



Unit Plan

5.5 Place Value Patterns and Decimal Operations

Chester / Littleville Elementary / Grade 5 / Mathematics

Week 16 - Week 21 | 4 Curriculum Developers | Last Updated: Mar 22, 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.**

- 1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols, e.g., $(6 \times 30) + (6 \times 1/2)$.
- 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.**

- 3b. Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.
- 4. Use place value understanding to round decimals to any place.
- 3. Read, write, and compare decimals to thousandths.
- 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.
- 3a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.

5.NBT Perform operations with multi-digit whole numbers and with decimals to hundredths.

- 7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction and multiplication and division; relate the strategy to a written method and explain the reasoning used.

Number & Operations—Fractions**5.NF Apply and extend previous understandings of multiplication and division to multiply and divide fractions.**

- 4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

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Enduring Understandings

Essential Questions

1. Mathematical Notation and Hierarchical Computation:

Students will understand that symbols such as parentheses, brackets, and braces indicate the order in which operations should be carried out within numerical expressions. Knowing how to use these symbols correctly is essential for evaluating complex expressions and ensuring accurate mathematical computations.

2. Expression and Interpretation:

Learners will comprehend the importance of writing simple mathematical expressions to represent calculations. They will realize that by interpreting numerical expressions without necessarily computing them, one can grasp the underlying relationships between numbers and operations.

3. Decimal Literacy:

Students will internalize that decimals are an extension of the base-ten number system, and they will be able to read, write, and compare decimal numbers up to the thousandths place accurately. Understanding the value of each place in a decimal is critical for comparison and subsequent operations involving decimals.

4. Place Value Understanding:

Students will recognize and appreciate that place value is a foundational concept in our number system. They will understand that the value of a digit is determined by its position and that each place represents ten times more, or one-tenth less, than the place immediately to its right or left, respectively. This concept extends to understanding the scaling and partitioning of numbers in the context of decimals.

5. Operations with Decimals:

Learners will develop a deep understanding of how to perform addition, subtraction, multiplication, and division with decimals up to the hundredths place. They will learn to apply concrete models, drawings, and place value strategies to aid in their computations. Students will also understand how these strategies relate to traditional algorithms and be able to articulate the reasoning behind the methods they use.

1. How do parentheses, brackets, and braces change the outcome of numerical expressions?

- Why is the order of operations important in evaluating expressions?

- Give an example of how the use of parentheses can affect the result of a numerical expression.

2. What does it mean to write and interpret numerical expressions without evaluating them?

- How can writing expressions help us understand the calculations they represent?

- Can you explain a situation where you would use a numerical expression to represent a real-world scenario?

3. Why is place value important when reading, writing, and comparing decimals?

- How do the positions of digits affect the value of decimal numbers?

- How can you determine if one decimal is greater than or less than another?

4. How does understanding that each place value is 10 times greater or $1/10$ of the adjacent place help in operations with multi-digit numbers, including decimals?

- Why is the understanding of place value significant for performing decimal operations accurately?

- Can you describe how the value of a digit changes as it moves from one place value to another in a decimal number?

5. What strategies can be used to add, subtract, multiply, and divide decimals, and how do you choose the most efficient strategy?

- How can place value and properties of operations help us solve decimal problems?

- Why is it useful to use drawings or models when calculating with decimals, and how can these methods be related to written algorithms?

- In what ways can you explain your reasoning when using a particular strategy for decimal operations?

Content

In this unit, students expand their knowledge of decimals to read, write, compare, and round decimals to the thousandths. They also extend their understanding of place value and numbers in base ten by performing operations on decimals to the hundredth.

In grade 4, students wrote fractions with denominators of 10 and 100 as decimals. They recognized that the notations 0.1 and $\frac{1}{10}$ express the same amount and are both called "one tenth." They used hundredths grids and number lines to represent and compare tenths and hundredths.

Here, students likewise rely on diagrams and their understanding of fractions to make sense of decimals to the thousandths. They see that "one thousandth" refers to the size of one part if a hundredth is partitioned into 10 equal parts, and that its decimal form is 0.001. Diagrams help students visualize the magnitude of each decimal place and compare decimals.

Skills

Section A Goals

- Compare, round and order decimals through the thousandths place based on the value of the digits in each place.
- Read, write, and represent decimals to the thousandths place, including in expanded form.

Section B Goals

- Add and subtract decimals to the hundredths using strategies based on place value.

Section C Goals

- Multiply decimals with products resulting in the hundredths using place value reasoning and properties of operations.

Section D Goals

- Divide decimals with quotients resulting in the hundredths using place value reasoning and properties of operations.

Students then apply their understanding of decimals and of whole-number operations to add, subtract, multiply, and divide decimal numbers to the hundredths, using strategies based on place value and the properties of operations.

They see that the reasoning strategies and algorithms they used to operate on whole numbers are also applicable to decimals. For example, addition and subtraction can be done by attending to the place value of the digits in the numbers, and multiplication and division can still be understood in terms of equal-size groups.

In grade 6, students will build on the work here to reach the expectation to fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Throughout the unit

The Number Talk routine is used throughout the unit to support students' developing fluency with fraction and decimal operations, and division by powers of 10.

How will you gauge student learning?

Assessments

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

[Grade5-5-End-of-Unit-Assessment-assessment.pdf](#)

[5 State Standards Assessed](#)

How will students learn?

Learning Activities

Section A:

In this section, students reason about decimals to the thousandths place. They begin by representing decimals on gridded area diagrams, where the large square has a value of 1, and each small square within represents $1/100$. Students learn that if they partition each small square into tenths, each of those parts represents a thousandth of the large square.

This awareness helps to prepare students for multiplication of a decimal by a whole number later in the unit. Students then move on to using number lines to represent decimals and to compare, order, and round them.

Section B:

In this section, students add and subtract decimals to the hundredths. They begin by adding and subtracting in ways that make sense to them, which prompts them to relate the operations to those on whole numbers. It also allows the teacher to take note of the strategies and algorithms they choose, including the standard algorithm and those that use expanded form.

Adding and subtracting decimals using the standard algorithm brings up a new question in terms of how the digits should be aligned. Before using the standard algorithm, students use place-value reasoning to decide whether sums and differences are reasonable and to ensure that the digits in the numbers are aligned correctly. As they take care to align tenths with tenths and hundredths with hundredths, students practice attending to precision (MP6).

Section C:

In this section, students learn to multiply decimals. They continue to think in terms of place value, make connections with whole-number operations, and use diagrams to support their reasoning.

Students begin by multiplying a whole number and a decimal. To find 2×0.43 , for instance, they shade 43 hundredths in each of two large squares, and see that the 86 shaded pieces or 86 hundredths, which is 0.86.

Diagrams also help students relate products of decimals and products of whole numbers.

Next, students reason about the product of two decimals. Diagrams are helpful here as well.

They also recognize that they can decompose the shaded region.

Section D:

In this section, students use the relationship between multiplication and division and the idea of equal groups to make sense of division of decimals, just as they had done with whole numbers and fractions.

Students learned previously that the expression $8 \div 2$ can mean finding how many are in one group if 8 is put into 2 equal groups, or it can mean finding how many groups of 2 are in 8. When dividing a decimal by a whole number, the other interpretation of division may be more intuitive. Later in the unit, students use equivalent expressions to find quotients.

Differentiated Instruction

Technology Integration

21st Century Skills

Positive Behavior

CASEL

Collaborative for Academic, Social, and Emotional Learning

Resources

Teacher Notes and Reflections
