Grade 2 Math Unit 2-Number and Operations in Base Ten

UNIT OVERVIEW

In Grade 2 math instruction centers around 4 Critical Focus Areas. This unit continues work in Critical Focus Area #1, Extending understanding of base-ten notation.

This unit includes work in 2 clusters:
-Understand place value * (See Connections for explanation)
- Use place value understanding and properties of operations to add and subtract

Students will:
-Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones
- Count within 1000, skip count by 5s, 10s, and 100s
- Read and write numbers to 1000
- Compare 2 three-digit numbers based on meanings of the hundreds, tens, and ones digits using >, <, = symbols
- fluently add and subtract within 100 using strategies based on place value
- add up to four two-digit numbers using strategies based on place value and properties of operations
- add and subtract within 1000
- mentally add and subtract 10 or 100 to/from a given number 100-900
- explain why addition and subtraction strategies work

STANDARDS

CC_Common Core State Standards - Mathematics (2010) - Grade 2
Domain 2.NBT Number and Operations in Base Ten
Cluster Statement: Understand place value .
Standard 2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:
2.NBT.1.a 100 can be thought of as a bundle of ten tens - called a "hundred."
2.NBT.1.b The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).
Standard 2.NBT.2 Count within 1000; skip-count by 5s, 10s, and 100s.
Standard 2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
Standard 2.NBT.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

Cluster Statement: Use place value understanding and properties of operations to add and subtract.
Standard 2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.
Standard 2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
Standard 2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.
Standard 2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations

Content Elaborations

2.NBT.1	**2.NBT.1** calls for students to decompose numbers by place value. Students should have ample experiences with concrete materials and pictorial representations examining that numbers between 100 and 999 can be decomposed into hundreds, tens and ones. Interpret the value of a digit in a multi-digit numeral by its position within the number with models, words and numerals. Use 10 as a benchmark number to compose and decompose when adding and subtracting whole numbers.
2.NBT.1a	**2.NBT.1a** calls for students to extend their work from Grade 1 by exploring a hundred as a unit (or bundle) of ten tens.
2.NBT.1b	**2.NBT.1b** builds on the work of **2.NBT.2a**. Students should explore the idea that numbers such as 100, 200, 300, etc. are groups of hundreds that no tens or ones. Students can represent this with place value blocks. **Understanding that 10 ones make one ten and that 10 tens make one hundred is fundamental to students' mathematical development.** Students need multiple opportunities counting and "bundling" groups of tens in first grade. In second grade, students build on their understanding by making bundles of 100s with or without leftovers using base ten blocks, cubes in towers of 10, ten frames, etc. This emphasisi on bundling hundreds will support students' discovery of place value patterns. As students are representing the various amounts, it is important that emphasis is placed on the language associated with the quantity. For example, 243 can be expressed in multiple ways such as 2 groups of hundred, 4 groups of ten and 3 ones, as well as 24 tens and 3 ones. When students read numbers, they should read in standard form as well as using place value concepts For example, 243 should be read as "two hundred forty-three" as well as two hundreds, 4 tens, 3 ones. **MP.2, MP.7, MP.8** should be emphasized.

2.NBT.2	**2.NBT.2** calls for students to count within 1,000. This means that students are expected to "count on" from any number and say the next few numbers that come afterwards. This standard also introduces skip counting by 5s and 100s. Students are introduced to skip counting by 10s in Grade 1. Students should explore patterns of numbers when they skip count. Students need many opportunities counting, up to 1000, from different starting points. They should also have many experiences skip counting by 5s, 10s and 100s to develop the concept of place value. The use of the 100s chart may be helpful for student to identify the counting patterns. The use of money (nickels, dimes, dollars) or base ten blocks may be helpful visual cues. The ultimate goal is to be able to count in multiple ways with no visual support. **MP.2, MP.6, MP.7, MP.8** should be emphasized.
2.NBT.3	**2.NBT.3** calls for students to read, write and represent a number of objects with a written numeral (number form or standard form). These representations can include place value (base ten) blocks, pictorial representation or other concrete materials. Remember that when reading and writing whole numbers, the word "and" should not be used. **MP.2, MP.6, MP.7, MP.8** should be emphasized
2.NBT.4	**2.NBT.4** builds upon the work of 2.NBT.1 and 2.NBT.3 by having students compare two numbers by examining the amount of hundreds, tens and ones in each number. Students are introduced to the symbols (>), (<), (=) in Grade 1 and use them in Grade 2 with numbers within 1000. Students should have ample experiences communicating their comparisons in words before using only symbols in this standard. **MP.2, MP.6, MP.7, MP.8** should be emphasized.
2.NBT.6	**2.NBT.6** calls for students to add a string of two-digit numbers (up to 4 numbers) by applying place value strategies and properties of operations. **MP.2, MP.6, MP.7, MP.8** should be emphasized.
2.NBT.7	**2.NBT.7** builds upon work from **2.NBT.5** by increasing the size of numbers (two 3-digit numbers) Students should have ample experiences to use concrete materials (base ten blocks) and pictorial representations to support their work. This standard also references composing and decomposing a ten. This work should include strategies such as making a 10, making a 100, breaking apart a 10, or creating an easier problem. While the standard (traditional) algorithm could be used here, students' experience should extend beyond only working with the algorithm. There is a strong connection between this standard and place value understanding with addition and subtraction of smaller numbers. Addition strategies based on place value include: adding by place value, incremental adding, and compensation. Subtraction strategies based on place value include: adding up, incremental subtracting, subtracting by place value. Properties that students should know and use are: commutative property of addition, associative property of addition, identify property of 0. **MP.2, MP.4, MP.5, MP.7, MP.8** should be emphasized.
2.NBT.8	**2.NBT.8** calls for students to mentally add or subtract multiples of 10 or 100 to any number between 100 and 900. In this standard, problems that require students to move from 10s to 100s should be included. (Example: 273 + 60 = 333). Students need many opportunities to practice mental math by adding and subtracting multiples of 10 and 100 up to 900 using different starting points. They can practice this by counting and thinking aloud, finding missing numbers in a sequence, and finding missing numbers on a number line or hundreds chart. Explorations should also include looking for relevant patterns. **MP.2, MP.7, MP.8** should be emphasized.
2.NBT.9	**2.NBT.9 c**alls for students to explain using concrete objects, pictures and words (oral or written) why addition and subtraction strategies work. The expectation is that students apply their knowledge of place value and the properties of operations in their explanation. Students should have opportunities to solve problems and then explain why their strategies work. Students could also have experiences examining strategies and explaining why they work. Also include incorrect examples for students to examine. **MP.2, MP.3, MP.4, MP.5, MP.7, MP.8** should be emphasized.

UNIT VOCABULARY

hundreds	expanded form	greater than
place value	thousand	less than
digit	compare	equal to

BIG IDEAS

ENDURING UNDERSTANDINGS

• The value of a digit depends upon its place in a number.

• Numbers can be represented in many ways, such as with base ten blocks, words, pictures, number lines, and expanded form.

• Place value determines which numbers are larger or smaller than other numbers.

•Addition and subtraction are inverse operations; one undoes the other.

•We can verify the results of our computation by using the inverse operation.

•Estimation helps us see whether or not our answers are reasonable.

•A numeral's meaning and value is based upon where digits are placed to write the numeral.

• Adding or subtracting ten from a given number changes the digit in the tens place of a given number but not the digit in the ones place of a given number. It also changes the value of the given number by either increasing or decreasing it in increments of ten

• Adding or subtracting 100 from a given number changes the digit in the hundreds place of that given number but not the digits in the tens and ones places of that given number. It also changes the value of the given number by either increasing or decreasing it in increments of 100.

• Addition means the joining of two or more sets that may or may not be the same size. There are several types of addition problems.

• Subtraction has more than one meaning. It not only means the typical "take away" operation, but also can denote finding the distance between two

ESSENTIALS QUESTIONS

Choose a few questions based on the needs of your students

• How can I use place value?

• How can I add three-digit numbers?

• How can I subtract three-digit numbers?

CONNECTIONS

* This cluster in connected to *Extend the counting sequence and Understand place value* in Grade 1, to *Work with equal groups of objects to gain foundations for multiplication* in Grade 2, and to *Use place value understanding and properties of operations to perform multi-digit arithmetic* in Grade 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)

UNDERSTAND PLACE VALUE

	CONTENT	SKILLS
2.NBT.1	Understand that the three digits of a three-digit number represent amounts of hundreds, tens and ones	Understand that the three digits of a three-digit number represent amounts of hundreds, tens and ones 1. recognize a hundred as a unit (bundle) of ten tens 2. decompose numbers between 100 and 999 using concrete materials 3. decompose numbers between 100 and 999 using pictorial representations 4. interpret the value of a digit in a multi-digit numeral by its position within the number using models, words and numerals. 5. use 10 as a benchmark number to compose and decompose when adding and subtracting whole numbers.
2.NBT.2	Count within 1000	Count within 1000 1. 'Count on' from any number and say the next few numbers that come afterwards. 2. Count back from any number and say the next few numbers that come afterwards. 3. Identify counting patterns in a hundreds chart when skip counting 4. Skip count by 10s using dimes and place value blocks 5. Skip count by 100s using dollars and base ten blocks 6. Skip count by 5s using nickels as a visual cue
2.NBT.3	Read and write numbers to 1000 using base-ten numerals, number names and expanded form.	Read and write numbers to 1000 using base-ten numerals, number names and expanded form. 1. Read numbers to 1000 2. Read number words to 1000 3. Represent a number of objects by using base ten blocks 4. Represent a number of objects by using pictorial representations 5. Represent a number of objects by writing a numeral 6. Represent a number of objects by written word form 7. Represent a number of objects using expanded form

	Content	Skills
2.NBT.4	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones 1. Compare two three-digit numbers using comparative language (more than, less than, greater than, most, greatest, same as, equal to and not equal to) 2. Compare two three-digit numbers using symbols (>, <, =)

USE PLACE VALUE UNDERSTANDING AND PROPERTIES OF OPERATIONS TO ADD AND SUBTRACT

	CONTENT	SKILLS
2.NBT.6	Add up to four two-digit numbers using strategies based on place value and properties of operations.	Add up to four two-digit numbers using strategies based on place value and properties of operations. 1. Know strategies for adding two digit numbers based on place value and properties of operations. 2. Use strategies to add up to four two-digit numbers.
2.NBT.7	Add and subtract within 1000	Add and subtract within 1000 1. Use concrete models or drawings to add and subtract 2. Compose and decompose tens or hundreds to add or subtract 3. Use properties of operations to add and subtract (e.g., commutative, associative property of addition) 4. Use strategies based on place value to add (e.g., adding by place value, incremental adding, compensation) 5. Use strategies based on place value to subtract (e.g., adding up, incremental subtracting, subtracting by place value) 6. Relate the chosen strategy (using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction) to a written method (equation) and explain the reasoning used.
2.NBT.8	Mentally add or subtract 10 or 100 to a given number 100-900	Mentally add or subtract 10 or 100 to a given number 100-900 1. Count on or Count back by 10 or 100 aloud 2. Find missing numbers on a number line or hundreds chart 3. Find missing numbers in a sequence
2.NBT.9	Explain why addition and subtraction strategies work, using place value and the properties of operations.	Explain why addition and subtraction strategies work, using place value and the properties of operations. 1. Know addition and subtraction strategies using place value and properties of operations related to addition and subtraction. 2. Explain why addition and subtraction strategies work based on place value and properties of operations.

UNIT RESOURCES

Math Common Core State Standards
McGraw-Hill, **My Math** Chapter 5-7
Number Talks by Sherry Parrish
Georgia Math Frameworks Grade 2 Unit 1
Debbie Diller Math Work Stations materials and process