Grade 4 Math Unit 1 - Number and Operations in Base Ten: Place Value with multi-digit arithmetic

UNIT OVERVIEW

In Grade 4, math instruction should focus around 3 Critical Focus Areas. This unit will address work in Critical Focus Area #1, Developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends and goes beyond to address Adding and subtracting multi-digit whole numbers.(See Connections for explanation)

This unit will address work in these clusters:
- Generalize place value understanding for multi-digit whole numbers
- Use place value understanding and properties of operations to perform multi-digit arithmetic

Students will:
- fluently read and write multi-digit whole numbers
- compare and order numbers with the same and different amount of digits
- round multi-digit whole numbers to a given place value
- fluently add and subtract multi-digit whole numbers using the standard algorithm

STANDARDS

CC_Common Core State Standards - Mathematics (2010) - Grade 4
Domain 4.NBT Number and Operations in Base Ten
Cluster Statement: Generalize place value understanding for multi-digit whole numbers.
Standard 4.NBT.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.
Standard 4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
Standard 4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.

Cluster Statement: Use place value understanding and properties of operations to perform multi-digit arithmetic.
Standard 4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.

CONTENT ELABORATIONS

4.NBT.1	4.NBT.1 calls for students to extend their understanding of place value related to multiplying and dividing by multiples of 10. In this standard, students should reason about the magnitude of digits in a number. Students should be given opportunities to reason and analyze the relationships of numbers that they are working with. Students should be familiar with and use place value as they work with numbers. Some activities that will help students develop understanding of this standard are: - Investigate the product of 10 and any number, then justify why the number now has a 0 at the end. (7 x 10 = 70 because 70 represents 7 tens and no ones, 10 x 35 = 350 because the 3 represents 3 hundreds, which is 10 times as much as 3 tens, and the 5 represents 5 tens, which is 10 times as much as 5 ones). While students can easily see the pattern of adding a 0 at the end of a number when multiplying by 10, they need to be able to justify why this works. - Investigate the pattern, 6, 60, 600, 6000, 60,000, 600,000 by dividing each number by the previous number. **MP.2, MP.6, MP.7** should be emphasized.

4.NBT.2	4.NBT.2 refers to various ways to write numbers. Students should have flexibility with the different number forms. Traditional expanded form is 285 = 200 + 80 + 5. Written form is two hundred eighty-five. However, students should have opportunities to explore the idea that 285 could also be 28 tens plus 5 ones or 1 hundred, 18 tens, and 5 ones. Students should also be able to compare two multi-digit whole numbers using appropriate symbols. Students use place value to compare numbers. For example, in comparing 34,570 and 34,192, a student might say, "both numbers have the same value of 10,000s and same value of 1000s however, the value in the 100s place is different so that is where I would compare the two numbers." **MP.2, MP.4, MP.6, MP.7 should be emphasized.**
4.NBT.3	4.NBT.3 refers to place value understanding, which extends beyond an algorithm or procedure for rounding. The expectation is that students have a deep understanding of place value and number sense and can explain and reason about the answers they get when they round. Students should have numerous experiences using a number line and a hundreds chart as tools to support their work with rounding. **MP.2, MP.6 should be emphasized.**
4.NBT.4	Students build on their understanding of addition and subtraction, their use of place value and their flexibility with multiple strategies to make sense of the standard algorithm. They continue to use place value in describing and justifying the processes they use to add and subtract. This standard refers to fluency, which means accuracy and efficiency (using a reasonable amount of steps and time), and flexibility (using a variety of strategies such as the distributive property, decomposing and recomposing numbers, etc.). This is the first grade level in which students are expected to be proficient at using the standard algorithm to add and subtract. However, other previously learned strategies are still appropriate for students to use. When students begin using the standard algorithm their explanation may be quite lengthy. After much practice with using place value to justify their steps, they will develop fluency with the algorithm. Students should be able to explain why the algorithm works. **MP.2, MP.5, MP.7, MP.8 should be emphasized.**

UNIT VOCABULARY

digit	is equal to (=)	Identity Property of Addition
place value	is greater than (>)	unknown
expanded form	is less than (<)	minuend
period	number line	subtrahend
standard form	Commutative Property of Addition	equation
word form	Associative Property of Addition	variable

BIG IDEAS

ENDURING UNDERSTANDINGS   **ESSENTIALS QUESTIONS**

The value of a number is determined by the place of its digits.
- Whole numbers are read from left to right using the name of the period.
- Numbers are written using commas to separate periods.
- Using rounding is an appropriate estimation strategy for solving problems and estimating.
- Rounded numbers are approximate and not exact.
- A number can be written using its name, standard, or expanded form.

Choose a few questions based on the needs of your students.
- How does place value help represent the value of numbers?
- What strategies can I use to add and subtract?

CONNECTIONS

In Critical Focus Area #1, students generalize their understanding of place value to 1,000,000, understanding relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operations in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on pace value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate and generalizable procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context.

A strong foundation in whole-number place value and rounding is critical for the expansion to decimal place value and decimal rounding.

The work in this unit's clusters are connected to Grade 2 Understand place value (**2.NBT.1-4**), to Grade 3 Use place value understanding and properties of operations to perform multi-digit arithmetic (**3.NBT.1-3**), and to Grade 4 Use operations with whole numbers to solve problems (**4.OA.2-3**).

Standards for Mathematical Practice (SMP)

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 (Deductive reasoning)

MP.8 Look for and express regularity in repeated reasoning (Inductive Reasoning)

Generalize place value understanding for multi-digit whole numbers

	CONTENT	SKILLS
4.NBT.1	Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.	Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. 1. Use place value chart and base ten blocks to show place value and correct positioning 2. Identify digits in ones, tens, hundreds, thousands period, and millions period of place value system 3. Identify the value of digits in ones, tens, hundreds, thousands period and millions period of the place value system 4. Justify and explain how the value of a digit would change if it moved one place; either to the right or to the left
4.NBT.2	Read and write multi-digit whole numbers	Read and write multi-digit whole numbers 1. Read and write numbers in standard form 2. Read and write numbers in expanded form 3. Read and write numbers in written form 4. Explore additional ways to write numbers (e.g., 285 could also be written 28 tens plus 5 ones or 1 hundred, 18 tens and 5 ones) 5. Create numbers that meet specific criteria (using card 0-9, select 4-6 cards. Using all of the cards, make the largest number possible, smallest number possible and the closest number to 5000 that is greater than 5000 or less than 5000)
1.NBT.2	Compare two multi-digit numbers based on meanings of the digits in each place.	Compare two multi-digit numbers based on meanings of the digits in each place. 1. Compare multi-digit numbers with the same number of digits 2. Compare multi-digit numbers with the same number in the leading digit position (45, 495, 41,223) 3. Compare multi-digit numbers that have different numbers of digits and different leading digits (312, 95, 5245, 10,002) 4. Use >, <, and = symbols to record results of comparisons
4.NBT.3	Round multi-digit whole numbers to any place.	Round multi-digit whole numbers to any place. 1. Use rounding as an estimation strategy to solve addition and subtraction problems 2. Identify the digit in the appropriate place for rounding 3. When rounding, identify possible answers and halfway points 4. When rounding, narrow where the given number falls between the possible answers and halfway point 5. Use tools to support rounding work; such as number line or hundreds chart

Use place value understanding and properties of operations to perform multi-digit arithmetic

	CONTENT	SKILLS
4.NBT.4	Fluently add and subtract using multi-digit whole numbers using the standard algorithm	Fluently add and subtract using multi-digit whole numbers using the standard algorithm 1. Accurately add and subtract multi-digit numbers 2. Efficiently add and subtract multi-digit numbers (using a reasonable amount of steps and time) 3. Use a variety of strategies to add and subtract multi-digit numbers 4. use place value to justify and explain why the steps work in the standard algorithm for addition and subtraction of multi-digit numbers 5. Proficiently use the standard algorithm to add and subtract multi-digit numbers

UNIT RESOURCES

Common Core Model Curriculum
McGraw-Hill, **My Math** Chapters 1-2
Number Talks by Sherry Parrish
Georgia Math frameworks, Grade 4 Unit 1
Manipulatives
place value flip charts, number cards
Smart Board resources
Discovery Video
Hands-On Standards
The King's Commissioners - Literery Reading