Unit D - *Ratio, Proportion, Percent*

Overview

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. They distinguish proportional relationships from other relationships. In the last unit of this course students will graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope.

21st Century Capacities: Analyzing and Synthesizing

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS	*Transfer:*
	Students will be able to independently use their learning in new situations to...
MP 1 Make sense of problems and persevere in solving them **MP7** Look for and make use of structure **MP8** Look for and express regularity in repeated reasoning	1. Examine information/data/evidence to make inferences and identify possible underlying assumptions, patterns, and relationships. (Analyzing) 2. Fluently move between different representations of a number (Synthesizing)

	Meaning:	
CC.7.RP.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships CC.7.RP.2d 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. CC.8.EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph.	UNDERSTANDINGS: *Students will understand that:* 1. Mathematicians apply the mathematics they know to solve problems arising in everyday life. 2. Mathematicians examine mathematical relationships to discern a pattern or structure. 3. Math can be used to model real world situations.	ESSENTIAL QUESTIONS: *Students will explore & address these recurring questions:* A. Is there more than one way to describe a relationship? B. What is another efficient way that this problem could be solved? C. How do I decide if my answer makes sense, and if not, what do I do? D. How can you determine when two quantities are in a proportional relationship?

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. CC.7.RP.2c 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 $t = pn$. CC.7.RP.2 Analyze proportional relationships and use them to solve real-world and mathematical problems. Recognize and represent proportional relationships between quantities. CC.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. CC.7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing at a different scale. CC.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.	*Acquisition:*	
	Students will know…	*Students will be skilled at…*
	1. The constant of proportionality is the unit rate. 2. Proportional relationships can be represented by tables, equations, and graphs. 3. Ratios can help with conversions between units of measure. 4. Percent is a ratio that is used proportionally to solve problems. 5. Tips, markups, commissions, discounts, tax, and simple interest are all applications of percent. 6. Similar figures are proportional. 7. Vocabulary: constant of proportionality, slope, similar, scale, simple interest, tax, commission, tip, gratuity, percent increase, percent decrease, percent error, markup, discount	1. Finding the ratio or unit rate of a situation from a verbal description, a table, diagram or a graph 2. Simplify ratios that involve complex fractions 3. Explaining what a point (x, y) on the graph of a proportional relationship means in terms of the situation 4. Comparing two different proportional relationships represented in different ways 5. Representing proportional relationships by equations 6. Analyzing proportional relationships and use them to solve real-world and mathematical problems. 7. Using the concept of proportionality to find missing lengths of similar figures 8. Working with scaled drawings to find missing dimensions 9. Using the percent proportion and/or the percent equation to solve problems involving tax, tips, discounts, simple interest, percent change and percent error.