Gateway Regional School District

Atlas

Unit Plan

5.6 More Decimal and Fraction Operations

Chester / Littleville Elementary / Grade 5 / Mathematics

Week 22 - Week 26 | 4 Curriculum Developers | Last Updated: Mar 26, 2024 by LeBlanc, Deanna

Style Guide

What is the purpose of the unit? What are the major take-aways?

Standards

MA: Mathematics (2017)
MA: Grade 5
Operations & Algebraic Thinking

5.OA Write and interpret numerical expressions.

- [x] 1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols, e.g., (6 x 30) + (6 x 1/2).
- [x] 2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. Show Details

Number & Operations in Base Ten

5.NBT Understand the place value system.

- [x] 1. Recognize that in a multi-digit number, including decimals, a digit in any place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
- [x] 2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

Number & Operations—Fractions

5.NF Use equivalent fractions as a strategy to add and subtract fractions.

- [x] 1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. Show Details
- [x] 2. Solve word problems involving addition and subtraction of fractions referring to the same whole (the whole can be a set of objects), including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. Show Details

5.NF Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

- [x] 4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
- [x] 5. Interpret multiplication as scaling (resizing), by:
- [x] 5a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. For example, which number is greater without multiplying: 225 or ¾ x 225; 11/50 or 3/2 x 11/50?
- [x] 5b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n × a)/(n × b) to the effect of multiplying a/b by 1.

Measurement & Data

5.MD Convert like measurement units within a given measurement system.

- [x] 1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

5.MD Represent and interpret data.

- [x] 2. Make a line plot (dot plot) to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots (dot plot). Show Details

Enduring Understandings

1. Mathematical Relationships and Symbols: Students will understand that symbols such as parentheses, brackets, and braces are tools that indicate the order in which operations in a numerical expression should be performed. They will grasp that these symbols help organize and clarify complex numerical expressions and ensure accurate evaluations.

2. Expressions and Interpretation: Students will comprehend that expressions can be written to represent mathematical calculations and that these expressions can be interpreted to understand the involved operations without actually performing the calculations. They will recognize the importance of being able to translate between verbal, written, and mathematical representations of problems.

3. Place Value and Digit Significance: Students will realize that in a multi-digit number, including those with decimals, the position of a digit is crucial to determining its value. They will learn that a digit in any given place is worth 10 times more than the same digit one place to the right and 1/10 of its value one place to the left. This understanding will be the foundation for operations with multi-digit numbers and decimals.

4. Patterns in Multiplication and Division by Powers of 10: Students will recognize patterns when multiplying and dividing numbers, including decimals, by powers of 10. They will understand how the number of zeros in the product changes when multiplying by powers of 10 and how the placement of a decimal point changes when multiplying or dividing decimals by powers of 10. They will become familiar with using whole-number exponents to signify the powers of 10, deepening their number sense and conceptual understanding of exponents and place value.

5. Equivalent Fractions and Operations with Unlike Denominators: Students will comprehend the concept of equivalent fractions and the necessity of using them to add and subtract fractions with unlike denominators, including mixed numbers. They will learn strategies to convert fractions to equivalent forms with common denominators to perform these operations. Through this, students will achieve a more profound understanding of fractions as numbers and develop skills to manipulate and operate on them in various contexts.

Essential Questions

1. For Understanding the Use of Parentheses, Brackets, or Braces in Numerical Expressions:
- How do parentheses, brackets, and braces change the outcome of numerical expressions?
- Why is it important to follow the correct order of operations when evaluating expressions that include these symbols?

2. For Writing and Interpreting Simple Expressions:
- What strategies can be used to write expressions that accurately represent mathematical calculations?
- How can you interpret a numerical expression without actually calculating the final value?

3. For Recognizing the Place Value of Digits in Multi-Digit Numbers, Including Decimals:
- How does the value of a digit change when it moves from one place to another in a decimal number?
- What is the relationship between adjacent place values in a decimal number?

4. For Understanding Patterns in Multiplication by Powers of 10:
- What pattern emerges when you multiply a number by powers of 10?
- How does the position of the decimal point change when multiplying or dividing by powers of 10, and why?

5. For Adding and Subtracting Fractions with Unlike Denominators:
- How can understanding equivalent fractions help you add and subtract fractions with unlike denominators?
- Why is it necessary to convert fractions to equivalent fractions with like denominators before adding or subtracting?

Content

Skills

In this unit, students deepen their understanding of place value relationships of numbers in base ten, unit conversion, operations on fractions with unlike denominators, and multiplicative comparison. The work here builds on several important ideas from grade 4.
In grade 4, students learned the value of each digit in a whole number is 10 times the value of the same digit in a place to its right. Here, they extend that insight to include decimals to the thousandths. Students recognize that the value of each digit in a place (including decimal places) is 110110 the value of the same digit in the place to its left.
This idea is highlighted as students perform measurement conversions in metric units.
Previously, students learned to convert from a larger unit to a smaller unit. Here, they learn to convert from a smaller unit to a larger unit. They observe how the digits shift when multiplied or divided by a power of 10 and learn to use exponential notation for powers of 10 to represent large numbers.

Next, students turn their attention to fractions. In earlier grades, students made sense of equivalent fractions, added and subtracted fractions with the same denominator, and added tenths and hundredths. In this unit, they add and subtract fractions with different denominators. They see that the key is to find a common denominator and analyze different techniques for doing so. Students then solve problems that involve measurement data (in halves, fourths, and eighths) that are displayed on line plots.
In the final section, students reason about the size of a product of fractions and that of the factors. This work builds on the multiplicative comparison work in grade 4, in which students compared a whole number as "_____ times as many (or as much) as" another whole number. Here, students reason about products of a whole number and a fraction without finding the value of each product. They use diagrams and expressions to support their reasoning.

Throughout the unit

The Number Talk routine is used throughout the unit to support students' developing fluency and to see the multiplicative structures present in the base-ten system, adding and subtracting of fractions, and multiplication of fractions. Students use benchmark fractions and equivalent fractions to reason about the value of the expressions.

Section A Goals

- Explain patterns when multiplying and dividing by powers of 10.
- Solve multi-step problems involving measurement conversions.

Section B Goals

- Add and subtract fractions with unlike denominators.
- Create line plots to display fractional measurement data, and use the information to solve problems.
- Solve problems involving addition and subtraction of fractions.

Section C Goals

- Interpret multiplication as scaling (resizing).
- Make generalizations about multiplying a whole number by a fraction greater than, less than and equal to 1.

How will you gauge student learning?

Assessments

5.6 End-of-Unit Assessment | Summative | Written Test

Grade5-6-End-of-Unit-Assessment-assessment.pdf

7 State Standards Assessed

How will students learn?

Learning Activities

Section A:
In this section, students extend their understanding of place value and apply it to perform conversions between different, mostly metric, units.
Students begin by observing that the value of the digit in each place is 10 times the value of the same digit in the place to its right and 110110 the value of the same digit in the place to its left. They see that this applies not only to whole-number places but also to decimal places.
Students then learn to use exponential notation for powers of 10 and use this notation to represent very large numbers such as 1 million or 1 billion.
Next, students reason about measurement conversions in metric and customary units. Conversion in metric units further highlights place-value relationships in numbers in base ten. For example, this table shows some distances in centimeters, meters, and kilometers.
Students notice that multiplying or dividing by a power of 10 shifts the position of the digits in a decimal number to the right or left.
As they perform conversions from a larger unit to a smaller unit and the other way around, students apply what they learned about performing operations on whole numbers and decimals.

Section B:
In this section, students learn to add and subtract fractions (including mixed numbers) with unlike denominators and apply this learning to solve problems.
Students begin to add and subtract fractions using strategies and diagrams that make sense to them, relying what they know about adding and subtracting fractions with like denominators and with equivalent fractions. They then consider ways to write equivalent fractions so that the fractions in an expression have the same denominator. Later, they analyze and then use numerical strategies for finding common denominators, such as multiplying the denominators and finding a common multiple.
At the end of the section, students create line plots to display measurement data in fractional units (halves, fourths, and eighths), interpret the data on line plots, and use all four fraction operations to solve problems involving fractional measurements.

Section C:
In this section, students build on their understanding of multiplication to include the concept of scaling. They interpret multiplication expressions as a quantity that is resized or scaled by a factor. This idea builds on the multiplicative comparison work students did with whole numbers in grade 4.
To develop an understanding of this concept, students compare the value of multiplication expressions without performing the multiplication. Early in the section, the expressions are such that one factor is the same and the other one is different.
Students also reason about products with one unknown factor, which prompts them to make the comparisons based on the size of the other factor.

Differentiated Instruction

Technology Integration

21st Century Skills

Positive Behavior

CASEL

Collaborative for Academic, Social, and Emotional Learning

Resources

Teacher Notes and Reflections