MATHEMATICS

UTAH CORE **GUIDES** GRADE **2**

UTAH STATE BOARD OF EDUCATION 250 EAST 500 SOUTH P.O. BOX 144200 SALT LAKE CITY, UTAH 84114-4200 SYDNEE DICKSON, Ed.D., STATE SUPERINTENDENT OF PUBLIC INSTRUCTION

Represent and solve problems involving addition and subtraction (Standard 2.OA.1).

Standard 2.OA.1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions, *for example, by using drawings and equations with a symbol for the unknown number to represent the problem*.

Concepts and Skills to Master

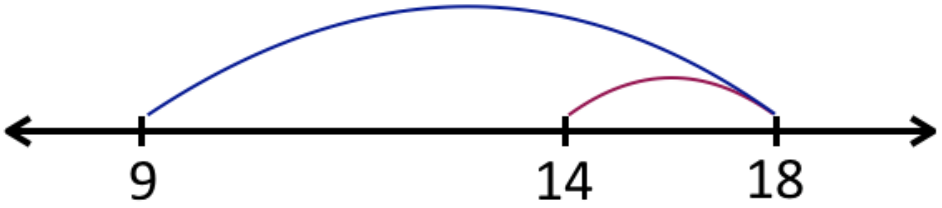
- Differentiate between one-step and two-step word problems (Two-step word problems may include two addition operations, two subtraction operations, or both an addition and subtraction operation in the same word problem)
- Determine the operation(s) based on the actions in the context of one-step and two-step word problems (avoid relying on keyword strategies)
- Use numbers and symbols to represent word problems (+, -, =, and a variety of symbols for unknowns)
- Solve the following addition and subtraction situations as well as situations listed in Standards K.OA.2 and 1.OA.1. (See: TABLE 1. Common addition and subtraction situations):
  - **Add To/Start Unknown**: Some bunnies were sitting on the grass. 3 more bunnies hopped there. Then there were 8 bunnies. How many bunnies were on the grass before? (? + 3 = 8)
  - **Take From/Start Unknown**: Some apples were on the table. I ate 3 apples. Then there were 37 apples. How many apples were in the table before? (? - 3 = 37)
  - **Compare/Larger Unknown**: Lucy has 12 fewer apples than Julie. Lucy has 26 apples. How many apples does Julie have? (12 + 26 = ?)
  - **Compare/Smaller Unknown**: Julie has 12 more apples than Lucy. Julie has 38 apples. How many apples does Lucy have? (? + 12 = 38, 38 - 12 = ?)

Teacher Note: Second grade is the first time students solve two-step word problems.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.NBT.5 Fluently add and subtract within 100 **2.NBT.6** Add up to four two-digit numbers **2.NBT.7** Add and subtract within 1,000 using concrete models **2.NBT.9** Explain why addition and subtraction work **2.MD.5** Use addition and subtraction within 100 to solve word problems involving length **2.MD.8** Solve word problems involving money **2.MD.10** Solve problems involving data presented in a graph of up to four categories	**3.MD.2** Solve word problems with all operations involving measurement **3.MD.3** Solve one-step and two-step problems involving information presented in graphs **3.OA.8** Solve two-step word problems involving all operations **4.OA.3** Solve multi-step whole number word problems involving all operations **4.NF.3** Understand addition and subtraction of fractions as joining and separating parts

Critical Background Knowledge from Previous Grade Levels

- Solve word problems with three addends (1.OA.2)
- Solve word problems involving addition and subtraction within 20 (1.OA.1)
- Add and subtract within 20 using a variety of strategies (1.OA.6a)
- Solve addition and subtraction word problems within 10 (K.OA.2)

Academic Vocabulary	
join, add, add to, combine, put together, addition, plus, sum, total, separate, take from, take apart, take away, minus, subtract, difference, equal to, compare, unknown	
Suggested Models	Suggested Strategies
Two-Step Example: There are 9 students in the cafeteria. 9 more students come in. After a few minutes, some students leave. There are now 14 students in the cafeteria. How many students left the cafeteria? Use drawings and equations to show your thinking.  	• Mental strategies for fluency within 20 • Making ten • Decomposing a number leading to a benchmark number • Use the relationship between addition and subtraction • Create equivalent but easier or known sums (compensation, doubles plus one, doubles minus one) • Apply the commutative or associative properties of addition • Students may create their own word problems verbally • Use drawings, objects, and equations • Use a bar model • Part/Part/Whole
Image Source: http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/2.pdf	

Fluently add and subtract within 20 (Standard 2.OA.2)

Standard 2.OA.2 Fluently add and subtract within 20.
a. Add and subtract within 20 using mental strategies such as counting on; making ten *(for example, 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14)*; decomposing a number leading to a ten *(for example, 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9)*; using the relationship between addition and subtraction *(for example, knowing that 8 + 4 = 12, one knows 12 – 8 = 4)*; and creating equivalent but easier or known sums *(for example, adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13)*.
b. By the end of Grade 2, know from memory all sums of two one-digit numbers.

Concepts and Skills to Master

- Add within 20 using mental strategies
- Subtract within 20 using mental strategies (see standard 1.OA.6 for a list of mental strategies)
- Understand subtraction as an addition problem with an unknown addend
- Know from memory all sums of two one-digit numbers (it is not expected for students to know sums of two-digit addends from memory)
- Apply addition and subtraction strategies flexibly, accurately and efficiently

Teacher Note: "Know from memory" does not necessarily mean "memorize." Students may memorize addition and subtraction facts or apply mental strategies to retrieve facts. Teachers can best support student fluency with sums and differences through varied experiences of composing and decomposing numbers, making 10, and working on mental strategies, rather than repetitive timed tests. This standard supports students as they fluently solve addition and subtraction problems with multi-digit numbers in other standards within second grade and in future grades. Developing fluency with one-digit addends is a foundation for extending strategies when adding and subtracting multi-digit numbers.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.OA.1 Use addition and subtraction within 100 in one-step and two-step word problems	**3.OA.8** Solve two-step word problems
2.NBT.5 Fluently add and subtract within 100	**3.OA.9** Identify arithmetic patterns including in addition tables
2.NBT.6 Add up to four two-digit numbers	**3.NBT.2** Fluently add and subtract within 1,000
2.NBT.7 Add and subtract within 1,000	**4.OA.3** Solve multi-step whole number word problems
	4.OA.5 Generate a number pattern that follows a given rule
	4.NBT.4 Fluently add and subtract multi-digit whole numbers

Critical Background Knowledge from Previous Grade Levels

- Add and subtract within 20. Demonstrate fluency for addition and subtraction within 10 (1.OA.6)
- Use addition and subtraction within 20 to solve all types of word problems (1.OA.1)
- Solve word problems with three addends (1.OA.2)
- Apply properties of operations as strategies to add and subtract (1.OA.3)
- Understand subtraction as an unknown-addend problem (1.OA.4)
- Relate counting to addition and subtraction (1.OA.5)

Academic Vocabulary

add, addend, compose, plus, total, subtract, minus, decompose, difference, equation

Suggested Models	Suggested Strategies
Example: 9 + 5 = __ Counting On: I started at 9 and then counted 5 more. I landed on 14. Decomposing a Number Leading to a Ten: I know that 9 and 1 is 10, so I broke 5 into 1 and 4. 9 plus 1 is 10. Then I have to add 4 more, which gets me to 14. **Example: 13 - 9 = __** Using the Relationship between Addition and Subtraction: I know that 9 plus 4 equals 13. So 13 minus 9 equals 4. Creating an Easier Problem: Instead of 13 minus 9, I added 1 to each of the numbers to make the problem 14 minus 10. I know the answer is 4. So 13 minus 9 is also 4.	• Counting on: 8 + 4 = □ (8 … 9, 10, 11, 12) • Counting back: 12 - 4 = □ (12 … 11, 10, 9, 8) • Making tens: 5 + 7 = □ (5 = 2 + 3 so 3 + 7 = 10 and 10 + 2 = 12) • Doubles: 6 + 6 = □ • Doubles plus/minus one: 6 + 7 = □ (6 + 6 + 1 or 7 + 7 – 1) • Decomposing a number leading to a ten: 15 – 7 = □ (15 – 5 = 10 and 10 – 2 = 8) • Working knowledge of fact families/related facts: 3 + 9 = 12 so 12 – 9 = 3 • Use number lines

Fluency within 20

Fluency in each grade involves a mixture of just knowing some answers, knowing some answers from patterns (for example, adding 0 yields the same number), and knowing some answers from the use of strategies. It is important to push sensitively and encouragingly toward fluency of the designated numbers at each grade level, recognizing that fluency will be a mixture of these kinds of thinking which may differ across students. (https://commoncoretools.files.wordpress.com/2011/05/ccss_progression_cc_oa_k5_2011_05_302.pdf)

Fluency of all one-digit sums include the following facts:

0+0	1+0	2+0	3+0	4+0	5+0	6+0	7+0	8+0	9+0
0+1	1+1	2+1	3+1	4+1	5+1	6+1	7+1	8+1	9+1
0+2	1+2	2+2	3+2	4+2	5+2	6+2	7+2	8+2	9+2
0+3	1+3	2+3	3+3	4+3	5+3	6+3	7+3	8+3	9+3
0+4	1+4	2+4	3+4	4+4	5+4	6+4	7+4	8+4	9+4
0+5	1+5	2+5	3+5	4+5	5+5	6+5	7+5	8+5	9+5
0+6	1+6	2+6	3+6	4+6	5+6	6+6	7+6	8+6	9+6
0+7	1+7	2+7	3+7	4+7	5+7	6+7	7+7	8+7	9+7
0+8	1+8	2+8	3+8	4+8	5+8	6+8	7+8	8+8	9+8
0+9	1+9	2+9	3+9	4+9	5+9	6+9	7+9	8+9	9+9

Work with equal groups of objects to gain foundations for multiplication (Standards 2.OA.3–4).

Standard 2.OA.3 Determine whether a group of objects (up to 20) has an odd or even number of members, (*for example, by pairing objects or counting them by twos*). Write an equation to express an even number as a sum of two equal addends.

Concepts and Skills to Master

- Apply work with doubles to the concept of odd and even
- Understand that numbers that can be decomposed into equal addends are even numbers
- Understand and represent an even number as an amount that can be made of two equal parts with no leftovers
- Understand and represent an odd number as a number that is not even and cannot be made into two equal whole number parts

Teacher Note: The number endings of 0, 2, 4, 6, and 8 are only an interesting and useful pattern or observation and should not be used as the definition of an even number. (Van, . W. J. A., & Folk, S. (2008). Elementary and middle school mathematics: Teaching developmentally. Toronto: Pearson Allyn and Bacon.p.292)

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.OA.4 Use addition to find the total number of objects arranged in arrays and write an equation to express the sum of equal addends **2.NBT.2** Count within 1,000	**3.OA.2** Interpret whole-number quotients as equally shared groups or an equal number of groups **3.OA.3** Use multiplication and division to solve word problems involving equal groups **3.OA.9** Identify arithmetic patterns and explain them using properties of operations

Critical Background Knowledge from Previous Grade Levels

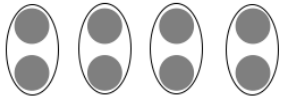
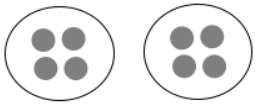
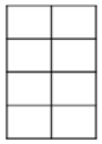
- Understand the meaning of the equal sign (1.OA.7), use doubles to add within 20 (1.OA.6), count to 120 (1.NBT.1)
- Use matching or counting strategies to determine whether groups are equal (K.CC.6)

Academic Vocabulary

odd, even, equal, equation, compose, doubles, sum

Suggested Models

Example: Is 8 an even number? Justify your thinking.

Student A	Student B	Student C	Student D	Student E
I grabbed 8 counters. I paired the counters up into groups of 2. Since I didn't have any counters left over, I know that 8 is an even number. 	I grabbed 8 counters. I put them into 2 equal groups. There were 4 counters in each group, so 8 is an even number. 	I drew 8 boxes in a rectangle that had two columns. Since every box on the left matches a box on the right, I know that 8 is even. 	I drew 8 circles. I matched one on the top with one on the bottom. Since they all match up, I know that 8 is an even number. 	I know that 4 plus 4 equals 8, so 8 is an even number

Suggested Strategies

- Build rectangular arrays, pair objects and skip count by twos, relate doubles to even numbers, use ten-frames to determine if a number is even or odd, place up to 20 objects in two equal groups, use a hundreds chart

Image and Text Source: http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/2.pdf

Work with equal groups of objects to gain foundations for multiplication (Standards 2.OA.3–4).

Standard 2.OA.4 Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

Concepts and Skills to Master

- Use rectangular arrays to work with repeated addition
- Write an addition equation representing an array as a sum of equal addends
- Understand that the total number of objects can be found by using repeated addition
- Write repeated addition equations to match arrays

Teacher Note: This is an essential standard to prepare students for understanding multiplication in 3rd grade.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.OA.3 Determine whether a group of objects has an even or odd numbers of members **2.G.2** Partition a rectangle into rows and columns of same-size squares and count to find the total number of squares	**3.OA.1** Interpret the products of whole numbers by looking at the number of groups and number in a group **3.OA.2** Interpret whole-number quotients as equally shared groups or an equal number of groups **3.OA.3** Use multiplication and division to solve word problems involving equal groups **3.OA.5** Apply properties of operations as strategies to multiply and divide **3.OA.6** Understand the relationship between multiplication and division **4.NBT.5, 4.NBT.6** Multiply and divide whole numbers using equations, rectangular arrays, and/or area models

Critical Background Knowledge from Previous Grade Levels

- Use addition and subtraction within 20 to solve word problems (1.OA.1)
- Solve word problems that call for addition of three whole numbers (1.OA.2)
- Add and subtract within 20 (1.OA.6)
- Use counting to answer questions about “how many” (K.CC.5)
- Solve addition and subtraction word problems within 10 (K.OA.2)

Academic Vocabulary

rectangular array, repeated addition, row, column, equation, sum, addend

Suggested Models	Suggested Strategies
 This array can be viewed as as 4 + 4 = 8 or 2 + 2 + 2 + 2 = 8	• Build rectangular arrays with up to 25 objects • Use graph paper to draw rectangular arrays • Use ink daubers to make arrays • Use flexible equations to represent the total (see Suggested Models to the left)

Understand place value (Standards 2.NBT.1–4)

Standard 2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; *for example, 706 equals 7 hundreds, 0 tens, and 6 ones*. Understand the following as special cases:
a. 100 can be thought of as a bundle of ten tens called a "hundred."
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).

Concepts and Skills to Master

- Understand that one hundred can be represented as 100 single units
- Understand that ten sets of ten can be bundled together to make 100
- Understand that when numbers are bundled into sets of hundreds, there are zero tens and zero ones
- Identify multiples of a hundred (in the range 100-900) as groups of hundreds with no tens or ones leftover
- Understand that in place value a specific digit represents how many hundreds, tens, or ones compose the number
- Use place value language to describe amounts of hundreds, tens, and ones. For example, 642 is six hundreds, four tens, and two ones
- Identify the value of a given digit in a three-digit number (for example, find the value of the 7 in 706; where 7 represents 700)

Teacher Note: Students in second grade extend their understanding of the base-ten system from tens to hundreds as they view 10 tens as a unit called a "hundred." They use manipulatives and pictorial representations to make a connection between the written 3-digit numbers and "hundreds," "tens," and "ones."

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.NBT.2 Count within 1,000; skip-count by 5's 10's and 100's. **2.NBT.3** Read and write numbers to 1,000 **2.NBT.4** Compare two three-digit numbers based on meanings of hundreds, tens, and ones digits **2.NBT.6** Add up to four two-digits using strategies based on place value **2.NBT.5, 2.NBT.7** Add and subtract within 100 and 1,000 using strategies based on place value **2.NBT.8** Mentally 10 or 100 to a given number (100 - 900) and mentally subtract 10 or 100 from a given number (100 - 900) **2.NBT.9** Explain why addition and subtraction strategies work, using place value	**3.NBT.1** Use place value to round whole numbers to the nearest 10 or 100 **3.NBT.2** Fluently add and subtract within 1,000 using strategies and algorithms based on place value **3.NBT.3** Multiply one-digit whole numbers by multiples of 10 in the range of 10 - 90 using strategies based on place value **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

Critical Background Knowledge from Previous Grade Levels

- Understand that the two digits of a two-digit number represent amounts of tens and ones (1.NBT.2)
- Compose and decompose numbers from 11–19 into ten ones and some further ones (K.NBT.1)

Academic Vocabulary

ones, tens, hundreds, decompose, compose, grouping, bundle, place value, digit, value

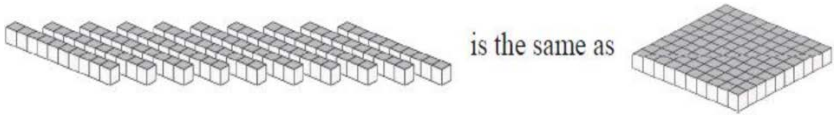
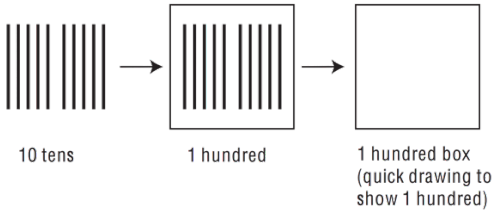
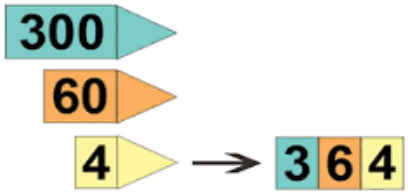
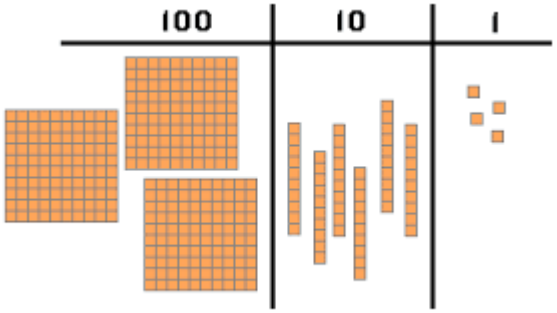
Suggested Models	Suggested Strategies
Base Ten Blocks  **Box, Line, Dot Drawing of Base Ten Blocks** (box=100, line=10, dot=1)  **Layered 3-digit Place Value Cards**  **Place Value Mat**  	• Use base-ten blocks to represent three-digit numbers • Place concrete representations on a place value mat to reinforce that multiples of one hundred are made of hundreds with no tens and no ones • Use place value mats and drawings to represent a number from 100 - 999 • Use place value cards to help students identify the value of the number in the hundreds, tens, and ones places • Model the same three-digit number (up to 999) using manipulatives and pictorial representations • Connect physical and pictorial representations with written numerals for multiples of 100. Discuss why the digit zero must be in the tens place and the ones place • Orally describe a number in terms of place value • Use hundreds charts and number lines to represent numbers

Image Sources: http://commoncoretools.me/wp-content/uploads/2015/03/ccss_progression_nbp_k5_2015_03_16.pdf; http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/2.pdf

Understand place value (Standards 2.NBT.1–4)

Standard 2.NBT.2 Count within 1,000; skip-count by fives, tens, and hundreds.

Concepts and Skills to Master

- Count within 1,000 by ones
- Count within 1,000 by fives (on the fives, for example 35, 40, 45, 50, . . .)
- Count within 1,000 by tens (on the decade numbers, for example 90, 100, 110, 120, 130, . . .)
- Count within 1,000 by hundreds (on the century numbers, for example 200, 300, 400, 500, . . .)
- Describe number patterns within 1,000

Related Standards: Current Grade Level

2.NBT.1 Understand that the three digits in a three-digit number represent amounts of hundreds, tens, and ones
2.NBT.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction
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
2.MD.7 Tell and write time from analog and digital clocks to the nearest five minutes
2.MD.8 Solve problems involving money

Related Standards: Future Grade Levels

3.OA.1 Interpret the products of whole numbers, such as interpreting 7 × 5 as the total number of objects in 7 groups of 5 objects each
3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities

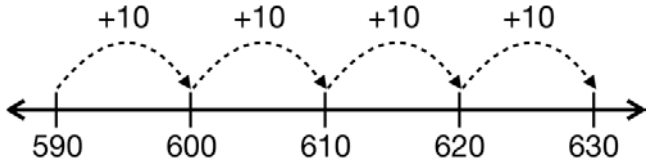
Critical Background Knowledge from Previous Grade Levels

- Count to 120, starting at any number less than 120. (1.NBT.1**)**
- Relate counting to addition and subtraction (1.OA.5)
- Count to 100 by ones and tens (K.CC.1)
- Count forward beginning from any number (K.CC.2)
- Read and write numerals from 0-20 (K.CC.3)

Academic Vocabulary

pattern, skip count, extend, repeated addition

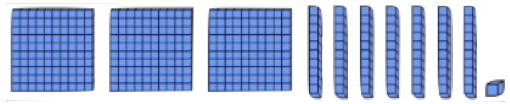
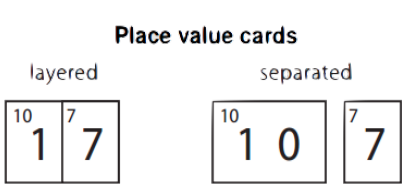
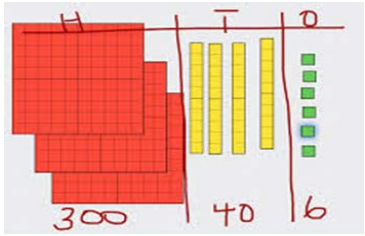
Suggested Models



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Suggested Strategies

- Use an open number line to illustrate skip counting by fives, tens or hundreds
- Identify number and counting patterns on a hundreds chart
- Relate skip counting patterns of 5, 10, and 100 within the range of numbers 1 to 999. For example, skip forward or backward by 5s from 225 to 250
- Use repeated subtraction to skip count backwards by 5s, 10s, or 100s

Understand place value (Standards 2.NBT.1–4)	
Standard 2.NBT.3 Read and write numbers to 1,000 using base-ten numerals, number names, and expanded form.	
Concepts and Skills to Master	
• Express a given number in multiple ways: o base-ten numerals (371) o base-ten word form (3 hundreds, 7 tens, and 1 one) o number names (three hundred seventy-one) o expanded form (300 + 70 + 1) • Compose and decompose numbers by representing numbers using base-ten numerals and expanded form	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones **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 **2.NBT.7** Add and subtract within 1,000 using strategies based on place value	**3.NBT.1** Use place value understanding to round whole numbers to the nearest 10 or 100 **3.NBT.2** Fluently add and subtract within 1,000 using strategies and algorithms based on place value **4.NBT.2** Read and write multi-digit whole numbers using base-ten numerals, number names and expanded form
Critical Background Knowledge from Previous Grade Levels	
• Understand that the two digits of a two-digit number represent amounts of tens and ones (1.NBT.2) • Read and write numerals up to 120 (1.NBT.1) • Read and write numerals from 0 to 20 (K.CC.3) • Compose and decompose numbers from 11-19 into ten ones and some further ones. Record each composition or decomposition by a drawing or equation. (18 = 10 + 8) (K.NBT.1)	
Academic Vocabulary	
hundreds, tens, ones, number names, expanded form, base-ten numerals, base-ten word form	
Suggested Models	Suggested Strategies
  	• Use manipulative materials such layered place value cards and place value dice to make connections between numbers written as base-ten numerals and in expanded form • Use base-ten blocks, drawings, and place value mats to represent three-digit whole numbers

Understand place value (Standards 2.NBT.1–4)

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.

Concepts and Skills to Master

- Understand that when comparing two numbers, one looks at the whole number, not just individual digits
- Understand that a number (greater than 0) in the hundreds place always has a greater value than the number in the tens place
- Generalize that the number with the most hundreds is greater
- Understand that if the number of hundreds is the same, the number with more tens is greater; if the number of hundreds and tens is the same, the number with more ones is greater
- Use terms including greater than, more than, less than, fewer than, equal to, and same as, to describe comparisons
- Use the symbols >, =, and < to correctly to compare three-digit numbers
- Understand that two three-digit numbers that have equal value are represented by the = sign

Teacher Note: In kindergarten students use verbal language to identify whether groups of objects or numerals are greater than, less than or equal to other groups of objects or numerals. In first grade students are introduced to using the symbols to record comparisons. Emphasis should be placed on the meaning of quantities rather than tricks such as "the alligator eats the bigger number," etc. In second grade, students should become more comfortable with the use and meanings of these symbols.

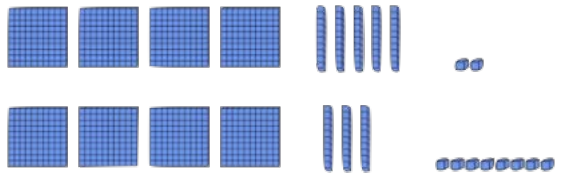
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones **2.NBT.3** Read and write numbers to 1,000 using base-ten numerals, number names and expanded form	**3.NF.3** Compare two fractions with the same numerator or the same denominator. Record the results of comparisons with the symbols >, +, or < **4.NBT.2** Compare two multi-digit whole numbers based on meaning of the digits in each place, using >, =, and < symbols **4.NF.2** Compare two fractions with different numerators, and different denominators. Record the results of comparisons with symbols >, =, or <

Critical Background Knowledge from Previous Grade Levels

- Understand that the two digits of a two-digit number represent amounts of tens and ones. (1.NBT.2)
- Compare two numbers between 1 and 10 presented as written numerals using "great than," "less than," or "equal to." (K.CC.7)
- Identify whether the number of objects in one group is greater than, less than or equal to the number of objects in another group. (K.CC.6)
- Compose and decompose numbers from 11-19 into ten ones and some further ones (K.NBT.1)

Academic Vocabulary

compare, more, greater than (>), more than, most, less, less than (<), fewer, least, equal (=), same as

Suggested Models	Suggested Strategies
452 > 438 **438 < 452** 	• Use concrete materials such as objects on a place value chart, a 100 chart, base-ten blocks, and number lines to compare two three-digit numbers • Write two three-digit numbers in expanded form and compare the value of the hundreds, tens, and ones

Use place value understanding and properties of operations to add and subtract (Standards 2.NBT.5–9).

Standard 2.NBT.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

Concepts and Skills to Master

- Extend first grade understanding to add and subtract numbers within 100
- Use concrete representations when adding and subtracting within 100 including composing and decomposing ones, tens, and hundreds
- Add and subtract fluently within 100 using strategies based on place value and the relationship between addition and subtraction
- Explain why addition and subtraction strategies work when adding and subtracting within 100
- Connect physical representations (objects) to visual representations (drawings)
- Connect physical and visual representations to written methods (expressions, equations, expanded from, etc.) and explain the reasoning used
- Understand that in adding two-digit numbers, one adds tens to tens and ones to ones
- Understand that in adding two-digit numbers, the tens may need to be composed (regrouped) to a hundred (98+2=100)
- Identify when it is necessary to compose a ten (regroup) and decompose (ungroup) a ten
- Write equations for addition and subtraction with sums and differences to 100

Teacher Note: The standard algorithm of compose and decompose is neither an expectation nor a focus in second grade. Students use multiple strategies for addition and subtraction in grades K-3. By the end of third grade students use a range of algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction to fluently add and subtract within 1000. Students are expected to fluently add and subtract multi-digit whole numbers using the standard algorithm by the end of fourth grade.

Related Standards: Current Grade Level	Related Standards: Future Grade Level
2.OA.1 Use addition and subtraction within 100 to solve one- and two-step word problems **2.OA.2** Fluently add and subtract within 20 **2.NBT.1** Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones **2.NBT.6** Add up to four two-digit numbers using strategies based on place value and properties of operations **2.NBT.7** Add and subtract within 1,000 using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction **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 **2.NBT.9** Explain why addition and subtraction strategies work, using place value and the properties of operations. Explanations may be supported by drawings or objects	**3.OA.8** Solve two-step word problems **3.NBT.2** Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction **4.OA.3** Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations **4.NBT.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm

Critical Background Knowledge from Previous Grade Levels

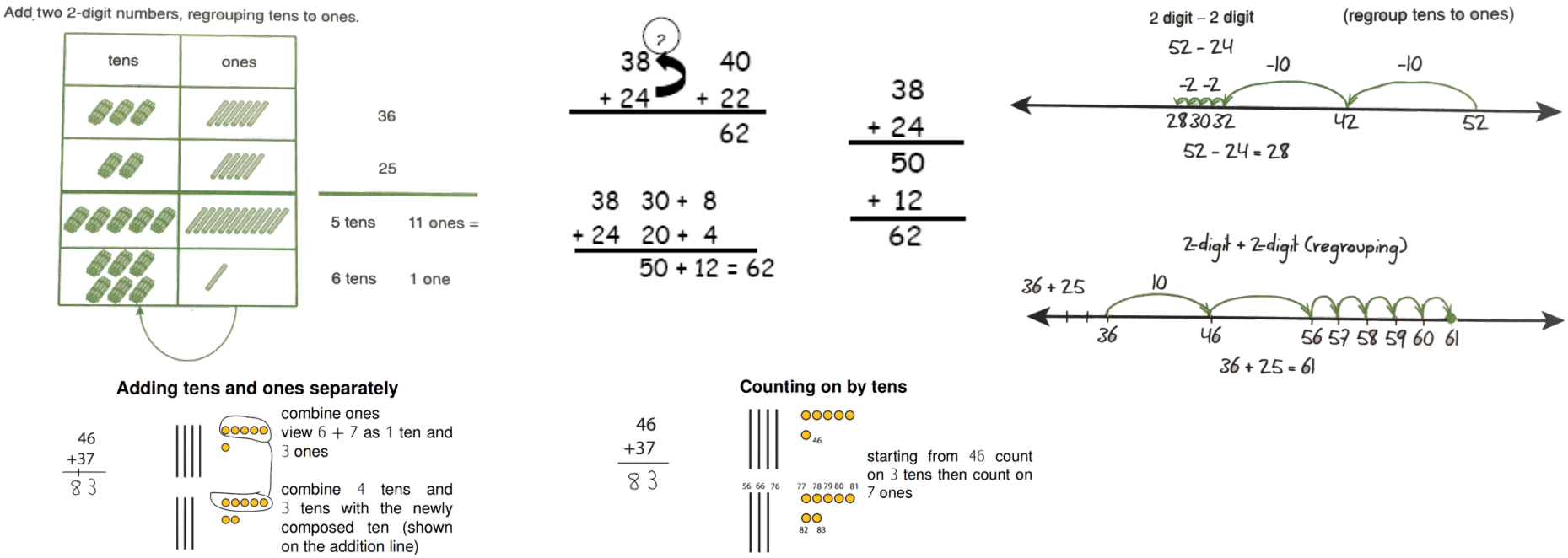
- Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens to tens and ones to ones, and that it is sometimes necessary to compose a ten (1.NBT.4)
- Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used (1.NBT.5)
- Subtract multiples of 10 in the range 10–90 from multiples of 10 in the range 10–90 (1.NBT.6)
- Solve addition and subtraction word problems within 10 (K.OA.2); Make sums of 10 using any number from 1 to 9 (K.OA.4)

place value, one, tens, add, subtract, compose (regroup), decompose (ungroup), digit(s), total, difference, place value

Suggested Strategies

- Use a hundreds chart, base ten blocks, open number lines, and other manipulatives and models to add and subtract
- Use mental computation and partial sums to develop conceptual understanding and number sense adding and subtracting 2-digit numbers
- Make the next ten to add a two-digit number to a two-digit number (24+18=42 by using 6 ones from the 8 ones and adding it to 24 to make the next ten which is 30. Then add 30 to the remaining 12 ones to get 42.)
- Decompose a ten to subtract a two-digit number from a two-digit number when necessary
- Understand and apply the commutative property, associative property, and the additive identity property of zero (Students may, but need not, use formal terms for these properties)

Suggested Models



This method is an application of the commutative and associative properties. The diagrams can help children with understanding and explaining the steps (MP.1). Advantages of writing the 1 below the addends are discussed in the Grade 2 margin.

Counting on by tens from 46, beginning 56, 66, 76, then counting on by ones. This method can be generalized, but the complexity of the counting on required and the lack of efficiency becomes apparent as the number of digits in the addends increases.

Images Sources : http://commoncoretools.me/wp-content/uploads/2015/03/ccss_progression_nbp_k5_2015_03_16.pdf
The Common Core Mathematics Companion: The Standards Decoded, Grades K-2, pp. 106 - 107

2.NBT.5

Use place value understanding and properties of operations to add and subtract (Standards 2.NBT.5–9).

Standard 2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

Concepts and Skills to Master

- Use place value understanding to compute sums of four two-digit numbers using concrete objects, place value cards, or drawings
- Use concrete representations to compose (regroup) a new ten or hundred when necessary
- Apply various strategies based on number sense and mental mathematics with sums of four two-digit numbers
- Explain why addition strategies work when adding four two-digit numbers
- Connect physical representations (objects) to visual representations (drawings)
- Connect physical and visual representations to written methods (expressions, equations, expanded from, etc.) and explain the reasoning used
- Understand that in adding two-digit numbers, one adds tens to tens and ones to ones
- Understand that in adding two-digit numbers, the tens may need to be composed (regrouped) to a hundred
- Identify when it is necessary to compose a ten (regroup)
- Write equations for addition with sums of four two-digit numbers

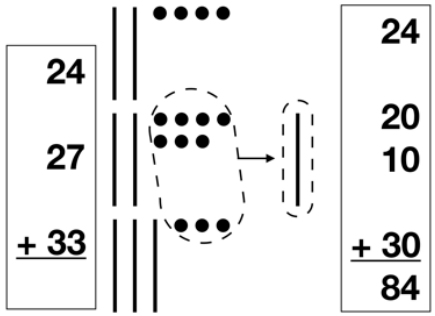
Teacher Note: The standard algorithm of compose and decompose is neither an expectation nor a focus in second grade. Students use multiple strategies for addition and subtraction in grades K-3. By the end of third grade students use a range of algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction to fluently add and subtract within 1,000. Students are expected to fluently add and subtract multi-digit whole numbers using the standard algorithm by the end of fourth grade. Students may, but need not, use formal terms for properties.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.OA.2 Fluently add and subtract within 20 **2.NBT.5** Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction **2.NBT.7** Add and subtract within 1,000 using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction **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 **2.NBT.9** Explain why addition and subtraction strategies work, using place value and the properties of operations. Explanations may be supported by drawings or objects	**3.OA.8** Solve two-step word problems **3.NBT.2** Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction **4.OA.3** Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted **4.NBT.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm

Critical Background Knowledge from Previous Grade Levels

- Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; (1.NBT.4)
- Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used (1.NBT.5)
- Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20 (1.OA.2)
- Add and subtract within 20 (1.OA.6)
- Solve addition and subtraction word problems within 10 (K.OA.2)
- Make sums of 10 using any number from 1 to 9 (K.OA.4)

Academic Vocabulary
compose (regroup), add, total, digit(s), ones, tens, hundreds, place value, addend

Suggested Models	Suggested Strategies
Example: 24 + 27 + 33 Associative Property: • Add 27 + 33 to get 60, • Then add 24 + 60 to get a total sum of 84 Place Value: • Add the tens 20 + 20 + 30 = 70 • Add the ones 4 + 7 + 3 = 14 • Add the two sums 70 + 14= 84 	• Use base ten blocks to add four two digit numbers • Use the Associative Property to add four two digit numbers • Use place value charts to add four two digit numbers • Use hundreds chart to add four two digit numbers • Use an open number line to add four two-digit numbers • Use physical models to add and subtract • Use mental computation to develop conceptual understanding and number sense adding four two digit numbers • Make the next ten to add a two-digit number to a two-digit number (24+18=42 by using 6 ones from the 8 ones and adding it to 24 to make the next ten which is 30. Then add 30 to the remaining 12 ones to get 42.)

Use place value understanding and properties of operations to add and subtract (Standards 2.NBT.5–9).

Standard 2.NBT.7 Add and subtract within 1,000 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, and ones and ones, and that it is sometimes necessary to compose or decompose tens or hundreds.

Concepts and Skills to Master

- Extend understanding from adding and subtracting within 100 to add and subtract within 1,000
- Use concrete representations when adding and subtracting within 1,000 including composing and decomposing ones, tens, and hundreds to regroup when necessary
- Add and subtract within 1,000 using strategies based on place value, number sense, mental mathematics, and the relationship between addition and subtraction
- Explain why addition and subtraction strategies work when adding and subtracting within 1,000
- Connect physical representations (objects) to visual representations (drawings)
- Connect physical and visual representations to written methods (expressions, equations, expanded from, etc.) and explain the reasoning used
- Understand that in adding and subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, and ones and ones
- Understand that in adding three-digit numbers, the hundreds may need to be composed (regrouped) to a thousand (998+2=1000)
- Identify when it is necessary to compose (regroup) or decompose (ungroup) a ten or hundred
- Write equations for addition and subtraction with sums and differences within 1,000
- Understand how to compute sums and difference in a variety of situations, including with zeros in various places

Teacher Note: The standard algorithm of compose and decompose is neither an expectation nor a focus in second grade. Students use multiple strategies for addition and subtraction in grades K–3. By the end of third grade students use a range of algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction to fluently add and subtract within 1000. Students are expected to fluently add and subtract multi-digit whole numbers using the standard algorithm by the end of fourth grade.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.OA.1 Use addition and subtraction within 100 to solve one- and two-step word problems **2.OA.2** Fluently add and subtract within 20 **2.NBT.1** Understand the digits of a three-digit number represent amounts of hundreds, tens, and ones **2.NBT.5** Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction **2.NBT.6** Add up to four two-digit numbers using strategies based on place value and properties of operations **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 **2.NBT.9** Explain why addition and subtraction strategies work, using place value and the properties of operations. Explanations may be supported by drawings or objects	**3.OA.8** Solve two-step word problems **3.NBT.2** Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction **4.OA.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted **4.NBT.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm

- Related Standards: Current Grade Level (see above)
- Understand that the two digits of a two-digit number represent amounts of tens and ones (1.NBT.2)
- Add and subtract within 100 in specific situations (1.NBT.4, 1.NBT.5, 1.NBT6)

Academic Vocabulary

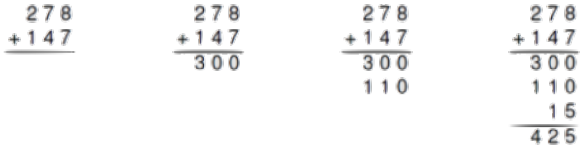
place value, one, ten, hundred, add, subtract, compose (regroup), decompose (ungroup), digit(s), total, difference,

Suggested Strategies

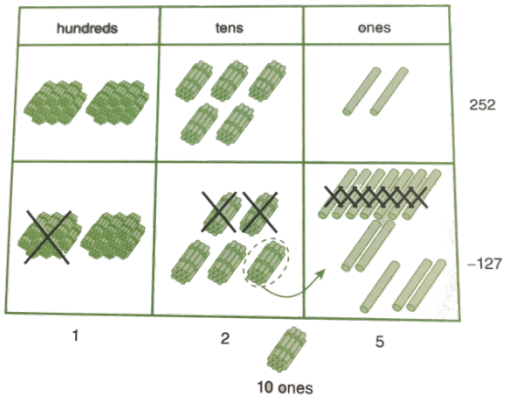
- Use hundreds charts, base ten blocks, open number lines, and place value charts to add and subtract
- Use mental computation to develop conceptual understanding and number sense adding and subtracting two and three digit numbers
- Make the next hundred to add a three-digit number to a two- or three-digit number
- Decompose a ten to subtract a two or one-digit number from a two-digit number when necessary
- Decompose a hundred to subtract a two- or three-digit number from three-digit number when necessary

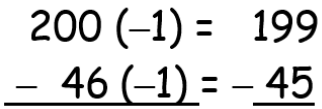
Suggested Models

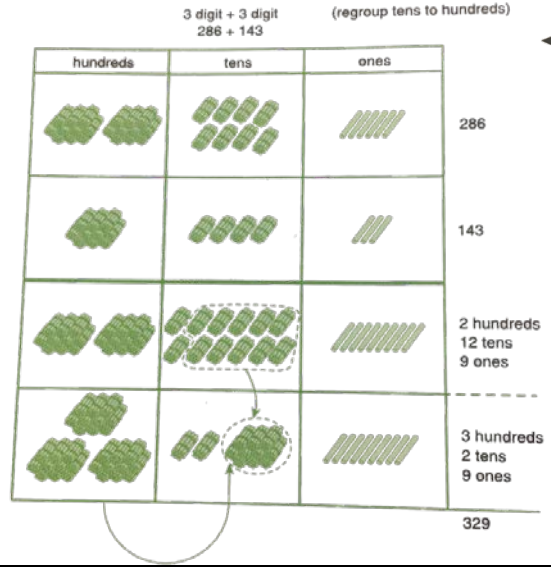
Addition: Recording newly composed units in separate rows

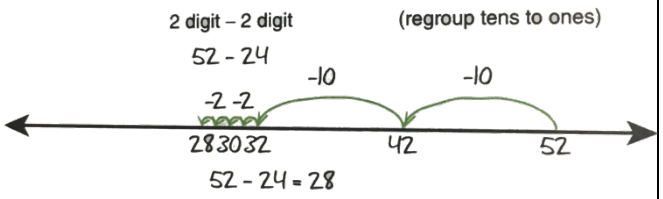


The computation shown proceeds from left to right, but could have gone from right to left. Working from left to right has two advantages: Many students prefer it because they read from left to right; working first with the largest units yields a closer approximation earlier.









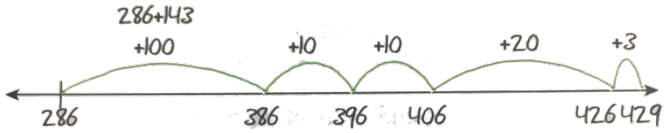


Image Sources: http://commoncoretools.me/wp-content/uploads/2015/03/ccss_progression_nbp_k5_2015_03_16.pdf
The Common Core Mathematics Companion: The Standards Decoded, Grades K-2, pp. 109-110

Use place value understanding and properties of operations to add and subtract (Standards 2.NBT.5–9).

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.

Concepts and Skills to Master

- Use mental calculation in finding 10 or 100 more than a given number
- Use mental calculation in finding 10 or 100 less than a given number
- Explain the reasoning used in finding 10 or 100 more and 10 or 100 less
- Understand that only the tens place changes when mentally finding 10 more and 10 less
- Understand that only the hundreds place changes when mentally finding 100 more and 100 less

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.OA.1 Use addition and subtraction within 100 to solve one- and two-step word problems **2.OA.2** Fluently add and subtract within 20 **2.NBT.1** Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones **2.NBT.5** Fluently add and subtract within 100 **2.NBT.7** Add and subtract within 1,000	**3.NBT.2** Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction **4.OA.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted **4.NBT.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm

Critical Background Knowledge from Previous Grade Levels

- Relate counting to addition and subtraction (1.OA.5)
- Given a two-digit number, mentally find 10 more or 10 less than the number without having to count (1.NBT.5)
- Solve addition and subtraction word problems within 10 (K.OA.2)

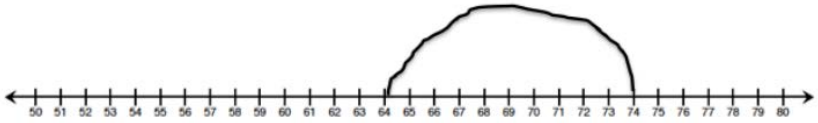
Academic Vocabulary

more, less, add, subtract, ten, hundred, digit(s)

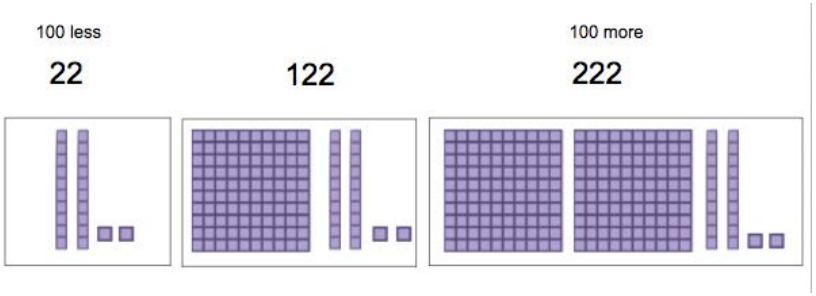
Suggested Models

There were 174 birds in a park and 10 flew away. How many birds remained?

I thought about a number line. I started at 174. Then, because 10 birds flew away, I took a leap of 10. I landed on 164. So, there are 164 birds left in the park.



I know that 10 less than 74 is 64. So there are 164 birds left in the park.



Suggested Strategies

- Mentally picture a number line or hundred chart
- Mentally picture ten frames
- Mentally add or subtract 10 and 100 without having to count by ones
- Use drawings and layered cards to explain mental computations

Image Source: http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/2.pdf

Use place value understanding and properties of operations to add and subtract (Standards 2.NBT.5–9).

Standard 2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations. Explanations may be supported by drawings or objects.

Concepts and Skills to Master

- Understand and explain when to use the Commutative Property and the Associative Property
- Explain thinking when solving and addition and subtraction problems
- Connect a given addition problem to a related subtraction problem
- Connect a given subtraction problem to a related addition problem
- Connect models to the related addition and subtraction problems

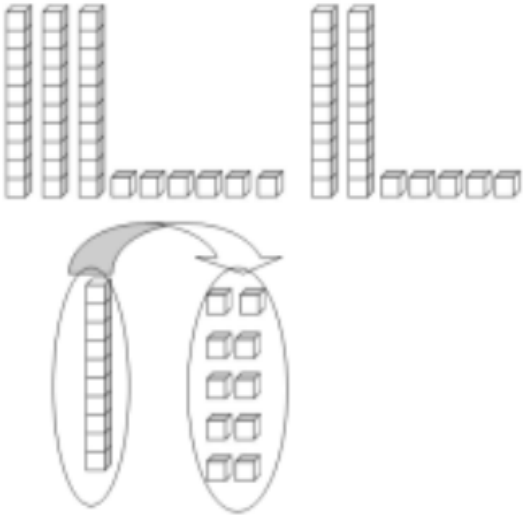
Teacher Note: This standard is connected to and taught along with 2.NBT.5–8. Students may, but need not, use the formal terms for properties.
The standard algorithm of compose and decompose is neither an expectation nor a focus in second grade. Students use multiple strategies for addition and subtraction in grades K-3. By the end of third grade students use a range of algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction to fluently add and subtract within 1,000. Students are expected to fluently add and subtract multi-digit whole numbers using the standard algorithm by the end of fourth grade.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.NBT.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. **2.NBT.6** Add up to four two-digit numbers using strategies based on place value and properties of operations. **2.NBT.7** Add and subtract within 1,000 using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and **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	**3.NBT.2** Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction **4.NBT.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm

Critical Background Knowledge from Previous Grade Levels

- Apply properties of operations as strategies to add and subtract; If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known (Commutative Property of Addition). To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 =12 (Associative Property of Addition) (1.OA.3)
- Understand subtraction as an unknown-addend problem (1.OA.4)
- Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10 (1.NBT.4)
- Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used (1.NBT.5)
- Solve addition and subtraction word problems within 10 (K.OA.2)
- Make sums of 10 using any number from 1 to 9 (K.OA.4)

Academic Vocabulary
place value, properties of operations, addition, subtraction, compose (regroup), decompose (ungroup), strategy, justify, clarify, reasoning, explain

Suggested Models	Suggested Strategies
Example: There are 36 birds in the park. 25 more birds arrive. How many birds are there? Solve the problem and show your work. Student A: I broke 36 and 25 into tens and ones 30 + 6 + 20 + 5. I can change the order of my numbers, since it doesn't change any amounts, so I added 30+ 20 and got 50. Then I added 5 and 5 to make 10 and added it to the 50. So, 50 and 10 more is 60. I added the one that was left over and got on 6 to get 61. So there are 61 birds in the park. Student B: I used place value blocks and made a pile of 36 and a pile of 25. Altogether, I had 5 tens and 11 ones. 11 ones is the same as one ten and one left over. So, I really had 6 tens and 1 one. That makes 61. 	• Use hundreds chart to add and subtract • Use base ten blocks to add and subtract • Use an open number line to add and subtract • Use physical models to add and subtract • Use place value charts to add and subtract • Use mental computation to develop conceptual understanding and number sense adding and subtracting two and three digit numbers

Images Source: http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/2.pdf

Measure and estimate lengths in standard units (Standards 2.MD.1–4)

Standard 2.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

Concepts and Skills to Master

- Identify and understand the difference between standard tools for linear measurement (rulers, yardsticks, meter sticks, and measuring tapes)
- Understand it may be more efficient to use tools closer to the size of the measured object (For example, use a ruler to measure a book, not a meter stick)
- Identify and understand the beginning point of the appropriate measuring tool
- Accurately measure a variety of objects using appropriate tools (leave no gaps, allow no overlays, and start at 0 on a measurement tool)
- Identify and record the appropriate length and unit (5 inches, 2 yards, 9 cm)

Teacher Note: Second grade is the first time students measure using standard units of measurement. In first grade, students lay multiple copies of the same object end to end to measure another object, such as measuring a pencil using paperclips. In second grade, students draw on this background knowledge as they transition to standard units of measurement. While it is important to teach students to start measuring on 0, they should also understand that they could start measuring at any whole number and then count the number of units in the length. Activities such as measuring with a "broken ruler" reinforce iterations of units being measured.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.MD.2 Measure the length of an object using units of different lengths	**3.MD.2** Measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms, milliliters, and liters
2.MD.3 Estimate lengths using units of inches, feet, centimeters and meters	**3.MD.4, 4.MD.4** Generate and display measurement data
2.MD.4 Measure to determine how much longer one object is than another	**3.MD.5–8, 4.MD.3** Extend understanding to area and perimeter
2.MD.5 Use addition and subtraction to solve word problems involving lengths	**4.MD.1** Know relative sizes of measurement units
2.MD.6 Represent whole numbers as lengths from 0 on a number line diagram	**4.MD.2** Use the four operations to solve measurement word problems
2.MD.9 Generate measurement data by measuring lengths of several objects	

Critical Background Knowledge from Previous Grade Levels

- Order three objects by length; compare the lengths of two objects indirectly by using a third object (1.MD.1)
- Express the length of an object as a whole number of length using nonstandard units (1.MD.2)
- Describe measurable attributes of objects, such as length (K.MD.1)
- Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute (K.MD.2)

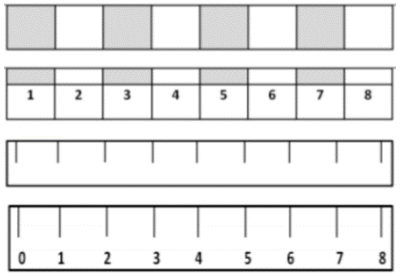
Academic Vocabulary

measure, unit(s), length, customary, inch (in.), foot (ft.), yard (yd.), ruler, yardstick, metric, centimeter (cm), meter (m), meter stick, measuring tape

Suggested Models

As students progress from
- a "ruler" that is blocked off into colored units (no numbers)…
- to a "ruler" that has numbers along with the colored units…
- to a "ruler" that has units (inches or centimeters) with and without numbers,

they develop the understanding that the numbers on a ruler do not count the individual marks but indicate the spaces (distance) between the marks. This is a critical understanding students need when using such tools as rulers, yardsticks, meter sticks, and measuring tapes.



Suggested Strategies

- Measure different objects around the classroom
- Determine which measurement tool would be most appropriate for measuring each item
- Create rulers using inch-tiles and compare to a commercial ruler
- Investigate and use customary and metric linear measurement tools

Image Source: http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/2.pdf

Measure and estimate lengths in standard units (Standards 2.MD.1–4)

Standard 2.MD.2 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.

Concepts and Skills to Master

- Identify and understand the difference between standard tools for linear measurement (rulers, yardsticks, meter sticks, and measuring tapes)
- Understand that when measuring, longer units of measure take fewer repetitions to measure objects
- Understand that when measuring, shorter units of measure take more repetitions to measure objects
- Understand the relative sizes between different units of measure (centimeters/inches, meters/yards, inches/feet, feet/yards)
- Record measurements using appropriate standard units

Teacher Note: Second grade students measure an object using two units of different lengths. This experience helps students realize that the unit used is as important as the attribute being measured. This is a difficult concept for young children and will require numerous experiences for students to predict, measure, and discuss outcomes.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.MD.1 Measure the length of an object by selecting and using appropriate tools	**3.NF.2** Understand and represent fractions on a number line diagram
2.MD.3 Estimate lengths using units of inches, feet, centimeters and meters	**3.NF.3** Compare fractions by reasoning about their size
2.MD.4 Measure to determine how much longer one object is than another	**3.MD.4** Generate measurement data by measuring lengths
2.MD.5 Use addition and subtraction to solve word problems involving lengths	**4.MD.1** Know relative sizes of measurement units within each system
2.MD.6 Represent whole numbers as lengths from 0 on a number line diagram	

Critical Background Knowledge from Previous Grade Levels

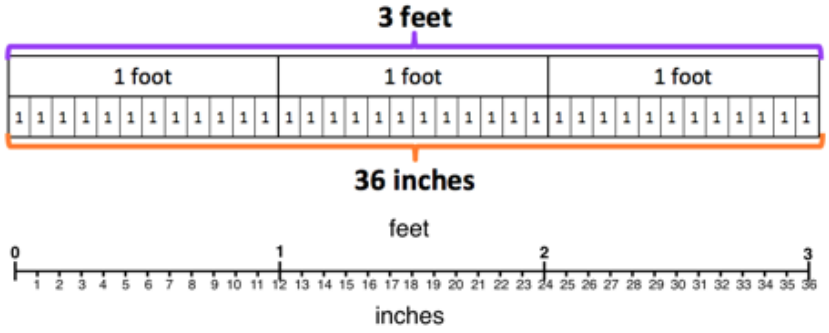
- Order three objects by length; compare the lengths of two objects indirectly by using a third object (1.MD.1)
- Express the length of an object as a whole number of length units (1.MD.2)
- Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object (K.MD.1)
- Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute (K.MD.2)

Academic Vocabulary

measure, unit(s), length, customary, inch (in.), foot (ft.), yard (yd.), ruler, yardstick, metric, centimeter (cm), meter (m), meter stick, measuring tape

Suggested Models

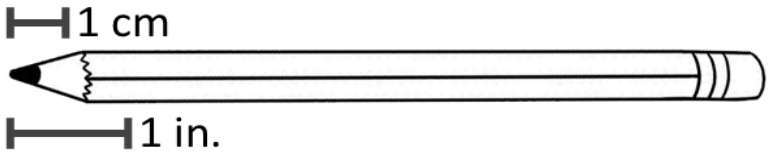
Example: A student measured the length of a desk in both feet and inches. She found that the desk was 3 feet long. She also found out that it was 36 inches long.
Teacher: Why do you think you have two different measurements for the same desk?
Student: It only took 3 feet because the feet are so big. It took 36 inches because an inch is a whole lot smaller than a foot.



Suggested Strategies

- Provide measurement activities using two different units (cm and in., ft. and yds., etc.)
- Discuss results in measuring an object in both inches and feet and centimeters and meters
- Use t-charts to compare the measurement of objects measured in two different units and describe how the two measurements relate to the size of the unit chosen

Image Source: https://commoncoretools.files.wordpress.com/2012/07/ccss_progression_gm_k5_2012_07_21.pdf

Measure and estimate lengths in standard units (Standards 2.MD.1–4)	
Standard 2.MD.3 Estimate lengths using units of inches, feet, centimeters, and meters.	
Concepts and Skills to Master	
● Understand that longer units of measure take fewer repetitions to measure objects ● Understand that shorter units of measure take more repetitions to measure objects ● Develop points of reference in order to estimate using inches, feet, centimeters, and meters (For example, an inch is about the distance between the first and second joints of the pointer finger) ● Understand that estimates are approximate, and are not expected to be exact	
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.MD.1 Measure the length of an object by selecting and using appropriate tools **2.MD.2** Measure the length of an object twice, using length units of different lengths for the two measurements **2.MD.4** Measure to determine how much longer one object is than another	**3.MD.2** Measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms, milliliters, and liters **3.NF.2** Understand and represent fractions on a number line diagram **4.MD.1** Know relative sizes of measurement units
Critical Background Knowledge from Previous Grade Levels	
● Order three objects by length; compare the lengths of two objects indirectly by using a third object (1.MD.1) ● Express the length of an object as a whole number of length units (1.MD.2) ● Directly compare two objects with a measurable attribute in common, to see which object has “more of”/”less of” the attribute (K.MD.2) ● Understand the relationship between numbers and quantities (K.CC.4)	
Academic Vocabulary	
estimate, measure, unit(s), length, inch, foot, centimeter, meter	
Suggested Models	Suggested Strategies
Example: When asked to estimate the length of a pencil in inches and centimeters, a student may estimate that the pencil is 6 inches or 10 centimeters.  	● Practice estimating and measuring often ● Use a three-column chart to track estimates, actual measurements, and the difference to analyze accuracy of estimations ● Use parts of students’ bodies to measure classroom objects and make an estimate, then measure with a standard tool (measure with the top joint of your thumb, then test with inches) ● Estimate a length, then justify the reasonableness of the estimation and the unit of measurement used ● Estimate a length, measure only a small section, then adjust the estimation as needed

Measure and estimate lengths in standard units (Standards 2.MD.1–4)

Standard 2.MD.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit. *For example, after measuring a pencil and a crayon, a student uses the measurements to determine that the pencil is two inches longer than the crayon.*

Concepts and Skills to Master

- Understand that differences in length can be measured (see Suggested Models below)
- Record the measure of two separate objects
- Compare the length of two separate objects and state which is longer/shorter than the other
- Find the difference in length of two separate objects and calculate the difference in the measurement units (for example, if a pencil is 10 cm and a marker is 8 cm, the marker is 2 cm shorter than the pencil)
- State the difference between the length of two objects in the same units as they were measured (for example, if a pencil and marker are measured in inches, the difference between the two objects will be stated in inches)

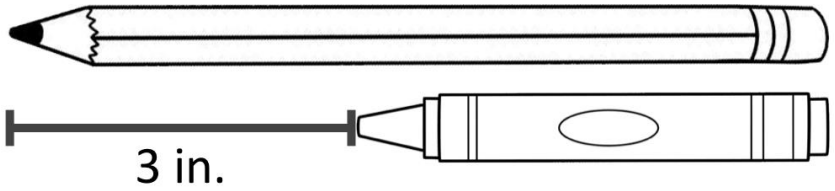
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.OA.1 Use addition and subtraction to solve one- and two-step word problems **2.MD.1** Measure the length of an object **2.MD.2** Measure the length of an object twice, using length units of different lengths for the two measurements **2.MD.3** Estimate lengths using units of inches, feet, centimeters and meters **2.MD.10** Draw a picture graph and a bar graph to represent a data set with up to four categories. Solve simple comparison problems using information presented in a bar graph	**3.MD.2** Measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms, milliliters, and liters **3.MD.4** Generate measurement data by measuring lengths using rulers **3.NF.3** Explain equivalence and compare fractions

Critical Background Knowledge

- Order three objects by length; compare the lengths of two objects indirectly by using a third object (1.MD.1)
- Express the length of an object as a whole number of length units (1.MD.2)
- Understand the relationship between numbers and quantities (K.CC.4)
- Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object (K.MD.1)
- Directly compare two objects with a measurable attribute in common, to see which object has “more of”/”less of” the attribute (K.MD.2)

Academic Vocabulary

inch, foot, yard, yardstick, ruler, centimeter, meter, meter stick, measuring tape, length, customary, metric, measure, unit(s), difference, compare

Suggested Models	Suggested Strategies
A student may lay the pencil and crayon end to end then measure the difference in distance between the tip of the pencil and the tip of the crayon.  	● Align two objects side by side and measure the difference between them (see Suggested Models to the left) ● Estimate the difference in length between two objects, then measure to check the accuracy of the estimate ● Measure different objects and use subtraction to find the difference in measurements

Relate addition and subtraction to length (Standards 2.MD.5–6).

Standard 2.MD.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units. *For example, use drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.*

Concepts and Skills to Master

- Interpret word problems involving length
- Represent and solve word problems involving length using visual models, pictures, and equations
- Attach measurement units to values when appropriate (for example, 5 inches will be listed as "5 inches" or "5 in." rather than "5")

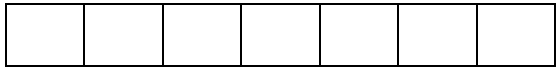
Related Standards: Current Grade Level	Related Standards: Future Grade Level
2.OA.1 Use addition and subtraction to solve one- and two-step word problems **2.MD.1** Measure the length of an object **2.MD.4** Measure to determine how much longer one object is than another	**3.MD.2** Measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms, milliliters, and liters **3.MD.4** Generate measurement data by measuring lengths using rulers **3.MD.8** Solve real world and mathematical problems involving perimeters **4.MD.2** Use the four operations to solve word problems using units of measure

Critical Background Knowledge

- Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. (2.MD.1)
- Use addition and subtraction within 20 to solve word problems (1.OA.1)
- Express the length of an object as a whole number of length units (1.MD.2)
- Understand the relationship between numbers and quantities. (K.CC.4)
- Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object (K.MD.1)
- Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. (K.MD.2)

Academic Vocabulary

addition, subtraction, measurement, length, equation, unit, unknown, symbol

Suggested Models	Suggested Strategies
Eva's train is 9 inches long, Jim's train is 7 inches long. How much longer is Eva's train than Jim's? 9 – 7 = ? or 7 + ? = 9 Eva's Train  Jim's Train 	• Act out the problem in order to develop a solution path • Create measurement word problems using student observations and measurements • Solve problems using manipulatives such as connecting cubes (see Suggested Models to the left comparing the length of Eva's and Jim's trains)

Relate addition and subtraction to length (Standards 2.MD.5–6).

Standard 2.MD.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2… Represent whole number sums and differences within 100 on a number line diagram.

Concepts and Skills to Master

- Draw a number line with equally spaced points
- Understand that a mark is used to indicate positions of whole numbers on a number line
- Understand that the numbers on a number line will increase to the right and decrease to the left
- Understand number lines as a measurement model
- Understand that when using the number line, it is the space between each line that represents the number/value, not the line itself
- Use a number line to calculate sums and differences within 100

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.OA.1 Use addition and subtraction to solve one- and two-step word problems **2.MD.4** Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit. **2.MD.5** Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same unit **2.MD.9** Show measurement data by making a line plot, where the horizontal scale is marked off in whole-number units	**3.NBT.2** Fluently add and subtract within 1,000 using strategies and algorithms **3.NF.2** Understand a fraction as a number on the number line; represent fractions on a number line diagram **3.MD.4** Show data by making a line plot, where the horizontal scale is marked off in appropriate units

Critical Background Knowledge

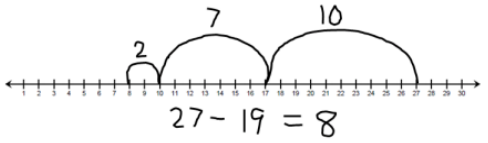
- Use addition and subtraction within 20 to solve word problems (1.OA.1)
- Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20 (1.OA.2)
- Add within 100 using concrete models or drawings and strategies (1.NBT.4)
- Given a two-digit number, mentally find 10 or more 10 less without having to count (1.NBT.5)
- Subtract multiples of 10 in the range 10–90 from multiples of 10 in the range 10–90 (1.NBT.6)

Academic Vocabulary

number line, sum, difference, greater than, less than, equal

Suggested Models

Example: There were 27 students on the bus. 19 got off the bus. How many students are on the bus?
Student A: I used a number line. I started at 27. I broke up 19 into 10 and 9. That way, I could take a jump of 10.
I landed on 17. Then I broke the 9 up into 7 and 2. I took a jump of 7.
That got me to 10. Then I took a jump of 2. That's 8. So, there are 8 students now on the bus.



Suggested Strategies

- Read the addition or subtraction problem to determine the range of numbers needed for the number line
- Create a classroom number line and demonstrate classroom contextual situations
- Use open number lines to solve problems
- Compare number lines to rulers to solve problems and note the similarities

Work with time and money (Standards 2.MD.7–8)

Standard 2.MD.7 Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

Concepts and Skills to Master

- Understand the numbers on an analog clock and view time in intervals of five minutes
- Understand a day is 24 hours long and is divided into two 12-hour segments, one being called a.m. and the other p.m.
- Represent and write time on analog and digital clocks using a.m. and p.m.
- Understand the relationship between the hour and minute hands as they move through time
- Represent time displayed in a digital format to the nearest five minutes on an analog clock
- Represent time displayed on an analog clock to the nearest five minutes in a digital format
- Use descriptive terms such as *half past, quarter after, five 'til*, etc.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.NBT.2 Skip-count by fives **2.G.3** Partition circles into two and four equal shares. Describe the shares using the words halves and quarters. **2.MD.8** Solve problems involving nickels (5 cents)	**3.MD.1** To the nearest minute, add and subtract time intervals in word problems **4.MD.1** Know relative sizes of hours, minutes, and seconds. Express hours as minutes or seconds and minutes as seconds.) **4.MD.2** Solve word problems involving intervals of time

Critical Background Knowledge

- Understand and tell time on analog and digital clocks to the hour and half hour (1.MD.3)
- Understand the difference between the minute and hour hands on an analog clock (1.MD.3)
- Partition circles into two and four equal shares. Describe the shares using the words halves and quarters (1.G.3)

Academic Vocabulary

time, hour, minute, minute hand, hour hand, quarter of, quarter past, quarter after, quarter to/till, analog clock, digital clock, a.m., p.m., midnight, noon

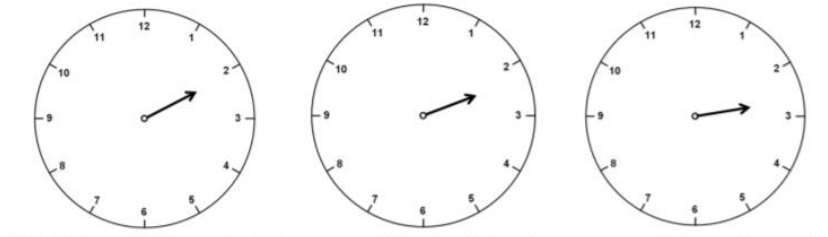
Suggested Models	Suggested Strategies
 All of these clocks indicte the hour of "two", although they look slightly different. This is an important idea for students as they learn to tell time.	● Manipulate a physical clock to represent time to the nearest five minutes ● Manipulate a virtual clock to represent time to the nearest five minutes ● Match times on digital and analog clocks ● Apply time to real world situations (class schedule, school events, etc.)

Image Source: http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/2.pdf

Work with time and money (Standards 2.MD.8)	
Standard 2.MD.8 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *For example, if you have 2 dimes and 3 pennies, how many cents do you have?*	
Concepts and Skills to Master	
● Understand that coins represent a part of a dollar ● Select coins for a given amount and create equivalent coin collections (same amounts, different coins) ● Identify the dollar bill and understand its value ● Use the dollar symbol to write the value of a dollar ($1, $7) ● Solve word problems involving dollars or cents and record using appropriate symbols For example, $6 and 25¢ Teacher Note: This standard does not include decimal notation. Students do not use decimal notation until 4th grade.	
Related Standards: Current Course	Related Standards: Future Courses
2.NBT.2 Skip-count by fives and tens **2.NBT.5** Fluently add and subtract within 100 **2.NBT.7** Add and subtract within 1,000 **2.OA.1** Use addition and subtraction within 100 to solve one- and two-step word problems	**4.MD.2** Solve word problems involving money
Critical Background Knowledge from Previous Grade Level	
● Identify the values of pennies, nickels, dimes and quarters and know their comparative values (1.MD.5) ● Use appropriate notation to designate a coin's value (1.MD.5)	
Academic Vocabulary	
bill, dollar ($), coin, penny, nickel, dime, quarter, cent (¢), value	
Suggested Models	Suggested Strategies
2 dimes, 2 nickels, and 3 pennies  10¢ + 10¢ + 5¢ + 5¢ + 1¢ + 1¢ + 1¢ = 33¢	● Use money to solve problems with real-life contexts ● Use physical coins to solve word problems ● When counting sets of coins, group same coins together, start with larger values and add on smaller values

Represent and interpret data (Standards 2.MD.9–10)

Standard 2.MD.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

Concepts and Skills to Master

- Measure lengths of several objects to the nearest whole unit (inches, feet, yards, centimeters, meters)
- Understand that data such as the lengths of several objects may be represented on a line plot with whole number units
- Understand line plots represent measurement data, not categorical data
- Make a line plot using generated measurements; include a horizontal scale, title, labels, and straight columns of symbols (• or **X**) to represent the data points
- Relate line plots to number lines

Teacher Note: Students do not have to generate the data each time they make line plots. That would be too time consuming. After some experiences in generating data, most work in producing line plots can be done by providing students with data sets. While scaffolds may be in place to support students in creating line plots when appropriate, students are expected to create the horizontal scale with tick marks when making line plots. While the emphasis of this standard is on generating data and making line plots, students may pose and answer simple questions about the data.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.MD.1 Use appropriate tools to measure length **2.MD.3** Estimate lengths using units of inches, feet, centimeters, and meters **2.MD.6** Represent whole numbers as lengths on a number line **2.MD.10** Draw, represent and interpret categorical data with up to four categories	**3.MD.4** Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot where the horizontal scale is marked off in appropriate units-whole numbers, halves, or quarters **4.MD.4** Make a line plot to display a data set of measurements in fractions of a unit (halves, quarters, and eighths). Solve problems involving addition and subtraction with like denominators of fractions by using information presented in line plots

Critical Background Knowledge

- Express the length of an object as a whole number of length units (1.MD.2)
- Organize, represent, and interpret data with up to three data categories (1.MD.4)
- Describe measureable attributes of objects such as length (K.MD.1)

Academic Vocabulary

data, line plot, horizontal scale, measurement, measure, units, tick mark (measurement on line plot)

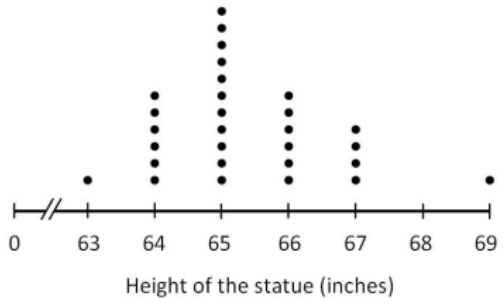
Suggested Models	Suggested Strategies
A Line Plot of Statue Height Data  	• Generate ideas about what measurement data could be generated and represented on a line plot • Measure physical objects or distances varying in length; use data to create a line plot • Students may use tally marks or data tables to record measurements prior to creating a line plot or they may produce the line plot as the data are being collected

Image Source: https://commoncoretools.files.wordpress.com/2011/06/ccss_progression_md_k5_2011_06_20.pdf

Represent and interpret data (Standards 2.MD.9–10)

Standard 2.MD.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and comparison problems using information presented in a bar graph.

Concepts and Skills to Master

- Draw a bar graph with a single-unit scale to represent data, with up to four categories; include title, labels, a horizontal and vertical axis (one axis representing categories and the other axis representing a scale showing counts in whole numbers)
- Draw a picture graph with a single-unit scale to represent data, up to four categories; include title, labels, a horizontal and vertical axis (one axis representing categories and the other axis representing a scale showing counts in whole numbers)
- Solve put-together (addition) and take-apart (subtraction) problems using information in a bar graph
- Solve comparison problems using information in a bar graph

Teacher Note: The Standards in Grades 1–3 do not require students to gather categorical data, just to represent it. Gathering data may be used as an instructional strategy, but it is not required of students.

Related Standards: Current Grade Level	Related Standards: Future Grade Level
2.OA.1 Solve addition and subtraction word problems (within 100) **2.OA.2** Add and subtract (within 20)	**3.MD.3** Draw scaled picture and bar graph

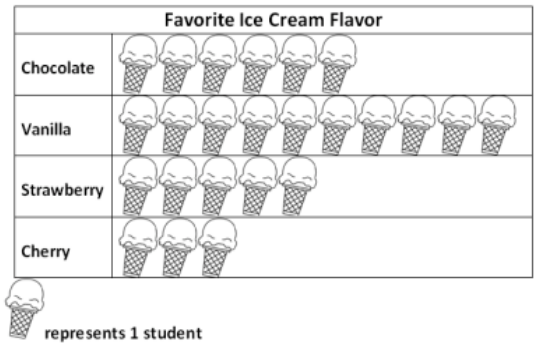
Critical Background Knowledge

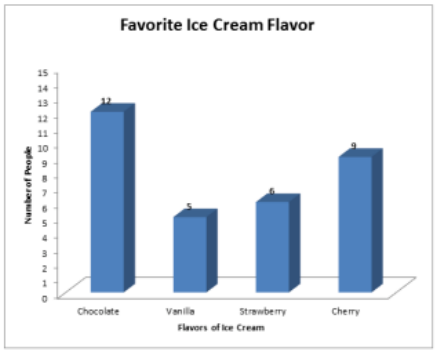
- Organize, represent and interpret data with up to three categories. Ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another (1.MD.4)
- Count the number of objects in each category and sort the categories by count (K.MD.3)

Academic Vocabulary

Graph, picture graph, bar graph, key, data, compare, category, title, labels, horizontal axis, vertical axis, rows, straight columns

Suggested Models





Suggested Strategies

- Collect data as a class. Create a graph with students. Use this time to model the process of creating a graph. Upon completion, let children create another graph on their own using another data set.
- Give students a set of data, determine up to four categories of possible responses, represent data on a picture graph or bar graph, and interpret the results .
- Discuss which type of graph (bar or picture) best represents the data

Image Source: http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/2.pdf

Reason with shapes and their attributes (Standards 1–3).

Standard 2.G.1 Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Sizes are compared directly or visually, not compared by measuring. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

Concepts and Skills to Master

- Identify shapes (see Academic Vocabulary below for a list) by the number of angles, sides, or equal faces
- Draw two-dimensional shapes given specified attributes (accuracy of drawings may be limited by a student's fine motor skills), students may explore drawing three-dimensional shapes but are not expected to do so

Teacher Note: Through building, drawing, and analyzing two- and three-dimensional shapes, students will develop a foundation for understanding area, volume, congruence, similarity, and symmetry in later grades. While students do not measure angles in second grade, they are first exposed to them as defining attributes.

Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.G.2 Partition a rectangle into rows and columns of same-size squares and count to find the total number of squares **2.G.3** Partition circles and rectangles into two, three, or four equal shares	**3.G.1** Understand that shapes in different categories may share attributes, and that the shared attributes can define a larger category **4.G.1** Draw points, lines, line segments, rays, angles (right, acute, and obtuse) and perpendicular and parallel lines **4.G.2** Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines or angles of a specified size

Critical Background Knowledge from Previous Grade Levels

- Identify defining attributes such as: number of sides, number of corners/vertices, etc. (1.G.1)
- Distinguish between defining attributes versus non-defining attributes; build and draw shapes that possess defining attributes (1.G.1)
- Correctly name shapes regardless of their orientations or overall sizes; Analyze, compare, and sort two- and three-dimensional shapes; Model and create shapes (K.G.2, K.G.4, K.G.5)
- Students work with trapezoids, half-circles, quarter-circles, and rectangular prisms in addition to kindergarten shapes in first grade (1.G.2a)
- Students work with squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres in kindergarten (K.G)

Academic Vocabulary

square, quarter-circle, triangle, rectangle, hexagon, cube, flat, solid, two-dimensional, three-dimensional, draw, attribute, defining attribute, non-defining attribute, closed figure, sides, corners/vertices, angles, edges, face, straight, round
Shapes new to second grade: quadrilateral, pentagon

Suggested Models	Suggested Strategies
 Teacher says, "Draw a closed shape that has five sides. What is the name of the shape?" Student says, "I drew a shape with 5 sides. It is a pentagon."  Student A says, "I have 3 sides and 3 angles. What am I?" Student B says, "A triangle. See, 3 sides, 3 angles."	• Identify and sort shapes from collections with various colors, sizes, and orientations • Draw a shape based on a given set of attributes, not the name of the shape • Explore drawing three-dimensional shapes, dot paper or isometric dot paper may be helpful • Construct shapes from various materials such as marshmallows and tooth picks, clay, straws, etc.

Image source: http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/2.pdf

Reason with shapes and their attributes (Standards 1–3).

Standard 2.G.2 Partition a rectangle into rows and columns of same-size squares and count to find the total number of squares.

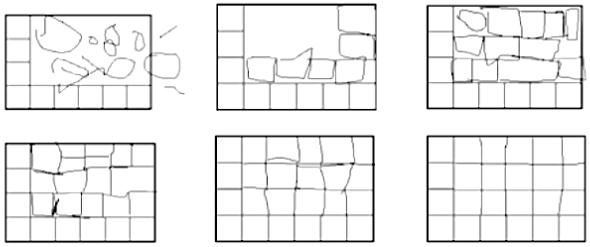
Concepts and Skills to Master

- Understand that a rectangle can be tiled with squares; there should be no overlaps or gaps
- Understand that all squares used to tile the rectangle must be the same size
- Understand that each row contains the same number of squares; repeated addition can be used to find the total number of squares
- Draw rows and columns to partition the rectangle into same-size squares
- Understand that the number of lines used to partition into columns or rows is one less than the number of columns or rows (three lines will partition the rectangle into four rows)

Teacher Note: This standard supports the use of arrays for understanding multiplication in third grade. "This involves more learning than is sometimes assumed. Students need to understand how a rectangle can be tiled with squares lined up in rows and columns. At the lowest level of thinking, students draw or place shapes inside a rectangle but do not cover an entire region. Only at the later levels do all the squares align vertically and horizontally." The number of objects arranged in rectangular arrays is limited to 5 rows and 5 columns (2.OA.4).

Text and image source: http://commoncoretools.me/wp-content/uploads/2014/12/ccss_progression_gk6_2014_12_27.pdf

Levels of thinking in spatial structuring



Levels of thinking portrayed by different students as they attempted to complete a drawing of an array of squares, given one column and row. This was an assessment, not an instructional task.

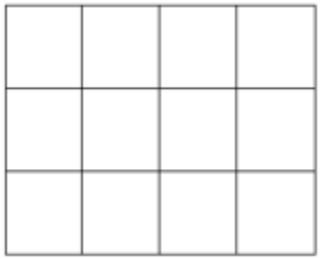
Related Standards: Current Grade Level	Related Standards: Future Grade Level
2.G.3 Partition circles and rectangles into two, three, and four equal shares; describe the shares as halves, thirds, half of, etc. **2.OA.4** Use addition to find the total number of objects arranged in a rectangular array and write an equation to express the total	**3.OA.1** Interpret products of whole numbers (using arrays as visual models) **3.OA.5** Apply properties of operations as strategies to multiply and divide (using arrays as visual models) **3.MD.6** Measure area by counting unit squares **3.G.2** Partition shapes into parts with equal areas and express the area of each part as a unit fraction of the whole

Critical Background Knowledge from Previous Grade Levels

- Notice smaller shapes within a larger existing shape (1.G.2)
- Partition circles and rectangles into two and four equal shares; describe the shares as halves, fourths, and quarters. Understand that decomposing into more equal shares creates smaller shares (1.G.3)
- Compose simple shapes to form larger shapes (K.G.6)
- Multiple shapes in a row equal the total (1.MD.2)

Academic Vocabulary

rectangle, row, column, same-size, partition, square

Suggested Models	Suggested Strategies
 4 + 4 + 4 = 12 Mathematical convention states that this model is thought of as three rows or groups of four and should be written as three addends of four (4 + 4 + 4 = 12). Students may also be exposed to this model as four columns or groups of three which would be written as four addends of three (3 + 3 + 3 + 3 = 12). This will prepare students for the commutative property of multiplication (3.OA.5).	• Use square tiles to fill a given rectangle, then identify how many tiles are contained within each row and each column • Use context to partition rectangles into rows and columns (garden boxes, patio tiles, classroom tables, etc.) • Partition rectangles using pipe cleaners or popsicle sticks to create the rows and columns • Given a rectangle, draw a given number of rows/columns and count to find the total number of squares created

Reason with shapes and their attributes (Standards 1–3).

Standard 2.G.3 Partition circles and rectangles into two, three, or four equal shares; describe the shares using the words *halves, thirds, half of, a third of,* etc.; and describe the whole as two halves, three thirds, or four fourths. Recognize that equal shares of identical wholes need not have the same shape.

Concepts and Skills to Master

- Recognize when shares are and are not equal
- Partition circles and rectangles into two, three, or four equal shares
- Describe the whole as two halves, three thirds, or four fourths
- Understand that the word halves is used to describe two equal shares that compose the whole (meaning that there are two parts and those two parts must be equal in size)
- Understand that the word thirds is used to describe three equal shares that compose the whole (meaning that there are three parts and those three parts must be equal in size)
- Understand that the words fourths and quarters are used to describe four equal shares that compose the whole (meaning that there are four parts and those four parts must be equal in size)
- Reason that as the number of equal shares in the whole increases, the size of the share decreases (thirds are smaller than halves because the whole has been partitioned into more equal parts)
- Recognize that equal shares of identical wholes need not have the same shape (see Suggested Models below)

Teacher Note: Students need only explore fraction concepts using rectangles and circles. Students extend first grade understanding to include thirds in second grade. Students verbally use the words partition, halves, thirds, fourths, and quarters and the phrases half of, quarter of and third of to describe their thinking. Second grade students are not expected to use or recognize fraction notation (½, ⅓, ¼). Fractional notation begins in third grade. Emphasis should be placed upon the relationship between the shares and the whole. Students should be given extensive opportunities to partition circles and rectangles rather than just identifying shares of pre-partitioned shapes.

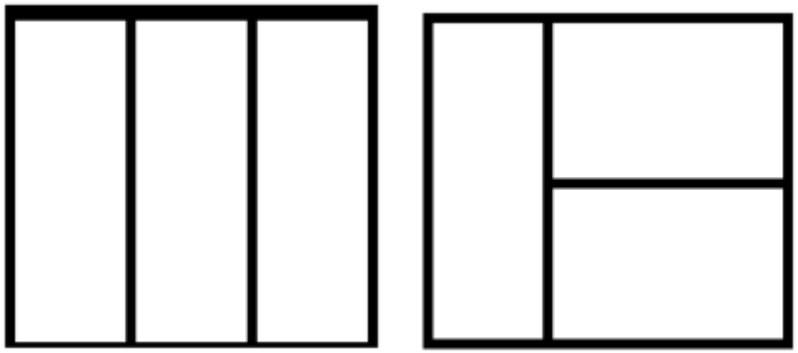
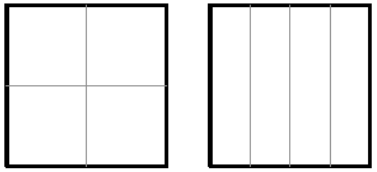
Related Standards: Current Grade Level	Related Standards: Future Grade Levels
2.G.2 Partition a rectangle into rows and columns of same-size squares and count to find the total number of squares **2.OA.4** Use addition to find the total number of objects arranged in a rectangular array and write an equation to express the total	**3.NF.1** Understand unit fractions **3.NF.2** Understand a fraction as a number on the number line **3.NF.3** Explain equivalence of fractions and compare fractions by reasoning about their size **3.G.2** Partition shapes into parts with equal areas and express the area of each part as a unit fraction of the whole **4.NF.1** Explain why fractions are equivalent using area models

Critical Background Knowledge from Previous Grade Levels

- Notice smaller shapes within a larger existing shape (see how two triangles make a square) (1.G.2)
- Partition circles and rectangles into two and four equal shares; describe the shares as halves, fourths, and quarters. Understand that decomposing into more equal shares creates smaller shares (1.G.3)
- Compose simple shapes to form larger shapes (K.G.6)

Academic Vocabulary

circle, rectangle, partition, decompose, equal shares, halves, thirds, fourths, quarters, half of, third of, fourth of, quarter of, whole

Suggested Models	Suggested Strategies
 **Squares partitioned into fourths**  These different partitions of a square afford the opportunity for students to identify correspondences between the differently-shaped fourths (MP.1), and to explain how one of the fourths on the left can be transformed into one of the fourths on the right (MP.7).	• Partition regions into equal shares using a context (for example: cookies, pies, pizza, brownies, crackers, grass area, etc.) • Sort shapes that are partitioned into equal shares and shares that are not equal • Partition shapes using manipulatives such as geoboards, paper rectangles and circles, food, etc. • Use context to compare the relative size of halves, thirds, and fourths (Would you rather have a third of this candy bar or a fourth of the same candy bar?) • Use context to compare the size of equal shares that differ in shape (Would you rather have the fourth of this brownie that is cut into a triangle or the fourth of the same brownie that is cut into a square? Which piece is more brownie?) • Find many, varied, and unusual ways to partition circles and rectangles into halves, thirds, and fourths