Randolph Township Schools
Randolph Middle School
Pre-Algebra 7 Honors Curriculum

"In mathematics the art of posing a question must be held of higher value than solving it."
-Georg Cantor

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Randolph Township Schools
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Mission Statement

We commit to inspiring and empowering all students in Randolph schools to reach their full potential as unique, responsible and educated members of a global society.

Affirmative Action Statement
Equality and Equity in Curriculum

The Randolph Township School district ensures that the district's curriculum and instruction are aligned to the state's standards. The curriculum provides equity in instruction, educational programs and provides all students the opportunity to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, religion, disability or socioeconomic status.

N.J.A.C. 6A:7-1.7(b): Section 504, Rehabilitation Act of 1973; N.J.S.A. 10:5; Title IX, Education Amendments of 1972

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EDUCATIONAL GOALS
VALUES IN EDUCATION

The statements represent the beliefs and values regarding our educational system. Education is the key to self-actualization, which is realized through achievement and self-respect. We believe our entire system must not only represent these values, but also demonstrate them in all that we do as a school system.

We believe:

- The needs of the child come first
- Mutual respect and trust are the cornerstones of a learning community
- The learning community consists of students, educators, parents, administrators, educational support personnel, the community and Board of Education members
- A successful learning community communicates honestly and openly in a non-threatening environment
- Members of our learning community have different needs at different times. There is openness to the challenge of meeting those needs in professional and supportive ways
- Assessment of professionals (i.e., educators, administrators and educational support personnel) is a dynamic process that requires review and revision based on evolving research, practices and experiences
- Development of desired capabilities comes in stages and is achieved through hard work, reflection and ongoing growth

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Introduction

Pre-Algebra 7 Honors is offered to seventh grade students. Its purpose is to provide students with a solid foundation in the concepts necessary for the building of a strong mathematical understanding as they prepare for Algebra in eight grade. Students will be shown the essential components including, but not limited to, operations with rational numbers and complex problem solving grounded in pre-algebra topics such as exponents, multi-step equations, linear representations and the discovery and application of the Pythagorean Theorem. Further topics include the study and application of two- and three-dimensional geometry as well as statistics and probability analysis.

In Pre-Algebra 7 Honors, students will produce, analyze, model and draw conclusions from data. In addition, students are encouraged to not only develop skills required to persevere in problem solving but also to apply those skills in real-world settings. They will produce convincing oral and written mathematical arguments, using appropriate terminology in a variety of settings.

Students enrolled in the honors course must solidly evidence conceptual understanding, knowledge of procedural skills, fluency, and ability to apply mathematics. Content at this level is fast-paced and rigorous with a focus on greater problem complexity. As such, mastery of prerequisite material must be present for success at this level.

Upon completion of this course, students will be prepared with the proper skills and understanding for the transition into Algebra I. This course will be guided by the current New Jersey Learning Standards in Mathematics.

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Curriculum Pacing Chart

SUGGESTED TIME ALLOTMENT	UNIT NUMBER	CONTENT - UNIT OF STUDY
8 weeks	I	The Number System
14 weeks	II	Algebraic Expressions, Equations, & Inequalities
5 weeks	III	Angles, Lines, & Two-Dimensional Geometry
4 weeks	IV	Three-Dimensional Geometry
5 weeks	V	Statistics & Probability

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Unit I: The Number System

STANDARDS / GOALS:	ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
NJ 2016 SLS: Math 7.NS.A.1: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers.	Real numbers are represented as points on an infinite line and are used to count measure, estimate, or approximate quantities.	• How can I represent and solve problems involving the multiplication and division of rational numbers using a variety of models?
7.NS.A.1.A: Describe situations where opposite quantities combine to make 0. 7.NS.A.1.C: Show that the distance between two rational numbers on the number line is the absolute value of their difference.	Real-life word problems can be solved using mathematical operations and applied to rational numbers, including negative numbers.	• How can a mathematical model aide in persevering when solving a real-world problem?
	KNOWLEDGE **Students will know:**	**SKILLS** **Students will be able to:**
7.NS.A.1.D: Apply properties of operations as strategies to add and subtract rational numbers. 7.NS.A.2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 7.NS.A.2.A: Understand the rules for multiplying signed numbers and the distributive property.	Rational numbers can be identified and represented on a horizontal number line. Rational numbers can be written as fractions with integers as the numerator and the denominator (excluding zero in the denominator). Absolute value is the measure of the distance from any rational or irrational number to zero on the number line.	Plot rational numbers on the real number line between two integers. Express all rational numbers as fractions. Use the number line to model the absolute value of two rational numbers to determine which has a greater distance.

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Unit I: The Number System

7.NS.A.2.B: Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers is a rational number.	Rational numbers can be written as decimals that either terminate or repeat.	Re-write any rational number into its decimal equivalent using the division algorithm.
7.NS.A.2.C: Apply properties of operations as strategies to multiply and divide rational numbers.	The number line can be used to compare rational numbers. Mathematical operations can be performed on rational numbers.	Illustrate the locations of rational numbers on the number line to indicate which is larger. Apply the rules of the four basic mathematical operations (addition, subtraction, multiplication, and division) on rational numbers.
7.NS.A.2.D: Convert a rational number to a decimal using long division and know that the decimal form terminates or repeats.		
7.NS.A.3: Solve real-world and mathematical problems involving the four operations with rational numbers.	The distance between two integers can be modeled on the number line. Multiple operations can be performed on rational numbers.	Construct a number line to illustrate the distance between two integers. Employ the order of operations to perform multiple operations on rational numbers.
NJ 2016 SLS: Mathematical Practices MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision. MP7 Look for and make use of structure.	**VOCABULARY:** opposites, number line, fraction, terminating, repeating, precise, approximate, income, expenses, decimal	

MP8 Look for and express regularity in repeated reasoning. **NJ 2020 SLS: Career Readiness, Life Literacies, and Key Skills** 9.2.8.CAP.20: Identify the items to consider when estimating the cost of funding a business. **NJ 2016 SLS: Literacy in History, Social Studies, & Technical Subjects** RST.6-8.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context. **NJ 2020 SLS: Computer Science and Design Thinking** 8.1.8.AP.2: Create clearly named variables that represent different data types and perform operations on their values.	**KEY TERMS:** integers, rational number, irrational number, real number, complex fractions, least common denominator, additive inverse, zero pair, significant digits, bar notation, positive numbers, negative numbers, absolute value, whole numbers, order of operations, mixed number, improper fraction, simplest form, percent, tuition and fees, room and board, work study, interest rate, interest fees	

ASSESSMENT EVIDENCE: Students will show their learning by:

- Articulating the knowledge of order of operations to solve problems with rational numbers
- Applying properties of absolute value and rational numbers to model on a number line
- Demonstrating understanding of key concepts by successfully completing a summative assessment at the culmination of a unit

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Unit I: The Number System

KEY LEARNING EVENTS AND INSTRUCTION:
- Teacher-led demonstration
- Student-led modeling
- Differentiated station groups
- Small-group instruction

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Unit I: The Number System

SUGGESTED TIME ALLOTMENT	8 weeks
SUPPLEMENTAL UNIT RESOURCES	**Required Resources:** Math in Focus Singapore Math: Course 2 https://my.hrw.com/ **Suggested Resources:** Big Ideas Red Accelerated Textbook www.bigideasmath.com/students Math in Focus Chapter Projects Number Line Creator http://themathworksheetsite.com/numline.html Worksheets http://www.kutasoftware.com/ www.mathblaster.com Illuminations Activities http://illuminations.nctm.org Brain Pop Videos http://www.brainpop.com/math/ Positive and Negative Integers in Golf video www.nbclearn.com/science-of-golf Interactive math practice www.ixl.com Absolute Value http://www.sheppardsoftware.com/mathgames/Numberballs_absolute_value/numberballsAS2_abs.htm

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Unit I: The Number System

	Math Goodies Interactive Practice www.mathgoodies.com

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Unit II: Expressions, Equations, and Inequalities

STANDARDS / GOALS:	ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
NJ 2016 SLS: Math 7.EE.A.1: Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. 7.EE.A.2: Understand that re-writing an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. 7.EE.B.3: Solve multi-step, real-life, and mathematical problems posed with positive and negative rational numbers in any form, using tools strategically. 7.EE.B.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.	Algebraic expressions containing rational numbers and multiple variables can be simplified, expanded, or factored to write equivalent expressions.	Do mathematical symbols model verbal expressions abstractly? Construct a viable argument.
	Algebraic equations and inequalities can be used to model mathematical or real-world situations, and to find values of variables.	How can algebraic equations and inequalities be used to model, analyze, and solve real-world problems?
	KNOWLEDGE **Students will know:**	**SKILLS** **Students will be able to:**
	Algebraic expressions with fractional and decimal coefficients can be simplified. Algebraic expressions with fractional, decimal, and negative factors can be expanded.	Simplify algebraic expressions with multiple terms and variables by adding and subtracting like terms. Utilize the distributive property to create equivalent expressions.

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Unit II: Expressions, Equations, and Inequalities

7.EE.B.4.A: Solve word-problems by comparing an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.	Algebraic expressions with two variables and negative terms can be factored.	Identify and apply the greatest common factor to create equivalent expressions.
7.EE.B.4.B: Graph the solution set of an inequality and interpret it in the context of a problem.	Verbal descriptions can be translated into algebraic expressions with multiple variables and parenthesis.	Convert verbal descriptions into algebraic expressions with one or more variables.
7.RP.A.2: Recognize and represent proportional relationships between quantities.	Algebraic reasoning can be utilized to solve real-world problems.	Demonstrate multiple methods (models, diagrams, tables, and expressions) in order to solve real-world problems.
7.RP.A.2.B: Identify the constant of proportionality in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	Equivalent equations are equations that have the same solution.	Recognize whether a pair of equations is equivalent.
7. RP.A.2.C: Represent proportional relationships by equations.	Algebraic equations with one or more variables can be solved by balancing.	Solve multi-step algebraic equations with variables on one side or both sides.
8.EE.A.1: Know and apply the properties of integer exponents to generate equivalent numerical expressions	Real-world problems can be solved algebraically with equations or inequalities.	Create algebraic equations and inequalities in order to solve a real-world problem.
8.EE.B.5: Graph proportional relationships, interpreting the unit rate as the slope of a graph.	Algebraic inequalities can be solved by balancing.	Solve multi-step algebraic inequalities with variables on one or both sides.

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Unit II: Expressions, Equations, and Inequalities

8.EE.B.6: Use similar triangles to explain why the slope m is the same between any two distinct points on a vertical line in the coordinate plane.	Solution sets of algebraic inequalities can be graphed on a number line.	Graph solution sets of algebraic inequalities using empty or shaded circles and arrows.
8.EE.C.7: Solve linear equations in one variable.	A variable in a two-variable equation can be solved in terms of the other variable.	Solve for a variable in a two-variable equation.
8.EE.C.7.A: Give examples of linear equations in one variable with one solution, no solution, or infinitely many solutions.	Linear equations can be used to solve mathematical and real-world problems.	Write and solve linear equations to represent real-world problems.
8.EE.C.7.B: Solve linear equations including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	A linear equation with one variable can have one solution, no solution, or infinitely many solutions.	Identify linear equations with no solution and infinitely many solutions.
NJ 2016 SLS: Mathematical Practices MP1 Make sense of problems and persevere in solving them.	A table of values and linear equations can be used to represent a linear relationship.	Express a linear relationship using equations and tables.
MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others.	The slope of a line can be determined by finding the ratio of the rise to the run.	Utilize multiple methods to calculate the slope of a line.
MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision. MP7 Look for and make use of structure.	Linear equations can be written in slope-intercept form ($y = mx + b$).	Construct linear equations in slope-intercept form.

MP8 Look for and express regularity in repeated reasoning.	Unit rates can be represented as a constant of proportionality (e.g. $y = k$ or $y = kx$).	Identify unit rates as direct proportions.
NJ 2016 SLS: Literacy in History, Social Studies, & Technical Subjects RST.6-8.3: Follow precisely a multistep procedure when carrying out.	Direct proportions can be interpreted using a graph.	Utilize a graph in order to interpret direct proportions.
RST.6-8.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context experiments, taking measurements, or performing technical tasks.	Direct proportions can be used to solve real-world problems.	Create direct proportional relationships to solve real-world problems.
	Inverse proportions can be represented as a constant of proportionality (e.g. $xy = k$).	Identify inverse proportions using the constant of proportionality.
NJ 2020 SLS: Computer Science and Design Thinking 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model.	Inverse proportions can be interpreted using a graph.	Utilize a graph in order to interpret inverse proportions.
	Inverse proportions can be used to solve real-world problems.	Create inverse proportional relationships to solve real-world problems.
	Exponential notation can be used to represent repeated multiplication of a factor.	Expand and evaluate expressions in exponential notation.
	Exponential notation can be used to write the prime factorization of a number.	Write the prime factorization of a number using exponential notation.

Unit II: Expressions, Equations, and Inequalities

	Mathematical operations can be performed on expressions written in exponential notation.	Apply the mathematical operations of multiplication and division to simplify expressions in exponential notation.
	Mathematical operations can be performed on expressions involving zero and negative exponents.	Simplify expressions involving zero and negative exponents.
	Parallel lines have the same slope and different y-intercepts.	Write an equation of a line that is parallel to a given line.
	Linear equations can be graphed using the slope and the y- intercept.	Sketch a graph of a line using the slope and the y-intercept or the slope and a given point.
	Slope and y-intercept can be interpreted in the context of real-world problems.	Explain the meaning of the slope and y-intercept in real-world problems.
	VOCABULARY: constant, variable, numerical term, simplify, translate, balancing, expand, substitute	

Unit II: Expressions, Equations, and Inequalities

	KEY TERMS: coefficient, expression, algebraic term, like terms, factors, equivalent equations, solution set, equivalent inequalities, shaded circle, open circle, bar model, greatest common factor, operation symbol, commutative property, distributive property, equation, inequality, isolate, inconsistent equation, consistent equation, identity, slope, rise, run, *y*- intercept, *x*-intercept, slope-intercept form, linear relationship, direct proportion, proportion, constant of proportionality, cross products, inverse proportion, consistent equation, identity, inconsistent equation, slope, rise, run, slope-intercept form, linear relationship	

ASSESSMENT EVIDENCE: Students will show their learning by:

- Articulating and writing algebraic expressions, equations, and inequalities that represent real-world scenarios
- Demonstrating understanding of key concepts by successfully completing a summative assessment at the culmination of the unit

KEY LEARNING EVENTS AND INSTRUCTION:

- Teacher-led demonstration
- Student-led modeling
- Differentiated station activities
- Small-group instruction

Unit II: Expressions, Equations, and Inequalities

SUGGESTED TIME ALLOTMENT	14 weeks
SUPPLEMENTAL UNIT RESOURCES	**Required Resources:** Math in Focus Singapore Math: Course 2 https://my.hrw.com/ **Suggested Resources:** Big Ideas Red Accelerated Textbook www.bigideasmath.com/students Math in Focus Chapter Projects Worksheets http://www.kutasoftware.com/ www.mathblaster.com Illuminations Activities http://illuminations.nctm.org Brain Pop Videos http://www.brainpop.com/math/ Interactive math practice www.ixl.com STEM Worksheets www.superteacherworksheets.com Interactive math practice www.ixl.com Electronic Flashcards on solving inequalities http://www.quia.com/jfc/906428.htm

	Inequality game involving word problems
	http://www.math-play.com/Inequality-Game.html
	Tic –Tac- Toe inequalities and equations
	http://www.education.com/activity/article/tic-tac-equations/
	Students must solve equations and find pairs of equations that "match"
	http://www.bbc.co.uk/education/mathsfile/shockwave/games/equationmatch.html

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Unit III: Angles, Lines, & Two-Dimensional Geometry

STANDARDS / GOALS:	ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
NJ 2016 SLS: Math 7.G.A.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.A.2: Draw (with technology, with ruler and protractor as well as freehand) 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.A.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.B.4: Know the formulas for the area and circumference of a circle and use them to solve problems.	Angles formed on a straight line, and by parallel lines and a transversal, have specific properties that are useful in solving problems.	• How can properties be used to prove relationships between lines and angles?
	A circle is a geometric figure that has many useful applications in the real world.	• How is everyday life impacted by circles?
	KNOWLEDGE **Students will know:**	**SKILLS** **Students will be able to:**
	Angle relationships can be identified as complementary, supplementary, or adjacent angles.	Identify angle relationships as complementary, supplementary, or adjacent angles.
	Recognizing properties of angles can be used to find unknown measurements in geometric shapes.	Calculate the value of an unknown angle using angle relationships.
	Properties of angles at point can be used to find unknown angle measurements.	Calculate the value of unknown angles using angles at a point.

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Unit III: Angles, Lines, & Two-Dimensional Geometry

7.G.B.5: Use facts about supplementary, complimentary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	Properties of vertical angles can be used to find unknown angle measurements.	Calculate the value of unknown angles using vertical angles.
8.G.A.2: Given two congruent (or similar) two-dimensional figures, describe a sequence that exhibits the congruence (or similarity) between them.	Angle bisectors divide angles into two equal parts.	Identify and construct an angle bisector using appropriate tools.
8.G.A.3: Describe the effects of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	Perpendicular bisectors of a line segment always pass through the midpoint of the segment at a right angle.	Define and construct perpendicular bisectors.
	Triangles can be constructed when three of its measurements are given.	Construct triangles with three given measurements.
NJ 2016 SLS: Mathematical Practices MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others.	A given set of measurements can be used to determine whether a unique triangle, more than one triangle, or no triangle can be drawn.	Conclude whether a unique triangle, more than one triangle, or no triangle can be drawn from a given set of measurements.
MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision.	Quadrilaterals can be constructed using a compass, ruler, and a protractor.	Recognize and use the appropriate tools to construct quadrilaterals.
MP7 Look for and make use of structure. MP8 Look for and express regularity in repeated reasoning.	Scale factor is the ratio of the length in a drawing to the corresponding length in the actual figure.	Calculate the scale factor using corresponding lengths in drawings and actual figures.

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Unit III: Angles, Lines, & Two-Dimensional Geometry

NJ 2016 SLS: Literacy in History, Social Studies, & Technical Subjects RST.6-8.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	Scale drawings can be used to solve problems involving scale drawings of geometric figures.	Utilize the scale factor to relate the length in a drawing to the length of the actual figure.
	The Pythagorean Theorem is used to find a missing side length of a right triangle, given two sides.	Use the Pythagorean Theorem to find unknown side lengths in real-world problems.
NJ 2020 SLS: Computer Science and Design Thinking 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model.	The converse of the Pythagorean Theorem determines whether a triangle is a right triangle.	Use the converse of the Pythagorean Theorem to determine if a triangle is a right triangle.
	Characteristics of basic geometric shapes can be used to find the area of composite figures.	Subdivide composite figures into basic geometric shapes in order to find the total area.
	Circumference is the measurement of the distance around the circle.	Calculate the circumference of circles, semicircles, and quarter circles using different values of pi.
	The area of a circle can be found using the formula $A = \pi r^2$.	Calculate the area of circles, semicircles, and quarter circles using different values of pi.
	Properties of circles and composite figures can be used to solve real-world problems.	Apply properties of circles and composite figures to solve real-world problems.

Unit III: Angles, Lines, & Two-Dimensional Geometry

Geometric transformations move figures on a plane. Each transformation changes some properties of a figure but leaves others unchanged.

Describe the effects of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

Compare translations, reflections, rotations and dilations.

VOCABULARY: scale, scale factor, vertex, straight lines, parallel lines, perpendicular lines, ratio, compass, ruler, protractor, diagonal

KEY TERMS: complementary angles, supplementary angles, adjacent angles, vertical angles, transversal, alternate exterior angles, alternate interior angles, corresponding angles, bisector, bisect, perpendicular bisector, included side, included angle, interior angle, exterior angle, isosceles triangle, equilateral triangle, quadrilateral, circle, circumference, area, radius, radii, diameter, pi, chord

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Unit III: Angles, Lines, & Two-Dimensional Geometry

ASSESSMENT EVIDENCE: Students will show their learning by:

- Applying knowledge of angle relationships to determine unknown values
- Utilizing tools to construct diagrams with specified measurements
- Deriving formulas for area and circumference using relationship between dimensions
- Demonstrating understanding of key concepts by successfully completing a summative assessment at the culmination of the unit

KEY LEARNING EVENTS AND INSTRUCTION:

- Teacher-led demonstration
- Student-led modeling
- Differentiated station activities
- Small-group instruction

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Unit III: Angles, Lines, & Two-Dimensional Geometry

SUGGESTED TIME ALLOTMENT	5 weeks
SUPPLEMENTAL UNIT RESOURCES	**Required Resources:** Math in Focus Singapore Math: Course 2 https://my.hrw.com/ **Suggested Resources:** Big Ideas Red Accelerated Textbook www.bigideasmath.com/students Math in Focus Chapter Projects Worksheets http://www.quia.com/jfc/906428.htm www.mathmix.com http://www.kutasoftware.com/ www.mathblaster.com Illuminations Activities http://illuminations.nctm.org Brain Pop Videos http://www.brainpop.com/math/ Interactive math practice www.ixl.com STEM Worksheets www.superteacherworksheets.com 3-D Geometry shapes and nets Math in Focus Chapter Projects

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Unit IV: Three-Dimensional Geometry

STANDARDS / GOALS:	ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
NJ 2016 SLS: Math 6.G.A.2: Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism.	Geometry and spatial sense offer ways to interpret and reflect on our physical environment.	How do geometric models describe spatial relationships?
	Analyzing geometric relationships develops reasoning and justification.	How are geometric shapes and objects classified?
7.G.B.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.	**KNOWLEDGE** **Students will know:**	**SKILLS** **Students will be able to:**
	Properties of prisms can be used to find volume and surface area.	Apply properties of prisms to solve real-world problems.
8.G.A.5: Establish facts…about the angle-angle criterion for similarity in triangles.	A cross section is the intersection of a solid and a plane.	Identify the basic geometric shape created by a cross section of a solid.
8.G.C.9: Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	Both congruent figures and similar figures can be related by geometric transformations.	Relate congruent or similar figures using geometric transformations.
	Concept of congruence and tests used to determine congruence in triangles.	Perform and identify a sequence of transformations.

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Unit IV: Three-Dimensional Geometry

NJ 2016 SLS: Mathematical Practices MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision. MP7 Look for and make use of structure. MP8 Look for and express regularity in repeated reasoning. **NJ 2016 SLS: Literacy in History, Social Studies, & Technical Subjects** WHST.6-8.2.D: Use precise language and domain-specific vocabulary to inform about or explain the topic. RST.6-8.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context.	**VOCABULARY:** cylinder, cone, sphere, hemisphere, cross section, statement of congruence, similarity **KEY TERMS:** composite figure, sphere, plane, congruence, lateral surface, slant height, corresponding angles, corresponding sides	

RH.6-8.7: Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts. **NJ 2020 SLS: Computer Science and Design Thinking** 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model.		

ASSESSMENT EVIDENCE: Students will show their learning by:

- Applying properties of geometric shapes to calculate surface area and volume
- Demonstrating understanding of key concepts by successfully completing a summative assessment at the culmination of a unit

KEY LEARNING EVENTS AND INSTRUCTION:

- Teacher-led demonstration
- Student-led modeling
- Differentiated station groups
- Small-group instruction

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Unit IV: Three-Dimensional Geometry

SUGGESTED TIME ALLOTMENT	4 weeks
SUPPLEMENTAL UNIT RESOURCES	**Required Resources:** Math in Focus Singapore Math: Course 2 https://my.hrw.com/ **Suggested Resources:** Big Ideas Red Accelerated Textbook www.bigideasmath.com/students Worksheets www.mathmix.com http://www.kutasoftware.com/ www.mathblaster.com Illuminations Activities http://illuminations.nctm.org Brain Pop Videos http://www.brainpop.com/math/ Math in Focus – Singapore Math Textbook Interactive math practice www.ixl.com STEM Worksheets www.superteacherworksheets.com 3-D Geometry shapes and nets "Moving day" activity http://www.learningresources.com/text/pdf/8521book.pdf Finding surface area and volume activity http://illuminations.nctm.org/LessonDetail.aspx?ID=U166

Unit IV: Three-Dimensional Geometry

	Slicing Three-Dimensional Figures – interactive website
	http://www.learner.org/courses/learningmath/geometry/session9/part_c/index.html

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Unit V: Statistics & Probability

STANDARDS / GOALS:	ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
NJ 2016 SLS: Math 6.SP.A.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. 6.SP.A.3: Recognize that a measure of center for a numerical data set summarizes al of its values with a single number, while a measure of variation describes how its values vary with a single number.	Measures of central tendency and measures of variation are used to draw conclusions about populations.	How can statistics be used to reason quantitatively and make decisions about populations?
	Events happen around you every day, some more likely than others. You can use probability to describe how likely an event is to occur.	How does the study of probability integrate the study of statistics?
6.SP.B.4: Display numerical data in box plots. 6.SP.B.5: Summarize and describe the shape of data distributions. 7.SP.A.2: Use data from a random sample to draw inferences about a population with an unknown characteristic of interest.	**KNOWLEDGE** **Students will know:**	**SKILLS** **Students will be able to:**
	Stem-and-leaf plots can be used to collect and organize large amounts of data for analyzing. Box plots can be used to indicate quartiles and interquartile ranges.	Create a stem-and-leaf plot to represent data. Draw conclusions and solve problems involving stem-and-leaf plots. Create box plot to represent data.

7.SP.B.3: Informally assess the degree of visual overlap of two numerical data distributions with similar variability, measuring the difference between the centers by expressing it as a multiple of a measure of variability.	Samples can be used to study or analyze the members of a larger population.	Solve problems involving box plots and mean absolute deviation. Understand and apply random sampling methods and simulate a random sampling process.
7.SP.B.4: Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.	Statistics from a sample can be used to make inferences about a population.	Draw conclusions about a population based on the statistics of a sample.
7.SP.C.5: Understand that the probability of a chance event is a number between zero and one that expresses the likely hood of an event occurring.	Comparative inferences can be made about two populations using two sets of sample statistics.	Compare inferences about two populations using the same measure of variation.
	The concepts of outcomes, events, and sample space can be applied to everyday life.	Describe and apply the concepts of outcomes, events, and sample space.
7.SP.C.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.	Probability can be used to determine the likelihood of an event.	Calculate the probability of an event.
	Venn diagrams can be used to illustrate events and their relationships.	Construct and interpret Venn diagrams.

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7.SP.C.7: Develop a probability model and use it to find probabilities of events.	Probability can be used to solve real-world problems.	Solve real-world problems involving probability using multiple methods.
7.SP.C.8: Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.	Relative frequencies as probabilities can be interpreted to make predictions.	Predict probability of an event from relative frequencies.
7.SP.C.8.A: Understand that the probability of a compound event is the fraction for outcomes in the sample space for which the compound event occurs.	In a long-run chance process, relative frequency resembles theoretical probability more closely.	Compare long-run relative frequencies to related theoretical probabilities.
7.SP.C.8.B: Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams.	Probability of outcomes of events can be written as a uniform or a nonuniform probability model.	Illustrate outcomes of events of uniform or nonuniform probability models through multiple representations.
7.SP.C.8.C: Design and use a simulation to generate frequencies for compound events.	Probability models can be used to predict outcomes in real life.	Predict outcomes of real-life events using probability models.
NJ 2016 SLS: Mathematical Practices MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others. MP4 Model with mathematics.	A compound event consists of two or more simple events occurring together or one after another. Possibility diagrams can be used to find the probability of compound events.	Understand and represent compound events using multiple representations. Construct and utilize possibility diagrams to find the probability of compound events.

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MP5 Use appropriate tools strategically. MP6 Attend to precision. MP7 Look for and make use of structure. MP8 Look for and express regularity in repeated reasoning. **NJ 2020 SLS: Career Readiness, Life Literacies, and Key Skills** 9.1.8.FP.6: Compare and contrast advertising messages to understand what they are trying to accomplish. 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising. 9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making. **NJ 2016 SLS: Literacy in History, Social Studies, & Technical Subjects** WHST.6-8.1.B: Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.	The multiplication and addition rules of probability can be used to solve problems involving independent events. For dependent events, the occurrence of one event will affect the probabilities of one event. **VOCABULARY:** outcome, Venn diagram, mean, median, mode, range, distribution, frequency table, dot plot, inference, event, probability, fair, dependent events, population, sample, sample size	Differentiate between the multiplication and addition rules of probability to calculate the probability of independent events. Implement the rules of probability to solve problems with dependent events.

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RH.6-8.7: Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts. **NJ 2020 SLS: Computer Science and Design Thinking** 8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.	**KEY TERMS:** stems, leaves, outlier, stem-and-leaf plot, random sample, unbiased sample, biased sample, simple random sampling, stratified sampling, systematic sampling, sample space, mutually exclusive, complementary events, compliment, relative frequency, observed frequency, experimental probability, theoretical probability, probability model, probability distribution, uniform probability model, nonuniform probability model, compound event, simple event, possibility diagram, tree diagram, independent events, multiplication rule of probability, addition rule of probability, measure of variation, quartiles, interquartile range, box plot, mean absolute deviation	

ASSESSMENT EVIDENCE: Students will show their learning by:

- Selecting and constructing appropriate displays to summarize data
- Drawing conclusions about a population based on the statistics of a sample
- Implementing the rules of probability to solve problems
- Demonstrating understanding of key concepts by successfully completing a summative assessment at the culmination of the unit

- **KEY LEARNING EVENTS AND INSTRUCTION:**
- Teacher-led demonstration
- Student-led modeling
- Differentiated station activities
- Small-group instruction

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SUGGESTED TIME ALLOTMENT	5 weeks
SUPPLEMENTAL UNIT RESOURCES	**Required Resources:** Math in Focus Singapore Math: Course 2 https://my.hrw.com/ **Suggested Resources:** Big Ideas Red Accelerated Textbook www.bigideasmath.com/students Worksheets http://www.kutasoftware.com/ www.mathblaster.com Illuminations Activities http://illuminations.nctm.org Choice Vs. Chance Activity http://illuminations.nctm.org/LessonDetail.aspx?id=L248 Interactive Spinners http://www.shodor.org/interactivate/activities/AdjustableSpinner/ Comparing Probabilities (good visual) http://www.shodor.org/interactivate/activities/CrazyChoicesGame/ Probability of Simple events http://www.math-play.com/Probability-Game.html Probability Games http://classroom.jc-schools.net/basic/math-prob.html Probability Activities http://www.math.wichita.edu/history/activities/prob-act.html#prob1 Spin the virtual spinner and watch the graph grow. http://www.mathsonline.co.uk/nonmembers/resource/prob/spinners.html

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APPENDIX A

Math in Focus: Singapore Math by Marshall Cavendish ISBN: 978-0-547-56098-4

Math in Focus Activity Book ISBN: 978-0-547-57898-9

Math in Focus Singapore Online Resources

Math in Focus Singapore Exam View

Math in Focus Singapore Activity Book

Math in Focus Singapore Brain @ Work

Math in Focus Singapore Enrichment

Math in Focus Singapore Activity Book

Math in Focus Singapore Vocabulary Review

Math in Focus Singapore Reteach

Math in Focus Singapore Spanish Edition

Big Ideas Math Textbook ISBN: 978-1-60840-231-1

Explorations in Core Math for Common Core Grade 7 ISBN: 978-0-547-87643-6

Holt Mathematics Course 2 Textbook ISBN: 0-03-092946-6

Holt Mathematics Grade 7 Textbook for Common Core ISBN: 978-0-547-64727-2

Mastering the Common Core in Mathematics Grade 7 Textbook ISBN: 978-1-59807-339-3

Glencoe Math Course 7 Textbook ISBN: 978-0-07661-929-0

Clarifying Expectations for Teachers & Students by McGraw Hill for Grade 8 Common Core ISBN: 978-007-662900-8

Partnership for Assessment of Readiness for College and Careers - http://www.parcconline.org/

Common Core State Standards Initiative - http://www.corestandards.org/

Study Island www.studyisland.com

Khan Academy Videos www.khanacademy.org

OneDrive Shared Document www.onedrive.com