

Summit Public Schools

Summit, New Jersey

Grade Level 7/ Content Area: Mathematics

Length of Course: Full Academic Year

Curriculum: Pre-Algebra

Revised 2017

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Course Description: This one-year course has been designed to equip students with the skills needed for Foundations of Algebra. Students will solidify their computation skills with rational numbers and integers, applying both number sets to algebraic and real-world problems. Students will be expected to write and solve one- and two-step equations with rational coefficients, solve and graph one- and two-step inequalities with integer and rational coefficients, and evaluate algebraic expressions with integers and rational numbers. In addition, students at this level will extend their understanding of algebraic expressions through the integration of exponent rules, including simplifying expressions with Scientific Notation. Order of operations will be extended to simplifying expressions with exponents. 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 finding areas of compound figures, or finding missing dimension given the area and remaining dimension(s). The three-dimensional geometry unit will include recognizing the two-dimensional shapes formed by slicing solids in different ways, knowing properties of solids and identifying their parts, 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:

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 Pre-Algebra 7

Unit 1: The Number System

Topic	Standard	Time Frame
Variables and Expressions 1.1	7.EE.A.1	1
Order of operations 1.2 (review)	6.EE.A.2.c	1
Evaluating Expressions 1.3 (review)	6.EE.A.2.a	2
Review/Quiz 1 (1.1-1.3)		2
Integers and Absolute Value 1.4	7.NS.A.1.a	1
Adding and Subtracting Integers 1.5-1.6	7.NS.A.1.b	3
Review/Quiz 2 (1.4-1.6)		2
Multiplying and Dividing Integers 1.9	7.NS.A.2.b	1
Review/Test-Integer Operations		3
Adding and Subtracting Rational Numbers (Decimal Review)	7.NS.A.1.d	2
Multiplying and Dividing Rational Numbers (Decimals Review)	7.NS.A.2	2
Review/Quiz - Decimal Operations		2
Rational Numbers 4.6 (Defining and Graphing, Evaluating Rational Expressions)	7.NS.A.1, 7.EE.A	1
Ordering and Comparing Rational Numbers (fractions and decimals) 5.2	7.NS.2.d	1
Adding and Subtracting Rational Numbers (fractions) 5.3	7.NS.1.d	4
Review/Quiz – 4.6, 5.2, 5.3		2
Algebraic Fractions (adding and subtracting) - outside sources	7.EE.A.1	3
Multiplying and Dividing Rational Numbers 5.4	7.NS.A.2.c	2
Review/Test – Rational Number Operations (Fractions Ch 5)		3
Total		38 days

Unit 2: Expressions and Equations

Topic	Standard	Time Frame
Properties of Numbers 2.1	7.EE.A.1	1
The Distributive Property 2.2	7.EE.B.4.a	2
Simplifying Variable Expressions 2.3	7.EE.A.1,2	2
Variables and Equations 2.4	7.EE.B.4.a	1
Review/Quiz 1 (2.1-2.4)		2
Solving Equations by Adding or Subtracting 2.5, 3.5, 5.7	7.EE.B.3, 4.a	3
Review/Quiz 2 (2.5, 3.5, 5.7)		2
Solving Equations by Multiplying or Dividing 2.6, 3.6, 5.8	7.EE.B.3, 4.a	2
Review/Test 2.1-2.6, 3.5, 3.6, 5.7, 5.8		2
Inequalities and their Graphs 2.8	7.EE.B.4.b	1
Solving One-Step Inequalities by Adding and Subtracting 2.9	7.EE.B.4.b	1
Solving One-Step Inequalities by Multiplying and Dividing 2.10	7.EE.B.4.b	2
Review / Quiz 2.8-2.10		2
Solving two-step equations 7.1	7.EE.B.4.a	2
Solving two-step inequalities 7.6	7.EE.B.4.b	1
Review/Test 2.8-2.10, 7.1, 7.6		3
Total		29 days

Unit 2A: Expressions and Equations (from Grade 8 – 8.EE.A.1 and 8.EE.A.3)

Topic	Standard	Time Frame
Exponents, order of operations with exponents 4.2	8.EE.A.1	2
Exponents and Multiplication 4.7, 5.9 (powers of products only)	8.EE.A.1	2-3
Review/Quiz 4.2, 4.7, 5.9		2
Exponents and Division 4.4, 4.8	8.EE.A.1	2
Powers of Quotients 5.9	8.EE.A.1	1
Scientific Notation 4.9	8.EE.A.3	2
Review / Test		3
Total		15 days

Unit 3: Ratios and Proportional Relationships

Topic	Standard	Time Frame
Ratios and Unit Rates 6.1	7.RP.A.1	2
Constant of proportionality - tables, graphs, equations	7.RP.A.2a-d	2
Proportions 6.2	7.RP.A.2a	1
Review/Quiz 6.1 to 6.2, Constant of Proportionality		2
Similar figures 6.3	7.G.A.1	2
Indirect measure and Scale Drawings 6.3	7.G.A.1	2
Review/Test - Rate,Ratio, and Proportion		2
Fractions, Decimals, Percents 6.5	review	1
Percent Proportions and Equations 6.6-6.7	7.RP.A.2	1
Review/Quiz 6.5-6.7		2
Applications of Percent 6.8-6.9 (tip, tax, commission, percent change, markup, discount)	7.RP.A.3	4
Review/Quest - Percent		3
Total		22 days

Unit 4: Statistics and Probability

Topic		Time Frame
Introductory Probability 6.4	7.SP.C.5	1
Counting Outcomes and Theoretical Probability 12.4	7.SP.C.7	2
Independent and Dependent Events 12.5	7.SP.C.8	2
Experimental Probability 12.7	7.SP.C.6	2
Review/ Quiz Probability		2
Measures of Central Tendency 3.3	7.SP.B.4	2
Measures of Variability MAD/IQR	7.SP.B.4	2-3
Comparative inferences - overlap - difference of means divided by MAD	7.SP.B.3,4	1
Review/Quiz MMM, MAD, IQR, comparative inferences		2
Random Samples and Surveys 12.8	7.SP.A	2
Review/Test		3
	Total	21 days

Unit 5: Geometry

Topic	Standard	Time Frame
Points, Lines, and Planes 9.1	7.G.A.2	3
Angle Relationships & Parallel Lines 9.2	7.G.B.5	3
Classifying Polygons 9.3	Review	1
Unique triangles - one, infinite, none (use outside resources)	7.G.A.2	2
Review / Quiz 9.1 – 9.3		2
Area of Polygons (includes irregular figures) 10.1-10.2	7.G.B.6	3
Circles and Circumference 9.6	7.G.B.4	1
Area of Circles 10.3	7.G.B.4	1
Review/Test 2D Geometry		2
Space Figures 10.4	Review	1
Surface Area of Prisms and Cylinders 10.5	7.G.B.6	3
Volume: Prisms & Cylinders 10.7	7.G.B.6	2
Review / Quest – 3D Geometry		2
	Total	24 days

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 PHPA: 1.1-1.6, 1.9, 4.6, 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 of a number 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 modify 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. Use models to describe real-world situations in which rational numbers are combined. ● Find absolute values of integers. ● Add, subtract, multiply, and divide integers using models and rules.
<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"> ● Apply order of operations with rational numbers. <p>Sample Assessment:</p> <ul style="list-style-type: none"> ● 4 unit quizzes ● 2 unit tests
<p>7.NS.3. Solve real-world and mathematical problems involving the four operations with rational numbers.</p>	<p>Sample Assessment 7.NS.1.</p> <ul style="list-style-type: none"> ● Example 1: Can two different numbers have the same absolute value? Explain. ● Example 2: Give a list of golf scores (+ or – in relation to par = 0), order the scores from least to greatest. Is it better to have a score closer to 0 or further from it? Explain in terms of absolute value.
<p>Career-Ready Practices</p> <p>CRP1: Act as a responsible and contributing citizen and employee.</p> <p>CRP2: Apply appropriate academic and technical skills.</p> <p>CRP3: Attend to personal health and financial well-being.</p> <p>CRP4: Communicate clearly and effectively and with reason.</p> <p>CRP5: Consider the environmental, social and economic impacts of decisions.</p> <p>CRP6: Demonstrate creativity and innovation.</p> <p>CRP7: Employ valid and reliable research strategies.</p> <p>CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>CRP9: Model integrity, ethical leadership and effective management.</p> <p>CRP10: Plan education and career paths aligned to personal goals.</p> <p>CRP11: Use technology to enhance productivity.</p> <p>CRP12: Work productively in teams while using cultural global competence.</p>	<p>Instructional Strategies:</p> <p>Interdisciplinary Connections</p> <ul style="list-style-type: none"> ● Science: <ul style="list-style-type: none"> 1) Integers are used to represent elevation above and below sea level. 2) Patterns in integer temperatures can represent daily and seasonal averages. ● Physical Education: In many games, positive and negative numbers are needed. <p>Technology Integration</p> <p>Excel Spreadsheet – create a bank or credit card statement using formulas for deposits & withdrawals. What are the advantages to keeping track of your expenses electronically?</p> <p>Brainpop videos – use an alternate medium for reinforcement of skills</p> <p>iMovie/Podcast – student-generated explanations of rational number operations to be shared with peers</p> <p>Global Perspectives</p> <ul style="list-style-type: none"> ● Graph temperatures for various locations in the world

	<p>on a coordinate grid. Compare current temperature data to data from 50 years ago. How might this be evidence of global warming?</p>
<p>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:</p>	<p>21st Century Skills: Creativity and Innovation Critical Thinking and Problem Solving Communication and Collaboration Information Literacy Media Literacy Life and Career Skills</p> <p>21st Century Themes (as applies to content area): Financial, Economic, Business, and Entrepreneurial Literacy Civic Literacy Health Literacy</p>

Unit 2: Expressions and Equations

Expressions and Equations	
Students will be able to use properties of operations to generate equivalent expressions.	
<p>Big Ideas: PHPA 2001: 2.1-2.6, 3.5-3.6, 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 number sense, mental math and estimation. ● Recognize rational numbers in the context of one-step equations. ● Solve one-step equations/inequalities with rational numbers using inverse operations. ● Write and graph one and two-step inequalities. 	
Essential Questions	Enduring Understandings
<i>What provocative questions will foster inquiry, understanding, and transfer of learning?</i>	<i>What will students understand about the big ideas?</i>
<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. ● Inverse operations “undo” each other and are used to isolate the variable. Number properties are applied when using inverse operations. ● To understand the equivalences of each type of number when presented in real-world situations

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 <p>Sample Assessment 7.EE.4</p> <ul style="list-style-type: none"> ● Example 1: Write and solve an equation: If your target heart rate is 130 bpm, which is 58 bpm more than your resting heart rate, find your resting heart rate.
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	

<p>construct simple equations and inequalities to solve problems by reasoning about the quantities.</p>	<ul style="list-style-type: none"> ● Example 2: Write and solve an inequality: The total weight limit for a truck is 100,000lbs. If the truck weighs 36,000lbs empty, what is the truck's maximum possible load?
<p>Career-Ready Practices CRP1: Act as a responsible and contributing citizen and employee. CRP2: Apply appropriate academic and technical skills. CRP3: Attend to personal health and financial well-being. CRP4: Communicate clearly and effectively and with reason. CRP5: Consider the environmental, social and economic impacts of decisions. CRP6: Demonstrate creativity and innovation. CRP7: Employ valid and reliable research strategies. CRP8: Utilize critical thinking to make sense of problems and persevere in solving them. CRP9: Model integrity, ethical leadership and effective management. CRP10: Plan education and career paths aligned to personal goals. CRP11: Use technology to enhance productivity. CRP12: Work productively in teams while using cultural global competence.</p>	<p>Instructional Strategies:</p> <p>Interdisciplinary Connections Science – Determine maximum load bridges can bear based on different engineering structures</p> <p>Technology Integration</p> <ul style="list-style-type: none"> ● Khan Academy – video clips on solving equations and inequalities ● Complete a short instant response quiz for a formative self-assessment (Google forms, quizlet, etc) <p>Media Literacy</p> <ul style="list-style-type: none"> ● Pear Deck presentation/discussion – name some instances of inequalities in the real world. How many can you list? (speed limit, maximum occupancy, etc.)
<p>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:</p>	<p>21st Century Skills:</p> <ul style="list-style-type: none"> Creativity and Innovation Critical Thinking and Problem Solving Communication and Collaboration Information Literacy Media Literacy Life and Career Skills <p>21st Century Themes (as applies to content area):</p> <ul style="list-style-type: none"> Financial, Economic, Business, and Entrepreneurial Literacy Civic Literacy Health Literacy

Unit 2A: Expressions and Equations (Exponent Rules) (from Grade 8 Standards - 8.EE.A.1 and 8.EE.A.3)

Expressions and Equations	
Students will be able to apply the properties of integer exponents to generate equivalent numerical expressions.	
Big Ideas:	
<ul style="list-style-type: none"> ● Use the Laws of Exponents to generate equivalent expressions. ● Use scientific notation to estimate very large or very small quantities. 	
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 repetitive patterns be written using exponents? ● How can computations involving very large or very small numbers be simplified? 	Students will understand that... <ul style="list-style-type: none"> ● The properties of integer exponents can generate equivalent numerical expressions. ● Numbers expressed in the form of a single digit times an integer power of 10 can be used to estimate very large or very small quantities and to express how many times as much one is than the other.
Areas of Focus: Proficiencies (Cumulative Progress Indicators)	Examples, Outcomes, Assessments
Students will: 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.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. <i>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.</i>	Instructional Focus: <ul style="list-style-type: none"> ● Use the order of operations and the properties of exponents to simplify expressions. ● Converting numbers in standard form to scientific notation and scientific notation to standard form Sample Assessments: <ul style="list-style-type: none"> ● 2 unit quizzes ● 1 unit test Sample Assessment 8.EE.A.3 <ul style="list-style-type: none"> ● List powers of 10 in descending order until you reach 10^0. Explain why $10^0 = 1$. Does this work for any base to a zero power? Sample Assessment 8.EE.A.1 <ul style="list-style-type: none"> ● Simplify the expression a^5b/ab^4 Instructional Strategies: Interdisciplinary Connections <ul style="list-style-type: none"> ● Science – Comparison of the nucleus of an atom to the distance of particular stars from Earth. Scientific notation is necessary to represent such large and small quantities. Technology Integration

<p>Career-Ready Practices</p> <p>CRP1: Act as a responsible and contributing citizen and employee.</p> <p>CRP2: Apply appropriate academic and technical skills.</p> <p>CRP3: Attend to personal health and financial well-being.</p> <p>CRP4: Communicate clearly and effectively and with reason.</p> <p>CRP5: Consider the environmental, social and economic impacts of decisions.</p> <p>CRP6: Demonstrate creativity and innovation.</p> <p>CRP7: Employ valid and reliable research strategies.</p> <p>CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>CRP9: Model integrity, ethical leadership and effective management.</p> <p>CRP10: Plan education and career paths aligned to personal goals.</p> <p>CRP11: Use technology to enhance productivity.</p> <p>CRP12: Work productively in teams while using cultural global competence.</p>	<ul style="list-style-type: none"> ● Use flashcardexchange.com to create, share, and print flashcards for studying the exponent rules ● On the SMART board, use a graphing application to show exponential growth rates graphically. Students can use the application to change the graph and observe its properties as it changes. <p>Global Perspectives</p> <ul style="list-style-type: none"> ● View a graph of human population growth over the last 12000 years. (http://mathbench.umd.edu/modules/popn-dynamics_exponential-growth/page18.htm) Exponents are used to represent growth that occurs very rapidly. Research online sources to determine what this means for the world population in the next century.
<p>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:</p>	<p>21st Century Skills:</p> <ul style="list-style-type: none"> Creativity and Innovation Critical Thinking and Problem Solving Communication and Collaboration Information Literacy Media Literacy Life and Career Skills <p>21st Century Themes (as applies to content area):</p> <ul style="list-style-type: none"> Financial, Economic, Business, and Entrepreneurial Literacy Civic Literacy Health Literacy

Unit 3: Ratios and Proportional Reasoning

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

Big Ideas: Ratio and Proportion (PHPA 2001 6.1-6.3, 6.5-6.9)

- 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? 	<p>Students will understand that...</p> <ul style="list-style-type: none"> ● 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 percent problems and applications of percent. ● Knowing applications of percent such as discount, sales tax, and markup can help one to be an informed consumer and make good purchasing decisions.

Areas of Focus: Proficiencies (Cumulative Progress Indicators)	Examples, Outcomes, Assessments
<p>Students will:</p> <p>7.RP.1. Compute unit rates associated with ratios of fractions, including ratios of lengths,</p>	<p>Instructional Focus</p> <ul style="list-style-type: none"> ● Find unit rates ● Determine if two ratios form a proportion. ● Solve proportions.

<p>areas and other quantities measured in like or different units.</p>	<ul style="list-style-type: none"> ● 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>7.RP.2. Recognize and represent proportional relationships between quantities.</p>	<p>Sample Assessments:</p> <ul style="list-style-type: none"> ● 2 unit quizzes ● 1 unit test
<p>7.RP.3. Use proportional relationships to solve multi-step ratio and percent problems.</p>	<p>Sample Assessment 7.RP.A.1</p> <ul style="list-style-type: none"> ● Example 1: If a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\frac{1/2}{1/4}$ miles per hour.
<p>Career-Ready Practices</p> <p>CRP1: Act as a responsible and contributing citizen and employee.</p> <p>CRP2: Apply appropriate academic and technical skills.</p> <p>CRP3: Attend to personal health and financial well-being.</p> <p>CRP4: Communicate clearly and effectively and with reason.</p> <p>CRP5: Consider the environmental, social and economic impacts of decisions.</p> <p>CRP6: Demonstrate creativity and innovation.</p> <p>CRP7: Employ valid and reliable research strategies.</p> <p>CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>CRP9: Model integrity, ethical leadership and effective management.</p> <p>CRP10: Plan education and career paths aligned to personal goals.</p> <p>CRP11: Use technology to enhance productivity.</p> <p>CRP12: Work productively in teams while using cultural global competence.</p>	<p>Sample Assessment 7.RP.2a</p> <ul style="list-style-type: none"> ● Example 1: Given a graph, determine if a proportional relationship is present. ● Example 2: Given a graph, identify the unit rate and determine the y value if $x =$ (given number) ● Example 3: On a road trip, the driver averages 60mph. Write an equation to represent the distance traveled d after h hours. <p>Instructional Strategies:</p> <p>Interdisciplinary Connections</p> <ul style="list-style-type: none"> ● Geography: use unit rate to find population density. ● Social Studies: In government, delegates are proportional to the population in each state. <p>Global Perspectives</p> <p>Use the exchange rates of various countries to figure out how much foreign money you can get in exchange for \$100 U.S. dollars. Use this to help make a decision about the most affordable travel destination.</p> <p>Media Literacy</p> <ul style="list-style-type: none"> ● Photos on Instagram must be in a square format and must be cropped to be displayed properly. Is the cropped photo similar to the original? If so, how can you find the scale factor? ● On certain smartphones, the photo editing feature offers the option to “constrain” the photo. How does this relate to proportionality?
<p>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:</p>	<p>21st Century Skills:</p> <p>Creativity and Innovation Critical Thinking and Problem Solving Communication and Collaboration</p>

	<p>Information Literacy Media Literacy Life and Career Skills</p> <p>21st Century Themes (as applies to content area): Financial, Economic, Business, and Entrepreneurial Literacy Civic Literacy Health Literacy</p>
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Unit 4: Statistics and Probability

Statistics and Probability Use random sampling to draw inferences about a population. Draw informal comparative inferences about two populations. Investigate chance processes and develop, use, and evaluate probability models.	
Big Ideas: Probability and Statistics (PHPA 2001 3.3, 6.4, 12.4-12.8) <ul style="list-style-type: none"> ● Determine measures of central tendency and which best represents a set of data. ● Identify random samples, how to write a survey question, and how to estimate population sizes using proportions. ● Students will become familiar with theoretical and experimental probability and be able to make a sample space to show the outcomes in an experiment. 	
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"> ● 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 can patterns in historical data be used to predict extreme weather conditions? 	Students will understand that... <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 represent information about a larger group. The data from random samples and surveys are often used to predict outcomes or estimate preferences of larger populations.
Areas of Focus: Proficiencies (Cumulative Progress Indicators)	Examples, Outcomes, Assessments
Students will: 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.	Instructional Focus: <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. Sample Assessments: <ul style="list-style-type: none"> ● 2 unit quizzes ● 1 unit test Sample Assessment 7.SP.4 &6
7.SP.2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate	

<p>multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.</p>	<ul style="list-style-type: none"> ● Example 1: Students will design a survey question and gather data from 30 people. Using their data, they will: <ol style="list-style-type: none"> 1) <i>estimate data for the entire 7th grade</i> 2) <i>decide whether their survey data alone is enough to accurately portray the preferences of the 7th grade</i> 3) <i>use measures of central tendency to summarize the data</i>
<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>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"> ● Example 2: Roll a 6-sided die a number of times and record the results. From the data, calculate experimental probabilities.
<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.
<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> <p>Design an experiment, such as tossing a coin 100 times. Calculate theoretical probabilities, then perform the experiment. Record the results in an Excel spreadsheet and produce a corresponding graph to compare experimental data with theoretical data.</p>
<p>7.SP.8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.</p>	<p>Media Literacy</p> <p>Post a survey question to your class on Edmodo about inherited traits (eye color, handedness, tongue curling, etc.). Do the results accurately portray a larger population?</p>
<p>Career-Ready Practices</p> <p>CRP1: Act as a responsible and contributing citizen and employee.</p> <p>CRP2: Apply appropriate academic and technical skills.</p> <p>CRP3: Attend to personal health and financial well-being.</p> <p>CRP4: Communicate clearly and effectively and with reason.</p> <p>CRP5: Consider the environmental, social and economic impacts of decisions.</p> <p>CRP6: Demonstrate creativity and innovation.</p> <p>CRP7: Employ valid and reliable research strategies.</p> <p>CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>CRP9: Model integrity, ethical leadership and effective management.</p> <p>CRP10: Plan education and career paths aligned to</p>	

<p>personal goals. CRP11: Use technology to enhance productivity. CRP12: Work productively in teams while using cultural global competence.</p>	
<p>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:</p>	<p>21st Century Skills: Creativity and Innovation Critical Thinking and Problem Solving Communication and Collaboration Information Literacy Media Literacy Life and Career Skills</p> <p>21st Century Themes (as applies to content area): Financial, Economic, Business, and Entrepreneurial Literacy Civic Literacy Health Literacy</p>

Unit 5: Geometry

Geometry	
Draw, construct, and describe geometrical figures and describe the relationships between them. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	
Big Ideas: PHPA 2001 (9.1-9.3, 9.6, 9.8-9.10, 10.1-10.3)	
<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	Enduring Understandings
<i>What provocative questions will foster inquiry, understanding, and transfer of learning?</i>	<i>What will students understand about the big ideas?</i>
<ul style="list-style-type: none"> • Why learn how to classify angles? • How can the area formulas for certain polygons be used to develop area formulas for other polygons? 	<p>Students will understand that...</p> <ul style="list-style-type: none"> • Architects use angles and geometric patterns to plan and design various structures. Depth of knowledge in how different shapes form a pattern is essential. • 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:	<p>Instructional Focus:</p> <ul style="list-style-type: none"> ● Area of Parallelograms ● Perimeter and Area of Triangles and Trapezoids. ● Areas of complex figures that combine basic shapes (e.g. a semi-circle on top of a rectangle) ● Circumference and Area of a Circle <p>Sample Assessments:</p> <ul style="list-style-type: none"> ● 2 unit quizzes ● 1 unit test <p>Sample Assessment 7.G. 4 The high school track appears to be a rectangle with a semi-circle on each end. Given the dimensions of the rectangle, find:</p> <ol style="list-style-type: none"> a) The distance around the track b) The area of the field inside the track c) How much it would cost to fertilize the grass on the field at \$2.50 per square yard
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.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>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>	<p>Sample Assessment 7.G.1 Two triangles have the same area. Must they have the same base and height?</p>
<p>Career-Ready Practices CRP1: Act as a responsible and contributing citizen and employee. CRP2: Apply appropriate academic and technical skills. CRP3: Attend to personal health and financial well-being. CRP4: Communicate clearly and effectively and with reason. CRP5: Consider the environmental, social and economic impacts of decisions. CRP6: Demonstrate creativity and innovation. CRP7: Employ valid and reliable research strategies. CRP8: Utilize critical thinking to make sense of problems and persevere in solving them. CRP9: Model integrity, ethical leadership and effective management. CRP10: Plan education and career paths aligned to personal goals. CRP11: Use technology to enhance productivity. CRP12: Work productively in teams while using cultural global competence.</p>	<p>Instructional Strategies: Interdisciplinary Connections</p> <ul style="list-style-type: none"> ● Social Studies – strong evidence of geometric patterns in Mayan architecture, including reflective and rotational symmetry http://www.ethnomath.org/resources/ISGEm/067.htm <p>Life and Career Skills</p> <ul style="list-style-type: none"> ● Home remodeling -Determining price of carpeting per square foot, finding cost of paint to cover walls, measuring tiles to fit in a specific geometric pattern to minimize waste.
<p>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:</p>	<p>21st Century Skills: Creativity and Innovation Critical Thinking and Problem Solving Communication and Collaboration Information Literacy Media Literacy Life and Career Skills</p> <p>21st Century Themes (as applies to content area): Financial, Economic, Business, and Entrepreneurial Literacy Civic Literacy Health Literacy</p>

Geometry (3D Figures - Naming, Drawing, Surface Area and Volume)	
Draw, construct, and describe geometrical figures and describe the relationships between them. Solve real-life and mathematical problems involving surface area and volume.	
Big Ideas: Measurement of 3-D Figures PHPA(2001) 10.4, 10.5, 10.7	
<ul style="list-style-type: none"> ● 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? 	Students will understand that... <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. ● To find the volume of prisms and cylinders, multiply the area of the base times the height of the prism.
Areas of Focus: Proficiencies (Cumulative Progress Indicators)	Examples, Outcomes, Assessments
Students will: 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.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.	Instructional Focus: <ul style="list-style-type: none"> ● Manipulate 2-dimensional shapes to create 3-D figures ● Classify and draw 3-dimensional figures. ● 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: <ul style="list-style-type: none"> ● 2 unit quizzes ● 1 unit test Sample Assessment 7.G.3 -Given different views of an object, choose the 3D object that matches those views. Sample Assessment 7.G.6 -A fish tank with length 12 inches, width 9 inches, and height 12 inches is filled to 75% capacity. Find how many cubic inches of water will be needed.
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CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9: Model integrity, ethical leadership and effective management.
CRP10: Plan education and career paths aligned to personal goals.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

Instructional Strategies:

Interdisciplinary Connections

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

Technology Integration

Display 3D figures on SMART board and have students draw corresponding nets or cross-sections

Life and Career Skills

Based on the surface area of an item you need to ship to California, decide which shipping company has the best rates for your size package. (e.g. FedEx, UPS, DHL, USPS)

To help your family move, you need to calculate how many moving boxes will fit in the truck. Find the volume of the truck and decide how many of different size boxes can fit (small, medium, large).

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

**Instructional Strategies:
Supports for English Language Learners:**

Sensory Supports	Graphic Supports	Interactive Supports
Real-life objects (realia)	Charts	In pairs or partners
Manipulatives	Graphic organizers	In triads or small groups
Pictures & photographs	Tables	In a whole group
Illustrations, diagrams, & drawings	Graphs	Using cooperative group structures
Magazines & newspapers	Timelines	With the Internet (websites) software programs
Physical activities	Number lines	In the home language
Videos & films		With mentors
Broadcasts		
Models & figures		

Differentiation Strategies:

Accommodations	Interventions	Modifications
Allow for verbal responses	Multi-sensory techniques	Modified tasks/ expectations
Repeat/confirm directions	Increase task structure (e.g., directions, checks for understanding, feedback)	Differentiated materials
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding (e.g., writing, reading aloud, answering)	Individualized assessment tools based on student need

from <https://wida.wisc.edu>

	questions in class)	
Audio Books	Utilize prereading strategies and activities: previews, anticipatory guides, and semantic mapping	Modified assessment grading

Curricular Addendum

Career-Ready Practices

- CRP1:** Act as a responsible and contributing citizen and employee.
- CRP2:** Apply appropriate academic and technical skills.
- CRP3:** Attend to personal health and financial well-being.
- CRP4:** Communicate clearly and effectively and with reason.
- CRP5:** Consider the environmental, social and economic impacts of decisions.
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Interdisciplinary Connections

- Close Reading of works of art, music lyrics, videos, and advertisements
- Use [Standards for Mathematical Practice](#) and [Cross-Cutting Concepts](#) in science to support debate/inquiry across thinking processes

Technology Integration

Ongoing:

- Listen to books on CDs, Playaways, videos, or podcasts if available.
- Use document camera or overhead projector for shared reading of texts.

Other:

- Use Microsoft Word, Inspiration, or SmartBoard Notebook software to write the words from their word sorts.
- Use available technology to create concept maps of unit learning.

Instructional Strategies: Supports for English Language Learners:

Sensory Supports	Graphic Supports	Interactive Supports
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Manipulatives	Graphic organizers	In triads or small groups
Pictures & photographs	Tables	In a whole group
Illustrations, diagrams, & drawings	Graphs	Using cooperative group structures
Magazines & newspapers	Timelines	With the Internet (websites) or software programs
Physical activities	Number lines	In the home language
Videos & films		With mentors
Broadcasts		
Models & figures		

from <https://wida.wisc.edu>

Media Literacy Integration

- Use multiple forms of print media (including books, illustrations/photographs/artwork, video clips, commercials, podcasts, audiobooks, Playaways, newspapers, magazines) to practice reading and comprehension skills.

Global Perspectives

- [The Global Learning Resource Library](#)

Differentiation Strategies:

Accommodations	Interventions	Modifications
Allow for verbal responses	Multi-sensory techniques	Modified tasks/ expectations
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Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding (e.g., writing, reading aloud, answering questions in class)	Individualized assessment tools based on student need
Audio Books	Utilize prereading strategies and activities: previews, anticipatory guides, and semantic mapping	Modified assessment grading