**Gateway Regional
School District**

Atlas

Unit Plan
5.4 Mult. and Div. with Multi-Digit Numbers

Chester / Littleville Elementary / Grade 5 / Mathematics

⌃   Week 12 - Week 15 | 4 Curriculum Developers | Last Updated: Mar 21, 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.

☑ 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.

☑ 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.

☑ 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.

☑ 5. Fluently multiply multi-digit whole numbers (include 2 digit x 4 digit numbers and 3 digit x 3 digit numbers) using the standard algorithm.

☑ 6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

☑ 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.

☑ 3. Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. **Show Details**

Measurement & Data

5.MD Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

☑ 3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

☑ 5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

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Enduring Understandings

1. Place Value Influence: Students should understand that the value of a digit in a multi-digit number is determined by its position, or place, within the number. This understanding supports the comprehension that digits shift in value as they move left or right in a multi-digit number, with each place representing a power of 10.

2. Expression Interpretation: Students will grasp that expressions are a way to write out calculations symbolically and that they can be understood without needing to find an answer. This conceptual knowledge allows for the analysis and discussion of mathematical processes and the relationships between numbers.

3. Zero Patterns: Students should recognize and explain the pattern that emerges when multiplying by powers of 10, particularly the increase in the number of zeros in the product. This knowledge aids in understanding the effects of place value and scale when working with large numbers and powers of 10.

4. Decimal Patterns: Students will be able to identify and articulate the changes in the placement of the decimal point when multiplying or dividing a decimal by a power of 10. Knowing this helps students scale numbers up or down and operate with decimals confidently.

5. Multiplication Fluency: Students should achieve fluency in multiplying multi-digit whole numbers using standard algorithms, understanding the procedural steps and reasons behind them. This efficiency with basic operations serves as a foundation for more complex mathematical problem-solving.

6. Division Strategies: Students need to learn and apply various strategies to find quotients with multi-digit numbers, such as using place value understanding, properties of operations, and visual models like area models. Through this practice, students discover the connections between multiplication and division and how to represent these operations in multiple ways.

Essential Questions

1. How can understanding place value help us multiply and divide multi-digit numbers more effectively?

2. What patterns emerge when we multiply or divide numbers by powers of 10, and how do these patterns help us understand the role of the decimal point?

3. When writing mathematical expressions for multi-digit multiplication and division, how do we interpret the expressions without actually computing the answers?

4. Why does a digit in a multi-digit number represent 10 times more than the digit to its right and 1/10 of the digit to its left, and how does this understanding aid us in operations with numbers?

5. How can we apply the standard algorithm to fluently multiply multi-digit whole numbers, including complex problems with 2-digit by 4-digit and 3-digit by 3-digit numbers?

6. What are effective strategies for finding the quotients of whole numbers with up to four-digit dividends and two-digit divisors?

7. How can using equations, rectangular arrays, and area models help illustrate and explain the process of multiplication and division?

8. What role do the properties of operations play in multiplying and dividing multi-digit numbers, and how can these properties be leveraged to simplify complex calculations?

Content

In this unit, students multiply multi-digit whole numbers using the standard algorithm and begin working toward end-of-grade expectation for fluency. They also find whole-number quotients with up to four-digit dividends and two-digit divisors.
In grade 4, students used strategies based on place value and properties of operations to multiply a one-digit whole number and a whole number of up to four digits, and to multiply a pair of two-

Skills

Section A Goals
- Multiply multi-digit whole numbers using the standard algorithm.

Section B Goals
- Divide multi-digit whole numbers using strategies based on place value, properties of operations, and the relationship between multiplication and division.

Section C Goals

digit numbers. They decomposed the factors by place value, and used diagrams and algorithms using partial products to record their reasoning.
Here, students build on those strategies to make sense of the standard algorithm for multiplication. They recognize that it is also based on place value but records the partial products in a condensed way.

In grade 4, students also found whole-number quotients using place-value strategies and the relationship between multiplication and division. They decomposed dividends in various ways and found partial quotients. The numbers they encountered then were limited to four-digit dividends and one-digit divisors. In this unit, they extend that work to include two-digit divisors.
As they build their facility with multi-digit multiplication and division, students solve problems about area and volume and reinforce their understanding of these concepts.

Throughout the unit

Throughout the unit, students engage in warm-up activities that support the work of the current unit, while allowing them to revisit concepts from previous grades and units. The Number Talk routines in this unit supports students to multiply powers of 10, and encourages them to think about partial products and partial quotients.

- Multiply and divide to solve real-world and mathematical problems involving area and volume.

How will you gauge student learning?

Assessments

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

📎 Grade5-4-End-of-Unit-Assessment-assessment.pdf

4 State Standards Assessed

How will students learn?

Learning Activities

Section A:
This section introduces the standard algorithm for multiplication, extending students' earlier work on multiplication. In grade 4, students used diagrams and partial-products algorithms to find the product of a one-digit number and a number up to four digits, and the product of 2 two-digit numbers. They attended to the role of place value along the way.
Students revisit these strategies and representations here, but work with factors with more digits than encountered in grade 4. They make connections between the partial products in diagrams and previous algorithms to the numbers in the standard algorithm. They also learn the notation for recording new place-value units that result from finding partial products.

When using the standard algorithm to multiply a two-digit number and a three-digit number, students account for the place value of the digits being multiplied, as they had done before.

Once students have practiced recording products this way, they learn to multiply factors that require composing new units.

Section B:
In grade 4, students found whole-number quotients and remainders with up to four-digit dividends and one-digit divisors using strategies based on place value and partial quotients. In grade 5, they extend this work to include quotients involving two-digit divisors.

Students begin with an exploration that relates division of large numbers to a real-world context. They use strategies based on place value and the relationship between multiplication and division to estimate how the world's longest noodle could be shared. Then, they analyze and use different ways to decompose a dividend.

Students see that some decompositions may be more helpful than others for finding whole-number quotients. They use this insight to make sense of algorithms using partial quotients that are more complex.

Note that use of the standard algorithm for division is not an expectation in grade 5, but students can begin to develop the conceptual understanding needed to do so. The algorithms using partial quotients seen here are based on place value, which will allow students to make sense of the logic of the standard algorithm they'll learn in grade 6.

Section C:

The final section invites students to use multiplication and division of whole numbers to estimate large quantities and solve real-world and mathematical problems.

Students encounter area and volume problems in the context of geography—the area of states—and everyday consumption—the volume of milk consumed, the area of plastic waste in the Pacific Ocean, and the volume of recyclable plastic shipped abroad for processing.

The section ends with an additional opportunity for mathematical modeling. Students estimate and calculate the weight of food waste produced in the United States per year, using an average per-person amount. They also estimate and reflect on the amount of their own food waste.

Differentiated Instruction

Technology Integration

21st Century Skills

Positive Behavior

CASEL

Collaborative for Academic, Social, and Emotional Learning

Resources

Teacher Notes and Reflections