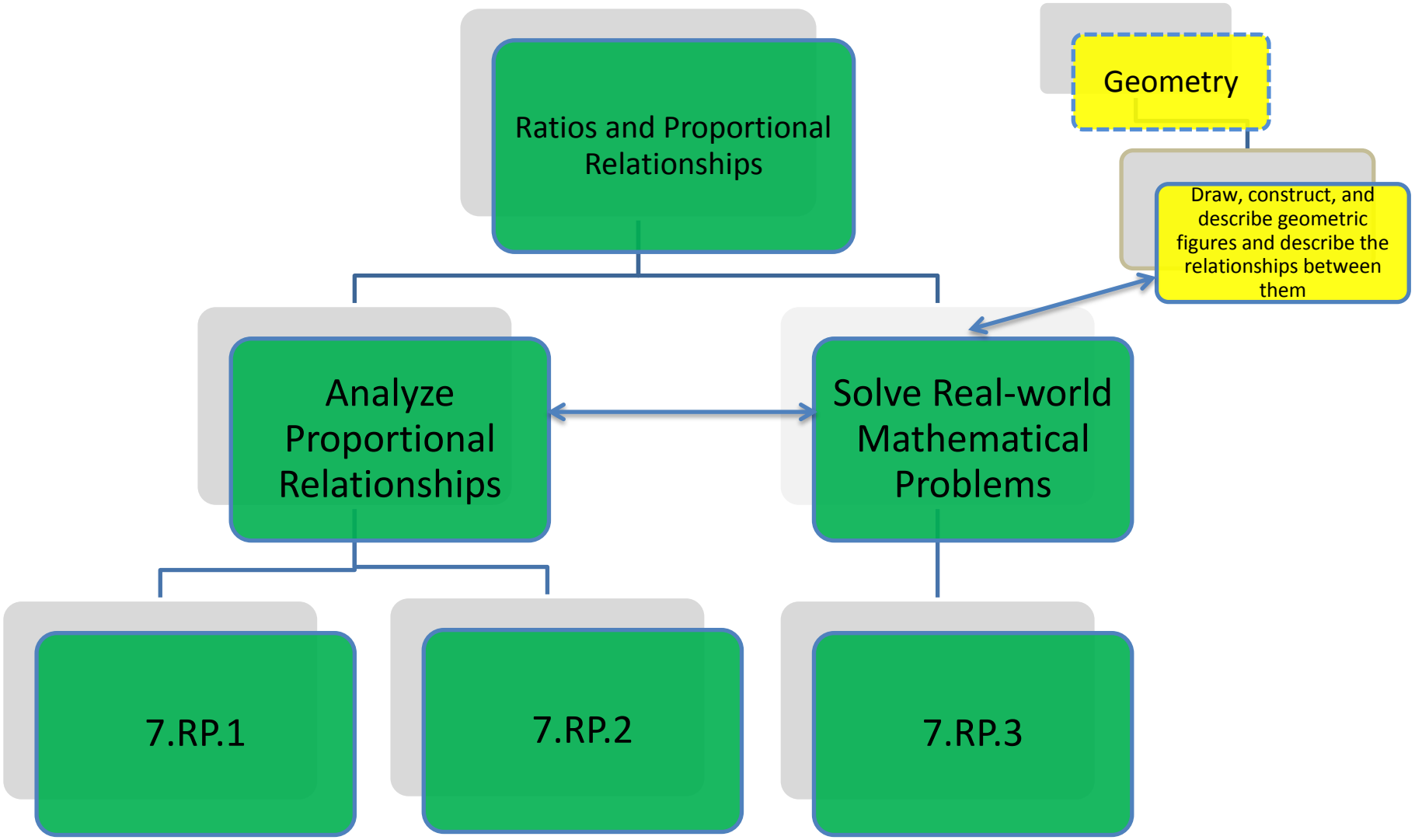
Common Core Math 7

Unit 1

Developing Understanding and Application of Proportional Relationships



COMMON CORE MATH 7 – UNIT 1

Developing Understanding and Application of Proportional Relationships

Critical Area: Students extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. Students use their understanding of ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students solve problems about scale drawings by relating corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope. They distinguish proportional relationships from other relationships.

CLUSTERS	COMMON CORE STATE STANDARDS
m[1] 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.*
m[1] 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.
MATHEMATICAL PRACTICES	
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.	As you begin the year, it is advised that you start with MP1, MP 3 and MP4 to set up your expectations of your classroom. This will help you and your students become proficient in the use of these practices. All other practices may be evident based on tasks and classroom activities.

8. Look for and express regularity in repeated reasoning.	

LEARNING PROGRESSIONS
The Progressions for the Common Core State Standards in Mathematics (draft) for 6-7, Ratios and Proportional Relationships shows how the study of ratios and proportional relationships extends students' work from previous grade levels' standards. The Ratios and proportional relationships are foundational for further study in mathematics and science and useful in everyday life. The CDE Progress to Algebra continuum K-8 shows the clusters as the build to the study of Ratios and Proportional Relationships 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
• 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. (Look at NYC Common Core Grade 7)	• 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?	Constant Equations Equivalency, Equivalence Proportion Proportional relationship Rate Ratio Scale Scale drawing Unit rate

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 NY Common Core Curriculum** Rational and Proportional Relationships Percent and Proportional Relationships **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 **Illustrative Mathematics**	• Real-world connections (e.g. Use grocery store ads to find unit rates for various products) • Structured instructional conversations (Think-Pair-Share) • Peer Tutoring • Journal writing prompts (link) • Use visuals to illustrate multiple representations of rate of change	**Formative Assessment** SBAC - http://www.smarterbalanced.org/ 7 RP 3 - Item #'s 42933, 42961 7G1 - Item # 43057 PARCC – Sample Items http://parcconline.org/samples/mathematics/grade-6-slider-ruler http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G7ProportionalRelationships_081913_Final.pdf http://www.parcconline.org/sites/parcc/files/PARCC_SampleItems_Mathematics_G7ReadingBooks_081913_Final.pdf

7.RP.1 Molly's Run
7.RP.2 Music Companies, Variations 1

Other Resources
TI Math–
Geometer's Sketchpad

Illustrative Mathematics

- 7.RP.1 Cooking with Whole Cup
- 7.RP.1 Track Practice
- 7 RP.2 Art Class, Variations 1& Variations 2
  - Buying Coffee

7.RP.2d Robot Races
7.RP.2 Sore Throats – Variation 1

LAUSD Assessments

District assessments are under development. More information to come soon.

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

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 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*

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."*

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 compare two geometric shapes (ratios, proportions, etc.) using comparative words such as equivalent, corresponding, proportional, 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.RP.1 and 7.RP.2 Proportion and Non-proportion Situations • 7.RP.1 and 7.G.1 Developing a Sense of Scale • 7.RP.3 Increasing and Decreasing Quantities by a Percent • 7.G.1 Drawing to Scale: Designing a Garden **LAUSD Concept Lessons** • Ratios and Percents • Shrinking and Enlarging • Gauging Gas Mileage	**Inside Mathematics** • 7.RP.1, 7.RP.3 – Mixing Paint Cereal Lawn Mowing- • 7.RP.2 - Cat Food **NCTM Illuminations** • 7.PR.2b Golden Ratio • 7.RP.1 What's Your Rate- • 7 G 1 Off the Scale **Utah Education Network** • 7.RP.1 and 7.RP.2 Ratios, Rates, and Proportions

DIFFERENTIATION📖		
FRONT LOADING	ACCELERATION	INTERVENTION
• Skills of arithmetic for fractions, decimals and percents are required for introducing the concepts in this unit. • Understanding of coordinate plane and graphing of linear functions will be useful in engaging students in the study of of application of proportional relationships. • Generate and solve linear equations • Understand solving formulas for different variables (*t=pn; y=kx; i=prt*)	• How is rate of change related to the slope? • Multiple discounts • Limits of change • Rates of Change for Acceleration and Deceleration 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	• Small teacher to student ratio discussion • Emphasize think-pair-share • Make connections to real life. Students understand that Part-to-part ratios are used to compare two parts. For example, the number of girls in the class (12) compared to the number of boys in the class (16) is the ratio the ratio 12 to 16. • Illustrate the concept of ratios and proportions using real life examples. Continuing with the use of a table and graph, students can investigate and reason about proportions. • Using kinesthetic activities and manipulatives

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