Alternative Accelerated CC Math 6/7 – UNIT 1
Understand the Concept of Ratio and Reason with Ratio and the Number System

Critical Area:
Ratio and Proportional Reasoning- Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates. Thus students expand the scope of problems for which they can use multiplication and division to solve problems, and they connect ratios and rates. Students solve a wide variety of problems involving ratios and rates.

Number System- Students use the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students use these operations to solve problems. Students extend their previous understandings of number and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, and in particular negative integers. They reason about the order and absolute value of rational numbers and about the location of points in all four quadrants of the coordinate plane.

Rationale- The study of ratios and proportional relationships follows a learning progression which expands students' understanding of measurement and multiplication and division in the elementary grades. This course begins with ratios and proportional relationships because this domain is foundational for further study in mathematics and science and useful in everyday life. In addition, students use ratio and proportions in Geometry and Algebra. In order for students to connect their learning across domains, beginning with ratios and proportional relationships is ideal. Only 3rd, 4th and 5th grade standards are prerequisite standards for 6th grade Ratio and Proportional Relationships. Ideally students would continue their learning in this domain by receiving instruction in the 7th grade standards for Ratio and Proportional Relationships. Although that would be ideal, the 6th grade Number System standards may be useful for the 7th grade Ratio and Proportional Relationship standards. Therefore, this unit will conclude with the 6th grade Number System standards, which have perquisite standards from the 3rd, 4th and 5th grade.

CLUSTERS	COMMON CORE STATE STANDARDS
(m)[1]Understand ratio concepts and use ratio reasoning to solve problems.	**6.RP.1**. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."* **6.RP.2**. Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*1

	6.RP.3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
Apply and extend previous understandings of multiplication and division to divide fractions by fractions.	**6.NS.1**. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3.* *(In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?*
	6.NS.2. Fluently divide multi-digit numbers using the standard algorithm.
	6.NS.3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
Compute fluently with multi-digit numbers and find common factors and multiples.	**6.NS.4**. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).*
Apply and extend previous understandings of numbers to the system of rational numbers.	

	6.NS.5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. **6.NS.6**. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g.,–(–3) = 3, and that 0 is its own opposite. b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. **6.NS.7**. Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.* b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3°C > –7°C to express the fact that –3°C is warmer than –7°C.* c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.* d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.* **6.NS.8**. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
(s/a)^2 Solve real-world and mathematical problems involving area, surface area, and volume.	6.G.1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
COMMON CORE STATE STANDARDS	PREREQUISITE COMMON CORE STATE STANDARDS
6.RP.1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to*	**6.RP.1** 4.OA.2- Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing

beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes." **6.RP.2**. Understand the concept of a unit rate *a*/*b* associated with a ratio *a:b* with $b \neq 0$, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."* **6.RP.3**. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	multiplicative comparison from additive comparison. 5.OA.3- Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.* 5.NF.5- Fluently multiply multi-digit whole numbers using the standard algorithm. **6.RP.2** 5.NF.3- Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. 4.MD.1- Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measure-ment equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), . . .* 5.NF.7- Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. **6.RP.3.a** 5.G.2- Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. **6.RP.3.b** 6.RP.2- Understand the concept of a unit rate *a*/*b* associated with a ratio *a:b* with $b \neq 0$, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."* 6.RP.3a- Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. **6.RP.3.c** 6.RP.2- Understand the concept of a unit rate *a*/*b* associated with a ratio *a:b* with $b \neq 0$, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."* **6.RP.3d**

	6.RP.2- Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to t4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*
COMMON CORE STATE STANDARDS	PREREQUISITE STANDARDS
6.NS.1. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3.* *(In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?*	**6.NS.1** 3.OA.6- Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.* 5.NF.7- Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.[1]
6.NS.2. Fluently divide multi-digit numbers using the standard algorithm.	**6.NS.2** 5.NBT.6- Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
6.NS.3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	**6.NS.3** 5.NBT.5- Fluently multiply multi-digit whole numbers using the standard algorithm. 5.NBT.6- Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. 5.NBT.7- Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
	6.NS.4 4.OA.4- Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a

6.NS.4. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).*	multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite. 5.OA.2- Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*
6.NS.5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. **6.NS.6**. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g.,–(–3) = 3, and that 0 is its own opposite. b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. **6.NS.7**. Understand ordering and absolute value of	**6.NS.5** NONE **6.NS.6a** 3.NF.2- Understand a fraction as a number on the number line; represent fractions on a number line diagram. 6.NS.5- Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. **6.NS.6b** 5.G.1- Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). 6.NS.6a- Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g.,–(–3) = 3, and that 0 is its own opposite. **6.NS.6c** 5.G.1- Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). 6.NS.6a- Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g.,–(–3) = 3, and that 0 is its own opposite. **6.NS.7a**

rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.* b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3°C > –7°C to express the fact that –3°C is warmer than –7°C.* c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.* d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.* **6.NS.8**. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	6.NS.6c- Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. **6.NS.7b** 6.NS.6c- Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. **6.NS.7c** 6.NS.6a- Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g.,–(–3) = 3, and that 0 is its own opposite. **6.NS.7d** 6.NS7a- Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.* 6.NS.7b- Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3°C > –7°C to express the fact that –3°C is warmer than –7°C* 6.NS.7c- Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. **6.NS.8** 5.G.2- Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. 6.NS.6b- Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
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. 8. Look for and express regularity in repeated	As you begin the year, it is advised that you start with MP1 and MP 3 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.

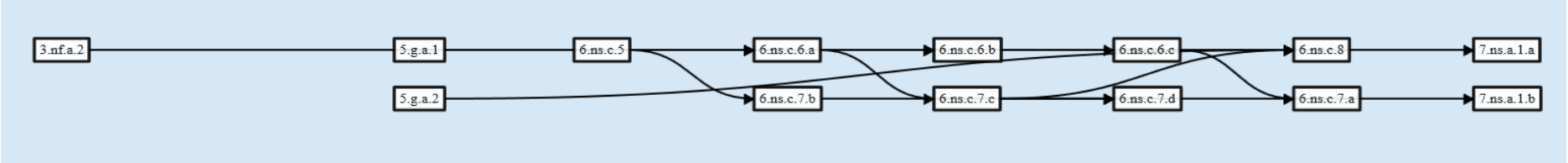
reasoning.	

LEARNING PROGRESSIONS

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 K-8 www.cde.ca.gov/be/cc/cd/documents/updateditem12catt3.doc

Interactive Wire Diagram for prerequisite standards
http://www.curtiscenter.math.ucla.edu/MapApp/prg_map.html



ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	KEY VOCABULARY
<u>Ratio and Proportional Relationships</u> -Understand relationships between two quantities involving ratios and explain using ratio language - Understand multiplication and division to solve ratio and rate problems about quantities - Understand ratios and rates and apply to real life situations -Understand percent as a rate per 100 -Understand and derive equivalent ratios and rates. <u>Number System</u> - Understand and explain why the procedures for dividing fractions make sense - Understand the full system of rational numbers, which include negative rational numbers with a focus on negative numbers. - Understand the ordering of numbers rational numbers. - Understand absolute value, order and location of points in all four quadrants of the coordinate plane. - Understand a rational number as a point on the number	<u>Ratio and Proportional Relationships</u> 1. What is a ratio and how does it describe a relationship between two quantities? 2. What is a unit rate and how do you use it in the context of a ratio relationship? 3. How would you use ratio and rate reasoning in real world situations? 4. How would you describe percent of a quantity as a rate per 100? <u>Number System</u> 1. How can you compute fractions by using visual fraction models and equations? 2. How do you find the GCF of two whole numbers using the distributive property? 3. How do you use positive and negative numbers to describe quantities having opposite values? 4. What is a rational number and how can you	<u>Ratio and Proportional Relationships</u> - Ratio - Proportional relationship - Equivalent - Rate - Quantity - Relationship - Part to part - Part to whole - Constant of proportionality - Scale factor - Percent - Per - Unit <u>Number System</u> - Quotient - Fraction - Factors - Multiples

line and order rational numbers on a number line.	graph it? 5. What is absolute value? 6. How can we apply inverse operations in solving problems?	- Rational number - Coordinate - Absolute value - Positive - Negative - Quadrants - Integers - Greatest common factor - Zero - Distributive property - Reflection - Opposite - Magnitude - Distance - Ordered pair - Common factor - Inequality - Divisor/Dividend - Equivalent fractions - Number line - Least common multiple

RESOURCES	INSTRUCTIONAL STRATEGIES	ASSESSMENT
Materials: **California Revised Mathematics Framework:** http://www.cde.ca.gov/be/cc/cd/draftmathfwchapters.asp. **Supporting Teachers with Deep Understanding of Math Content** NCTM, *Making Sense Fractions, Ratios and Proportions*, 64th Yearbook (2002) **Other Resources** Thinking Blocks: Ratios http://www.thinkingblocks.com/tb_ratios/ratios.html	**Journal / Quick Write Prompts** Compare and contrast expressing a relationship between quantities as a ratio, fraction and percent. Create a ratio problem for your classmates using a different context (situation) than the ones you have worked on in class. The most important thing to remember when solving ratio and percent problems is…. Some good test questions for ratio and percent are…	Ratio and Proportional Relationships SBAC - http://www.smarterbalanced.org/ PARCC - http://parcconline.org/samples/mathematics/grade-6-slider-ruler Number System SBAC – http://www.smarterbalanced.org/ PARCC - http://parcconline.org/samples/mathematics/grade-

Enrich Math: Once Upon a Time http://nrich.maths.org/4783 Enrich Math: Orange Drink http://nrich.maths.org/2420 Enrich Math: Pumpkin Pie Problem http://nrich.maths.org/1026 Mathplayground problem sets http://www.mathplayground.com/wp_videos.html **Illustrative Mathematics Resources:** • **6.RP Voting for Two, Variation 1 http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/061/original/illustrative_mathematics_61.pdf?1343857022** • **6.RP Voting for Two, Variation 2 http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/062/original/illustrative_mathematics_62.pdf?1343857023** • **6.RP Voting for Two, Variation 3 http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/063/original/illustrative_mathematics_63.pdf?1343857025** • **6.RP Voting for Two, Variation 4 http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/065/original/illustrative_mathematics_65.pdf?1343857026** **NCTM Illuminations** Highway Robbery: http://illuminations.nctm.org/LessonDetail.aspx?id=L838 **Unit Planning Template** http://edtech4schools.pbworks.com/f/UbDPages.pdf Number System **Supporting Teachers with Deep Understanding**	Use tape diagrams (bar model) to model problems where both quantities have the same units. Use double number lines to model problems where both quantities have different units. Use the multiplication table to help students find equivalent ratios Have students scale quantities up or down by using a rate table. Number System - Use of number line - Use of human graph -Using common denominators to divide fractions - Journal / Quick Write Prompts - Use of visual fraction models for division - Using common denominators to divide fractions to understand the remainder - Sorting cards - Fraction bars in teaching equivalent fractions - Vocabulary Development – 3x3 EL puzzle	6-slider-ruler **Sample Assessment Items** http://illustrativemathematics.org/standards/k8

of Math Content Ma, Liping. *Knowing and Teaching Elementary Mathematics: Teachers' Understanding of Fundamental Mathematics in China and the United States*, Chapter 3 "Generating Representations: Division by Fractions" - The 5 Practices - Book **Other Resources** Video explanation of division of fractions http://www.mathplayground.com/howto_divide_fractions.html Fractions Misconceptions http://www.cimt.plymouth.ac.uk/resources/help/miscon5.pdf Invert and Multiply? http://www.unclebobpuzzles.com/Permasite/UB&AC/dividefrac2.html Building Venn Diagrams http://www.pbslearningmedia.org/content/vtl07.math.data.rep.lpvenn/ Factor Trees http://www.mathplayground.com/factortrees.html Distributive Property Matrix Multiplication http://maine.edc.org/file.php/1/ParticipantResources/DistribPropMatrix1_Bean_L.html Chameleon Graphing http://mathforum.org/cgraph/cplane/ Maze Game http://www.shodor.org/interactivate/activities/MazeGame/ •		

LANGUAGE GOALS

Ratio and Proportional Relationships

- Students will summarize the steps in setting up and solving a problem involving ratio relationships using conditional and sequence words such as *if-then, first, next, therefore.*

Example: ".For every vote candidate A received, candidate C received nearly three votes. The ratio of candidate A to Candidate C is 1 to 3. Therefore, if candidate A received 1500 votes, how many votes will Candidate C receive.
I solved for the variable by _____. This means that I will multiply 1500 by 3 to get the number of votes Candidate C received.

- 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.

Example: The unknown variable is _____ because ___. This solution demonstrates that _____.

- 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"*

Example: "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger." For every ____ of ___ there are _____ of _____.

Number System

Students will be able to compare and contrast multiplication and division of rational numbers.
Example: To express 4x5 = 20 as division problem, I _____.

Students will be able to explain (writing/speaking) their understanding of absolute value and critique the reasoning of others.
Example: The absolute value of -5 is_____. This mean that if I travel to school for 5 miles, it will take_____ miles to travel home.

Students will be able to read a word problem and understand the situation in order to solve the problem.

Students will use the meaning of fractions to explain (writing/speaking) why the procedures for dividing fractions make sense.
Example: To divide fractions, I will _____ and _____.

When dividing fractions, students will be able to explain the meaning of the remainder.
Example: When I divide fraction, the remainder means _____.

PERFORMANCE TASKS

Ratio and Proportional Relationships

ILLUSTRIVE MATHEMATICS

- 6.RP Games at Recess. 6RP.A.1
  http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/076/original/illustrative_mathematics_76.pdf?1343857006

LAUSD Concept Lessons – math.lausd.net

- The Candy Bar Task: http://www.lausd.net/math/InstructionalGuides/Subjects/G6/PDF%20Documents/09.%20The%20Candy%20Jar.pdf
- The Caterpillar Task Part 1: http://math.lausd.net/sites/math.lausd.net/files/Day%204%20Concept%20task.pdf
- The Caterpillar Task Part 2: http://math.lausd.net/sites/math.lausd.net/files/Day%204%20caterpillars%20Pt2v1.pdf

MARS Tasks:

- Optimizing : Security Cameras http://map.mathshell.org/materials/lessons.php?taskid=482#task482
- Sharing Costs http://map.mathshell.org/materials/lessons.php?taskid=489&subpage=problem
- Designing : Candy Cartons http://map.mathshell.org/materials/lessons.php?taskid=488&subpage=problem
- Percent Cards http://www.insidemathematics.org/pdfs/sixth-grade/percent-cards/task.pdf
- Snail Pace http://www.insidemathematics.org/pdfs/sixth-grade/snail-pace/task.pdf
- Candies http://www.insidemathematics.org/pdfs/fifth-grade/candies/task.pdf

NCTM Illuminations Lessons

- Bean Counting and Ratios: http://illuminations.nctm.org/LessonDetail.aspx?id=L722
- Hay Bale Farmer: http://illuminations.nctm.org/LessonDetail.aspx?id=L783

Number System

MARS Tasks

Pedro's Tables http://www.insidemathematics.org/pdfs/seventh-grade/pedros-tables/task.pdf

Winning Lines http://www.insidemathematics.org/pdfs/fourth-grade/winning-lines/task.pdf

LAUSD Concept Lessons

Fraction of a Fraction http://www.lausd.net/math/InstructionalGuides/Subjects/G6/PDF%20Documents/03.%20Fraction%20of%20a%20Fraction.pdf

Linking Fractions http://www.lausd.net/math/InstructionalGuides/Subjects/G6/PDF%20Documents/04.%20Linking%20Fractions.pdf

Off to the Races http://localdistrict5.org/index.php?option=com_phocadownload&view=category&id=61:elementary-math&Itemid=199

Game of Chips http://localdistrict5.org/index.php?option=com_phocadownload&view=category&id=61:elementary-math&Itemid=199

Need resources for 6NS.1, NS.5, NS.6, NS.7-8

DIFFERENTIATION📖

FRONT LOADING	ACCELERATION	INTERVENTION
Ratio and Proportional Relationships Prerequisites: • Students apply their understanding of multiplication tables. Situations that give rise to columns or rows of a multiplication table can provide good initial context. • Students apply and extend their knowledge of	Ratio and Proportional Relationships 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	Ratio and Proportional Relationships • 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

common fractions, relationships and rules for multiplication and division of whole numbers as they apply to decimal fractions, Multiples and Factors and Divisibility Rules. <u>Number System</u> Students apply and extend their understanding of number sense, computation with multi-digit whole numbers and decimals (to hundredths), including application of order of operations, addition, subtraction, multiplication, and division of common fractions, and familiarity with factors and multiples. Front load vocabulary associated with applications of integers such as: Thermometer Elevator Credit/Debit Sea level	personal meaning of the lesson. For example: Use ratio and rate reasoning, percent of quantity as a rate per 100, and solve problems involving finding the whole given a part and the percent to solve real-world and mathematical problems: Students apply their math knowledge of ratio and rate by surveying all the students at their school on a current issue, students record their results in a contingency table below and make conclusions based on their results. <u>Number System</u> • Have students describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge. • Students design a story problems using temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge. • Explain absolute value by using the distant they travel to school each way (to and fro). That distance is always positive. • Provide a scenario where students will gather real – world data and graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	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, students can investigate and reason about proportions. Example of a juice mixture of juice A and B of a 5 to 2 and you want to know how m any cups of juice A to mix with juice B. Students make a ratio table to find the juice A entry that pairs with 12 cups of juice B in the table. Emphasis should be made to the important role of the multiplication table and division in how entries are related to each other. • Making explicit the type of relationships that exist between two values will minimize confusion between multiplicative and additive situations. • Use concrete manipulatives <u>Number System</u> Small teacher to student ratio discussion • Emphasize think-pair-share • Make connections to real life • give concrete examples • use of manipulatives – especially the number line • Use of multiple representations to represent fraction division problems. Set the problem in context and represent the problem with a concrete or pictorial model. • Provide multiple experiences to

		understand the relationships between numbers, absolute value, and statements about order. • Example: in real world, the absolute value can be used to describe size or magnitude. An ocean depth of 900 feet, write | –900| = 900 to describe the distance below sea level

[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.**

References:

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