>Sample Assessments:</p> <ul style="list-style-type: none"> ● 2 unit quizzes ● 1 unit test ● Students take a survey of 30 people to find the month of each person's birthday. Find the experimental

<p>7.SP.4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.</p>	<p>probability for each month and share results with the class.</p>
<p>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.</p>	<ul style="list-style-type: none"> ● From a bag of a predetermined number of colored cubes, have each student select a cube and record. When finished, have each student predict how many of each colored cubes are in the bag.
<p>7.SP.6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.</p>	<p>Instructional Strategies:</p> <p>Interdisciplinary Connections</p> <ul style="list-style-type: none"> ● Science: Use probability to find out of a group of 1000 people, how many would be colorblind. ● Industry: Use probability to determine how many specific parts of an automobile that are being manufactured could be defective.
<p>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.</p>	<p>Technology Integration</p> <ul style="list-style-type: none"> ● Use a graphing calculator to simulate the toss of 1000 coins. Find various probabilities.
<p>7.SP.8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.</p>	<p>Global Perspectives</p> <ul style="list-style-type: none"> ● Find the likelihood of inheriting particular traits from different animals around the world with the use of Punnett squares.

Unit 5: Geometry

Geometry: 2-D Figures	
<p>Students will be able to draw construct, and describe geometrical figures and describe the relationships between them. Students will be able to solve real-life and mathematical problems involving angle measure, area, surface area, and volume.</p>	
<p>Big Ideas: Prentice Hall 7.2-7.3 and 8.2-8.5</p> <ul style="list-style-type: none"> ● Classify and identify angle relationships, solve equations using knowledge of angle relationships ● Find the areas of polygons, including triangles, parallelograms, and trapezoids. ● Find the area and circumference of circles. 	
Essential Questions <i>What provocative questions will foster inquiry, understanding, and transfer of learning?</i>	Enduring Understandings <i>What will students understand about the big ideas?</i>
<ul style="list-style-type: none"> • Why learn how to classify angles? • Are the area formulas for the various polygons related? 	<p>Students will understand that...</p> <ul style="list-style-type: none"> • It is very important in the field of architecture to be able to classify different types of angles. Architects have to think about angles in structures they design in order to predict if different geometric figures can fit together. • The formula for the area of a triangle is proven using the area formula of a parallelogram. • The area formula for a trapezoid can be found using two parallelograms. • Find the area of any regular polygon by dividing the polygon into equal triangular pieces, finding the area of one triangle and multiplying the answer by the amount of triangles.

Areas of Focus: Proficiencies (Cumulative Progress Indicators)	Examples, Outcomes, Assessments
Students will:	Instructional Focus:
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.	<ul style="list-style-type: none"> ● Area of Parallelograms ● Perimeter and Area of Triangles and Trapezoids. ● Circumference and Area of a Circle
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.	<p>Sample Assessments:</p> <ul style="list-style-type: none"> ● 2 unit quizzes ● 1 unit test ● Given several empty pizza pans, have students calculate the area of each pan. Then determine the amount of pizza each student would get if it were divided between three, four, five etc people.
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.	<p>Instructional Strategies:</p> <p>Interdisciplinary Connections</p> <ul style="list-style-type: none"> ● Architecture- Used to create buildings, sculptures, packages, etc. ● Industry-used for packaging items for shipping, label designs, etc. ● Carpentry-Determining price of carpeting per square foot, finding cost of paint to cover walls
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.	<p>Global Perspectives</p> <ul style="list-style-type: none"> ● How geometry is used in building houses: http://www.holistichouseplans.com/ ● Geometric images: http://fiveprime.org/hivemind/Tags/geometry,hyperbolic ● China: http://www.math.admu.edu.ph/tsg22/mok.htm ● Incas: geometry from the land of Incas (http://agutie.homestead.com/) ● Research countries where mathematics developed http://www-groups.dcs.st-and.ac.uk/~history/BirthplaceMaps/MapIndex.html

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Geometry: 3-D Figures

Students will be able to draw construct, and describe geometrical figures and describe the relationships between them. Students will be able to solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Big Ideas: Measurement of 3-D Figures PHC2 8.8-8.10 and PHPA(2001) 10.4-10.5, 10.7

- Identify, draw, and name parts of 3-dimensional figures.
- Find the surface areas and volumes of rectangular prisms and cylinders.
- Solve real world problems involving the volume of 3-dimensional shapes.

Essential Questions <i>What provocative questions will foster inquiry, understanding, and transfer of learning?</i>	Enduring Understandings <i>What will students understand about the big ideas?</i>
<ul style="list-style-type: none"> ● How much wrapping paper you would need for a friend's gift? ● Is it possible for rectangular prisms to have the same volume, but different surface areas? 	<p>Students will understand that...</p> <ul style="list-style-type: none"> ● 3-dimensional figures are composed of 2-dimensional shapes. ● Surface area is the sum of the areas of each face. ● Volume of prisms and cubes is the area of the base times the height.
Areas of Focus: Proficiencies (Cumulative Progress Indicators)	Examples, Outcomes, Assessments
<p>Students will:</p> <p>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.</p> <p>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.</p>	<p>Instructional Focus:</p> <ul style="list-style-type: none"> ● Manipulate 2-dimensional shapes to create 3-D figures ● Assist students in identifying the real-world applications of 3-dimensional geometry in terms of jobs and everyday occurrences. ● Classify and draw 3-dimensional figures. ● Be able to describe the cross section of a given 3D figure ● Identify faces, edges, bases, and vertices of 3-dimensional figures. ● Find surface area and volume of rectangular prisms and cylinders. ● Compare rectangular prisms that have the same volume, but different surface areas.

Sample Assessments:

- 2 unit quizzes
- 1 unit test
- Construct a 3-D figure after drawing a net of the shape.
- Build a 3D figure from cubes and describe the possible 2D cross-sections and different 2D views of the figure

Instructional Strategies:**Interdisciplinary Connections**

- Art: Importance of the ability to visualize and draw 3-dimensional objects.
- Manufacturing: Knowing how to find surface area and volume will help manage packaging expenses

Technology Integration

- Internet- interactive activity – (Shodor.org)
- Create an icosahedron using paper and rulers.
- Use plastic geometric models for surface area and volume.
- Display 3D figures on SMART board and have students draw corresponding nets or cross-sections

Global Perspectives

- Search the water cube from the Chinese Olympics 2010.