Pacing: 3 weeks (plus 1 week for re-teaching/enrichment)

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| **Mathematical Practices**  |
| *Mathematical Practices #1 and #3* *describe a classroom environment that encourages thinking mathematically and are critical for quality teaching and learning.**Practices in bold are to be emphasized in the unit.***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. |
| **Domain and Standards Overview** |
| Ratios and Proportional Relationships* Understand ratio concepts and use ratio reasoning to solve problems.
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| **Priority and** Supporting **CCSS** | **Explanations and Examples\*** |
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| **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* ≠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.” (Expectations for unit rates in this grade are limited to non-complex fractions.)* | **6.RP.1.** A ratio is a comparison of two quantities which can be written as *a* to *b*, $\frac{a}{ b}$ , or *a:b*. A rate is a ratio where two measurements are related to each other. When discussing measurement of different units, the word rate is used rather than ratio. Understanding rate, however, is complicated and there is no universally accepted definition. When using the term rate, contextual understanding is critical. Students need many opportunities to use models to demonstrate the relationships between quantities before they are expected to work with rates numerically. A comparison of 8 black circles to 4 white circles can be written as the ratio of 8:4 and can be regrouped into 4 black circles to 2 white circles (4:2) and 2 black circles to 1 white circle (2:1). Students should be able to identify all these ratios and describe them using “For every…., there are …”6.RP.2. A unit rate compares a quantity in terms of one unit of another quantity. Students will often use unit rates to solve missing value problems. Cost per item or distance per time unit are common unit rates, however, students should be able to flexibly use unit rates to name the amount of either quantity in terms of the other quantity. Students will begin to notice that related unit rates are reciprocals as in the first example. It is not intended that this be taught as an algorithm or rule because at this level, students should primarily use reasoning to find these unit rates. In Grade 6, students are not expected to work with unit rates expressed as complex fractions. Both the numerator and denominator of the original ratio will be whole numbers. Examples: • On a bicycle you can travel 20 miles in 4 hours. What are the unit rates in this situation, (the distance you can travel in 1 hour and the amount of time required to travel 1 mile)? Solution: You can travel 5 miles in 1 hour written as $\frac{5 mi}{1 hr}$ and it takes $\frac{1}{5}$ of a hour to travel each mile written as $ \frac{\frac{1}{5} hr}{ 1 mi}$. Students can represent the relationship between 20 miles and 4 hours.  • A simple modeling clay recipe calls for 1 cup corn starch, 2 cups salt, and 2 cups boiling water. How many cups of corn starch are needed to mix with each cup of salt? |
| **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.**1. **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.**
2. **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?*
3. **Find a percent of a quantity as a rate per 100 (e.g., 30 percent of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.**
4. **Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.**
 | **6.RP.3.** Examples: • Using the information in the table, find the number of yards in 24 feet. There are several strategies that students could use to determine the solution to this problem. o Add quantities from the table to total 24 feet (9 feet and 15 feet); therefore the number of yards must be 8 yards (3 yards and 5 yards). o Use multiplication to find 24 feet:  1) 3 feet x 8 = 24 feet; therefore 1 yard x 8 = 8 yards, or  2) 6 feet x 4 = 24 feet; therefore 2 yards x 4 = 8 yards. • Compare the number of black to white circles. If the ratio remains the same, how many black circles will you have if you have 60 white circles? • If 6 is 30% of a value, what is that value? (Solution: 20) • A credit card company charges 17% interest on any charges not paid at the end of the month. Make a ratio table to show how much the interest would be for several amounts. If your bill totals $450 for this month, how much interest would you have to pay if you let the balance carry to the next month? Show the relationship on a graph and use the graph to predict the interest charges for a $300 balance.  |

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| **Concepts****What Students Need to Know** | **Skills****What Students Need To Be Able To Do** | **Bloom’s Taxonomy Levels** |
| * ratios and rates
	+ tables of equivalent ratios
	+ missing values in tables
	+ tape diagrams
	+ double number line diagrams
	+ equations
* pairs of values on a coordinate plane
* unit rate
	+ unit pricing
	+ constant speed
* percent
	+ a quantity as a rate per 100
	+ finding the whole, given a part and the percent
* measurement units
 | * UNDERSTAND (ratios/the concept of a unit rate)
* DESCRIBE (ratio relationship)
* USE (ratio and rate reasoning/language)
* SOLVE (with and without context)
* MAKE (tables of equivalent ratios)
* FIND (missing values in tables)
* PLOT (pairs of values on the coordinate plane)
* SOLVE (unit rate problems)
* FIND (percent of a quantity as a rate per 100)
* SOLVE (problems finding the whole, given a part and the percent)
* CONVERT (measurement units)
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| **Essential Questions**  |
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| **Corresponding Big Ideas** |
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| **Standardized Assessment Correlations****(State, College and Career)** |
| **Expectations for Learning (in development)** This information will be included as it is developed at the national level. CT is a governing member of the Smarter Balanced Assessment Consortium (SBAC) and has input into the development of the assessment. |

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| **Tasks and Lessons from the Mathematics Assessment Project (Shell Center/MARS, University of Nottingham & UC Berkeley)****These tasks can be used during the course of instruction when deemed appropriate by the teacher.** |
| **Taxi Cabs** <http://map.mathshell.org/materials/tasks.php?taskid=395&subpage=expert> |

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| **Tasks from Inside Mathematics (**<http://insidemathematics.org/index.php/mathematical-content-standards>)**These tasks can be used during the course of instruction when deemed appropriate by the teacher.****NOTE: Most of these tasks have a section for teacher reflection.** |
| **Truffles -** NOTE: question #5 is not strongly connected to 6.EE.9 so task can be given as part of unit 5 in grade 6 and students should be able to be successful. Recommend remove 6.EE.9 connection to task. Task is also listed under 6.EE.9 but does not belong.**Sewing -** Ratios and Rates for sales tax application in question #3.**Snail Pace** |

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| **Unit Assessments****The items developed for this section can be used during the course of instruction when deemed appropriate by the teacher.** |
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