	COMPARING AND SCALING Ratios, Rates, Percents, and Proportions		
Instructional Time and Investigations	22 days	• Inv. 1: Ways of Comparing: Ratios and Proportions (4 Problems) • Inv. 2: Comparing and Scaling Rates (3 Problems) • Inv. 3: Markups, Markdowns, and Measures: Using Ratios, Percents, and Proportions (3 Problems)	
Goals	**Ratios, Rates, and Percents:** Understand ratios, rates, and percents. • Ratios make comparisons between two quantities. Rates, unit rates, and percents are all types of ratios. • Knowing the desired ratio between two variables allows you to scale the ratio or find a missing part of a ratio.	**Proportionality:** Understand proportionality in tables, graphs, and equations. • A proportional relationship has particular characteristics when represented in a table, graph or equation. For example, it is a straight line in a graph and can be represented as $y = mx$.	**Reasoning Proportionality:** Develop and use strategies for solving problems that require proportional reasoning. • Being able to change the form of a ratio is a useful problem-solving strategy. • Various strategies can be used to solve problems involving proportions, including scaling, rate tables, percent bars, unit rates, and equivalent ratios.
Common Core Standards	**Common Core Standards for Mathematical Practice** **MP.1:** Make sense of problems and persevere in solving them. **MP.2:** Reason abstractly and quantitatively. **MP.3:** Construct viable arguments and critique the reasoning of others. **MP.4:** Model with mathematics. **MP.5:** Use appropriate tools strategically. **MP.6:** Attend to precision. **MP.7:** Look for and make use of structure. **MP.8:** Look for and express regularity in repeated reasoning.	**Common Core Content Standards** **7.RP.A.1:** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. **7.RP.A.2:** Recognize and represent proportional relationships between quantities. **7.RP.A.3:** Use proportional relationships to solve multistep ratio and percent problems. **7.EE.B.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. **Also 7.RP.A.2a–d, 7.NS.A.3, 7.EE.A.2, 7.EE.B.3, 7.EE.B.4a**	

COMPARING AND SCALING Ratios, Rates, Percents, and Proportions

Content Connections to Other Units

Goals of the Unit	Prior Work	Future Work
Ratios, Rates, and Percents: Understand ratios, rates, and percents.	• Exploring and applying rational number concepts (*Comparing Bits and Pieces; Let's Be Rational; Decimal Ops; Accentuate the Negative*) • Percent defined as a ratio to 100 and connected to fractions and decimals (*Comparing Bits and Pieces; Let's Be Rational; Decimal Ops*)	• Calculating and applying slope with equations in $y = mx + b$ form (*Moving Straight Ahead; Thinking With Mathematical Models; Say It With Symbols*) • Making comparisons between groups of different sizes (*Samples and Populations; Growing, Growing, Growing*)
Proportionality: Understand proportionality in tables, graphs, and equations.	• Connecting and comparing rates using ratios, decimals, and percents (*Comparing Bits and Pieces; Let's Be Rational; Stretching and Shrinking*) • Comparing data sets (*Data About Us*) • Representing patterns of change in words, tables, graphs, and equations (*Variables and Patterns*) • Fractions as a part/whole comparison, addition, subtraction, multiplication, and division with fractions (*Comparing Bits and Pieces; Let's Be Rational*)	• Comparing probabilities (*What Do You Expect?*) • Comparing data sets (*Samples and Populations; Thinking With Mathematical Models*) • Finding the equation of a line (*Moving Straight Ahead; Thinking With Mathematical Models*) • Expressing linear relationships with symbols (*Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing*) • Expressing and applying probabilities as fractions (*What Do You Expect?*) • Determining if two algebraic expressions are equivalent (*Growing, Growing, Growing; Frogs, Fleas and Painted Cubes; Say It With Symbols; Function Junction*)
Reasoning Proportionality: Develop and use strategies for solving problems that require proportional reasoning.	• Using percents to make comparisons (*Comparing Bits and Pieces; Decimal Ops*) • Recognizing direct proportionality relationships with a unit rate (*Variables and Patterns*) • Making inferences about quantities (*Data About Us*) • Comparing and subdividing similar figures to determine scale factors (*Stretching and Shrinking*)	• Expressing proportional and nonproportional linear relationships with symbols (*Moving Straight Ahead; Thinking With Mathematical Models*) • Making inferences about quantities and populations based on experimental or theoretical probabilities (*What Do You Expect?*) • Estimating with and comparing large numbers (*Growing, Growing, Growing*) • Developing benchmarks and skills for estimating irrational numbers (*Looking for Pythagoras*) and for estimating populations (*Samples and Populations*) • Scaling up rectangular prisms (*Filling and Wrapping*)