6-5: Decimal Ops

Unit Goals, Focus Questions, and Mathematical Reflections

Unit Goals

Numeric Estimation Understand that estimation can be used as a tool in a variety of situations, including as a way to check answers and make decisions

- Use estimates to solve problems and check answers

Decimal Operations Revisit and continue to develop meanings for the four arithmetic operations on rational numbers, and practice using algorithms to operate on decimals

- Recognize when addition, subtraction, multiplication, or division is the appropriate operation to solve a problem
- Use place value to develop understanding of algorithms and to relate operations with decimals to the same operations with fractions
- Extend understanding of multiplication and division of multidigit whole numbers
- Develop standard algorithms for multiplying and dividing decimals with the aid of, at most, paper and pencil
- Find a repeating or terminating decimal equivalent to a given fraction
- Solve problems using arithmetic operations on decimals, including finding unit rates

Variables and Number Sentences Use variables to represent unknown values and number sentences to represent relationships between values

- Write number sentences to represent relationships between both real-world and abstract values
- Use fact families to write and solve equivalent number sentences
- Use multiplication sentences to check division sentences

Percents Develop understanding of percents through various contexts, such as sales tax, tips, discounts, and percent increases

- Develop models for percent problems
- Write and solve number sentences involving percents

CONNECTED MATHEMATICS PROJECT

6-5 Decimal Ops: Focus Questions (FQ) and Mathematical Reflections

Investigation 1 Decimal Operations and Estimation	Investigation 2 Adding and Subtracting Decimals	Investigation 3 Multiplying and Dividing Decimals	Investigation 4 Using Percents
Problem 1.1 **Out to Lunch: Matching Operations and Questions** FQ: What signals in a real-world problem tell you which operation to use? **Problem 1.2** **Getting Close: Estimating Decimal Calculations** **FQ:** When you work with decimal computations, what strategies can you use to estimate the results? **Problem 1.3** **Take a Hike: Connecting Ratios, Rates, and Decimals** FQ: How can you express a unit rate as a decimal and use it to solve problems?	**Problem 2.1** **Getting Things in the Right Place: Adding Decimals** FQ: What's the Difference? Subtracting Decimals **Problem 2.2** **What's the difference? Subtracting Decimals** FQ: How do you subtract one decimal number from another? **Problem 2.3** **Connecting Operations: Fact Families** FQ: Do fact families apply to operations with decimal numbers?	**Problem 3.1** **It's Decimal Times(s): Multiplying Decimals I** FQ: How do you find the product of any two decimal numbers? **Problem 3.2** **It Works Every Time: Multiplying Decimals II** FQ: What algorithm can be used to find any decimal product? **Problem 3.3** **How Many Times? Dividing Decimals I** FQ: How can a decimal division problem be written in equivalent fraction and whole number form? **Problem 3.4** **Going the Long Way: Dividing Decimals II** FQ: How can you carry out a decimal division using a method similar to long division of whole numbers? **Problem 3.5** **Challenging Cases: Dividing Decimals III** FQ: How can you complete a long division problem that doesn't give a whole number quotient? That is, how do you express remainders in decimal form?	**Problem 4.1** **What's the Tax on This Item?** FQ: How do you find the tax and the total cost of an item from a given selling price and tax rate? How do you find the base price from a given tax rate and amount? **Problem 4.2** **Computing Tips** FQ: How do you find the tip and the total cost of a restaurant meal from a given meal price and tip rate? How do you find the meal price from a given tip percent and amount? **Problem 4.3** **Percent Discounts** FQ: How do you find the discount and the total cost of an item from a given selling price and discount rate? How do you find the base price from a given discount rate and amount? How can you express a change in a given amount as a percent change? **Problem 4.4** **Putting Operations Together** FQ: How do you decide which operations to perform when a problem involves decimals and percents?
Mathematical Reflections 1. How do you know when solving a problem that involves decimals requires addition? Subtraction? Multiplication? Division? 2. Describe a strategy that you use when estimating with decimals. Explain why it is helpful to you. 3. What is a unit rate? Describe how unit rates are useful.	**Mathematical Reflections** 1. How does interpreting decimals as fractions help you make sense of adding and subtracting decimals? Give an example to show your thinking. 2. How does the place-value interpretation of decimals help you add and subtract decimals? Give an example to show your thinking. 3. Describe algorithms for adding and subtracting any two decimal numbers.	**Mathematical Reflections** 1. What algorithm can be used to multiply any two decimal numbers? Explain why your algorithm works, and give an example that shows how it works. 2a. What algorithm can be used to divide any two decimal numbers? Explain why your algorithm works, and give an example that shows how it works. 2b. How can you predict whether a quotient will be a terminating decimal or a repeating decimal? 3a. What is the fact-family connection between decimal multiplication and division? 3b. How can you check the result of a division calculation? 3c. How can you check the result of a multiplication calculation?	**Mathematical Reflections** 1a. How do you find the tax on a purchase and calculate the final bill? Give an example, then write and solve a number sentence to illustrate your strategy. 1b. How do you find the price of a discounted item if you know the percent of the discount? Give an example, then write and solve a number sentence to illustrate your strategy. 1c. How do you find the cost of a purchase if you know the percent and the amount of the tax on the purchase? Give an example, then write and solve a number sentence to illustrate your strategy. 1d. How can you find the percent one number is of another? For example, what percent of 35 is 7? Write and solve a number sentence to illustrate your answer. 1e. How are all the number sentences in parts (a)-(d) the same? 2. How do you recognize when addition, subtraction, multiplication, and/or division of decimals is required to solve a problem?