Los Angeles Unified School District
Office of Curriculum Instruction and School Support
2014-2015 Common Core Math 8 Curriculum Map

Overview of the Common Core Mathematics Curriculum Map

Introduction to the Document:

Welcome to the Los Angeles Unified School District's Common Core Mathematics Curriculum Map. The mathematics curriculum map for Los Angeles Unified School District is developed as a tool for direction and clarification. It is a living document that is interactive and web-based. There are specific, precise links to provide readily accessible resources needed to appropriately meet the rigors of the common core state standards. The mathematics curriculum map is intended to be a one-stop tool for teachers, administrators, parents, and other school support personnel. It provides information on the Common Core Standards for Mathematics, assessment sample items, and suggested instructional tools organized into units providing one easy-to-read resource.

Components of the Mathematics Curriculum Map:

The curriculum map is designed around the standards for mathematics K – 12 which are divided into two sets: Practice Standards and Content standards. The Standards for Mathematical Practice are identical for each grade level. They are the expertise and understanding which the mathematics educators will seek to develop in their students. These practices are also the "processes and proficiencies" to be used as instructional "habits of mind" to be developed at all grade levels. It is critical that mathematical literacy is emphasized throughout the instructional process.

The Mathematics Curriculum Map is grouped into four coherent units by grade level. Each unit clarifies the cluster and specific standards students are to master. In addition, the relevant Mathematical Practices and learning progressions are correlated. These sections of the mathematics curriculum map define the big idea of the unit. These four units are summarized in the **Unit Organizer** which provides the overview for the year.

Instructional components are specified in:

- **Enduring Understandings** which are the key understandings/big ideas that the students will learn from the unit of study. These are statements that communicate the learning in a way that engages students.
- **Essential Questions** which are based on enduring understandings. They are used to gain student interest in learning and are limited in number. They promote critical or abstract thinking and have the potential of more than one "right" answer. They are connected to targeted standards and are the framework and focus for the unit.
- **Standards**: Targeted (content and skills to be taught and assessed) and supporting (content that is relevant to the unit but may not be assessed; may include connections to other content areas). This includes what students have to know and be able to do (learning targets) in order to meet the standards.

Los Angeles Unified School District
Office of Curriculum Instruction and School Support
2014-2015 Common Core Math 8 Curriculum Map

Mathematical literacy is a critical part of the instructional process, which is addressed in:

- **Key Vocabulary** and **Language Goals** which clearly indicate strategies for meeting the needs of EL and SEL students

Planning tools provided are:

- **Instructional Strategies** lead to enduring understandings. They are varied and rigorous instructional strategies to teach content. They are plan experiences that reinforce and enrich the unit while connecting with the standards and assessments. Instructional strategies addresses individual student needs, learner perspectives, integration of technology, learning styles, and multiple intelligences.
- **Resources** and **Performance Tasks** offer concept lessons, tasks, and additional activities for learning.
- **Assessments:** This is also a listing of formative and summative Assessments to guide backwards planning. Student progress in achieving targeted standards/expected learning is evaluated. Entry-level (formative)-based on summative expectations, determine starting points for learning. Benchmark-determine progress of learning, misconceptions, strengths/weaknesses along the learning trajectory.
- **Differentiation** (📖) falls into three categories:
    - **Front Loading:** strategies to make the content more accessible to all students, including EL, SEL and students with special needs. This defines prerequisite skills needed to be successful.
    - **Acceleration:** activities to extend the content for all learners, as all learners can have their thinking advanced, and to support the needs of GATE students. These are ideas to deepen the conceptual understanding for advanced learners.
    - **Intervention:** alternative methods of teaching the standards, in which all students can have a second opportunity to connect to the learning, based on their own learning style. They guide teachers to resources appropriate for students needing additional assistance

Using the Mathematics Curriculum Map:

The guide can be thought of as a menu. It cannot be expected that one would do every lesson and activity from the instructional resources provided. To try to teach every lesson or use every activity would be like ordering everything on a menu for a single meal. It is not a logical option. Nor is it possible given the number of instructional days and the quantity of resources. That is why the document is called a "***Mathematics Instructional Guide or Curriculum Map***" and not a "*Mathematics Pacing Plan*." And, like a menu, teachers select, based on instructional data, which lessons best fit the needs of their students – sometimes students need more time with a concept and at other times, less.

An effective way to use this guide is to review and assess mathematical concepts taught in previous grades to identify potential learning gaps. From there, teachers would map out how much time they feel is needed to teach the concepts within the unit based on the data of their students' needs. For example, some classes may need more time devoted to developing expressions and equations, while another class in the same course may need more focused time on understanding the concept of functions.

The starting point for instructional planning is the standards and how they will be assessed. By first considering how the standards will be assessed, teachers can better select the instructional resources that best build mathematical understanding. There are hundreds of resources available, both publisher- and teacher-created, as well as web-based, that may be used to best teach a concept or skill. Collaborative planning, both within and among courses, is strongly encouraged in order to design effective instructional programs for students.

Learning Progressions:
The Common Core State Standards in mathematics were built on progressions: narrative documents describing the progression of a topic across a number of grade levels, informed both by research on children's cognitive development and by the logical structure of mathematics. The progressions documents can explain why standards are sequenced the way they are, point out cognitive difficulties and pedagogical solutions, and give more detail on particularly knotty areas of the mathematics. This would be useful in teacher preparation and professional development, organizing curriculum, and writing textbooks.

Standards for Mathematical Practice:
The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. The first of these are the National Council of Teachers of Mathematics (NCTM) process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council's report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy).

Los Angeles Unified School District
Office of Curriculum Instruction and School Support
2014-2015 Common Core Math 8 Curriculum Map

The MIG is a living document—it is neither set in stone for all time nor is it perfect. Teachers and other users are encouraged to provide on-going feedback as to its accuracy, usability, and content. Please go to math.lausd.net and share your comments and suggestions. Your participation in making this instructional guide a meaningful and useful tool for all is needed and appreciated.

The grade level Common Core State Standards-aligned Curriculum Maps of the courses in this 2014 edition of the *CCSS Mathematics Curriculum Map* are the result of the collective expertise of the LAUSD Secondary Mathematics Team.

The District extends its gratitude to the following:

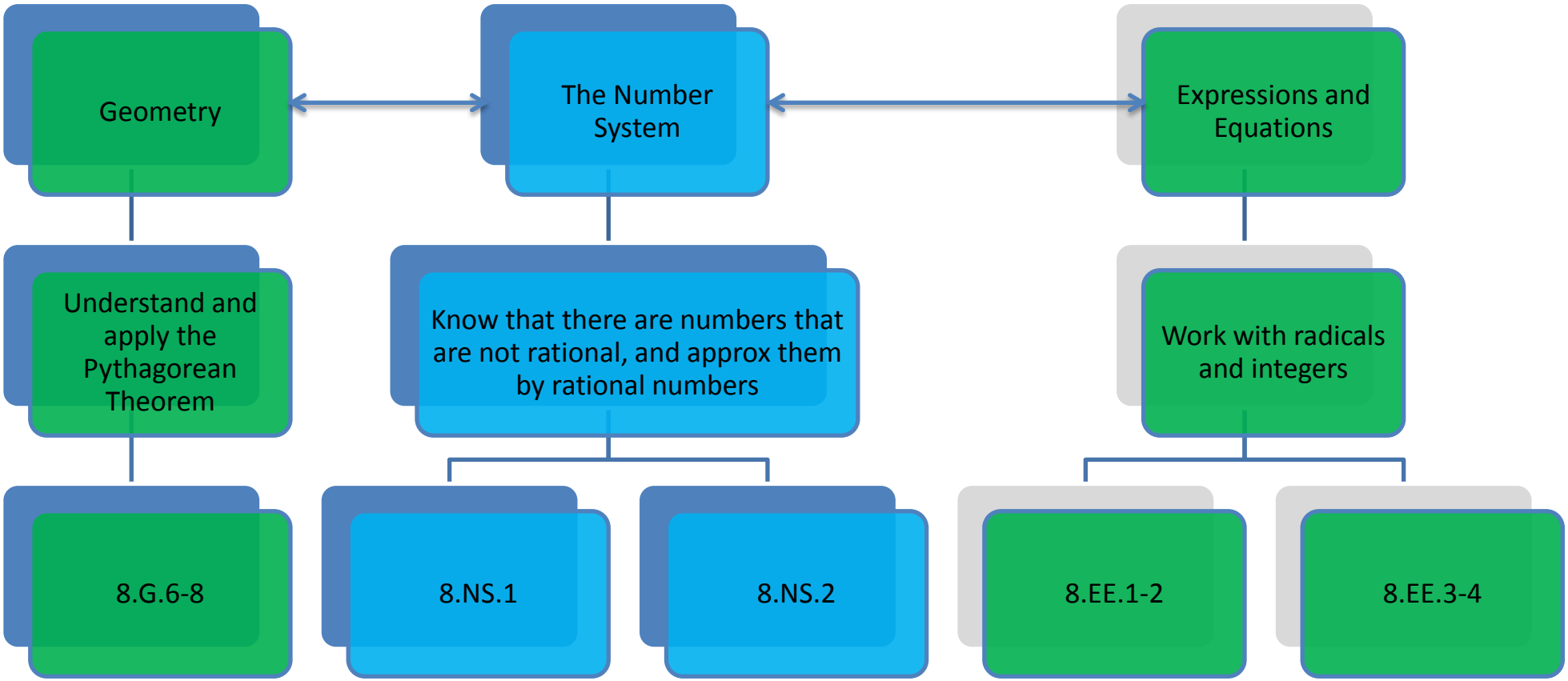
Firoza Kanji, Elisa Rose, Andres Flores, Amneris Gonzalez, Adebayo Windokun, Jesus Rocha, Lisa Usher, Barbara Jacobs-Ledbetter, Lynda McCoy, Daniela Marcu-Roman, Susan Mussack, Jane Berman, Diana Tabbara, Seng Fong, Kamau, Mposi, Marla Mattenson, Leslie Hicks, Geoffrey Buck, Hendrick Hueck, Joel Tepper, Oksana Pivnenko, Reginald Brookens, Roslyn Lewis-Chambers, Travis Holden, Norma Alvarez, Helen Choi, and Phuongthao Dinh.

This document was developed under the auspices of the Executive Director of the Office of Curriculum, Instruction and School Support, Gerard Loera. Particular gratitude is extended to Caroline Piangerelli, Lisa Ward, Shirley Guzman, and Philip Ogbuehi, who coordinated the 2014 edition initiative under the guidance of Susan Tandberg, Director of the Office of Curriculum, Instruction and School Support.

Common Core Math 8

Unit 1

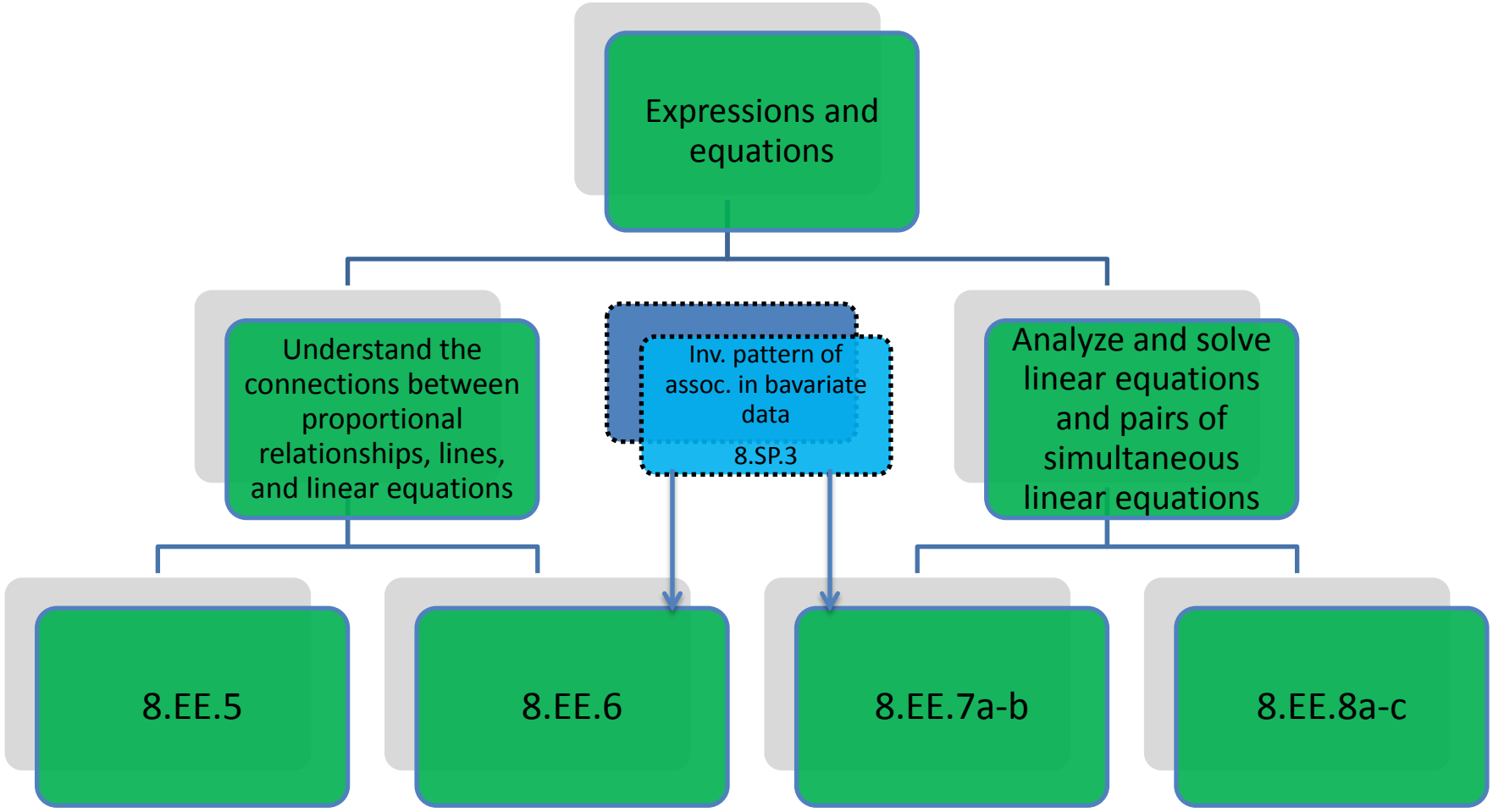
Rational Numbers, Properties of Integer Exponents and Square Root



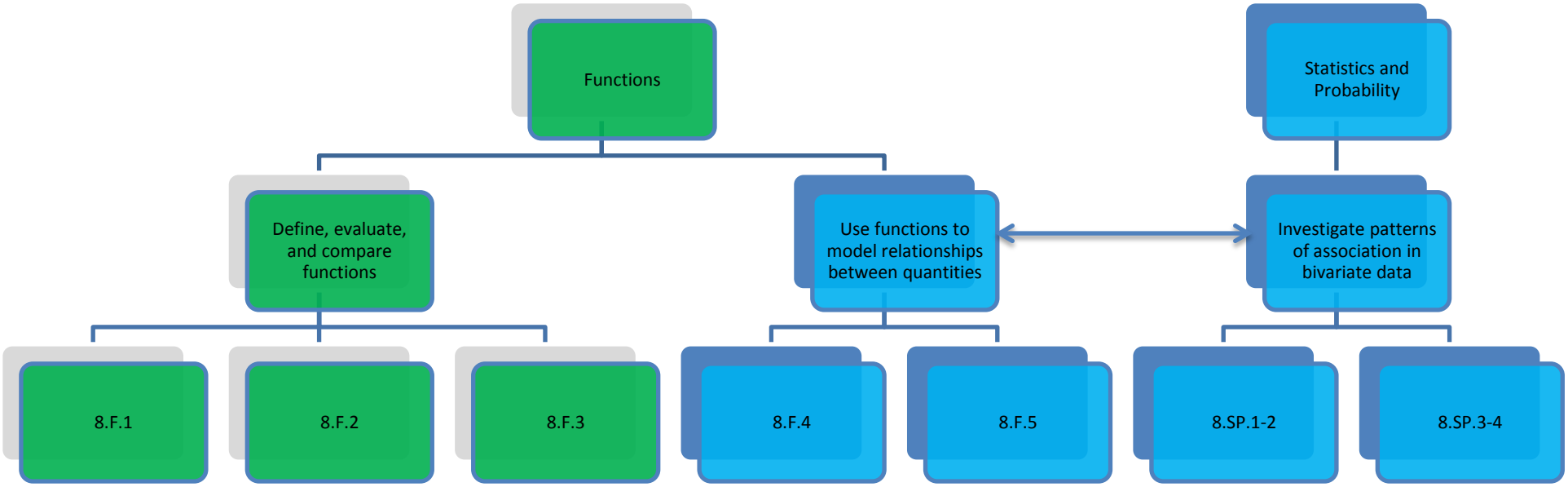
Common Core Math 8

Unit 2

Proportional Relationships and Linear Equations Involving Bivariate Data and Solution of Simultaneous Equations



Common Core Math 8
Unit 3
Function to Model Relationships between Quantities

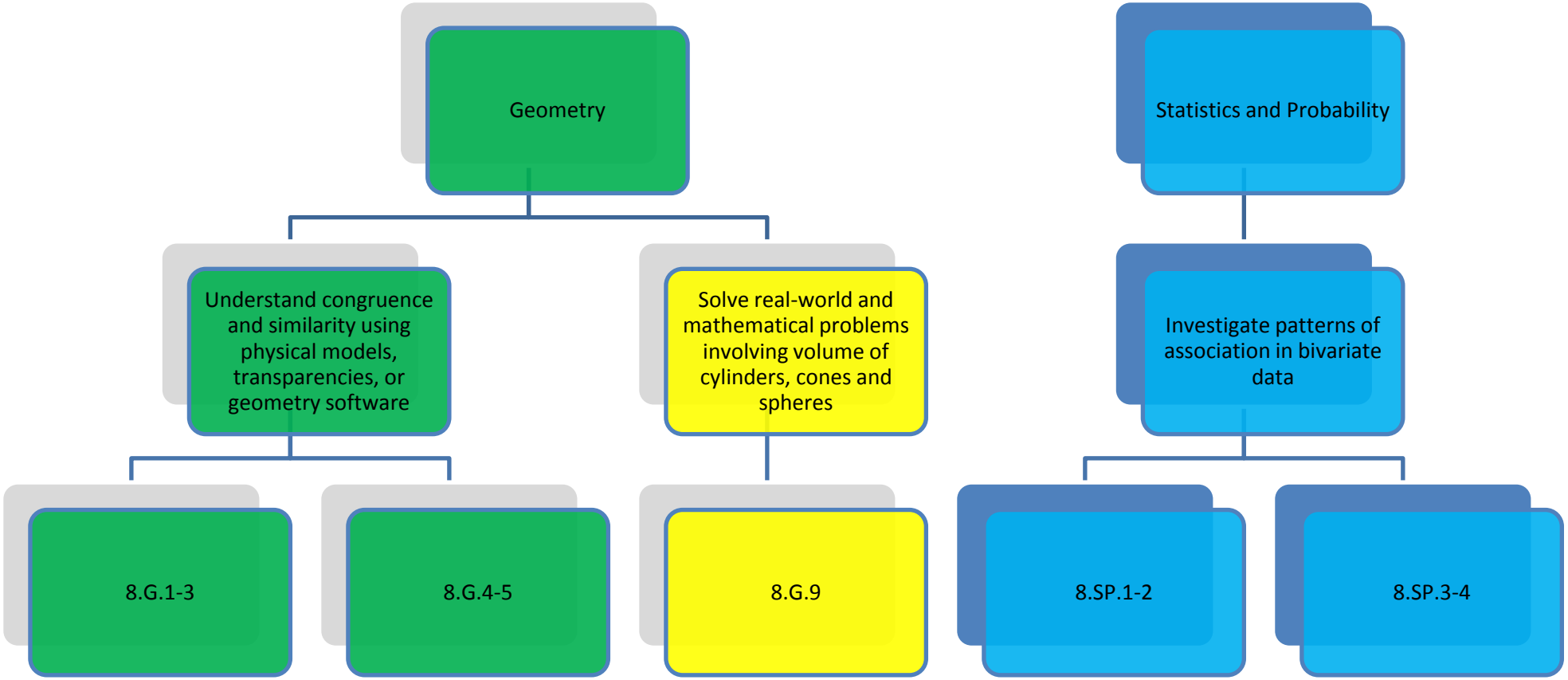


Key: Major Clusters; Supporting Clusters; Additional Clusters

Common Core Math 8

Unit 4

Pythagorean Theorem, Congruence and Similarity, Problem Solving Involving 3-D Geometry



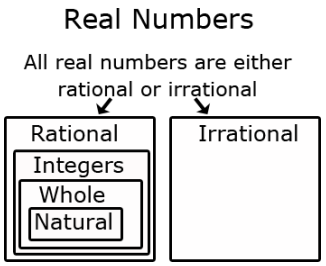
Using Rational Numbers in Finding the Distance between Two Points and Properties of Integer Exponents and Square Root to Represent Solution to Equations

Critical Area: Students will understand informally the rational and irrational numbers and use rational numbers approximation of irrational numbers. Students will use rational numbers to determine an unknown side in triangles. They apply the Pythagorean Theorem to find distances between points on the coordinate plane, to find lengths, and to analyze polygons. Students use radicals and integers when they apply the Pythagorean Theorem in real word.

CLUSTER	COMMON CORE STATE STANDARDS
Understand and apply the Pythagorean Theorem.	**8.G.6** Explain a proof of the Pythagorean Theorem and its converse. 8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real world and mathematical problems in two and three dimensions. 8.G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
Know that there are numbers that are not rational, and approximate them by rational numbers.	8.NS.1. Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. 8.NS.2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g.,π^2). *For example, by truncating the decimal expansion of* $\sqrt{2}$*, show that* $\sqrt{2}$ *is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*
Work with radicals and integer exponents.	8.EE.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.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational. 8.EE.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

CLUSTER	COMMON CORE STATE STANDARDS
	many times as much one is than the other. *For example, estimate the population of the United States as* 3×10^8 *and the population of the world as* 7×10^9*, and determine that the world population is more than 20 times larger.* 8.EE.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
MATHEMATICAL PRACTICES	**LEARNING PROGRESSIONS**
1. Make sense of problems and persevere in solving them. **2. Reason abstractly and quantitatively.**3. Construct viable arguments and critique the reasoning of others. **4. Model with mathematics.** 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	http://ime.math.arizona.edu/progressions/#committee. CDE Progress to Algebra K-8 www.cde.ca.gov/be/cc/cd/documents/updateditem12catt3.doc

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
• Students apply real world problem using Pythagorean Theorem. • Students approximate irrational numbers using their understanding of square and cube roots. • Students extend their understanding of the number system by investigating the relationship between the sides of a right triangle. • Students create equivalent expressions using integer exponents. • Students apply their understanding of exponents to express and compare numbers. • Students understand irrational numbers and when to use them in solving problems.	How are rational and irrational numbers related? How can lengths and distances be expressed – exactly or approximately – using understanding of square roots? What real world problems does the Pythagorean Theorem allow us to solve? How do we determine whether two expressions involving exponents are equivalent? How can we express very small or very large numbers using exponential (scientific) notation? How can you investigate the relationships between rational and irrational numbers?	Approximate Benchmark Converse Cube root, cubic root Equation Equivalent Estimate, Exponent Expression Hypotenuse Integer Irrational Pythagorean Theorem Radical Rational Scientific notation Side, length, distance, Square root

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
Mathematics Assessment Project 8.G.6, 8.G.7: The Pythagorean Theorem: Square Areas 8.NS.1, 8.NS.2: MAP Concept Lesson, "Repeating Decimals," **Illustrative Mathematics** 8EE.1: Extending the Definition of Exponents," **LAUSD Adopted Textbooks and Programs** • Houghton Mifflin Harcourt, 2014 Go Math! • McGraw-Hill, 2014, California Math, Courses 1-3 • College Preparatory Mathematics, 2013 Core Connections, Courses 1-3 • Pearson, 2013, Common Core System of Courses	• Introduce the proof of the Pythagorean Theorem using a concrete model such as manipulative or have students draw a right triangle with sides 3, 4, and 5 units. Then have them draw a square of the above dimensions at each side of the right triangle. • Have students verify using a model, that the sum of the squares of the legs is equal to the square of the hypotenuse in a right triangle. • Students should also understand that if the sum of the squares of the 2 smaller legs of a triangle is equal to the square of the third leg, then the triangle is a right triangle. • Engage students to have authentic experiences and exploration which would enable them to use the Pythagorean Theorem to solve problems. • Students can use graphic organizers to show the relationship between the subsets of the real number system.  • Students can approximate square roots by iterative processes. Have students to recognize that $\sqrt{5}$ falls between $2^2 = 4$ and $3^2 = 9$. The value will be closer to 2 than to 3. • For 8.EE 1 and 2, have students experience different examples such as: $\frac{4^3}{4^7} = 4^{3-7} = 4^{-4} = \frac{1}{4^4} = \frac{1}{256}$ • Have students match cards with a given fractional exponents and their solutions. $3^2 = 9$ and $\sqrt{9} = \pm 3$	Formative Assessments SBAC - http://www.smarterbalanced.org/ ITEM #'S 42906 8 NS1-2, 8 EE 1-2 SBAC Sample Items: • 8 G 7 MAT.08.CR.1.0000G.H.002 • 8 G 8 MAT.08.SR.1.0000G.H.143 • 8 EE 1 MAT.08.SR.1.000EE.B.203 • 8 EE 2: MAT.08.TE.1.000EE.B.144 MAT.08.TE.1.000EE.B.323 • 8 G 7: CR 5: Jane's TV **Mathematics Assessment Project** 8 NS, 8 EE, Short Novice Assessment Tasks 8 EE: Summative Assessment Tasks: "100 People" LAUSD Periodic Assessments District assessments can be accessed through: http://achieve.lausd.net/math http://achieve.lausd.net/ccss Use your Single Sign On to access the Interim Assessments State Assessments California will be administering the SMARTER Balance Assessment as the end of course for grades 3-8 and 11. There is no assessment for Algebra 1. The 11th grade assessment will include ítems from Algebra 1, Geometry, and Algebra 2 standards. For examples, visit the SMARTER Balance Assessment at: http://www.smarterbalanced.org/ Sample Smarter Balanced Items:

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
	$\left(\frac{1}{3}\right)^3 = \left(\frac{1^3}{3^3}\right) = \frac{1}{27}$ and $\sqrt[3]{\frac{1}{27}} = \frac{\sqrt[3]{1}}{\sqrt[3]{27}} = \frac{1}{3}$ • Have students convert decimal forms to scientific notation and apply rules of exponents to simplify expressions. Have them use calculators or spreadsheets, to recognize scientific notation and output of 2.45E+23 is 2.45 x 1023 and 3.5E-4 is 3.5 x 10-4.	http://sampleitems.smarterbalanced.org/itempreview/sbac/index.htm SBAC Content Specs: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2011/12/Math-Content-Specifications.pdf 8 G 7: CR 5: Jane's TV

LANGUAGE GOALS for **low achieving, high achieving, students with disabilities and English Language Learners**

- Students will summarize the steps in approximating irrational numbers using the square and cube roots.
  Example Stem: Irrational numbers are _____. An example of an irrational number is _____. It is an irrational number because _____)
- Students will provide concluding statements related to sides of the triangle using a concluding statement.
  Example Stem: In conclusion, if side A is ____ and side B is ____, the length of the side C is ____ because _____.
- Students will explain how the mathematical relationship of the sides of a triangle applies in real life, using subordinate conjunctions.
  Example Stem: This idea relates to real life in that _____.
- Students will use comparative adjectives to compare, explain and justify solutions.
  (i.e. This exponent is greater than _____ because _____)
- Students will compare and contrast rational and irrational numbers.
  Example: The difference between a rational and irrational number is_____.

Mathematics Assessment Project
8.EE: Solving Real-Life Problems: Baseball Jerseys
8.EE.4: Estimating Length Using Scientific Notation

DIFFERENTIATION 🕮		
UDL/ FRONT LOADING	ACCELERATION	INTERVENTION
Expressions and Equations: • Students have an understanding of whole number powers of 10 with exponential notation. • Students have an understanding of the meaning of multiplication and further develop whole number power of 10 to estimate very large or very small quantities	Acceleration for high achieving students: Provide students with opportunities to be recognized for their previous knowledge and to be allowed to avoid redundant learning by being encouraged to learn the sophisticated and advanced information and skills of the curriculum or related curriculums at their own rate. This	Intervention for low achieving students and students with disabilities: • Small teacher to student ratio discussion – have students observe a micro-organism and discuss such things as area, volume and rate but on a much smaller scale, thus having a

	also includes the opportunity for students to make personal meaning of the lesson. For example: **Expressions and Equations:** Students apply their math knowledge of scientific notation and choose appropriate size for measurements depending on quantity to determine such thing as measuring the volume of air a person breaths in a day , week, year, and lifetime given a rate. Bridging from 8 NS 1, 8 NS 2 to the related HS N-RNL Rational and Irrational Numbers 1, Concept Lesson http://map.mathshell.org/materials/lessons.php?taskid=424&subpage=conceptRational and Irrational Numbers 2, Concept Lesson http://map.mathshell.org/materials/lessons.php?taskid=434&subpage=concept	need for exponential notation. • Emphasize think-pair-share • Provide multiple representation activity for rational exponents to allow students to discuss and refine their understanding of exponential and radical notation

References:

1. National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). *Common Core State Standards (Mathematics)*. Washington D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.
2. McCallum, W., Zimba, J., Daro, P. (2011, December 26 Draft). *Progressions for the Common Core State Standards in Mathematics*. Cathy Kessel (Ed.). Retrieved from http://ime.math.arizona.edu/progressions/#committee.
3. Engage NY. (2012). New York Common Core Mathematics Curriculum. Retrieved from http://engageny.org/sites/default/files/resource/attachments/a-story-of-ratios-a-curriculum-overview-for-grades-6-8.pdf.
4. Mathematics Assessment Resource Service, University of Nottingham. (2007 - 2012). Mathematics Assessment Project. Retrived from http://map.mathshell.org/materials/index.php.
5. Smarter Balanced Assessment Consortium. (2012). Smarter Balanced Assessments. Retrieved from http://www.smarterbalanced.org/.
6. Partnership for Assessment of Readiness for College and Career. (2012). PARCC Assessments. Retrieved from http://www.parcconline.org/parcc-assessment.
7. California Department of Education. (2013). Draft Mathematics Framework Chapters. Retrieved from http://www.cde.ca.gov/be/cc/cd/draftmathfwchapters.asp.
8. National Council of Teachers of Mathematics (NCTM) Illuminations. (2013). Retrieved from http://illuminations.nctm.org/Weblinks.aspx.
9. The University of Arizona. (2011-12). Progressions Documents for the Common Core Math Standards. Retrieved from http://ime.math.arizona.edu/progressions.

COMMON CORE MATH 8 – UNIT 2

Understanding of the connections between Proportional Relationships and Linear Equations Involving Bivariate Data and Solution of Simultaneous Equations

Students understand the connections between proportional relationships and linear equations involving bivariate data. Students will analyze and solve linear equations and pairs of simultaneous linear equations. Students use similar triangles to explain why the slope is the same between two distinct points on a non-vertical line in the coordinate plane as well as derive the equation of a line.

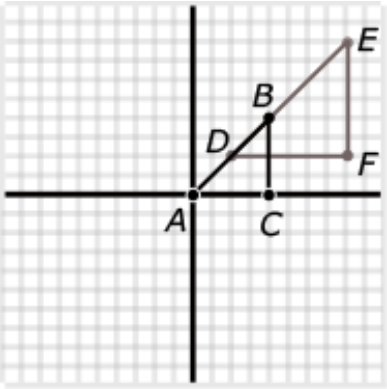
CLUSTER	COMMON CORE STATE STANDARDS
Understand the connections between proportional relationships, lines and linear equations.	**8.EE.5** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.* **8.EE.6** Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.
Investigate patterns of association in bivariate data.	**8.SP.3** Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*
Analyze and solve linear equations and pairs of simultaneous linear equations.	**8.EE.7** Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. **8.EE.8** Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables

CLUSTER	COMMON CORE STATE STANDARDS
	correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.* c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*
MATHEMATICAL PRACTICES	LEARNING PROGRESSIONS
1. Make sense of problems and persevere in solving them. **2. Reason abstractly and quantitatively.** 3. Construct viable arguments and critique the reasoning of others. **4. Model with mathematics.** 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	http://ime.math.arizona.edu/progressions/#committee. CDE Progress to Algebra K-8 www.cde.ca.gov/be/cc/cd/documents/updateditem12catt3.doc

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
• Students compare proportional relationships using a variety of representations of these relationships (graph, table, symbols). • Students understand and represent slope as a unit rate, and apply their knowledge of right triangles to represent slope. Students relate the	How can I determine, when analyzing the motion of two objects, which object has the greater speed? What is the meaning of the slope and intercept of a line, in the context of the situation?	Axis, *x*-axis, *y*-axis, origin Bivariate Coefficient Coordinate plane Data Distributive property

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
slope with its concept as a rate and its visual representation as a set of right triangle that are similar for each line. • Students interpret slope and intercept using real world applications (e.g. bivariate data). • Students create equivalent equations to solve for an unknown. • Students employ graphical, tabular and symbolic representations to express linearity and determine the number of solutions. • Students interpret a linear equation in a real world application by deriving the equation.	How may I use similar triangles to show that the slope is the same, given two distinct sets of points on a graph? How will I explain how I know that a pair of linear equations has one solution, no solutions, or infinitely many solutions? Is the slope between any two points on the same line the same? Explain your reasoning. How can I create an equation with given information from a table, graph, or problem situation? How can mathematics be used to provide models that helps us interpret data and make predictions?	Equation Equivalent Estimate Graph Horizontal Intercept/point of interception Point Proportion Rate Slope Solution Solve Symbol Triangle Variable Vertical

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
Inside Mathematics 8.EE.7: Squares and Circles 8.EE.8: Problem of the Month, "On Balance **Mathematics Assessment Project** 8.EE.7: Solving Linear Equations in One Variable 8.EE.8: Classify Solutions to Systems of Equations 8.EE.8c: Problem Solving Lesson, Solving Real Life Problems: Baseball Jerseys **LAUSD Concept Lesson** 8.SP.3: Tying the Knot 8.SP.3: Cal's Dinner Card Deals Statistics: Investigate patterns of Association in Bivariate Data **LAUSD Adopted Textbooks and Programs** • Houghton Mifflin Harcourt, 2013 Go Math!	• Identify cases in which a system of two equations in two unknowns has no solution, an infinite number of solutions. • Solve a system of two equations (linear) in two unknowns algebraically. • Estimate the point(s) of intersection for a system of two equations in two unknowns by graphing the equations. • Use graphs of experiences that are familiar to students to increase accessibility and supports understanding and interpretation of proportional relationship. Students are expected to both sketch and interpret graphs. For 8.EE.6 use this example to introduce it: • Explain why ΔACB is similar to ΔDFE, and deduce that $\overline{AB}$ has the same slope as	**Formative Assessment** SBAC - http://www.smarterbalanced.org/, http://sampleitems.smarterbalanced.org/itempreview/sbac/index.htm Item #'S 42906 8 NS1-2, 8 EE 1-2, 43056 8 EE 7 "Expressions and Equations 3" Sample Items: 8 EE 7: MAT.08.SR.1.000EE.D.201 8 EE 8: MAT.08.TE.1.000EE.C.200 MAT.08.TE.1.000EE.D.147 SBAC Content Specs: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2011/12/Math-Content-Specifications.pdf 8 EE 8: CR 8: Taxi Cabs **LAUSD Assessments** District assessments can be accessed through: http://achieve.lausd.net/math http://achieve.lausd.net/ccss

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
• McGraw-Hill, 2013, California Math, Courses 3 • College Preparatory Mathematics, 2013, Core Connections, Courses 3 • Pearson, 2013, Common Core System of Courses	$\overline{BE}$. Express each line as an equation.  	Use your Single Sign On to access the Interim Assessments **State Assessments** California will be administering the SMARTER Balance Assessment as the end of course for grades 3-8 and 11. There is no assessment for Algebra 1. The 11th grade assessment will include ítems from Algebra 1, Geometry, and Algebra 2 standards. For examples, visit the SMARTER Balance Assessment at: http://www.smarterbalanced.org/

LANGUAGE GOALS for **low achieving, high achieving, students with disabilities and English Language Learners**

Students will compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
Example: The difference between a distance-time graph and a distance-time equation in terms of speed is _____.

Students will explain in writing how to derive the equation y = mx for a line through the origin.
Example: The *m* in the equation *y = mx + b* for a line intercepting the vertical axis at *b* is_____ because _____.

Students will identify the solution(s) to a system of two linear equations in two variables as the point(s) of intersection of their graphs.
Example: To identify the solution(s) of a system of two linear equations in two variables, I will _____.

Students will describe the point(s) of intersection between two lines as points that satisfy both equations simultaneously.
Example: 3x + 2y = 5 and 3x + 2y = 6 have no solution because _____ be ___ and 6.

DIFFERENTIATION 🕮		
UDL/ FRONT LOADING	ACCELERATION	INTERVENTION
Have students analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. Use square tiles to construct different patterns that are growing with constant amount to introduce proportional relationship.	Acceleration for high achieving students: Explain that the connection between the unit rate in a proportional relationships and the slope of its graph depends on a connection with the geometry of similar triangles. Explain to the students that the fact that a line has a well-defined slope—that the ratio	Intervention for low achieving students and students with disabilities: Use blocks or virtual manipulative to build patterns. Have the students work in groups to construct a table based on the growing pattern. Then have them explain how the patterns translate to the numbers

DIFFERENTIATION 🕮		
UDL/ FRONT LOADING	ACCELERATION	INTERVENTION
Explain that the connection between the unit rate in a proportional relationships and the slope of its graph depends on a connection with the geometry of similar triangles. Explain to the students that the fact that a line has a well-defined slope—that the ratio between the rise and run for any two points on the line is always the same—depends on similar triangles.	between the rise and run for any two points on the line is always the same—depends on similar triangles. Have students use equations in two variables to express relationships between two quantities that vary together. When they construct an expression like 10 - *p* to represent a quantity, students can choose a variable such as *C* to represent the calculated quantity and write *C*=10 - *p* to represent the relationship. This prepares students for work with functions in later grades.	they have on the table of values and subsequently have then graph the values.

References:

1. National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). *Common Core State Standards (Mathematics)*. Washington D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.
2. McCallum, W., Zimba, J., Daro, P. (2011, December 26 Draft). *Progressions for the Common Core State Standards in Mathematics*. Cathy Kessel (Ed.). Retrieved from http://ime.math.arizona.edu/progressions/#committee.
3. Engage NY. (2012). New York Common Core Mathematics Curriculum. Retrieved from http://engageny.org/sites/default/files/resource/attachments/a-story-of-ratios-a-curriculum-overview-for-grades-6-8.pdf.
4. Mathematics Assessment Resource Service, University of Nottingham. (2007 - 2012). Mathematics Assessment Project. Retrieved from http://map.mathshell.org/materials/index.php.
5. Smarter Balanced Assessment Consortium. (2012). Smarter Balanced Assessments. Retrieved from http://www.smarterbalanced.org/.
6. Partnership for Assessment of Readiness for College and Career. (2012). PARCC Assessments. Retrieved from http://www.parcconline.org/parcc-assessment.
7. California Department of Education. (2013). Draft Mathematics Framework Chapters. Retrieved from http://www.cde.ca.gov/be/cc/cd/draftmathfwchapters.asp.
8. National Council of Teachers of Mathematics (NCTM) Illuminations. (2013). Retrieved from http://illuminations.nctm.org/Weblinks.aspx.
9. The University of Arizona. (2011-12). Progressions Documents for the Common Core Math Standards. Retrieved from http://ime.math.arizona.edu/progressions.

COMMON CORE MATH 8 – UNIT 3
Function to Model Relationships between Quantities

Students grasp the concept of a function as a rule that assigns to each input exactly one output. They understand that functions describe situations where one quantity determines another. They can translate among representations and partial representations of functions (noting that tabular and graphical representations may be partial representations), and they describe how aspects of the function are reflected in the different representations.

CLUSTER	COMMON CORE STATE STANDARDS
Define, evaluate and compare functions. MP 2,4, and 7	**8.F.1.** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. **8.F.2** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.* **8.F.3** Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*
Use functions to model relationships between quantities. MP 1, 2, and, 4	**8.F.4** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two *(x, y)* values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. **8.F.5** Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
Investigate patterns of association in bivariate data. MP 1, 4, 5, 6, and 7	**8.SP.1** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

CLUSTER	COMMON CORE STATE STANDARDS
	8.SP.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. **8.SP.3** Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.* **8.SP.4** Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*
MATHEMATICAL PRACTICES	LEARNING PROGRESSIONS
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	http://ime.math.arizona.edu/progressions/#committee. CDE Progress to Algebra K-8 www.cde.ca.gov/be/cc/cd/documents/updateditem12catt3.doc

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
• Students understand that a function is a relationship with a unique output for each input. • Students develop their ability to make connections between multiple representations of functions and interpret the features of functions in terms of real world contexts. • Students are able to construct a function to model a linear relationship. • Students identify (from a graph, table, $y= mx+b$, etc.) and interpret the rate of change and initial value of a linear function in terms of the situation.	How would you determine that a relationship is a function? What are some characteristics of a (linear) (non-linear) function? How would you interpret the features (e.g. rate of change, initial value, increasing/decreasing) of a function, in a real world context? How would you determine, depict, and describe "patterns of association" between two quantities, in bivariate data?	• Bivariate measurement • Data • Function • Graph • Input • Intercept • Line of best fit • Ordered pair • Output • Rate of change • Relative frequency • Rule • Scatter plot • Slope • Table of values • Variable

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
Illustrative Mathematics • 8.F.1: Foxes and Rabbits • 8.SP.4: Music and Sports • 8.F.2: Battery Charging **Inside Mathematics** • 8.F.4 and 8.SP.1: House Prices **LAUSD Concept Lesson** • 8.SP: The Power of Diversity • 8.SP.1, 8.SP.2: Through the Grapevine **LAUSD Adopted Textbooks and Programs** • Houghton Mifflin Harcourt, 2013 Go Math! • McGraw-Hill, 2013, California Math, Courses 3 • College Preparatory Mathematics, 2013, Core Connections, Courses 3 • Pearson, 2013, Common Core System of Courses	• Use the function machine to introduce the basic idea and understanding of function. • Have student complete the "Surround the Pool" concept task to generate sets of bivariate data in a table to compare properties of functions algebraically, graphically, and verbally. • Use a different task to show students how to write linear equation of the form $y=mx+b$. • Have students collect real-world data such as students test scores and the number of hours they watch television each week. Using the bivariate data, they would investigate and describe patterns of association. • Involve students in conducting an experiment where they would generate linear model to solve problems in the context of bivariate measurement data. • Engage students to describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing,	**Formative Assessment** SBAC - http://www.smarterbalanced.org/ ITEM #'S 42906 8 NS1-2, 8 EE 1-2 43208, 8 SP 1, 8 SP 3, 8 F 5 SBAC Sample Items: 8 F 1: MAT.08.CR.1.0000F.E.135 MAT.08.TE.1.0000F.E.140 8 F 5: MAT.08.CR.1.0000F.F.090 **LAUSD Periodic Assessment** District assessments can be accessed through: http://achieve.lausd.net/math http://achieve.lausd.net/ccss Use your Single Sign On to access the Interim Assessments California will be administering the SMARTER Balance Assessment as the end of course for grades 3-8 and 11. There is no assessment for Algebra 1.

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
	linear or nonlinear)	The 11th grade assessment will include ítems from Algebra 1, Geometry, and Algebra 2 standards. For examples, visit the SMARTER Balance Assessment at: http://www.smarterbalanced.org/ SBAC Content Specs http://www.smarterbalanced.org/wordpress/wp-content/uploads/2011/12/Math-Content-Specifications.pdf 8 F 1, 8 F2: CR 10: Shelves 8 SP 1: CR 7: Bird and Dinosaur Eggss 8 EE 8, 8 F4: CR 4: Baseball Jerseys

LANGUAGE GOALS for **low achieving, high achieving, students with disabilities and English Language Learners**

Students will compare and contrast two functions with different representations.
Students will draw conclusions based on different representations of functions.
Students will write a comparison of the characteristics of linear and nonlinear functions using various representations and explain orally.
Students will recognize and explain that a linear function is graphed as a straight line.
Example: An example of nonlinear functions is_____. It is nonlinear because_____.

PERFORMANCE TASK

Mathematics Assessment Project

- 8 F 4, 8 F 5: Lines and Linear Equations
- 8.F.4: Interpreting Distance-Time Graphs
- 8.EE, 8.F: Generalizing Patterns: The Difference of Two Squares
- 8.F.2, 8.F.4: Modeling Situations with Linear Equations

DIFFERENTIATION 🕮

UDL/ FRONT LOADING	ACCELERATION	INTERVENTION
Statistics and Probability: • Students have enough experience with coordinate geometry and linear functions to plot bivariate data as points on a plane and to make use of the equation of a line in analyzing the relationship between two points. • Students build on their experience with	Acceleration for high achieving students: • Have students design a plan for collection and production of data relevant to questions of interest. Working collaboratively students apply their experience with the coordinate plane and linear functions in the study of association between two variables related to a question of interest.	Intervention for low achieving students and students with disabilities: • Engage students in gathering bivariate data and have a discussion regarding variability. Collect and plot data on a coordinate system. Students can collect their shoe sizes and heights as a group and make a plot of heath versus shoe size to determine if there is a correlation.

DIFFERENTIATION 🕮		
UDL/ FRONT LOADING	ACCELERATION	INTERVENTION
decimals and percent, and the ideas of association between measurement variables, students now take a more careful look at possible association between categorical variables **Functions:** • Students extend and apply their understanding of expressions, equations and graphing, tabular representations and how these relate to each other to semi-formally describe a function: a rule that assigns to each input exactly one output. • Students use function machine to introduce to idea of function.	Acceleration for high achieving students: • As in the univariate case, analysis of bivariate measurement data graphed on a scatterplot proceeds by describing shape, center, and spread. Students determine the correlation of the graph – whether the association of the bivariate data is positive, negative, or a cloud of points on a plane, "center" based on the line of best fit. • 8.F.5, Inside Mathematics Problem of the Month, "Growing Staircases," http://insidemathematics.org/problems-of-the-month/pom-growingstaircases.pdf	Intervention for low achieving students and students with disabilities: • The teacher explains dependent and independent variable based on the plot. Also the association between shoe size and height if any can be discussed. • Have students use a manipulative, such as tiles, paper clips, or toothpick to construct patterns that are growing at constant rate. Have them write the data on a table of values as well as graph the points. Engage them in a discussion of dependent and independent variables, etc.

References:

1. National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). *Common Core State Standards (Mathematics)*. Washington D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.
2. McCallum, W., Zimba, J., Daro, P. (2011, December 26 Draft). *Progressions for the Common Core State Standards in Mathematics*. Cathy Kessel (Ed.). Retrieved from http://ime.math.arizona.edu/progressions/#committee.
3. Engage NY. (2012). New York Common Core Mathematics Curriculum. Retrieved from http://engageny.org/sites/default/files/resource/attachments/a-story-of-ratios-a-curriculum-overview-for-grades-6-8.pdf.
4. Mathematics Assessment Resource Service, University of Nottingham. (2007 - 2012). Mathematics Assessment Project. Retrieved from http://map.mathshell.org/materials/index.php.
5. Smarter Balanced Assessment Consortium. (2012). Smarter Balanced Assessments. Retrieved from http://www.smarterbalanced.org/.
6. Partnership for Assessment of Readiness for College and Career. (2012). PARCC Assessments. Retrieved from http://www.parcconline.org/parcc-assessment.
7. California Department of Education. (2013). Draft Mathematics Framework Chapters. Retrieved from http://www.cde.ca.gov/be/cc/cd/draftmathfwchapters.asp.
8. National Council of Teachers of Mathematics (NCTM) Illuminations. (2013). Retrieved from http://illuminations.nctm.org/Weblinks.aspx.
9. The University of Arizona. (2011-12). Progressions Documents for the Common Core Math Standards. Retrieved from http://ime.math.arizona.edu/progressions.

COMMON CORE MATH 8 – UNIT 4
Pythagorean Theorem and its Converse, Congruence and Similarity
Problem Solving Involving Volume of Cylinders, Cones and Spheres

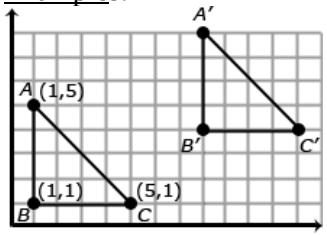
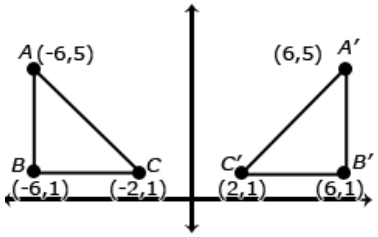
Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines. Students understand the statement of the Pythagorean Theorem and its converse, and can explain why the Pythagorean Theorem holds, for example, by decomposing a square in two different ways. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.

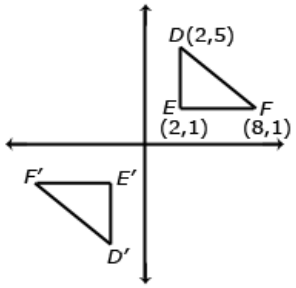
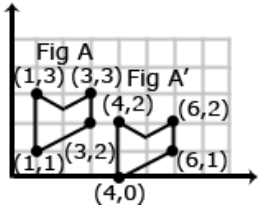
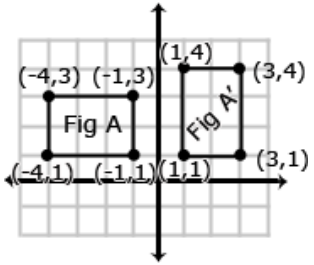
CLUSTER	COMMON CORE STATE STANDARDS
Understand congruence and similarity using physical models, transparencies, or geometry software.	**8.G.1** Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines. **8.G.2** Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. **8.G.3** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. **8.G.4** Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. **8.G.5** Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*
Solve real-world and mathematical problems involving volume of cylinders,	**8.G.9** Know the formulas for the volumes of cones, cylinders, and spheres and

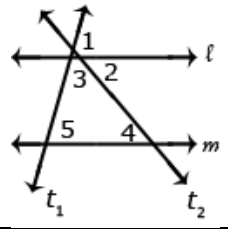
CLUSTER	COMMON CORE STATE STANDARDS
cones and spheres.	use them to solve real-world and mathematical problems.
MATHEMATICAL PRACTICES	**LEARNING PROGRESSIONS**
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. **Construct viable arguments and critique the reasoning of others.** 4. Model with mathematics. 5. **Use appropriate tools strategically.** 6. Attend to precision. 7. Look for and make use of structure. 8. **Look for and express regularity in repeated reasoning.**	http://ime.math.arizona.edu/progressions/#committee. CDE Progress to Algebra K-8 www.cde.ca.gov/be/cc/cd/documents/updateditem12catt3.doc

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
• Students apply their understanding of the effect of geometric transformation(s) on a figure or shape. • Students describe how two figures or shapes are congruent or similar. • Students create or identify a sequence of transformations that lead to congruent or similar figures. • Students analyze the relationship between angles measures (triangle sum; parallel lines cut by a transversal; impact of a geometric transformation). • Students prove the Pythagorean Theorem, use to determine the distance between two coordinate points, and apply to real world situations.	How are the (angles), (lengths), or (figures) changing? How are they staying the same? How is _____ related to ____? What happens when an object is dilated? How could an object be transformed to enlarge or reduce its size? How can you determine the distance between two points in a coordinate plane?	Angle, Angle sum Argument Cone Congruent Coordinate Cylinder Dilation Exterior angle Line Line segment Parallel Proof Reflection Rotation Sequence Similar/similarity Sphere Translation Transversal Two-dimensional (2-D)

LANGUAGE GOALS for **low achieving, high achieving, students with disabilities and English Language Learners**
Students will understand prime notation to describe an image after a translation, reflection, or rotation. I will describe an image of translation, reflection, or rotation by_____. Students will use physical models, transparencies, or geometry software to verify the properties of rotations, reflections, and translations. Students will explain a proof of the Pythagorean Theorem and its converse. Students will apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. The unknown side lengths of a right_____ can be determined by using _____.
PERFORMANCE TASKS
Mathematics Assessment Project • 8.G.9: Modeling Making Matchsticks • 8.G.1: Representing and Combining Transformations • 8.G.4: Photographs

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
LAUSD Concept Lesson 8.G.9: The Chocolate Factory 8.G.6: Squaring Triangles **Mathematics Assessment Project** 8.G.1: Representing and Combining Transformations 8.G.1: Aaron's Designs 8.G.5: Finding Shortest Routes: The Schoolyard Problem 8.G.5: Identifying Similar Triangles **Engage NY**: 8.G.1: The Concept of Congruence. 8.G.4: Similarity. **NCTM Illuminations** 8.G.1: Cyclic Figures 8.G.1: Dihedral Figures 8.G.4: In Your Shadow 8.G.4: Inversions	Provide explanations with examples of Reflection, Rotation, Translation, and Dilation. Examples:  ΔABC has been translated 7 units to the right and 3 units up. To get from A (1,5) to A′ (8,8), move A 7 units to the right (from x = 1 to x = 8) and 3 units up (from y = 5 to y = 8). Points B + C also move in the same direction (7 units to the right and 3 units up).  When an object is reflected across the y axis, the reflected x coordinate is the opposite of the pre-image x coordinate.	SBAC Sample Items: 8.G.2 MAT.08.SR.1.0000G.G.141 MAT.08.TE.1.0000G.G.146 8.G.3 MAT.08.SR.1.0000G.G.142 8.G.5 MAT.08.CR.1.0000G.G.129 8.G.6: MAP Center, Summative Assessment: "Proofs of the Pythagorean Theorem?" http://map.mathshell.org/materials/tasks.php 8.G: MAP Center, Summative Assessment, "Circles and Squares," http://map.mathshell.org/materials/tasks.php?taskid=287#task287

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
8.G.5: Angle Sums 8.G.9 Popcorn, Anyone? 8.G.9: Popcorn Cylinders Anyone? 8.G.9: Cubed Cans. **Inside Mathematics**: Cut It Out" activity **Illustrative Mathematics** 8.G.2: Congruent Segments. 8.G.2: Congruent Rectangles 8.G.2: Congruent Triangles 8.G.3: Reflecting Reflections 8.G.3: Triangle Congruence with Coordinates 8.G.5: Are They Similar? **LAUSD Adopted Textbooks and Programs** • Houghton Mifflin Harcourt, 2013 Go Math! • McGraw-Hill, 2013, California Math, Courses 3 • College Preparatory Mathematics, 2013, Core Connections, Courses 3 • Pearson, 2013, Common Core System of Courses	 Consider when is rotated 180˚ clockwise about the origin. The coordinates of are D(2,5), E(2,1), and F(8,1). When rotated 180˚, has new coordinates D'(-2,-5), E'(-2,-1) and F'(-8,-1). Each coordinate is the opposite of its pre-image. Examples: • Is Figure A congruent to Figure A'? Explain how you know.  • Describe the sequence of transformations that results in the transformation of Figure A to Figure A'.  • Examples: Students can informally prove relationships with transversals. Show that m $\angle 3$ + $m\angle 4$ + $m\angle 5$ = 180˚ if ℓ and m are parallel lines and t_1 & t_2 are transversals. $\angle 1 + \angle 2 + \angle 3 = 180^\circ$. Angle 1 and Angle 5 are congruent because they are corresponding angles ($\angle 5 \cong \angle 1$). $\angle 1$ can be substituted for $\angle 5$.	

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
	$\angle 4 \cong \angle 2$: because alternate interior angles are congruent. $\angle 4$ can be substituted for $\angle 2$ Therefore m$\angle 3$ + m$\angle 4$ + m$\angle 5$ = 180° 	

DIFFERENTIATION 🕮		
UDL/ FRONT LOADING	ACCELERATION	INTERVENTION
• Students build on their understanding of what it means for two objects to be similar and/or congruent • Students expand their knowledge of finding distances between two points in a coordinate system. (8.G.8: Unit 1) • Students are able to draw, construct and describe geometrical figures and describe the relationships between them. (7.G.2) • Students use facts about supplementary, complementary, vertical and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. (7.G.5) • Students build on knowledge of radicals, integer exponents, square roots, and cube roots. (8.EE.2: Unit 1)	Acceleration for high achieving students: • Students can compare the volume of different objects and can describe optimization • Given a complex polygon in a coordinate plane, students can describe the boundaries of the figure	Intervention for low achieving students and students with disabilities: • Students use "nets" and other hands on manipulatives to visualize 3 dimensions • Teacher uses "transparency" sheets or computer applets to show transformations • Provide sentence starters for students to be able to describe the effects of transformations. • Provide sentence frames to support students using informal arguments to establish facts. • Choral response especially for two parallel lines cut by a transversal theorems.

References:

1. National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). *Common Core State Standards (Mathematics)*. Washington D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

2. McCallum, W., Zimba, J., Daro, P. (2011, December 26 Draft). *Progressions for the Common Core State Standards in Mathematics*. Cathy Kessel (Ed.). Retrieved from http://ime.math.arizona.edu/progressions/#committee.
3. Engage NY. (2012). New York Common Core Mathematics Curriculum. Retrieved from http://engageny.org/sites/default/files/resource/attachments/a-story-of-ratios-a-curriculum-overview-for-grades-6-8.pdf.
4. Mathematics Assessment Resource Service, University of Nottingham. (2007 - 2012). Mathematics Assessment Project. Retrieved from http://map.mathshell.org/materials/index.php.
5. Smarter Balanced Assessment Consortium. (2012). Smarter Balanced Assessments. Retrieved from http://www.smarterbalanced.org/.
6. Partnership for Assessment of Readiness for College and Career. (2012). PARCC Assessments. Retrieved from http://www.parcconline.org/parcc-assessment.
7. California Department of Education. (2013). Draft Mathematics Framework Chapters. Retrieved from http://www.cde.ca.gov/be/cc/cd/draftmathfwchapters.asp.
8. National Council of Teachers of Mathematics (NCTM) Illuminations. (2013). Retrieved from http://illuminations.nctm.org/Weblinks.aspx.
9. The University of Arizona. (2011-12). Progressions Documents for the Common Core Math Standards. Retrieved from http://ime.math.arizona.edu/progressions.
10. Illustrative Mathematics. https://www.illustrativemathematics.org/