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 Accelerated Common Core Math 7 curriculum map for Los Angeles Unified School District is developed as a tool for instructional planning, 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.

Accelerated Common Core Math 7 Curriculum Map

This curriculum map is designed to be used to plan, direct, and clarify instruction for Grade 7 students enrolled in Accelerated Common Core (CC) Math 7 course. Accelerated CC Math 7 contains all the CC Math 7 standards and half of the CC Math 8 standards. Standards are not cut or skipped but compacted requiring students to learn at a faster pace. "Mathematics is by nature hierarchical. Every step is a preparation for the next one. Learning it properly requires thorough grounding at each step and skimming over any topics will only weaken one's ability to tackle more complex material down the road" (Wu 2012). Serious efforts must be made to consider solid evidence of a student's conceptual understanding, knowledge of procedural skills, fluency, and ability to apply mathematics before moving a student into an accelerated pathway." (The California Mathematics Framework - Appendix A, November 6, 2013.). The Accelerated Pathway is only for students who show advanced readiness or for students currently enrolled in an accelerated pathway. Students should not skip any math concepts as they accelerate to higher courses, otherwise, they will not have the depth of understanding needed to be successful in those courses.

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.

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.

- **Enrichment:** 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 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).

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 click on the **2013-2014 MIG** link, 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 Instructional Guide* are the result of the collective expertise of the LAUSD Secondary Mathematics Team.

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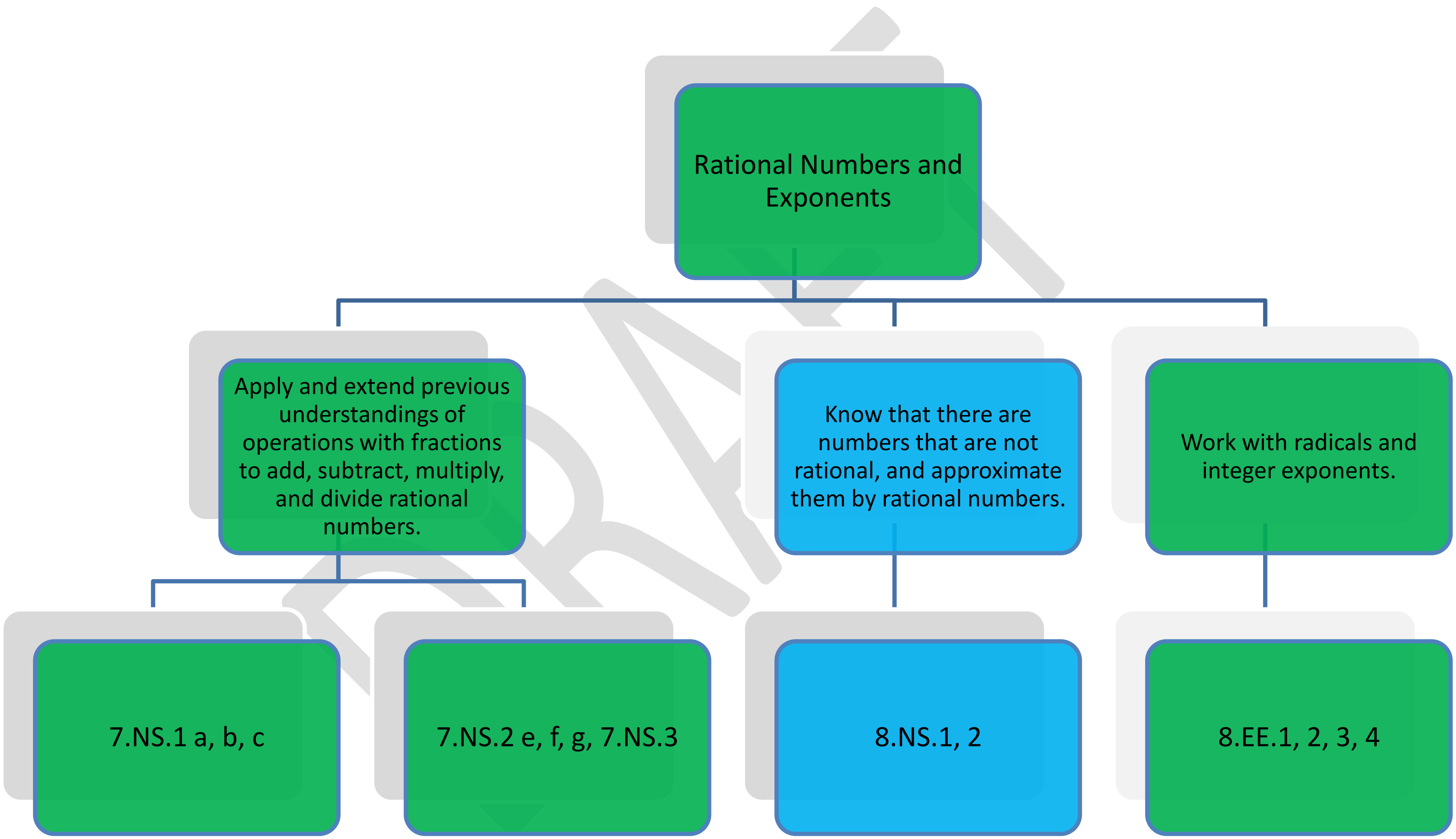
Accelerated Grade 7

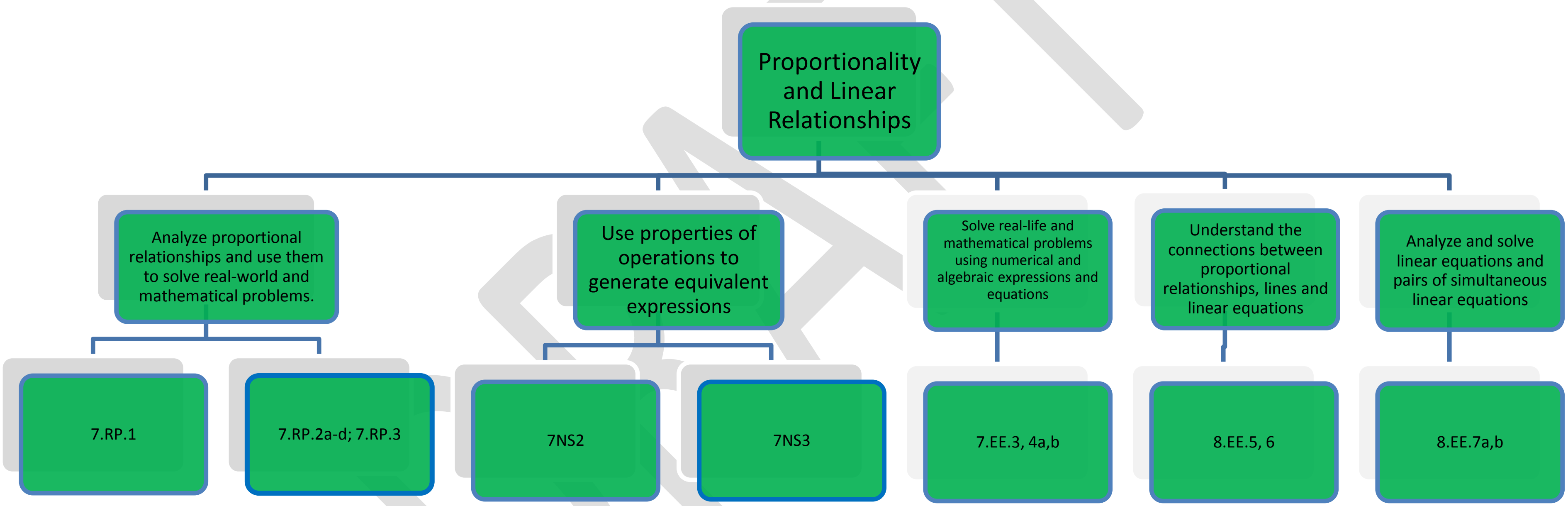
Unit 1



Key: Major Clusters; Supporting Clusters and Additional Clusters

Accelerated Grade 7

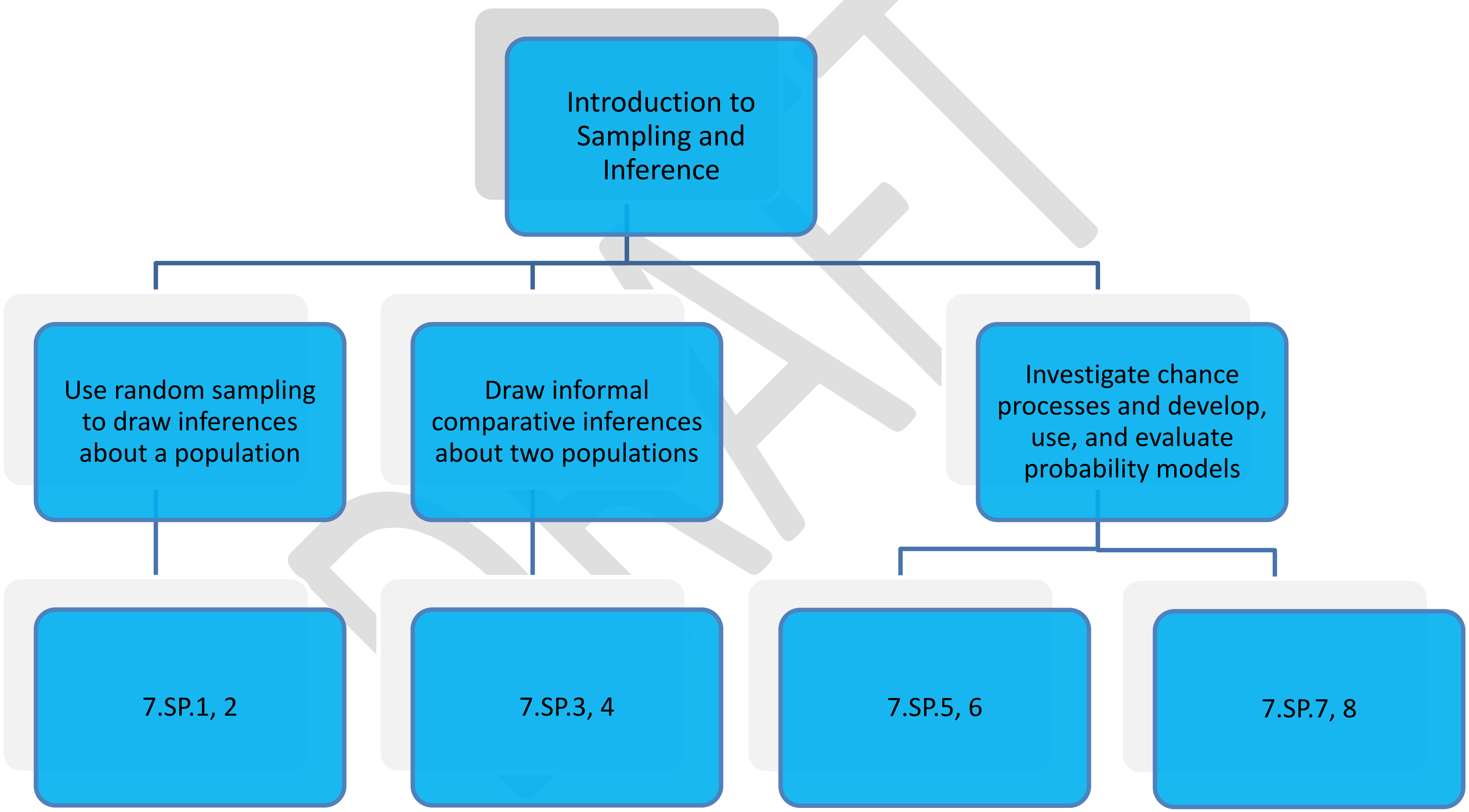
Unit 2



Key: Major Clusters; Supporting Clusters and Additional Clusters

Accelerated Grade 7

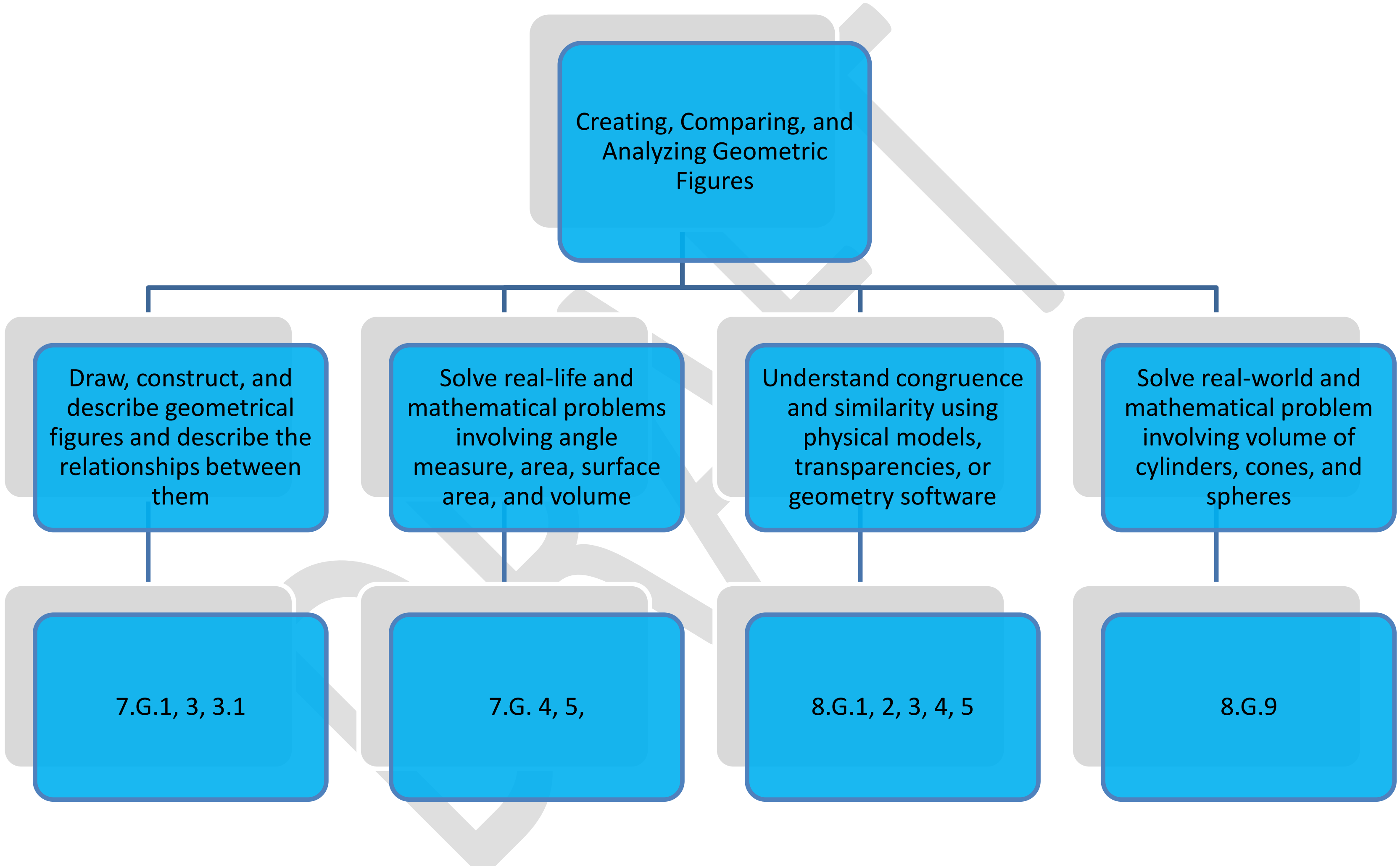
Unit 3



Key: Major Clusters; Supporting Clusters and Additional Clusters

Accelerated Grade 7

Unit 4



Key: Major Clusters; Supporting Clusters and Additional Clusters

Accelerated Grade 7 – UNIT 1
Rational Numbers and Exponents

Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems. They extend their mastery of the properties of operations to develop an understanding of integer exponents, and to work with numbers written in scientific notation

CLUSTERS	COMMON CORE STATE STANDARDS
Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	**7.NS.1** Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged*. b. Understand p+q as the number located a distance from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, p-q=p+(-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers. **7.NS.2** Apply and extend previous understanding of multiplication and division and of fractions to multiply and divide rational numbers. e. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1)=1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. f. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q)=(-p/q)=(p/-q). Interpret quotients of rational numbers by

	describing real-world contexts. g. Apply properties of operations as strategies to multiply and divide rational numbers. h. Convert a rational number to a decimal using long division; know that the decimal from of a rational number terminates in 0s or eventually repeats. **7.NS.3** Solve real-world and mathematical problems involving the four operations with rational numbers.
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.,). *For example, by truncating the decimal expansion of √ , show that √ 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 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.

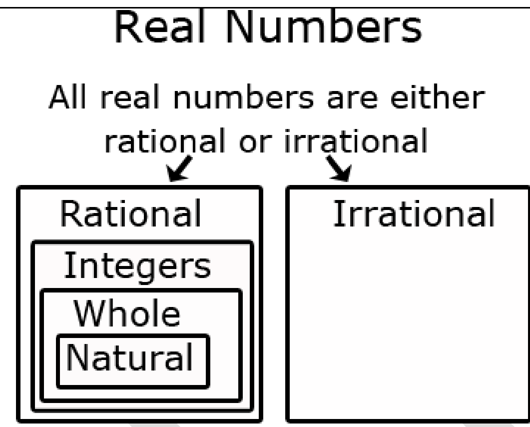
MATHEMATICAL PRACTICES	LEARNING PROGRESSIONS
1. **Make sense of problems and persevere in solving them.** 2. **Reason abstractly and quantitatively.** 3. **Construct viable arguments and critique the arguments of others.** 4. **Model with mathematics.** 5. **Use appropriate tools strategically.** 6. **Attend to precision.** 7. **Look for and make use of structure.** 8. **Look for and express regularity in repeated reasoning.**	http://commoncoretools.files.wordpress.com/2012/02/ccss_progression_nf_35_2011_08_12.pdf This cluster builds upon the understandings of rational numbers in Grade 6: • quantities can be shown using + or – as having opposite directions or values, • points on a number line show distance and direction, • opposite signs of numbers indicate locations on opposite sides of 0 on the number line, • the opposite of an opposite is the number itself, • the absolute value of a rational number is its distance from 0 on the number line, • the absolute value is the magnitude for a positive or negative quantity, and • locating and comparing locations on a coordinate grid by using negative and positive numbers. Learning now moves to exploring and ultimately formalizing rules for operations (addition, subtraction, multiplication and division) with integers. Using both contextual and numerical problems, students should explore what happens when negatives and positives are combined. Number lines present a visual image for students to explore and record addition and subtraction results. Students should be able to give contextual examples of integer operations, write and solve equations for real- world problems and explain how the properties of operations apply. Real-world situations could include: profit/loss, money, weight, sea level, debit/credit, football yardage, etc. http://ime.math.arizona.edu/progressions/#committee. CDE Progress to Algebra continuum K-8 www.**cde**.ca.gov/be/cc/**cd**/documents/updateditem12catt3.doc

[1] **Major Clusters – area of intensive focus where students need fluent understanding and application of the core concepts.**
[2] **Supporting/Additional Clusters – designed to support and strengthen areas of major emphasis/expose students to other subjects.**

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
• Computation with positive and negative numbers is often necessary to determine relationships between quantities. • Models, diagrams, manipulatives, number lines, and patterns are useful in developing and remembering algorithms for computing with positive and negative numbers. • Properties of real numbers hold for all rational numbers. • Positive and negative numbers are often used to solve problems in everyday life. • 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.	• When should we use additive inverse or multiplicative inverse? • How do we use a number line to show addition and subtraction of rational numbers? • What is the result of (what happens when) adding a number and its inverse or multiplying a number and its inverse? • How is the identity related to its inverses? • What is the relationship between addition and subtraction? • What is the relationship between multiplication and division? • How are the operations applied in real-world contexts? • How do the properties of operation help us compute with rational numbers? • Is it always true that multiplying a negative factor by a positive factor always produces a negative product? • 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?	• absolute Value • additive Inverse • approximate • associative Property • benchmark • commutative Property • converse • cube root, cubic root • distance • distributive Property • divisor • equation • equivalent • estimate • exponent • expression • factor • hypotenuse • integer • integers • irrational • length • multiplicative Inverse • opposite • product • Pythagorean Theorem • quotient • radical • rational • rational Numbers • repeating Decimal • scientific notation • side • square root • terminating decimal

		• zero Pair

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
NLVM http://nlvm.usu.edu **NCTM Illuminations activities** 7.NS.3 Comparing Freezing Points http://www.illustrativemathematics.org/illustrations/314 7.NS.1a Distances on the Number Line 2 http://www.illustrativemathematics.org/illustrations/310 7.NS.3 Operations on the number line http://www.illustrativemathematics.org/illustrations/46 **California Draft Mathematics Framework:** http://www.cde.ca.gov/be/cc/cd/draftmathfwchapters.asp . **LAUSD Adopted Textbooks:** **California Mathematics: Concepts Skills and Problem Solving, Glencoe McGraw-Hill** 2.1 Rational Numbers 2.3 Multiplying Positive and Negative Fractions 2.4 Dividing Positive and Negative Fractions 2.5 Adding and Subtracting Like Fractions 2.6 Adding and Subtracting Unlike Fractions **California Math: Course 2 - McDougal Littell** 2.1 Simplifying Fractions 2.2 Comparing Fractions and Mixed Numbers 2.3 Adding and Subtracting Fractions 2.4 Using a Common Denominator 2.5 Multiplying Fractions 2.6 Dividing Fractions 2.7 Rational Numbers in Decimal Form 8.NS.1, 8.NS.2: MAP Concept Lesson, "Repeating Decimals," http://map.mathshell.org/materials/lessons.php?taski d=421&subpage=concept	• Number line model for operation with integers • Use of chips model (positive/negative numbers) for creating 0-pairs. • Use a foldable for integer rules. • Show that $\lvert a+b\rvert \neq \lvert a\rvert + \lvert b\rvert$ • Introduce this concept 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.	SBAC - http://www.smarterbalanced.org/ Item #'s Items: 2959, 43022, 43023, 43026, 43047, 43053 SBAC - http://www.smarterbalanced.org/ ITEM #'S 42906 8 NS1-2, 8 EE 1-2 SBAC Sample Items: 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 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 PARCC MAP Center 8 NS, 8 EE, MAP Center, Short Novice Assessment Tasks, http://map.mathshell.org/materials/tasks.php?taskid=398#task3

8EE.1: Illustrative Mathematics, “Extending the Definition of Exponents,” http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/395/original/illustrative_mathematics_395.pdf?1343857080 **Engage New York**: Grade 8 Module 1 Integer Exponents and Scientific Notation	 • Students can approximate square roots by iterative processes. Have students to recognize that falls between $2^2 = 4$ and $3^2 = 9$. The value will be closer to 2 than to 3.	98 8 EE: MAP Center, Summative Assessment Tasks: “100 People” http://map.mathshell.org/materials/download.php?fileid=1046

LANGUAGE GOALS

Students will describe situations in which opposite quantities will combine to make 0 or 1.
Example: To add -5 and 5, I_______________. The resulting sum will be__________, because _____________.

Students will explain how they will use the properties of operations to compute with rational numbers.
Example: In performing operations with rational numbers, I will ____________________.

Students will create/write real-world problems representing operations with rational numbers.
Example: If the temperature is 40^{0}F in the morning and increases by 10^{0} F by noon, the new temperature will be_____.

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 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__________________.

PERFORMANCE TASKS

MATHEMATICS ASSESSMENTS PROJECT
7. NS.1 and 7.NS.3 Using Positive and Negative Numbers in Context
http://map.mathshell.org/materials/lessons.php?taskid=453#task453

7NS.2 and 7.NS.3 Increasing and Decreasing Quantities by a Percent http://map.mathshell.org/materials/lessons.php?taskid=210#task210 8.EE: MAP Center Concept Lesson, “Solving Real-Life Problems: Baseball Jerseys,” http://map.mathshell.org/materials/download.php?fileid=1265 8.EE.4: MAP Center Concept Lesson, “Estimating Length Using Scientific Notation,” http://map.mathshell.org/materials/lessons.php?taskid=414&subpage=concept

DIFFERENTIATION 🕮		
FRONT LOADING	ACCELERATION	INTERVENTION
• Have students construct number lines and show how they would get zero by determining how many points they would move from point 3 to 6 and back. • Use the amount they owe their friend to show that when they pay the debt, that there will be zero amount left. • Explain absolute value by using the distant they travel to school each way (to and fro). That distance is always positive. • Introduce integer concept using chips, manipulatives, number line or modeling virtually. • 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	• Show students on a number line that the absolute value of a and absolute value of b will equal the magnitude of $\|a\|$ and $\|b\|$ $\|a\| + \|b\| = a + b$ • Have students prove the following: Are there any rectangles whose area and perimeter have the same numerical value? • Can you write 1/2 as the sum of two “unit fractions”? $1⁄2= 1/a + 1/b$. • Have students write multiplication problem or fraction division problem that can be modeled using area or linear model. • 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 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=concept Rational and Irrational Numbers 2, Concept Lesson http://map.mathshell.org/materials/lessons.php?taskid=434&subpage=concept	• Use manipulative to reteach integers such as using red and blue chips. • Provide number line strips to pairs of students and give them different integer problems. • Show students how to solve problems involving fractions with unlike denominators using a picture. Have them solve it using numbers and words. • Use Algebra tiles and fraction bars to reinforce learning. • 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 need for exponential notation. • Emphasize think-pair-share. • Provide multiple

estimate very large or very small quantities.		representation activity for rational exponents to allow students to discuss and refine their understanding of exponential and radical notation.

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9. National Council of Teachers of Mathematics (NCTM) Illuminations. (2013). Retrieved from http://illuminations.nctm.org/Weblinks.aspx.

10. The University of Arizona. (2011-12). Progressions Documents for the Common Core Math Standards. Retrieved from http://ime.math.arizona.edu/progressions.

Accelerated Grade 7 – UNIT 2
Proportionality and Linear Relationships

Students use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems. Students recognize equations for proportions (y/x = m or y = mx) as special linear equations (y = mx + b), understanding that the constant of proportionality (m) is the slope, and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input or x-coordinate changes by an amount A, the output or y-coordinate changes by the amount m×A. Students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions of the original equation.

CLUSTERS	COMMON CORE STATE STANDARDS
Analyze proportional relationships and use them to solve real-world and mathematical problems.	**7.RP.1** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.* **7.RP.2** Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn*. d. Explain what a point *(x, y)* on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r)* where *r* is the unit rate. **7.RP.3** Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*
Use properties of operations to generate equivalent expressions	**7.EE.1** Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients **7.EE.2** Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, a + 0.05a = 1.05a means that *"increase by 5%"* is the same as *"multiply by 1.05."*
Solve real-life and mathematical problems using numerical and algebraic expressions and equations	**7.EE.3.** Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the*

	bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. **7.EE.4.** Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm.* Its length is 6 cm. What is its width? b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write* an inequality for the number of sales you need to make, and describe the solutions.
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.
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.* b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

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 arguments 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.**	6-7, Ratios and Proportional Relationships http://commoncoretools.files.wordpress.com/2012/02/ccss_progression_rp_67_2011_11_12_corrected.pdf CDE Progress to Algebra continuum K-8 (P. Daro) - http://www.cde.ca.gov/be/cc/cd/documents/updateditem12catt3.doc UNIVERSITY OF ARIZONA - INSTITUTE FOR MATHEMATICS EDUCATION http://commoncoretools.files.wordpress.com/2011/04/ccss_progression_ee_2011_04_25.pdf http://ime.math.arizona.edu/progressions/#committee.

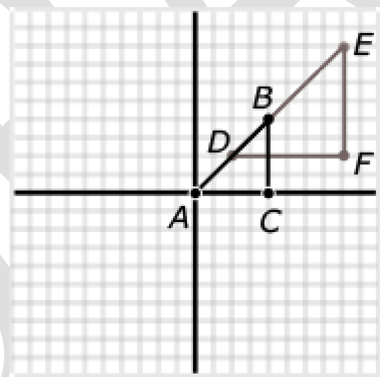
[1] **Major Clusters – area of intensive focus where students need fluent understanding and application of the core concepts.**

[2] **Supporting/Additional Clusters – designed to support and strengthen areas of major emphasis/expose students to other subjects.**

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
• Proportional reasoning is essential in problem solving • Understanding mathematical relationships allows us to make predictions, calculate and model unknown quantities. • Proportional relationships express how quantities change in relationship to each other. • Generating equivalent, linear expressions with rational coefficients using the properties of operations will lead to solving linear equation. • Discovering that rewriting expressions in different forms in a problem context leads to understanding that the values are equivalent. • Ability to solve and explain real life and mathematical problems involving rational numbers using numerical and algebraic expressions is important for preparation for HS Algebra. • Constructing simple equations and inequalities to solve real life word problems is a necessary concept. • Write and solve real- life and mathematical problems involving simple equations for an unknown angle in a figure would help students as the engage in higher Geometry concepts. • 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 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 can proportions be used to solve problems? • When is a relationship proportional? • How can proportions increase our understanding of the real world? • How does the mathematical use of the word *similar* differ from the everyday use? • How can similarity help us solve measurement problems? • What are the connections between similarity, geometry and algebra? • How can I apply the order of operations and the fundamentals of algebra to solve problems? • How can I justify that multiple representations in the context of a problem are equivalent expressions? • How do I assess the reasonableness of my answer? • How will I use the properties of equality to explain the order of the steps in solving equations and inequalities? • How do I interpret the solutions for equations and inequalities in the context of the problem? • How can I use and relate facts about special pairs of angles to write and solve simple equations involving unknown angles? • 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? • 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.	• algebraic • arithmetic • axis, x-axis, y-axis, • bivariate • coefficient • coefficient • constant • context • coordinate plane • cube Root • data • distributive property • equation • equivalence, equivalence • equivalent • estimate • expand • expression • factor • graph • horizontal • inequality • intercept/point of interception • linear • operations • origin • per • perfect Cube • perfect Square • point • properties • proportion

	• How can I create an equation with given information from a table, graph, or problem situation	• proportional relationship • rate • ratio • rational • scale • scale drawing • slope • Solution • solution Set • solve • square Root • symbol • triangle • unit rate • variable • vertical

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
LAUSD Adopted Textbook: Glencoe – California Mathematics Grade 7, Chapter 4 – lessons 4.1-10 McDougal Holt – California Mathematics, Course 2, Chapter 3 –Lessons 3.6, 3.7, 3.8, Chapter 5 - 5.6. **Engage New York:** Grade 8 Module 4 - Linear Equations **National Library of Virtual Manipulatives -** http://nlvm.usu.edu/en/nav/grade_g_3.html **NCTM Tools Activities –** http://www.nctm.org/resources/content.aspx?id=32702 **TI Math–** http://education.ti.com/calculators/timathnspired/US/Activities/Subject?sa= **Geometer's Sketchpad -**	• Real-world connections (e.g. Use grocery store ads to find unit rates for various products) • Structured instructional conversations (Think-Pair-Share) • Peer Tutoring • Use visuals to illustrate multiple representations of rate of change • Real-world connections (Use equations to set up a home budget, e.g. % of take-home pay for rent, utilities, food, savings, etc.) • Structured instructional conversations (Think-Pair-Share) • Journal writing prompts - http://futureofmath.misterteacher.com/Writing%20Prompts.pdf • Questioning Strategies - http://www.utdanacenter.org/mathtoolk	SBAC - http://www.smarterbalanced.org/ 7 RP 3 - Item #'s 42933, 42961 7G1 - Item # 43057 7EE – Item # 2959, 43022, 43023, 43026, 43047, 43053 PARCC - http://parcconline.org/samples/mathematics/grade-7-speed http://parcconline.org/samples/mathematics/grade-6-slider-ruler 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:

http://dynamicgeometry.com/ **Illustrative Mathematics** 7.RP.1 Molly's Run http://illustrativemathematics.org/illustrations/828 7.RP.2 Music Companies, Variations 1 - http://illustrativemathematics.org/illustrations/95 **LAUSD Adopted Textbook**: Glencoe – California Mathematics Grade 7 Chapter 1 – lessons 1.2, 1.4, 1.5,1.7, 1.8, 1.9, 1.10; Chapter 6 – Lessons 6.1, 6.3 Chapter 8– lessons 1-8 Holt McDougal – California Mathematics, Course 2, Chapter 5–Lessons 1,2,3,4,5,6,7,8,9 **National Library of Virtual Manipulatives** - http://nlvm.usu.edu/en/nav/grade_g_3.html **NCTM Tools and Activities** – http://www.nctm.org/resources/content.aspx?id **TI Math Tools**– http://education.ti.com/calculators/timathnspired/US/Activities/Subject?sa **Geometer's Sketchpad** - http://dynamicgeometry.com/ **California Draft Mathematics Framework Chapters** http://www.cde.ca.gov/be/cc/cd/draftmathfwchapters.asp . **Illustrative Mathematics** 7.EE.1– Equivalent Expressions - http://illustrativemathematics.org/illustrations/543 7.EE.1 and 7.EE.4a – Guess My Number - http://illustrativemathematics.org/illustrations/712 8.EE.7, Inside Mathematics, Performance Tasks, Squares and Circles, http://insidemathematics.org/common-core-math-tasks/8th-grade/8-2006%20Squares%20and%20Circles.pdf 8.EE.7: MAP Center, Concept Lesson, "Solving Linear Equations in One Variable,"	it/support/questioning.php • 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 ACB □ is similar to DFE, and deduce that AB has the same slope as BE. Express each line as an equation. 	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/wpcontent/uploads/2011/12/Math-Content-Specifications.pdf 8 EE 8: CR 8: Taxi Cabs

http://map.mathshell.org/materials/lessons.php?taskid=4 42&subpage=concept Other Resources http://www.arcademicskillbuilders.com/games/ratio-blaster/ratio-blaster.html http://www.azed.gov/azcommoncore/files/2012/11/7th_flipbookedited21.pdf http://schools.nyc.gov/NR/rdonlyres/41C0F04C-0BD6-491F-9BF0-16485EC080BE/0/NYCDOEG7MathProportionalReasoning_Final.pdf		

LANGUAGE GOALS

Reading

Students will evaluate the argument and specific claims in a word problem, including the validity of the reasoning, making explicit reference to words in the problem and using reporting language (According to the problem, …; the problem states that…; the main points are…' *argues, In my opinion, the way to solve this problem is…; What is most important in this problem is…;*

Students will read ratios, proportions, and percent's aloud fluently, without hesitating

Students will summarize the steps in setting up and solving a proportion as described in their textbooks using the words *first*, *second*, *third*, *etc*.

Students will identify words, or phrases, in word problems that help them solve them using a causative structure such as: *The following words* **"**unit " *and* "rate" *help me solve the problem*

Students will read equations, expressions, and inequalities aloud fluently, without hesitating

Writing

Students will write definitions of key vocabulary using complete, well-formed sentences.

Students will write a constructed response to a word problem using logically ordered reasons that are supported by facts and details and using the appropriate mathematic vocabulary.

Students will list possible reasons for their conclusions, using verbs such as *explain, demonstrate, justify* and *because*).

Students will explain how they use a specific mathematical concept in their lives, using the following specific set of words: *miles per gallon*, miles per hour, feet per second, *cents/pound*, "*the ratio of a to b." variable*, *distribute*,

Students will write definitions of key vocabulary using complete, well-formed sentences.

Listening and Speaking

Students will explain how to set up and solve a proportion to a partner using the words *first*, *second*, *third*, *etc.*

Students will describe the relationship between fraction, ratio, proportion, using the words comparison, part to whole , part to part

Students will explain how to set up and solve/evaluate equations, expressions, and inequalities to a partner using the words *first*, *second*, *third*, *etc.*

Students will describe the difference between an equation, an expression, and an inequality using the words solution, simplify, solution set

Students will compare two angles (complementary, supplementary, and straight) using comparative words such as less than, greater than, equal to,

etc. Students will agree or disagree with mathematical answers to specific word problems using expressions of agreement or disagreement (I agree/disagree because) 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_______. 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.

PERFORMANCE TASKS
MATHEMATICS ASSESSMENT PROJECT 7.RP.1 and 7.RP.2 Proportion and Non-proportion Situations http://map.mathshell.org/materials/lessons.php?taskid=483#task483 7.RP.1 and 7.G.1 Developing a Sense of Scale http://map.mathshell.org/materials/lessons.php?taskid=456#task45 7.RP.3Increasing and Decreasing Quantities by a Percent http://map.mathshell.org/materials/lessons.php?taskid=210#task210 7.EE.1 and 7.EE.4 Steps to Solving Equations http://map.mathshell.org/materials/lessons.php?taskid=431#task431 **LAUSD CONCEPT LESSONS** RATIOS AND PERCENT LESSON - http://www.lausd.net/lausd/offices/iss/Math/MS/RATIO_AND_PERCENTS.pdf SHRINKING AND ENLARGING - http://www.lausd.net/lausd/offices/iss/Math/MS/SHRINKING_AND_ENLARGING.pdf GAUGING GAS MILEAGE - http://www.lausd.net/lausd/offices/iss/Math/MS/GAUGING_GAS_MILEAGE.pdf Planning a Bowling Party– http://math.lausd.net/sites/math.lausd.net/files/18.%20Planning%20a%20Bowling%20Party.pdf 7.EE.4 a Calling Plans– http://math.lausd.net/sites/math.lausd.net/files/17.%20Calling%20Plans.pdf **ILLUSTRATIVE MATHEMATICS** 7.RP.1 Cooking with Whole Cup - http://illustrativemathematics.org/illustrations/470 7.RP.1 Track Practice - http://illustrativemathematics.org/illustrations/82 7 RP.2 Art Class, Variations 1&2 - http://illustrativemathematics.org/illustrations/100 ; http://illustrativemathematics.org/illustrations/101 - Buying Coffee - http://illustrativemathematics.org/illustrations/104 7.RP.2d Robot Races - http://illustrativemathematics.org/illustrations/181 7.RP.2 Sore Throats – Variation 1 - http://illustrativemathematics.org/illustrations/180 7.EE.1 – Miles to Kilometers - http://illustrativemathematics.org/illustrations/433 7 EE.3 – Discounted Books - http://illustrativemathematics.org/illustrations/478 7.EE.4 and 4b. – Fishing Adventures 2 - http://illustrativemathematics.org/illustrations/643 7 EE.4b – Sport Equipment Set - http://www.illustrativemathematics.org/illustrations/986

INSIDE MATHEMATICS
7.RP.1, 7.RP.3 – Mixing Paint - http://insidemathematics.org/common-core-math-tasks/7th-grade/7-2003%20Mixing%20Paints.pdf
- Cereal – http://insidemathematics.org/common-core-math-tasks/7th-grade/7-2004%20Cereal.pdf
- Lawn Mowing- http://insidemathematics.org/common-core-math-tasks/7th-grade/7-2005%20Lawn%20Mowing.pdf
7.RP.2 - Cat Food- http://insidemathematics.org/common-core-math-tasks/7th-grade/7-2009%20Cat%20Food.pdf
7.EE.2&4 - The Wheel Shop http://insidemathematics.org/problems-of-the-month/pom-thewheelshop.pdf
7.EE.3 - The Toy Train http://insidemathematics.org/common-core-math-tasks/7th-grade/7-2009%20Toy%20Trains.pdf
NCTM ILLUMINATIONS
7.PR.2b Golden Ratio- http://illuminations.nctm.org/LessonDetail.aspx?ID=L510
7.RP.1 What's Your Rate- http://illuminations.nctm.org/LessonDetail.aspx?ID=L511
7.EE.1 The Mango Problem http://illuminations.nctm.org/LessonDetail.aspx?id=L264
7.EE.1 The Sailor and Cocoanut Problem http://illuminations.nctm.org/lessons/6-8/mangoes/Classic-AS-Sailor.pdf
7.EE.1 and 7.EE.2 Pan Balance - Expressions - http://illuminations.nctm.org/LessonDetail.aspx?id=L755
UTAH
7.RP.1 and 7.RP.2 Ratios, Rates, and Proportions – http://www.uen.org/Lessonplan/preview.cgi?LPid=23491

DIFFERENTIATION 🕮

FRONT LOADING	ACCELERATION	INTERVENTION
• Skills of arithmetic for fractions, decimals and percents • Understanding of coordinate plane and graphing of linear functions • Generate and solve linear equations Understand solving formulas for different variables (*t=pn; y=kx; i=prt*) • Reason about and solve 1-variable equations and inequalities • Apply and extend previous understandings of arithmetic to algebraic expressions Apply and extend understandings of numbers to the number system of rational numbers • 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	• How is rate of change related to the slope? • Multiple discounts • Limits of change • Rates of Change for Acceleration and Deceleration • 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. • 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	□ ALEKS – www.aleks.com □ Small group re-teach □ Using kinesthetic activities and manipulatives 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 they have on the table of values and subsequently have then graph the values.

growing with constant amount to introduce proportional relationship. • 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.	relationship. This prepares • Use the following activities for acceleration: First Rate (LEVEL D) http://insidemathematics.org/problems-of-the-month/pom-firstrate.pdf 7.RP.2 Bagel Algebra http://illuminations.nctm.org/LessonDetail.aspx?id=L662 Building bridges http://illuminations.nctm.org/LessonDetail.aspx?id=L247	

References:

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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. Institute for Mathematics & Education (2013). Illustrative Mathematics. Retrieved from http://www.illustrativemathematics.org/
8. California Department of Education. (2013). Draft Mathematics Framework Chapters. Retrieved from http://www.cde.ca.gov/be/cc/cd/draftmathfwchapters.asp.
9. National Council of Teachers of Mathematics (NCTM) Illuminations. (2013). Retrieved from http://illuminations.nctm.org/Weblinks.aspx.
10. The University of Arizona. (2011-12). Progressions Documents for the Common Core Math Standards. Retrieved from http://ime.math.arizona.edu/progressions.

Accelerated Grade 7 – UNIT 3
Introduction to Sampling and Inference

Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

CLUSTERS	COMMON CORE STATE STANDARDS
Statistics and Probability **(s/a)2 Use random sampling to draw inferences about a population.**	**7.SP.1**. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. **7.SP.2**. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*
(s/a)2 Draw informal comparative inferences about two populations.	**7.SP.3**. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.* **7.SP.4**. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*
(s/a)2 Investigate chance processes and develop, use, and evaluate probability models.	**7.SP.5**. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. **7.SP.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. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not*

	exactly 200 times. **7.SP.7**. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.* b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?* **7.SP.8**. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*
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 arguments 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 continuum K-8 www.**cde**.ca.gov/be/cc/**cd**/documents/updateditem12catt3.doc

[1] **Major Clusters – area of intensive focus where students need fluent understanding and application of the core concepts.**

[2] **Supporting/Additional Clusters – designed to support and strengthen areas of major emphasis/expose students to other subjects.**

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
• Compare two data distributions and address questions about differences between populations. • Begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.	• How do you determine which measures of variability should be used to draw informal comparative inferences? • How are lists, tables, tree diagrams or simulation used to find the probability of an event? • 3. How is probability used to predict frequency of an event?	• comparative • compound events • deviation • Discrepancy • distribution • draw inference • frequency • gauge • inferences • prediction • probability • random • relative • simple events • simulation • statistics • variability • variation

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
NLVM http://nlvm.usu.edu/ **California Draft Mathematics Framework:** http://www.cde.ca.gov/be/cc/cd/draftmathfwchapters.asp **LAUSD Adopted Textbooks:** **California Mathematics: Concepts Skills and Problem Solving, Glencoe McGraw-Hill** 11.1 Problem Solving Investigation 11.4 Measures of Central Tendency and Range 11.5 Measures of Variation 11.8 Select an Appropriate Display **California Math: Course 2 - McDougal Littell** 11.1 Mean, Median, Mode, and Range 11.2 Bar Graphs and Circle Graphs 11.3 Frequency Tables and Histograms	• Journal writing prompts • Use of spreadsheets and graphing tools • Use visuals to illustrate multiple representations of rate of change • Real-world connections • Structured instructional conversations (Think-Pair-Share)	SBAC - http://www.smarterbalanced.org/

LANGUAGE GOALS

Students will understand that some verbs have different meanings in different mathematical situations. (draw)

Students will be able to interpret the characteristics of 2D and 3D figures in order to manipulate them.
Example: The difference between 2D figure and 3D figure is __________________________.

Students will understand the context and relationship between data in order to make prediction and draw inferences.
Example: Given two different sets of data, I can predict that ________________ . Based on this prediction, I could draw inference that __________.

Students will be able to select the appropriate formulas needed to solve real-world and mathematical problems.
Example: I can compare the formulas for computing area, surface area, and volume of figures and objects, by ____________________.

Students will be able to justify steps taken to arrive at a logical conclusion.
Example: If the situation is__________, then I can conclude that _____________.

PERFORMANCE TASKS

MATHEMATICS ASSESSMENT PROJECT
7.G.6 Maximizing Area: Gold Rush http://map.mathshell.org/materials/lessons.php?taskid=415#task415
7.G.4 and 7.G.6 Using Dimensions: Designing a Sports Bag http://map.mathshell.org/materials/lessons.php?taskid=416#task416
7.G.4 and 7.G.6 Drawing to Scale: Designing a Garden http://map.mathshell.org/materials/lessons.php?taskid=494#task494
7.SP.1 Estimating: Counting Trees http://map.mathshell.org/materials/lessons.php?taskid=422#task422
7.G.6 Estimations and Approximations: The Money Munchers http://map.mathshell.org/materials/lessons.php?taskid=220#task220
7.SP.5-8 Evaluating Statements About Probability http://map.mathshell.org/materials/lessons.php?taskid=225#task225

ILLUSTRATIVE MATHEMATICS
7.SP.1, 7.SP.2 and 7.SP.7 Estimating the Mean State Area http://www.illustrativemathematics.org/illustrations/260
7.SP.2 and &.SP.7 Election Poll, Variation 1 http://www.illustrativemathematics.org/illustrations/235
7.SP.2 and SP.2 Election Poll, Variation 2 http://www.illustrativemathematics.org/illustrations/559/

DIFFERENTIATION 🕮		
FRONT LOADING	ACCELERATION	INTERVENTION
• Students Formulate questions that can be answered with data • Students design and use a plan to collect relevant data • Students analyze the data with appropriate methods • Students are able to interpret results and draw valid conclusions from the data that relate to the questions posed. • Such investigations involve making sense of practical problems by turning them into statistical investigations; moving from context to abstraction and back to context; repeating the process of statistical	• 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 at their own rate. This also includes the opportunity for students to make personal meeting of the lesson. • Statistics and Probability: Simulating probability experiments via technology where students collect meaningful data (type of music, who eats cafeteria food). Use the following activity for acceleration: Election Poll, Variation 3 http://www.illustrativemathematics.org/illustrations/55	• Small teacher to student ratio discussion – have students draw informal comparative inferences about two populations (boys vs. girls) • Data discussed comes from sampling life data (soccer team height vs. football team height) • In probability and statistics: Census data, experimental results

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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.
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6. Partnership for Assessment of Readiness for College and Career. (2012). PARCC Assessments. Retrieved from http://www.parcconline.org/parcc-assessment.
7. Institute for Mathematics & Education (2013). Illustrative Mathematics. Retrieved from http://www.illustrativemathematics.org/
8. California Department of Education. (2013). Draft Mathematics Framework Chapters. Retrieved from http://www.cde.ca.gov/be/cc/cd/draftmathfwchapters.asp.
9. National Council of Teachers of Mathematics (NCTM) Illuminations. (2013). Retrieved from http://illuminations.nctm.org/Weblinks.aspx.

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Acceleration Grade 7 – UNIT 4
Creating, Comparing, and Analyzing Geometric Figures

Students continue their work with area from Grade 6, solving problems involving the area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity, they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationships between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross-sections. They solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms. 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 complete their work on volume by solving problems involving cones, cylinders, and spheres.

CLUSTERS	COMMON CORE STATE STANDARDS
Geometry **Draw, construct, and describe geometrical figures and describe the relationships between them.**	**7.G.1**. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. **7.G.2**. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. **7.G.3**. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. **7.G.*3.1 Describe how two or more objects are related in space (e.g., skew lines, the possible ways three planes might intersect).***
Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	**7.G.4**. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. **7.G.5**. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. **7.G.6**. Solve real-world and mathematical problems involving area, volume and surface area of two- and three dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
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 problem involving volume of cylinders, cones, and spheres.	**8.G.9** Know the formulas for the volumes of cones, cylinders, and spheres and 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 arguments 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 continuum K-8 www.**cde**.ca.gov/be/cc/**cd**/documents/updateditem12catt3.doc

[1] **Major Clusters – area of intensive focus where students need fluent understanding and application of the core concepts.**

[2] **Supporting/Additional Clusters – designed to support and strengthen areas of major emphasis/expose students to other subjects.**

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
• Solve problems involving the area and circumference of a circle and surface area of three-dimensional objects. • Reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, which will lead to gaining familiarity with the relationships between angles formed by intersecting lines. Work with three-dimensional figures, relating them to two- dimensional figures by examining cross-sections. • Solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms. • Apply their understanding of the effect of geometric transformation(s) on a figure or shape. • Describe how two figures or shapes are congruent or similar. • Create or identify a sequence of transformations that lead to congruent or similar figures. • Analyze the relationship between angles measures (triangle sum; parallel lines cut by a transversal; impact of a geometric transformation). • Prove the Pythagorean Theorem, use to determine the distance between two coordinate points, and apply to real world situations.	• What 2-D figure results from slicing 3-D figures? • (cones, spheres, or cylinders) • How do you find the surface area and volume of a 3D figure? • What is the total number of degrees in supplementary and complementary angles? • What is the relationship between vertical and adjacent angles? • How would the volume and surface area be affected when dimensions of a figure are doubled and/or triple? • 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?	adjacent angle, Angle sum argument complementary cone congruent construct coordinate cylinder dilation exterior angle geometry line line segment parallel plane proof rectangular figures rectangular pyramids reflection rotation scale sequence similar/similarity skew sphere supplementary surface area three-dimensional (3-D) translation transversal two-dimensional (2-D) vertical

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
NLVM http://nlvm.usu.edu/ **NCTM Illuminations activities** 7.G.1 - Floor Plan - http://illustrativemathematics.org/illustrations/107 **California Draft Mathematics Framework:** http://www.cde.ca.gov/be/cc/cd/draftmathfwchapters.asp. **8.G.9: LAUSD Concept Lesson, "The Chocolate Factory,"** http://www.lausd.net/lausd/offices/iss/Math/HS/27_The%20Choc olate%20Factory_2008%20-%202009.pdf **8.G.6: LAUSD Concept Lesson, "Squaring Triangles,"** **http://www.lausd.net/lausd/offices/issMath/HS/09_Unit%202_Concept_Task_Aquaring_Triangles.pdf** **LAUSD Adopted Textbooks:** **California Mathematics: Concepts Skills and Problem Solving, Glencoe McGraw-Hill** 7.1 Circumference and Area of Circles 7.2 Problem Solving Investigation 7.3 Area of Complex Figures 7.4 Three-Dimensional Figures 7.5 Volume of Prisms and Cylinders 7.6 Volume of Pyramids and Cones 7.7 Surface Area of Prisms and Cylinders 7.8 Surface Area of Pyramids 7.9 Similar Solids **California Math: Course 2 - McDougal Littell** 8.5 Triangles and Their Areas 8.7 Quadrilaterals and Their Areas 8.8 Circumferences and Areas of Circles 9.2Translations in the Coordinate Plane	• Journal writing prompts (link) • Technology to show visual representations of geometric figures: Geometry sketchpad • Use visuals to illustrate multiple representations of rate of change • Real-world connections • Structured instructional conversations (Think-Pair-Share) • Provide explanations with examples of Reflection, Rotation, Translation, and Dilation	SBAC - http://www.smarterbalanced.org/ PARCC - http://parcconline.org/samples/mathematics/grade-6-slider-ruler

9.3 Reflections in the Coordinate Plane 9.4 Dilations in the Coordinate Plane 10.1 Lines and planes 10.2 Three-Dimensional Figures 10.3 Surface Areas of Prisms and Cylinders 10.4 Surface Areas of Pyramids and Cones 10.5 Volumes of Prisms and Cylinders 10.6 Volumes of Pyramids and Cones 10.7 Similar Solids **Engage New York**: Grade 8 Module 2 - The Concept of Congruence		

LANGUAGE GOALS

- Students will understand that some verbs have different meanings in different mathematical situations. (draw)
- Students will be able to interpret the characteristics of 2D and 3D figures in order to manipulate them.
  Example: The difference between 2D figure and 3D figure is ________________________.
- Students will be able to select the appropriate formulas needed to solve real-world and mathematical problems.
  Example: I can compare the formulas for computing area, surface area, and volume of figures and objects, by ___________________.
- Students will be able to justify steps taken to arrive at a logical conclusion.
  Example: If the situation is__________, then I can conclude that ____________.
- 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

- 7.G.6 Maximizing Area: Gold Rush http://map.mathshell.org/materials/lessons.php?taskid=415#task415
- 7.G.4 and 7.G.6 Using Dimensions: Designing a Sports Bag http://map.mathshell.org/materials/lessons.php?taskid=416#task416
- 7.G.4 and 7.G.6 Drawing to Scale: Designing a Garden http://map.mathshell.org/materials/lessons.php?taskid=494#task494
- 7.G.6 Estimations and Approximations: The Money Munchers http://map.mathshell.org/materials/lessons.php?taskid=220#task220
- 8.G.9: Problem Solving Lesson, "Modeling Making Matchsticks," http://map.mathshell.org/materials/lessons.php?taskid=410&subpage=problem

DIFFERENTIATION 🕮		
FRONT LOADING	ACCELERATION	INTERVENTION
Geometry: • Students work on problems involving areas and volumes. • Students understand multiple algorithms for the volume of prisms • Students apply visualization skills connected to solve the area of 3D shapes. • Students can construct 3d models from 2d models.	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 at their own rate. This also includes the opportunity for students to make personal meeting of the lesson. Geometry: Extension of standard 7G.3 - Students describe or define the features or characteristics of 2-D geometric figures that result when 3d figures are sliced horizontally, vertically or diagonally.	• Use Physical objects to demonstrate the math. In geometry : Such as cones, squares, sphere, etc.

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10. The University of Arizona. (2011-12). Progressions Documents for the Common Core Math Standards. Retrieved from http://ime.math.arizona.edu/progressions.