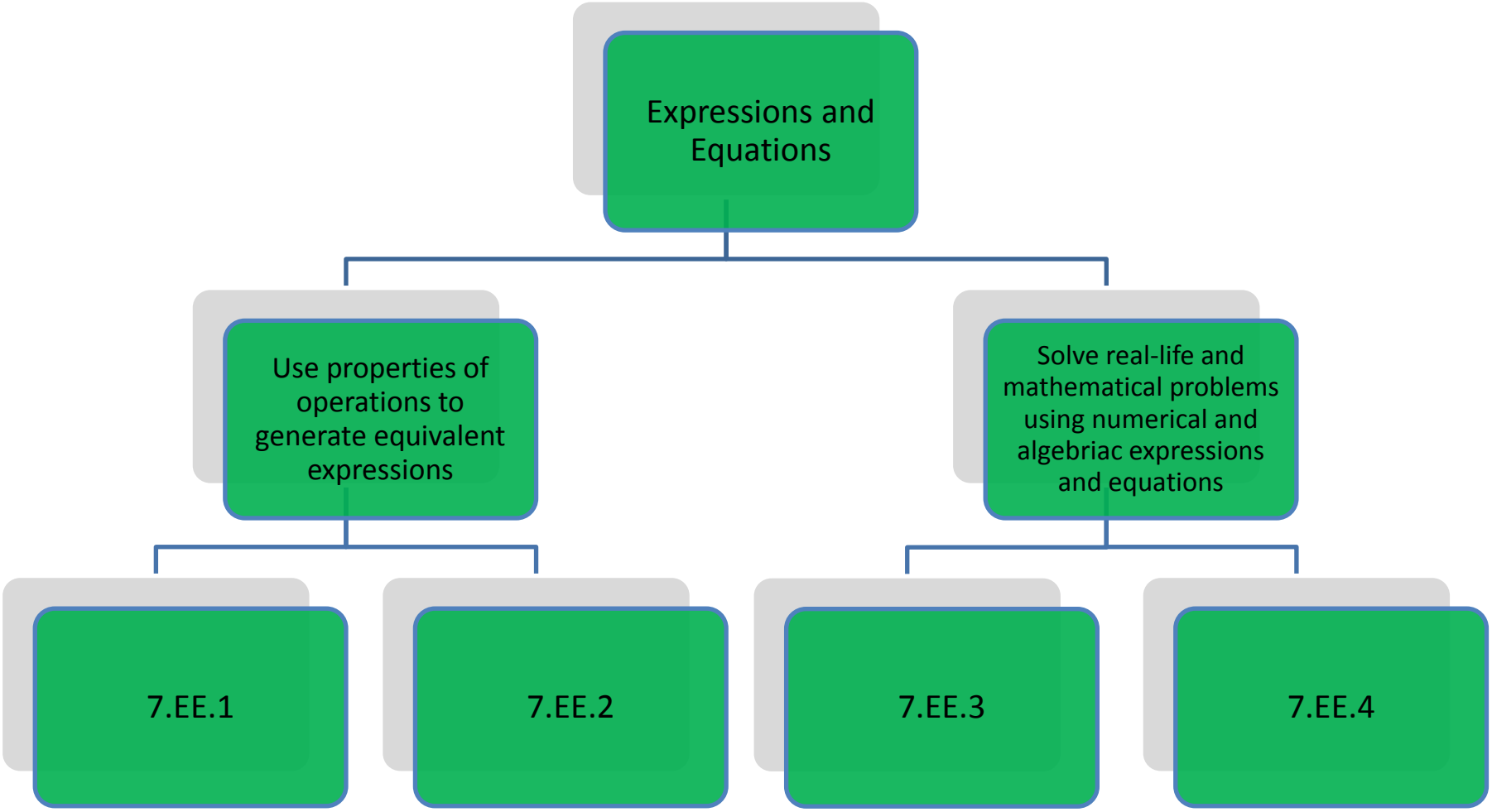
Common Core Math 7

Unit 3

Understand Expressions and Equations



COMMON CORE MATH 7 - UNIT 3
Understand Expressions and Equations

Description of Critical Area 2B: 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 division including expanding linear expressions with rational coefficient, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication. 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.

CLUSTER	COMMON CORE STATE STANDARDS
m[1] 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."*
m[1] 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.
m[1] Solve real-life and mathematical problems involving angle measure, area, surface area, and volume	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

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.	The Progressions for the Common Core State Standards in Mathematics (draft) for Expressions and Equations shows how the study of expressions and equations progress from grades 6 to 8. The progression of study and understanding that give rise to students solving real-life and mathematical problems using numerical and algebraic expressions and equations is presented in this document. The CDE Progress to Algebra continuum K-8 shows the clusters as the build to the study of Expressions and Equations from earlier grades.

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

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
• 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	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	• Algebraic • Arithmetic • Coefficient • Context • Cube Root • Equation • Expand • Expression • Factor • Inequality • Linear • Operations • Per • Perfect Cube

problems involving simple equations for an unknown angle in a figure would help students as the engage in higher Geometry concepts.	angles to write and solve simple equations involving unknown angles?	• Perfect Square • Properties • Rational • Solution Set • Square Root

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
LAUSD Adopted Textbook: • California Mathematics • College Preparatory Mathematics • Go Math Click on each list above for Textbook Alignment **Others** National Library of Virtual Manipulatives NCTM Tools and Activities TI Math Tools Geometer's Sketchpad **California Draft Mathematics Framework Chapters** http://www.cde.ca.gov/be/cc/cd/draftmathfwchapters.asp. **Illustrative Mathematics** 7.EE.1– Equivalent Expressions 7.EE.1 and 7.EE.4a – Guess My Number **Engage NY Common Core Curriculum** Module 4 – Expressions and Equations **Illustrative Mathematics** • 7.EE.1 – The Mango Problem • 7.EE.1 – The Sailor and Cocoanut Problem • 7.EE.1 and 7.EE.2 Pan Balance - Expressions • 7.EE.1 – Miles to Kilometers • 7 EE.3 – Discounted Books • 7.EE.4 and 4b. – Fishing Adventures 2 • 7 EE.4b – Sport Equipment Set	• Help students to gain a fundamental understanding that the distributive property works "on the right" as well as "on the left," in addition to "forwards" as well as "backwards." • Real-world connections (Use equations to set up a home budget, e.g. Percent of take-home pay for rent, utilities, food, savings, etc.to provide students a conceptual understanding of expressions and equations). • Engage students in a discussion to learn that different ways of writing expressions can serve different purposes and provide different ways of seeing a problem. Have students use this *example* to work with expressions: A rectangle is twice as long as it is wide. Find as many different ways as you can to write an expression for the perimeter of such a rectangle. • Use the Surround the Pool Concept Lesson • Structured instructional conversations (Think-Pair-Share) • Peer Tutoring • Journal writing prompts - • Questioning Strategies	Formative Assessment SBAC - http://www.smarterbalanced.org/ Item #'s Items: 2959, 43022, 43023, 43026, 43047, 43053 LAUSD 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. The 11th grade assessment will include ítems from Algebra 1, Geometry, and Algebra 2 standards. For examples, visit the SMARTER Balance Assessment at: SBAC - http://www.smarterbalanced.org/

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

By the end of 7th grade, students are expected to:

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 _____; because_____.*

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

Students will summarize the steps in setting up and evaluating/solving expressions, equations and inequalities 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* **"**evaluate" *and* "solution," and "solution set" *help me solve the problem*

Students will use the definitions in their textbook to describe key geometrical shapes using the relative pronoun "whose" (angles whose measures add up to 180° are supplementary)

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: *variable, distribute,*

Listening and Speaking

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)

PERFORMANCE TASKS

Mathematics Assessment Project

- 7.EE.1 and 7.EE.4 Steps to Solving Equations

LAUSD Concept Lessons

Planning a Bowling Party

7.EE.4a – Calling Plans

Inside Mathematics

- 7 EE.2 & 4 – The Wheel Shop
- 7 EE.3 – The Toy Train

DIFFERENTIATION 🕮		
UDL/ FRONT LOADING	ACCELERATION	INTERVENTION
• 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	Use the Building bridges activity to enrich high achieving students: http://illuminations.nctm.org/LessonDetail.aspx?id=L247	Intervention for low achieving students and students with disabilities: • Small teacher to student ratio discussion • Emphasize think-pair-share • Make connections to real life • ALEKS –www.aleks.com • Small group re-teach • Using kinesthetic activities and manipulatives

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. 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.