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# GRADE 2 • MODULE 4

## Addition and Subtraction Within 200 with Word Problems to 100

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## Grade 2 • Module 4

# Addition and Subtraction Within 200 with Word Problems to 100

## OVERVIEW

In Module 3 students were immersed in the base ten system, as they built a strong foundation through a concrete to pictorial to abstract approach. They bundled groups of 10, and saw that 10 like units could be bundled to produce a new unit that is ten times as large. They progressed from seeing 10 ones as 1 ten (**1.NBT.2a**) to understanding 10 tens as 1 hundred (**2.NBT.2**). Module 4 builds on that place value understanding to compose and decompose place value units in addition and subtraction within 200.

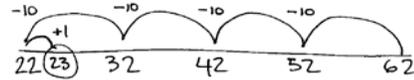
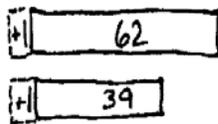
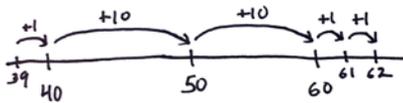
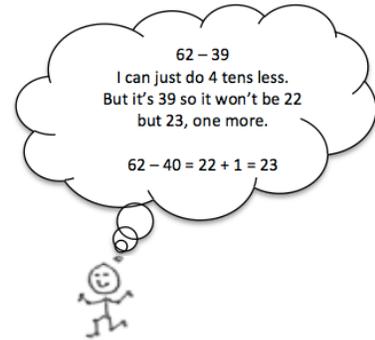
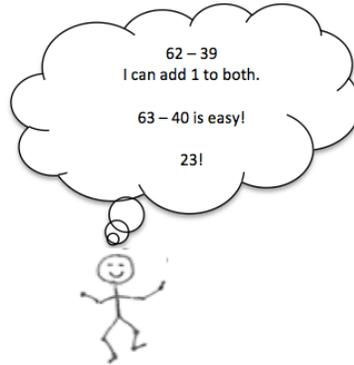
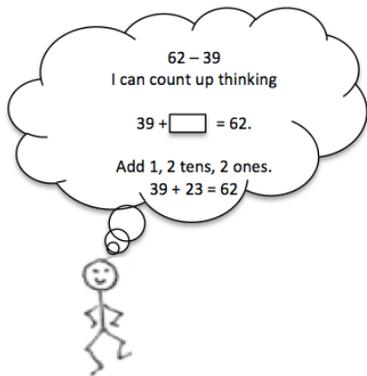
Module 4 is devoted to three major areas of work. The first two are building fluency in two-digit addition and subtraction within 100 (**2.NBT.5**) and applying that fluency to one- and two-step word problems of varying types within 100 (**2.OA.1**). Students' increasing fluency with calculations within 100, begun in Grade 1, allows word problems to transition from being mere contexts for calculation into opportunities for students to see and analyze the relationships between quantities (**MP1 and 2**). Daily application problems and specific lessons in Topics A, C, and F provide students with guided and independent practice as they negotiate a variety of problem types, including the more complex comparison problems. Note that most two-step problems involve single-digit addends, and do not involve the most difficult comparison problem types.<sup>1</sup>

The third major area of work is developing students' conceptual understanding of addition and subtraction of multi-digit numbers within 200 (**2.NBT.7, 2.NBT.9**) as a foundation for work with addition and subtraction within 1000 in Module 5.

In Topic A, students work with place value strategies to fluently add and subtract within 100 (**2.NBT.5**). The final lessons of Module 3 (finding 1 more, 1 less, 10 more, 10 less) transition into mental addition and subtraction of 1 and 10 (**2.NBT.8**). Students mentally add and subtract 100 in Topics D and E, as well as during fluency activities throughout the module, as they did in Module 3. This knowledge is then extended and used to solve problems.

For example, students might count on by ones and tens, e.g.,  $39 + \square = 62$ , so 40, 50, 60, 61, 62. They might use compensation, adding the same amount to the subtrahend as to the minuend to make a multiple of ten, e.g.,  $62 - 39 = 63 - 40$ . They might add or subtract a multiple of 10 and adjust the solution as necessary, e.g.,  $62 - 39$  is 4 tens less than 62 but... one more (**2.NBT.5**). Students explain why these strategies work using place value language, properties of addition and subtraction, and models, such as the number line (**2.NBT.9**).

<sup>1</sup> See the Progression document "Operations and Algebraic Thinking," p. 18, for the specific types and the rationale.



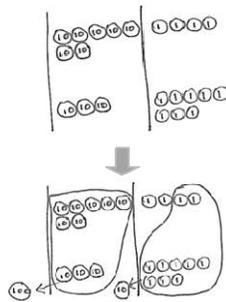
Topic A’s strategies lead naturally to work with the written vertical algorithm for addition (Topic B) and subtraction (Topic C). In these two topics, students represent place value strategies with place value disks and math drawings (see images with strategy names below). Students work with composing 1 ten from 10 ones or decomposing 1 ten as 10 ones (with minuends within 100). After the mid-module assessment, students continue working with manipulatives and math drawings to make sense of problems in which they compose or decompose twice. Topic D focuses on addition, with the new complexity of composing 1 hundred from 10 tens within 200 in problems with up to four addends (**2.NBT.6, 2.NBT.7**). Subtraction in Topic E involves subtracting when decomposing 1 hundred for 10 tens and 1 ten for 10 ones (**2.NBT.7**).

Concrete

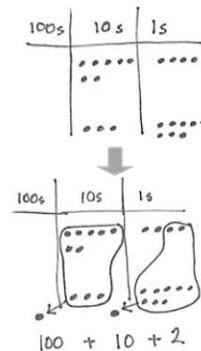


Place value disks

Pictorial

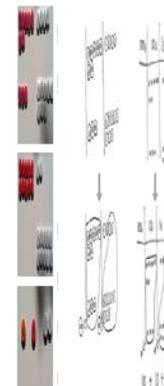


Place value chart with labeled disks



Chip model

Abstract



New groups below

Throughout the module, manipulatives and math drawings allow students to see numbers in terms of place value units and serve as a reminder that they must add like units (e.g., knowing that  $74 + 38$  is 7 tens + 3 tens and 4 ones + 8 ones).

The focus is often on computational strategies with bare numbers (i.e., no context) so that total attention is given to understanding the value of each digit within a number, as well as why and how the written method works. Students use the place value chart as an organizer. Simultaneous use of a written method and a place value chart allows students to better recognize both the value of numbers when they are not on the place value chart, and like units. The same is true when students make math drawings and use place value language to relate each step of the drawing to a written method (**2.NBT.7**). The different representations serve to solidify the understanding of the composition and decomposition of units, moving from concrete to pictorial to abstract. Throughout the work, students are encouraged to explain their actions and analyses, and to use the relationship between addition and subtraction to check their work (**2.NBT.9**).

Throughout the module, students are encouraged to be flexible in their thinking and to use multiple strategies in solving problems, including the use of drawings such as tape diagrams, which they relate to equations. In Topic F, students are introduced to the totals below method (pictured below to the far left) and are challenged to explain why both it and the new groups below method (also pictured below to the left) work (**2.NBT.9**).

$$\begin{array}{r} 124 \\ + 38 \\ \hline 12 \\ 50 \\ + 100 \\ \hline 162 \end{array}$$
 Totals below

$$\begin{array}{r} 124 \\ + 38 \\ \hline 162 \end{array}$$
 New groups below

I see 12 ones, 5 tens and 1 hundred in 2 different ways. 12 ones is 1 ten and 2 ones. That's the big difference.

Let me show you with my Hide Zero cards.  
 $50 + 10 = 60$   
 $100 + 60 + 2 = 162$

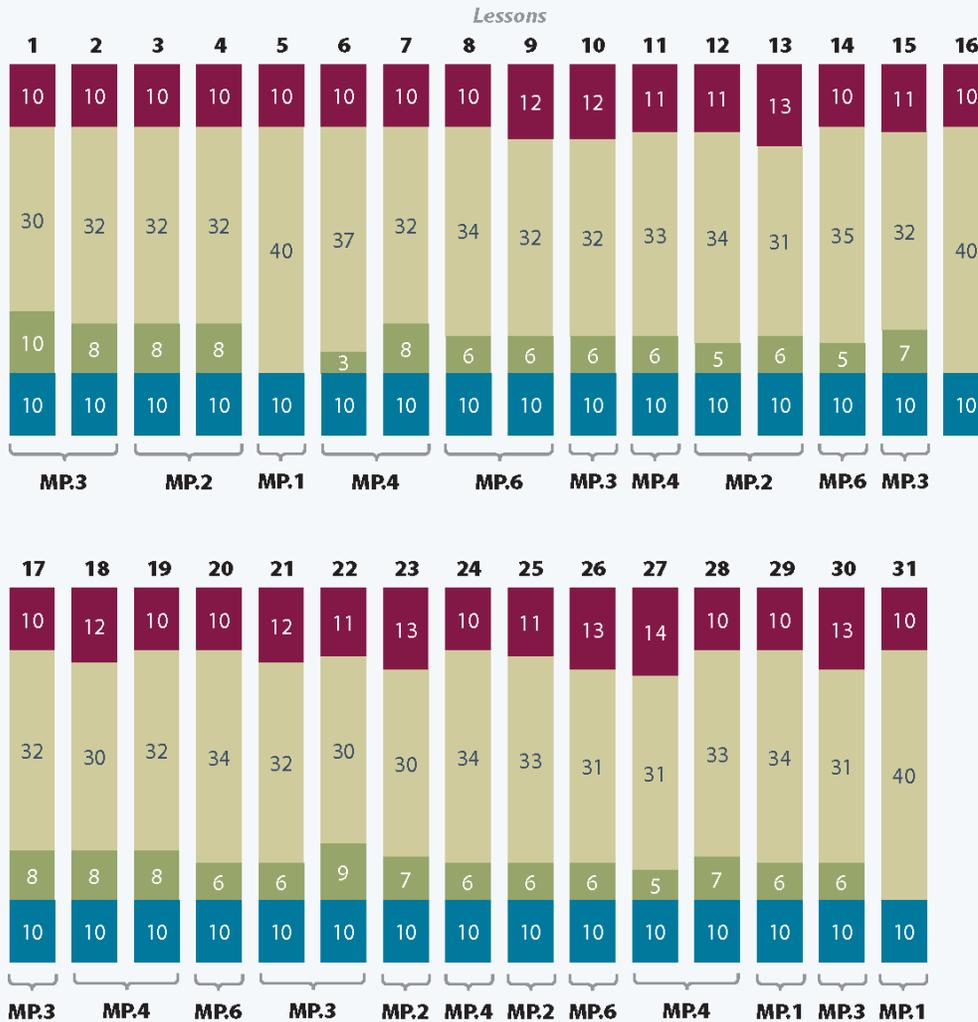
The Mid-Module Assessment follows Topic C, and the End-of-Module Assessment follows Topic F.



## Distribution of Instructional Minutes

This diagram represents a suggested distribution of instructional minutes based on the emphasis of particular lesson components in different lessons throughout the module.

- Fluency Practice
- Concept Development
- Application Problems
- Student Debrief



MP = Mathematical Practice

## Focus Grade Level Standards

### Represent and solve problems involving addition and subtraction.

- 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, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

### Use place value understanding and properties of operations to add and subtract.<sup>2</sup>

- 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 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
- 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.)

## Foundational Standards

- 1.OA.1** Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
- 1.OA.3** Apply properties of operations as strategies to add and subtract. (Students need not use formal terms for these properties.) *Examples: 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.4** Understand subtraction as an unknown-addend problem. *For example, subtract  $10 - 8$  by finding the number that makes 10 when added to 8.*
- 1.NBT.2** Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:

<sup>2</sup> In this module, work is limited to within 200. This work is extended to numbers within 1000 in the next module.

- a. 10 can be thought of as a bundle of ten ones – called a “ten.”
- b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.
- c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).

**1.NBT.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, 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 and tens, ones and ones; and sometimes it is necessary to compose a ten.

**2.NBT.1** Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

- 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).

**2.NBT.2** Count within 1000; skip-count by 5s, 10s, and 100s.

**2.NBT.3** Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

## Focus Standards for Mathematical Practice

- MP.1** **Make sense of problems and persevere in solving them.** Students solve two-step word problems, and are challenged to make sense of more complex relationships within situations. They flexibly solve problems with a variety of strategies at their disposal, sometimes finding many ways to solve the same problem.
- MP.2** **Reason abstractly and quantitatively.** Students reason abstractly when they represent two-step problems and harder problem types with drawings such as tape diagrams and when they relate those drawings to equations. As the Module progresses, students move back and forth between concrete, pictorial, and abstract work to make sense of quantities and their relationships in problem situations.
- MP.3** **Construct viable arguments and critique the reasoning of others.** Students construct viable arguments when they use place value reasoning and properties of operations to explain why their addition and subtraction strategies work, and when they use that reasoning to justify their choice of strategies in solving problems. They critique the reasoning of others when they use those same concepts to disprove or support the work of their peers.
- MP.4** **Model with mathematics.** Students model with mathematics when they write equations to solve two-step word problems, make math drawings when solving a vertical algorithm, or when they draw place value charts and disks to represent numbers.
- MP.6** **Attend to precision.** Students attend to precision when they label their math drawings and

models with specific place value units. They calculate accurately and efficiently when adding numbers within 200 and they use the relationship between addition and subtraction to check their work.

## Overview of Module Topics and Lesson Objectives

Standards	Topics and Objectives	Days
<b>2.OA.1</b> <b>2.NBT.5</b> <b>2.NBT.8</b> <b>2.NBT.9</b>	<b>A Sums and Differences Within 100</b> Lesson 1: Relate 1 more, 1 less, 10 more, and 10 less to addition and subtraction of 1 and 10. Lesson 2: Add and subtract multiples of 10 including counting on to subtract. Lessons 3–4: Add and subtract multiples of 10 and some ones within 100. Lesson 5: Solve one- and two-step word problems within 100 using strategies based on place value.	5
<b>2.NBT.7</b> <b>2.NBT.9</b> 2.OA.1 2.NBT.5	<b>B Strategies for Composing a Ten</b> Lesson 6: Use manipulatives to represent the composition of 10 ones as 1 ten with two-digit addends. Lesson 7: Relate addition using manipulatives to a written vertical method. Lesson 8: Use math drawings to represent the composition and relate drawings to a written method. Lessons 9–10: Use math drawings to represent the composition when adding a two-digit to a three-digit addend.	5
<b>2.OA.1</b> <b>2.NBT.7</b> <b>2.NBT.9</b> 2.NBT.5	<b>C Strategies for Decomposing a Ten</b> Lesson 11: Represent subtraction with and without the decomposition of 1 ten as 10 ones with manipulatives. Lesson 12: Relate manipulative representations to a written method. Lesson 13: Use math drawings to represent subtraction with and without decomposition and relate drawings to a written method. Lessons 14–15: Represent subtraction with and without the decomposition when there is a three-digit minuend. Lesson 16: Solve one- and two-step word problems within 100 using strategies based on place value.	6
	Mid-Module Assessment: Topics A–C (assessment ½ day, return ½ day, remediation or further applications 1 day)	2



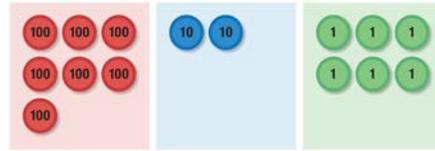
Standards	Topics and Objectives	Days
<p><b>2.NBT.6</b>  <b>2.NBT.7</b>  <b>2.NBT.8</b>  <b>2.NBT.9</b></p>	<p><b>D Strategies for Composing Tens and Hundreds</b></p> <p>Lesson 17: Use mental strategies to relate compositions of 10 tens as 1 hundred to 10 ones as 1 ten.</p> <p>Lesson 18: Use manipulatives to represent additions with two compositions.</p> <p>Lesson 19: Relate manipulative representations to a written method.</p> <p>Lessons 20–21: Use math drawings to represent additions with up to two compositions and relate drawings to a written method.</p> <p>Lesson 22: Solve additions with up to four addends with totals within 200 with and without two compositions of larger units.</p>	6
<p><b>2.NBT.7</b>  <b>2.NBT.9</b></p>	<p><b>E Strategies for Decomposing Tens and Hundreds</b></p> <p>Lesson 23: Use number bonds to break apart three-digit minuends and subtract from the hundred.</p> <p>Lesson 24: Use manipulatives to represent subtraction with decompositions of 1 hundred as 10 tens and 1 ten as 10 ones.</p> <p>Lesson 25: Relate manipulative representations to a written method.</p> <p>Lesson 26: Use math drawings to represent subtraction with up to two decompositions and relate drawings to a written method.</p> <p>Lessons 27–28: Subtract from 200 and from numbers with zeros in the tens place.</p>	6
<p><b>2.OA.1</b>  <b>2.NBT.7</b>  <b>2.NBT.9</b></p>	<p><b>F Student Explanations of Written Methods</b></p> <p>Lesson 29: Use and explain the <i>totals below</i> written method using words, math drawings, and numbers.</p> <p>Lesson 30: Compare <i>totals below</i> to <i>new groups below</i> as written methods.</p> <p>Lesson 31: Solve two-step word problems within 100.</p>	3
	<p>End-of-Module Assessment: Topics A–F (assessment ½ day, return ½ day, remediation or further applications 1 day)</p>	2
<b>Total Number of Instructional Days</b>		<b>35</b>

## Terminology

### New or Recently Introduced Terms

- Equation
- Minuend
- New groups below
- Place value chart (pictured below right)
- Place value or number disk (pictured to the right)
- Subtrahend
- Totals below

$$\begin{array}{r} 68 \text{ minuend} \\ - 42 \text{ subtrahend} \\ \hline 26 \text{ difference} \end{array}$$



Say Ten form modeled with number disks:  
7 hundreds 2 tens 6 ones = 72 tens 6 ones

Place Value Chart with Headings  
(use with numbers)

hundreds	tens	ones
7	2	6

### Familiar Terms and Symbols<sup>3</sup>

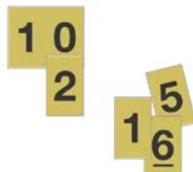
- Addend
- Addition
- Bundle, unbundle, regroup, rename, change (compose or decompose a 10 or 100)
- Difference
- Hundreds place (referring to place value)
- Place value (referring to the unit value of each digit in a given number)
- Subtraction
- Units of ones, tens, hundreds, thousands (referring to place value; 10 ones is the same as 1 unit of ten)

Place Value Chart without Headings  
(use with number disks)

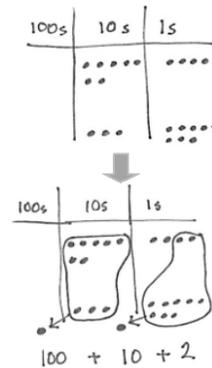
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## Suggested Tools and Representations

- Chip model (shown at right)
- Hide Zero cards (shown below)
- Place value charts and mats (pictured above right)
- Place value disk sets (18 ones, 18 tens, 18 hundreds, 1 one thousand per set)



Hide Zero cards



Chip model

<sup>3</sup> These are terms and symbols students have used or seen previously.

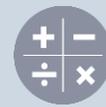
## Scaffolds<sup>4</sup>

The scaffolds integrated into *A Story of Units* give alternatives for how students access information as well as express and demonstrate their learning. Strategically placed margin notes are provided within each lesson elaborating on the use of specific scaffolds at applicable times. They address many needs presented by English language learners, students with disabilities, students performing above grade level, and students performing below grade level. Many of the suggestions are applicable to more than one population. The charts included in Module 1 provide a general overview of the lesson-aligned scaffolds, organized by Universal Design for Learning (UDL) principles. To read more about the approach to differentiated instruction in *A Story of Units*, please refer to “How to Implement *A Story of Units*.”

## Assessment Summary

Type	Administered	Format	Standards Addressed
Mid-Module Assessment Task	After Topic C	Constructed response with rubric	2.OA.1 2.NBT.5 2.NBT.7 2.NBT.8 2.NBT.9
End-of-Module Assessment Task	After Topic F	Constructed response with rubric	2.OA.1 2.NBT.5 2.NBT.6 2.NBT.7 2.NBT.8 2.NBT.9

<sup>4</sup> Students with disabilities may require Braille, large print, audio, or special digital files. Please visit the website, [www.p12.nysed.gov/specialed/aim](http://www.p12.nysed.gov/specialed/aim), for specific information on how to obtain student materials that satisfy the National Instructional Materials Accessibility Standard (NIMAS) format.



## Topic A

## Sums and Differences Within 100

2.OA.1, 2.NBT.5, 2.NBT.8, 2.NBT.9

<b>Focus Standard:</b>	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, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
	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. <sup>1</sup>
	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.)
<b>Instructional Days:</b>	5	
<b>Coherence</b>	<b>-Links from:</b>	G2-M3 Place Value, Counting, and Comparison of Numbers to 1000
	<b>-Links to:</b>	G2-M5 Addition and Subtraction Within 1000 with Word Problems to 100
		G3-M2 Place Value and Problem Solving with Units of Measure

In Topic A, students build upon their understanding of the base ten system and their prior knowledge of place value strategies presented in Module 3. In Lesson 1, students relate 10 more and 10 less and 1 more and 1 less to addition and subtraction. They recognize that they must add and subtract like units, and that the digit in the tens place changes when adding and subtracting 10, just as the digit in the ones place changes when adding or subtracting 1. Students see numbers in terms of place value units;  $54 - 10$  is 5 tens 4 ones minus 1 ten. They learn to record the addition and subtraction of multiples of 10 using arrow notation.

$$33 + 12 : 33 \xrightarrow{+10} 43 \xrightarrow{+1} 44 \xrightarrow{+1} 45$$

In Lesson 2, students apply place value understanding to add and subtract multiples of 10 before counting on by tens. For example, when adding 20 to 43, they may count 53, 63. Students also develop flexibility in using related addition problems. For example, to solve  $92 - 60$ , one student might think 9 tens – 6 tens is 3 tens, plus 2 is 32, while another starts at 60, adds on 3 tens and then 2 ones to reach 92, so 32.

<sup>1</sup> Students mentally add and subtract 100 in Topics D and E of Module 4.

In Lessons 3-4, students continue to add and subtract multiples of 10 with the added complexity of some ones. Problems are intentionally chosen so that the ones digit is close to a multiple of 10 (e.g., 38, 39, 41).

$$29 + 42 = 30 + 41$$

$$= 72$$

I can decompose 42 as 1 and 41 to make 30 and 41

This prompts students to discover and use relationships between the numbers to develop a variety of simplifying strategies they can use to solve. For example, students might reason mentally that for  $29 + 42$ , they can make a multiple of 10 and count on to solve. They use number bonds to decompose 42 as 1 and 41 to make  $30 + 41 = 71$  (as shown above right).

They also learn to use arrow notation (the *arrow way*) to record their mental math and to show change in numbers as they work with them. First, students add a multiple of 10, then count on 2 to make 71 (as shown at right). This avoids common misconceptions arising from using the equal sign to record such computation (e.g., erroneously recording  $29 + 40 = 69 + 2 = 71$ ).

$$29 \xrightarrow{+40} 69 \xrightarrow{+2} 71$$

Similarly, students use number bonds to make a multiple of 10 when subtracting (as shown below). After students subtract  $30 - 29$ , they add  $41 + 1$  to make 42.

The ease of subtracting a multiple of 10 is highlighted again, as students learn the strategy of compensation for subtraction. For example, in  $71 - 29$ , the same amount, 1, can be added (or subtracted) to both numbers to create the equivalent problem that involves no renaming (as shown at right).

$$71 - 29 = 41 + 1$$

$$= 42$$

I can decompose 71 as 41 and 30 since 30 is just a little bigger than 29.

Topic A closes with a lesson that focuses on one- and two-step word problems within 100. Students apply their place value reasoning, mental strategies, and understanding of renaming to negotiate different problem types with unknowns in various positions. The lesson begins with guided practice and transitions to students solving problems on their own or with others, independent of teacher direction. Students are encouraged to be flexible in their thinking and to use multiple strategies in solving problems. For example,

$$71 - 29 = 72 - 30$$

$$= 42$$

If I add the same amount to both numbers, the difference stays the same!

For example, students might use tape diagrams to solve word problems, relating the diagrams to a situation equation (e.g.,  $\_\_\_ - 36 = 60$ ) and rewriting it as a solution equation (e.g.,  $60 + 36 = \_\_\_$ ), thus illustrating the relationship between operations and using this relationship to check their work. Or, students might use arrow notation and count on. Discussion ensues as each problem is solved, with students sharing strategies, analyzing the efficiency of each, defending their work, and/or critiquing or supporting the work of their peers.

The strategies taught in Topic A are designed to build fluency and develop students' conceptual understanding of addition and subtraction using properties of operations and place value reasoning. This sets the stage for composing and decomposing a ten in Topics B and C.

**A Teaching Sequence Towards Mastery of Sums and Differences Within 100**

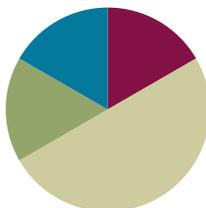
- Objective 1:** Relate 1 more, 1 less, 10 more, and 10 less to addition and subtraction of 1 and 10.  
(Lesson 1)
- Objective 2:** Add and subtract multiples of 10 including counting on to subtract.  
(Lesson 2)
- Objective 3:** Add and subtract multiples of 10 and some ones within 100.  
(Lessons 3–4)
- Objective 4:** Solve one- and two-step word problems within 100 using strategies based on place value.  
(Lesson 5)

## Lesson 1

**Objective:** Relate 1 more, 1 less, 10 more, and 10 less to addition and subtraction of 1 and 10.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Application Problem	(10 minutes)
■ Concept Development	(30 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (10 minutes)

- Place Value **2.NBT.1, 2.OA.2** (6 minutes)
- More/Less **2.NBT.5** (4 minutes)

### Place Value (6 minutes)

Materials: (S) Place value charts, personal white boards

Note: Practicing place value skills will prepare students for adding and subtracting 1 and 10 in the lesson.

- T: (Project place value chart to the tens.) Show 5 ones in number disks. Write the number below it.  
 S: (Draw 5 ones disks and write 5 below it.)  
 T: Show 2 tens disks and write the number below it.  
 S: (Draw 2 tens disks and write 2 at the bottom of the tens column.)  
 T: Say the number in unit form.  
 S: 2 tens 5.  
 T: Say the number in standard form.  
 S: 25.  
 T: Add 1 to your chart. What is 1 more than 25?  
 S: 26.  
 T: Now add 1 ten to your chart. What is 10 more than 26?  
 S: 36.  
 T: Subtract 1 from 36 by crossing out a 1. What is 1 less than 36?  
 S: 35.

T: Now subtract 10 from 35 by crossing out 1 ten. What is 10 less than 35?

S: 25.

Continue with the following possible sequence: 4 tens 7 ones, 1 ten 8 ones, and 6 tens 9 ones.

### More/Less (4 minutes)

Note: Practicing giving 1 or 10 more or less will prepare students to add and subtract 1 and 10 fluently.

T: For every number I say, you say a number that is 1 more. When I say 5, you say 6. Ready?

T: 5.

S: 6.

T: 8.

S: 9.

Continue with the following possible sequence: 9, 16, 19, 28, 38, 39, 44, 49, 54, and 60.

T: Now for every number I say, you say a number that is 10 more. When I say 50, you say 60. Ready?

T: 50.

S: 60.

T: 30.

S: 40.

Continue with the following possible sequence: 50, 80, 40, 20, 21, 28, 30, 35, 45, and 56.

T: Let's try saying 1 less for every number I say. When I say 6, you say 5. Ready?

T: 6.

S: 5.

T: 9.

S: 8.

Continue with the following possible sequence: 11, 14, 19, 20, 30, 31, 51, and 50.

T: Now for every number I say, you say a number that is 10 less. When I say 50, you say 40. Ready?

T: 50.

S: 40.

T: 30.

S: 20.

Continue with the following possible sequence: 80, 70, 50, 51, 41, 46, 48, 28, and 18.

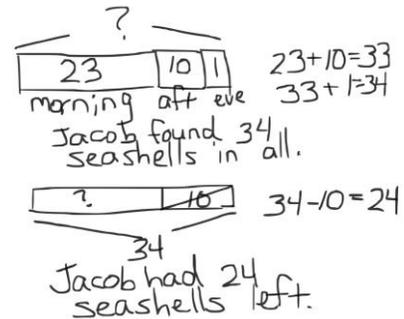
**Application Problem (10 minutes)**

In the morning, Jacob found 23 seashells on the beach. In the afternoon, he found 10 more. In the evening, he found 1 more. How many seashells did Jacob find in all? If he gives 10 to his brother, how many seashells will Jacob have left?

Note: This problem is designed to lead into the Concept Development for the day’s lesson, relating 10 more and 10 less to addition and subtraction. Students will complete this problem independently to provide insight into the kinds of mental strategies they currently use.

Review the RDW procedure for problem solving. Directions: Read the problem, draw and label, write a number sentence, and write a word sentence. The more students participate in reasoning through problems with a systematic approach, the more they internalize those behaviors and thought processes.

(Excerpted from “How to Implement *A Story of Units*.”)



**Concept Development (30 minutes)**

Materials: (T) Sentence frames:

- \_\_\_ is 1 more than \_\_\_. 1 more than \_\_\_ is \_\_\_.
- 1 less than \_\_\_ is \_\_\_. \_\_\_ is 1 less than \_\_\_.
- 10 more than \_\_\_ is \_\_\_. \_\_\_ is 10 more than \_\_\_.
- 10 less than \_\_\_ is \_\_\_. \_\_\_ is 10 less than \_\_\_.
- (S) 9 tens disks, 9 ones disks, place value chart

Post *more* sentence frames on one side of the board and *less* frames on the other side. Pass out charts and disks.

- T: Use your number disks to show me 36 on your place value chart.
- S: (Show 3 tens 6 ones.)
- T: Show me 1 more.
- S: (Add a ones disk to show 3 tens 7 ones.)
- T: Use a sentence frame to describe adding one to 36.
- S: 37 is 1 more than 36. → 1 more than 36 is 37.
- T: What did you do to change 36?
- S: We added one to the ones place.
- T: Give me an addition sentence starting with 36.



**NOTES ON MULTIPLE MEANS OF REPRESENTATION:**

Use different models to demonstrate the change in 1 more, 1 less, 10 more, 10 less.

- With a hundreds chart on the wall and student copies, point to different numbers and have students show *more* and *less* changes by sliding their finger. Ask questions to foster conceptual understanding: “What patterns do you notice in the rows? Columns? What happens to the digits? Value of the number?” Invite one or two students to lead the class and model problems. Then have students work in pairs.
- Use concrete objects other than disks, such as a Rekenrek or bundled straws, to show groups of tens and/or ones.

S:  $36 + 1 = 37$ .

T: Start with 37.

S:  $37 = 1 + 36$ .  $\rightarrow 37 = 36 + 1$ .

Repeat the process for 1 less than 36.

T: Show me 36 again. (Pause as students reset their place value charts.)

T: Show me 10 more than 36.

S: (Add a tens disk to show 4 tens 6 ones.)

T: Use a sentence frame to describe adding ten to 36.

S: 46 is 10 more than 36.  $\rightarrow$  10 more than 36 is 46.

T: What did you do to change 36?

S: We added another ten.

T: Be specific. Where did you add the ten?

S: To the tens place.

T: Yes!

T: Give me an addition sentence starting with 36.

S:  $36 + 10 = 46$ .

T: Start with 46.

S:  $46 = 10 + 36$ .  $\rightarrow 46 = 36 + 10$ .

Repeat the process for 10 less than 36.

T: Talk with your partner. Use place value language to explain what you understand about 1 more, 1 less, 10 more, and 10 less. (Allow about one minute for discussion.)

S: 1 more is just adding 1, and 10 more is adding 10.  $\rightarrow$  1 less and 10 less is the same as taking away 1 or 10.  $\rightarrow$  We have to subtract and add the same units, so the ones place changes when we add or subtract 1. The same for the tens place.

T: (Collect the number disks and charts.) Listen as I say a number pattern. Raise your hand when you know the *more* or *less* rule for my pattern.

T: For example, if I say, "45, 46, 47, 48, 49," you say, "1 more." Wait for my signal. Ready?

T: 23, 33, 43, 53, 63.

S: 10 more!

T: 76, 75, 74, 73, 72.

S: 1 less!

Continue until students can readily identify the rule.

T: Take out your white boards. Now I'll write a series of numbers on the board. You write the rule and the next three numbers. The rules are  $+ 1$ ,  $-1$ ,  $+ 10$ , and  $-10$ .

T: Turn your board over when you have written your answer. Wait until I say, "Show me." Ready?

T: (Write 18, 17, 16, \_\_, \_\_, \_\_. Pause.) Show me.



### NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Listen intently as students use place value language to talk with their partners. Use number disks and the place value mat to help students navigate the following vocabulary: *place value*, *tens*, *ones*, *digit*, *value*, *unit*. Post key vocabulary on the wall and point to words accompanied by a visual (e.g., 56 is 5 tens and 6 ones).

S: (Show  $-1$  and  $15, 14, 13$ .)

Continue to give students practice with each rule.

In this next activity, model arrow notation by recording the following sequence on the board step by step as students write each answer.

It will look like this:  $33 \xrightarrow{+10} \underline{\quad} \xrightarrow{-1} \underline{\quad} \xrightarrow{-1} \underline{\quad} \xrightarrow{-10} \underline{\quad} \xrightarrow{-10} \underline{\quad}$ .

T: Let's try something different. (Write  $33 \xrightarrow{+10} \underline{\quad}$  on the board.) What is  $33 + 10$ ? Show me.

S: (Write  $43$ .)

T:  $-1$ ? (Continue to record the sequence by filling in  $43$  and writing  $\xrightarrow{-1} \underline{\quad}$ .)

S: (Write  $42$ .)

$$33 \xrightarrow{+10} 43 \xrightarrow{-1} 42 \xrightarrow{-1} 41 \xrightarrow{-10} 31 \xrightarrow{-10} 21$$

T:  $-1$ ? (Fill in  $42$  and write  $\xrightarrow{-1} \underline{\quad}$ .)

S: (Write  $41$ .)

T:  $-10$ ? (Fill in  $41$  and write  $\xrightarrow{-10} \underline{\quad}$ .)

S: (Write  $31$ .)

T:  $-10$ ? (Fill in  $31$  and write  $\xrightarrow{-10} \underline{\quad}$ .)

S: (Write  $21$ .)

T: (Point to the completed sequence on the board.) This is a **simplifying strategy** called arrow notation. We can also call it the *arrow way*. Pretend your partner is a family member. Explain how and why you changed each number. Be sure to use place value language.

S: You add or subtract  $1$  or  $10$  and the arrows point to what the number becomes after you change it.  $\rightarrow$  It shows that you're changing the ones or the tens place and whether it's more or less.  $\rightarrow 10$  more than  $33$  is  $43$ , and  $1$  less is  $42$ , and  $1$  less is  $41$ . Then  $10$  less than  $41$  is  $31$ , and  $10$  less than  $31$  is  $21$ .

If necessary or if time permits, model another example with the following problem:

$$62 - 23.$$

$$62 \xrightarrow{-10} \underline{\quad} \xrightarrow{-10} \underline{\quad} \xrightarrow{-1} \underline{\quad} \xrightarrow{-1} \underline{\quad} \xrightarrow{-1} \underline{\quad}$$

MP.3

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. Some problems do not specify a method for solving. This is an intentional reduction of scaffolding that invokes MP.5, Use Appropriate Tools Strategically. Students should solve these problems using the RDW approach used for Application Problems.

For some classes, it may be appropriate to modify the assignment by specifying which problems students should work on first. With this option, let the careful sequencing of the problem set guide your selections so that problems continue to be scaffolded. Balance word problems with other problem types to ensure a range of practice. Assign incomplete problems for homework or at another time during the day.

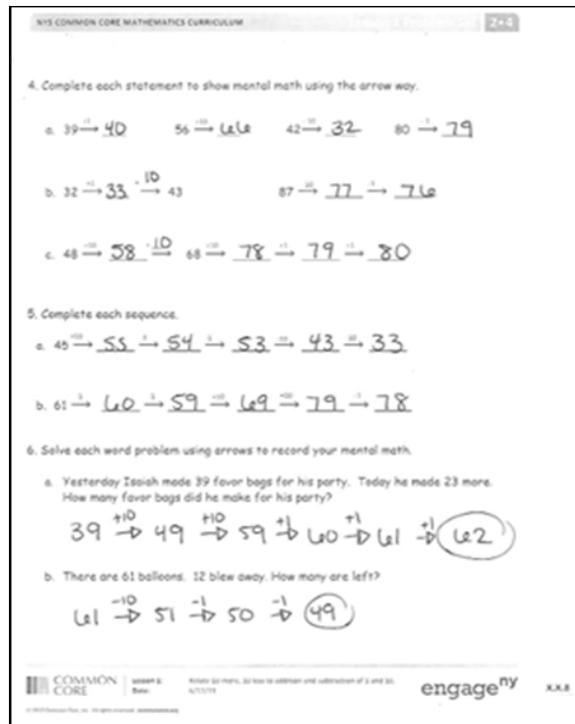
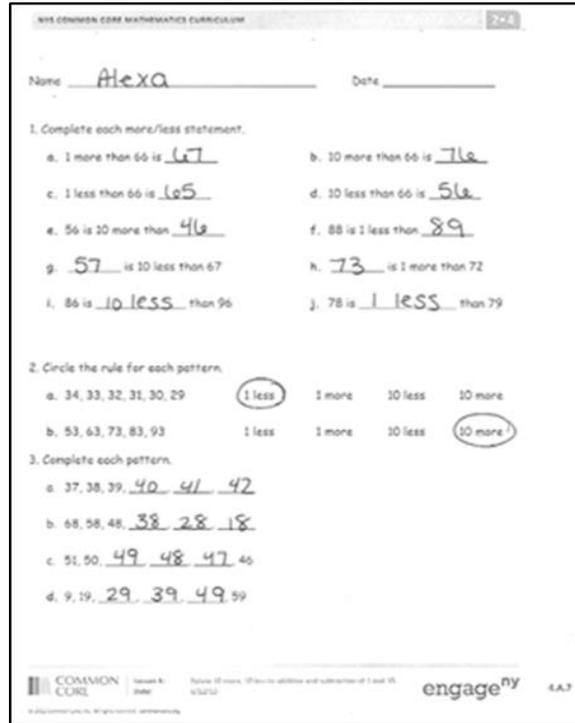
### Student Debrief (10 minutes)

**Lesson Objective:** Relate 1 more, 1 less, 10 more, and 10 less to addition and subtraction of 1 and 10.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- What do you need to know to complete each pattern in Problem 3?
- Look at Problem 4. What are we actually doing when we talk about 10 more, 10 less, 1 more, 1 less of a number?



- What helpful strategy did we use today to record a sequence of numbers? Can we use an equal sign instead of an arrow? Is this statement true ( $33 + 10 = 43 - 1 = 42 - 1 = 41$ )?
- In Problem 5(c), what total quantity did you add to 48 to arrive at 80? How do you know? How can we show it as an equation?
- What **simplifying strategy** did you use to answer Problem 6? How could you use what you know from Problem 5 to answer Problem 6?
- What important connection did we make today?

### Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Complete each more/less statement.

a. 1 more than 66 is \_\_\_\_\_.

b. 10 more than 66 is \_\_\_\_\_.

c. 1 less than 66 is \_\_\_\_\_.

d. 10 less than 66 is \_\_\_\_\_.

e. 56 is 10 more than \_\_\_\_\_.

f. 88 is 1 less than \_\_\_\_\_.

g. \_\_\_\_\_ is 10 less than 67.

h. \_\_\_\_\_ is 1 more than 72.

i. 86 is \_\_\_\_\_ than 96.

j. 78 is \_\_\_\_\_ than 79.

2. Circle the rule for each pattern.

a. 34, 33, 32, 31, 30, 29

1 less

1 more

10 less

10 more

b. 53, 63, 73, 83, 93

1 less

1 more

10 less

10 more

3. Complete each pattern.

a. 37, 38, 39, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

b. 68, 58, 48, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

c. 51, 50, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 46

d. 9, 19, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 59

4. Complete each statement to show mental math using the arrow way.

a.  $39 \xrightarrow{+1} \underline{\quad}$        $56 \xrightarrow{+10} \underline{\quad}$        $42 \xrightarrow{-10} \underline{\quad}$        $80 \xrightarrow{-1} \underline{\quad}$

b.  $32 \xrightarrow{+1} \underline{\quad} \xrightarrow{+ \underline{\quad}} 43$        $87 \xrightarrow{-10} \underline{\quad} \xrightarrow{-1} \underline{\quad}$

c.  $48 \xrightarrow{+10} \underline{\quad} \xrightarrow{+ \underline{\quad}} 68 \xrightarrow{+10} \underline{\quad} \xrightarrow{+1} \underline{\quad} \xrightarrow{+1} \underline{\quad}$

5. Complete each sequence.

a.  $45 \xrightarrow{+10} \underline{\quad} \xrightarrow{-1} \underline{\quad} \xrightarrow{-1} \underline{\quad} \xrightarrow{-10} \underline{\quad} \xrightarrow{-10} \underline{\quad}$

b.  $61 \xrightarrow{-1} \underline{\quad} \xrightarrow{-1} \underline{\quad} \xrightarrow{+10} \underline{\quad} \xrightarrow{+10} \underline{\quad} \xrightarrow{-1} \underline{\quad}$

6. Solve each word problem using arrows to record your mental math.

a. Yesterday Isaiah made 39 favor bags for his party. Today he made 23 more. How many favor bags did he make for his party?

b. There are 61 balloons. 12 blew away. How many are left?

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Complete the pattern.

a. 48, 47, 46, 45, 44, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

b. 5, 10, 20, 25, 35, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

c. 35, 34, 44, 43, 53, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

2. Create 2 of your own patterns using one of these rules for each: +1, -1, +10, or -10.

a. \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

Rule for Pattern (a): \_\_\_\_\_

b. \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

Rule for Pattern (b): \_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Complete each more/less statement.

1 more than 37 is \_\_\_\_\_.

10 more than 37 is \_\_\_\_\_.

1 less than 37 is \_\_\_\_\_.

10 less than 37 is \_\_\_\_\_.

58 is 10 more than \_\_\_\_\_.

29 is 1 less than \_\_\_\_\_.

\_\_\_\_\_ is 10 less than 45.

\_\_\_\_\_ is 1 more than 38.

49 is \_\_\_\_\_ than 50.

32 is \_\_\_\_\_ than 22.

2. Complete each pattern and write the rule.

a. 44, 45, \_\_\_\_\_, \_\_\_\_\_, 48

Rule: \_\_\_\_\_

b. 44, \_\_\_\_\_, 24, \_\_\_\_\_, 4

Rule: \_\_\_\_\_

c. 44, \_\_\_\_\_, \_\_\_\_\_, 74, 84

Rule: \_\_\_\_\_

d. \_\_\_\_\_, 43, 42, \_\_\_\_\_, 40

Rule: \_\_\_\_\_

e. \_\_\_\_\_, \_\_\_\_\_, 44, 34, \_\_\_\_\_

Rule: \_\_\_\_\_

f. 41, \_\_\_\_\_, \_\_\_\_\_, 38, 37

Rule: \_\_\_\_\_

3. Label each statement as true or false.
- 1 more than 36 is the same as 1 less than 38. \_\_\_\_\_
  - 10 less than 47 is the same as 1 more than 35. \_\_\_\_\_
  - 10 less than 89 is the same as 1 less than 90. \_\_\_\_\_
  - 10 more than 41 is the same as 1 less than 43. \_\_\_\_\_
4. Below is a chart of balloons at the county fair.

Color of Balloons	Number of Balloons
Red	59
Yellow	61
Green	65
Blue	
Pink	

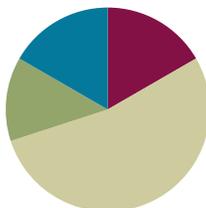
- Use the following to complete the chart and answer the question.
  - The fair has 1 more blue than red balloons.
  - There are 10 fewer pink than yellow balloons.
  - Are there more blue or pink balloons?
- If 1 red balloon pops and 10 red balloons fly away, how many red balloons are left? Use the arrow way to show your work.

## Lesson 2

**Objective:** Add and subtract multiples of 10 including counting on to subtract.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Concept Development	(32 minutes)
■ Application Problem	(8 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (10 minutes)

- Place Value **2.NBT.1, 2.NBT.5** (7 minutes)
- How Many More Tens? **2.NBT.5** (3 minutes)

#### Place Value (7 minutes)

Materials: (S) Place value charts, personal white boards

Note: Practicing place value skills will prepare students for adding and subtracting multiples of 10 in the lesson.

- T: (Project place value chart to the tens.) Show 1 ten and 3 ones in number disks. Write the number below it.
- S: (Students draw 1 tens and 3 ones disks and write 13 below it.)
- T: Say the number in unit form.
- S: 1 ten 3 ones.
- T: Say the number in standard form.
- S: 13.
- T: Add 2 tens to your chart. How many tens do you have now?
- S: 3 tens.
- T: What is 20 more than 13?
- S: 33.
- T: Add 3 tens to 33. How many tens do you have now?
- S: 6 tens.



#### NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Before the lesson, have students skip-count by tens to a hundred and back down to zero while doing a physical activity, e.g., jumping jacks.

During the lesson, encourage one or more students to lead the class in an example, e.g.,  $48 - 30$ . These may be students who are struggling to grasp the concept and would benefit from personal guidance, or students who grasp the concept quickly and would thrive on leadership opportunities. Praise their use of place value language to explain their thinking.

- T: What is 30 more than 33?  
S: 63.  
T: Say the number in unit form.  
S: 6 tens 3 ones.  
T: Now subtract 4 tens from 63. What is 40 less than 63?  
S: 23.

Continue with the following possible sequence:  $23 + 70$ ,  $93 - 40$ ,  $53 + 30$ , and  $83 - 80$ .

### How Many More Tens? (3 minutes)

Materials: (S) Personal white boards

Note: Practicing subtracting multiples of 10 will prepare students for the lesson.

- T: If I say  $34 - 24$ , you say 10. To say it in a sentence you say 34 is 10 more than 24. Ready?  
T:  $64 - 44$ .  
S: 20.  
T: Say it in a sentence.  
S: 64 is 20 more than 44.

Continue with the following possible sequence:  $85 - 45$ ,  $68 - 38$ ,  $59 - 49$ ,  $47 - 17$ , and  $99 - 19$ .

### Concept Development (32 minutes)

Materials: (T) Rekenrek (S) Personal white boards

Show 34 beads on the Rekenrek.

- T: Yesterday we added and subtracted 1 ten. Today, let's add 2 tens, then 3 tens, and more!  
T: How many do you see?  
S: 34!  
T: The Say Ten way?  
S: 3 tens 4!  
T: (Add 2 tens.) How many do you see?  
S: 5 tens 4!  
T: I am going to add 2 more tens. Turn and talk, what will happen to the number when I add 2 tens?  
S: The number in the tens place will get bigger by 2. → The number will get bigger by 20. → It will be 74.  
T: (Add 2 tens.) What is  $54 + 20$ ?  
S: 74!  
T: The Say Ten way?

- S: 7 tens 4!
- T: If I asked you to add 3 tens to 26, how could you solve that?
- S: Count on by ten three times.  
 → Change the 2 to 5 because 2 tens plus 3 tens is 5 tens. → Add 3 tens on the Rekenrek.
- T: Let's show that on the board using both simplifying strategies, the arrow way and number bonds. I know many of you can just do mental math!
- T: I can write adding 3 tens the arrow way, as we did yesterday. (Demonstrate and involve the students as you write.) I can also break apart the tens and ones with a number bond, add the tens and then add the ones. (Demonstrate and involve the students as you write.)
- T: No matter which way I write it, when I add tens to a number, the ones stay the same!

MP.3

The number bond's decomposition is one choice for solving the problem that may not work for some students as a solution strategy but is beneficial for all to understand. Students should be encouraged to make connections between different solution strategies and to choose what works best for a given problem or for their way of thinking.

T: Now it's your turn. On your personal white board, solve  $18 + 20$ . Show your board when you have an answer.

Repeat this process with examples as needed:  $25 + 50$ ,  $38 + 40$ , and  $40 + 27$ .

Show 74 beads on the Rekenrek.

- T: Now, let's subtract 2 tens, then 3 tens, and more!
- T: How many do you see?
- S: 74!
- T: The Say Ten way?
- S: 7 tens 4!
- T: (Subtract 2 tens.) How many do you see?
- S: 5 tens 4!
- T: I am going to subtract 2 more tens. Turn and talk, what will happen to the number when I subtract 2 tens?



**NOTES ON  
 MULTIPLE MEANS OF  
 REPRESENTATION:**

When counting up by tens and on by ones, use a number line to provide visual support. For example, when counting from 30 to 42, have students point to the jump between 30 and 40, then point to 41, 42. The number line correlates very well to the arrow notation.

MP.3

- S: The number in the tens place will get smaller by 2. → The number will get smaller by 20. → It will be 34.
- T: (Add 2 tens.) What is  $54 - 20$ ?
- S: 34!
- T: The Say Ten way?
- S: 3 tens 4!
- T: Ok, now subtract 3 tens from 56. Take a moment and work on your personal board to solve  $56 - 30$ . (Show the work on the board as students work out this first problem using number bonds and the arrow way.)
- T: (Model both the number bonds and arrow methods from their work.) We have an extra simplifying strategy when we are subtracting. We can count up from the part we know.
- T: What is the whole?
- S: 56.
- T: What is the part we know?
- S: 30.
- T: How could we show the missing part with an addition problem?
- S:  $30 + \underline{\quad} = 56$ . →  $\underline{\quad} + 30 = 56$ .
- T: We can use the arrow way, counting first by either tens or ones. Try it with a partner.

Hmmm... I can count on to subtract, too

Number Bonds

$$56 - 30 = 26$$

$$50 - 30 = 20$$

$$20 + 6 = 26$$
  

$$56 - 30 = 20 + 6 = 26$$

The Arrow Way

$$56 \xrightarrow{-10} 46 \xrightarrow{-10} 36 \xrightarrow{-10} 26$$
  

$$56 \xrightarrow{-30} 26$$

Counting On

$$30 \xrightarrow{+20} 50 \xrightarrow{+6} 56$$

Mental Math

$$56 - 30 = 26$$

You can either guide students through this or let them work independently. Starting at 30, they might add 2 tens first and then 6 ones, or add 6 ones first and then add 3 tens.

Repeat with  $62 - 40$ ,  $51 - 20$ , and  $77 - 30$ .

### Application Problem (8 minutes)

Susan has 57 cents in her piggy bank. If she just put in 30 cents today, how much did she have yesterday?

Note: This problem gives the students a chance to apply their new learning. It is an *add to with start unknown* problem, a bit of a wolf in sheep's clothing. Many students will say 87 cents. Persist in uncovering the part-whole relationships.

57 cents

$$\square + 30 = 57$$

$$57 - 30$$

$$50 - 30 = 20$$

$$20 + 7 = 27$$

She had 27 cents yesterday.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Add and subtract multiples of 10 including counting on to subtract.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- Which simplifying strategy did you use to solve the sequence in Problem 1(d)? Why is the arrow way a good choice for counting up?
- Explain to your partner how you solved the sequence in Problem 2(c). How did they help you to solve the problems in 2(d)? What was similar about them?
- How was solving Problem 3(e) different from solving the other parts of Problem 3? What did you need to do?
- Explain to your partner how you used the arrow way to solve Problem 4. Why did this strategy work well?
- What connections can you make between the number bond strategy and the arrow way? What is the goal of these simplifying strategies?



#### NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Encourage students to explain their thinking about adding or subtracting tens. For Problem 2 (c) and (d), facilitate a discussion in which different students share which problem solving method they prefer, and why. Ask students, “How can you tell when one strategy might be better than another?” Students may learn as much from each other’s reasoning as from the lesson.

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

3. Solve.

a.  $39 + 30 = 69$

b. 8 tens 7 ones  $-$  3 tens = 57

c. 20 = 5 tens + 7 tens

d. 30 = 5 tens 0 ones + 8 tens 0 ones

e. 48 ones  $-$  2 tens = 2 tens 8 ones

4. Mark had 78 puzzle pieces. He lost 30 pieces. How many pieces does Mark have left? Use the Arrow Way to show your simplifying strategy.

78  $\xrightarrow{-10}$  68  $\xrightarrow{-10}$  58  $\xrightarrow{-10}$  (48)

COMMON CORE | Lesson 2 | Add and subtract multiples of 10 including counting on to subtract. | engage<sup>ny</sup> | 4.A.21

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using place value strategies. Use scratch paper to use the arrow way or number bonds, or just use mental math and record your answers.

a. 5 tens + 3 tens = \_\_\_\_\_ tens      2 tens + 7 tens = \_\_\_\_\_ tens

$50 + 30 = \underline{\quad}$

$20 + 70 = \underline{\quad}$

b.  $24 + 30 = \underline{\quad}$        $50 + 24 = \underline{\quad}$        $14 + 50 = \underline{\quad}$

c.  $20 + 37 = \underline{\quad}$        $37 + 40 = \underline{\quad}$        $60 + 27 = \underline{\quad}$

d.  $57 + \underline{\quad} = 87$        $\underline{\quad} + 34 = 74$        $19 + \underline{\quad} = 69$

e.  $\underline{\quad} + 56 = 86$        $38 + \underline{\quad} = 78$        $12 + \underline{\quad} = 72$

2. Solve using place value strategies.

a. 8 tens - 2 tens = \_\_\_\_\_ tens      7 tens - 3 tens = \_\_\_\_\_ tens

$80 - 20 = \underline{\quad}$

$70 - 30 = \underline{\quad}$

b.  $78 - 40 = \underline{\quad}$        $56 - 30 = \underline{\quad}$        $88 - 50 = \underline{\quad}$

c.  $84 - \underline{\quad} = 24$        $57 - \underline{\quad} = 37$        $93 - \underline{\quad} = 43$

d.  $83 - \underline{\quad} = 23$        $54 - \underline{\quad} = 34$        $91 - \underline{\quad} = 41$

3. Solve.

a.  $39 + \underline{\quad} = 69$

b.  $8 \text{ tens } 7 \text{ ones} - 3 \text{ tens} = \underline{\quad}$

c.  $\underline{\quad} + 5 \text{ tens} = 7 \text{ tens}$

d.  $\underline{\quad} + 5 \text{ tens } 6 \text{ ones} = 8 \text{ tens } 6 \text{ ones}$

e.  $48 \text{ ones} - 2 \text{ tens} = \underline{\quad} \text{ tens } \underline{\quad} \text{ ones}$

4. Mark had 78 puzzle pieces. He lost 30 pieces. How many pieces does Mark have left? Use the arrow way to show your simplifying strategy.

Name \_\_\_\_\_

Date \_\_\_\_\_

Directions: Fill in the missing number to make each statement true.

1.  $50 + 20 = \underline{\quad}$

2.  $4 \text{ tens} + 3 \text{ tens} = \underline{\quad} \text{ tens}$

3.  $7 \text{ tens} - \underline{\quad} \text{ tens} = 5 \text{ tens}$

4.  $\underline{\quad} - 20 = 63$

5.  $6 \text{ tens} + 1 \text{ ten } 4 \text{ ones} = 9 \text{ tens } 4 \text{ ones} - \underline{\quad} \text{ tens}$

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using place value strategies.

<p>a. 2 tens + 3 tens = _____ tens 20 + 30 = _____</p> <p>2 tens 4 ones + 3 tens = _____ tens _____ ones 24 + 30 = _____</p>	<p>b. 5 tens + 4 tens = _____ tens 50 + 40 = _____</p> <p>5 tens 9 ones + 4 tens = _____ tens _____ ones 59 + 40 = _____</p>
--	--

c.  $28 + 40 = \underline{\hspace{2cm}}$

$18 + 30 = \underline{\hspace{2cm}}$

$60 + 38 = \underline{\hspace{2cm}}$

d.  $30 + 25 = \underline{\hspace{2cm}}$

$35 + 50 = \underline{\hspace{2cm}}$

$15 + 20 = \underline{\hspace{2cm}}$

e.  $37 + \underline{\hspace{2cm}} = 47$

$\underline{\hspace{2cm}} + 27 = 57$

$17 + \underline{\hspace{2cm}} = 87$

f.  $\underline{\hspace{2cm}} + 22 = 62$

$29 + \underline{\hspace{2cm}} = 79$

$11 + \underline{\hspace{2cm}} = 91$

2. Find each sum. Then use  $>$ ,  $<$ , or  $=$  to compare.

a.  $23 + 40 \underline{\hspace{1cm}} 20 + 33$

d.  $64 + 10 \underline{\hspace{1cm}} 49 + 20$

b.  $50 + 18 \underline{\hspace{1cm}} 48 + 20$

e.  $70 + 21 \underline{\hspace{1cm}} 18 + 80$

c.  $19 + 60 \underline{\hspace{1cm}} 39 + 30$

f.  $35 + 50 \underline{\hspace{1cm}} 26 + 60$

3. Solve using place value strategies.

<p>a. 6 tens - 2 tens = ___ tens 60 - 20 = _____</p> <p>6 tens 3 ones - 3 tens = ___ tens ___ ones 63 - 30 = _____</p>	<p>b. 8 tens - 5 tens = ___ tens 80 - 50 = _____</p> <p>8 tens 9 ones - 5 tens = ___ tens ___ ones 89 - 50 = _____</p>
--	--

c.  $55 - 20 = \underline{\hspace{2cm}}$        $75 - 30 = \underline{\hspace{2cm}}$        $85 - 50 = \underline{\hspace{2cm}}$

d.  $72 - \underline{\hspace{2cm}} = 22$        $49 - \underline{\hspace{2cm}} = 19$        $88 - \underline{\hspace{2cm}} = 28$

e.  $67 - \underline{\hspace{2cm}} = 47$        $71 - \underline{\hspace{2cm}} = 51$        $99 - \underline{\hspace{2cm}} = 69$

4. Complete each math phrase.

20 less than 58 is \_\_\_\_\_.

36 more than 40 is \_\_\_\_\_.

40 less than \_\_\_\_\_ is 28.

50 more than \_\_\_\_\_ is 64.

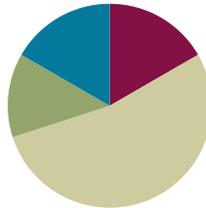
5. There were 68 plates in the sink at the end of the day. There were 40 plates in the sink at the beginning of the day. How many plates were added throughout the day? Use the arrow way to show your simplifying strategy.

## Lesson 3

Objective: Add and subtract multiples of 10 and some ones within 100.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Application Problem	(8 minutes)
■ Concept Development	(32 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (10 minutes)

- More and Less: Multiples of 10 **2.NBT.5** (2 minutes)
- Sprint: Two-Digit Addition **2.NBT.5** (8 minutes)

### More and Less: Multiples of 10 (2 minutes)

Note: Students review the previous lesson by adding and subtracting multiples of 10 fluently.

- T: 2 tens less than 6 tens.  
 S: 4 tens.  
 T: Subtraction number sentence?  
 S:  $60 - 20 = 40$ .  
 T: 2 tens less than 6 tens 8 ones.  
 S: 4 tens 8 ones.  
 T: Subtraction number sentence?  
 S:  $68 - 20 = 48$ .

Continue with the following possible sequence:  $56 - 23$ ,  $73 - 41$ ,  $60 + 22$ ,  $64 + 22$ ,  $57 + 12$ , and  $46 + 33$ .

### Sprint: Two-Digit Addition (8 minutes)

Materials: (S) Two-Digit Addition Sprint

Note: Students review two-digit addition in preparation for the lesson.

**Application Problem (8 minutes)**

Terrell puts 19 stamps in his book on Monday. He puts in 32 stamps on Tuesday. How many stamps does Terrell put in his book?

If Terrell's book holds 90 stamps, how many more stamps does he need to fill his book?

Note: This problem invites students to use mental math, arrow notation, or number bonds to solve. You may choose a method to model as guided practice, or you may have the students work independently and then share their methods.

$$\begin{array}{l} a) 19 + 32 = \\ 19 + \cancel{32} \quad 49 + \cancel{3} = 51 \\ 19 + 32 = 51 \end{array}$$

$$\begin{array}{l} b) 90 - 51 = \\ 90 - \cancel{39} \quad 40 \rightarrow 39 \\ 90 - 51 = 39 \end{array}$$

**Concept Development (32 minutes)**

Materials: (T) Rekenrek (S) Personal white boards

Note: Students record their answers on their boards and then turn over the boards. When most students' boards are turned over, say, "Show me." Students hold up their boards for a visual check. Then they erase their boards and are ready for the next problem.

- T:  $40 + 20$ . Show me.  
 S: (Show 60.)  
 T:  $48 + 20$ . Show me.  
 S: (Show 68.)  
 T:  $48 + 21$ ? Talk with your partner.  
 S: I would add 8 ones and 1 one, 9 ones, then add 4 tens and 2 tens, 6 tens. That's 69.  $\rightarrow$  I added  $40 + 20$  and then 8 ones and 1 one, 69.  $\rightarrow$  I added  $48 + 20$ , which is 68, + 1 is 69.  
 T:  $48 + 19$ ?  
 S: That's hard!  
 T: We can solve  $48 + 21$  and  $48 + 19$  using  $48 + 20$  to help us.  
 T: From 20 to 21 is one more or one less?  
 S: 1 more.  
 T: From 20 to 19 is one more or one less?



**NOTES ON  
 MULTIPLE MEANS OF  
 REPRESENTATION:**

When students turn their boards over, pay attention to students who are consistently not ready with the rest of the class, as they may need additional review or support on the foundational skills and concepts.

MP.2

S: 1 less.

T: Adding 21 is adding one more than 20. (Demonstrate as shown to the right.)

$$48 + 20 \qquad 48 \xrightarrow{+20} 68$$

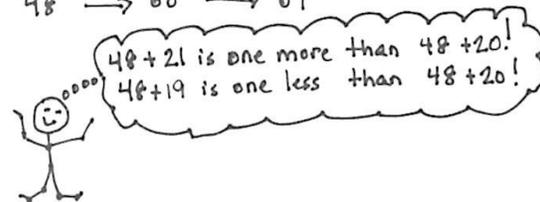
T: Adding 19 is adding one less than 20. (Demonstrate as shown.)

$$48 + 21 \qquad 48 \xrightarrow{+20} 68 \xrightarrow{+1} 69$$

$$48 + 19 \qquad 48 \xrightarrow{+20} 68 \xrightarrow{-1} 67$$

Have students solve the following problems on their white boards as they share their thinking with a partner.

- $36 + 50$ ,  $36 + 51$ ,  $36 + 49$
- $27 + 60$ ,  $27 + 61$ ,  $27 + 59$
- $43 + 20$ ,  $43 + 22$ ,  $43 + 18$



Then have students pair-share to explain their strategies.

T: Let's try this with subtraction. What is  $68 - 20$ ? Show me using the arrow way.

S: (Show.)

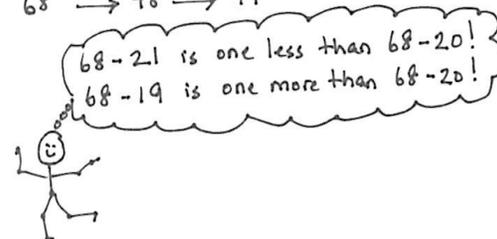
T: Talk with your partner. Solve  $68 - 21$ , using  $68 - 20$  to help you.

$$68 - 20 \qquad 68 \xrightarrow{-20} 48$$

$$68 - 21 \qquad 68 \xrightarrow{-20} 48 \xrightarrow{-1} 47$$

$$68 - 19 \qquad 68 \xrightarrow{-20} 48 \xrightarrow{+1} 49$$

T: Solve  $68 - 19$ , using  $68 - 20$  to help you.



Call two volunteers to solve the following problems on their boards as they share their thinking with a partner.

- $57 - 30$ ,  $57 - 31$ ,  $57 - 29$
- $63 - 40$ ,  $63 - 41$ ,  $63 - 39$
- $72 - 50$ ,  $72 - 51$ ,  $72 - 49$

Follow with a discussion of why the strategy works. Be aware that students may be more confused by the subtraction. To subtract 31, we are subtracting one more. To subtract 29, we are subtracting one less than 30, so we add one to the result of  $68 - 20$ .

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.



#### NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

The concept of *take away 10, add 1* in subtraction might still elude some students. With the problem  $25 - 9$ , use a number line or hundreds chart and start with  $25 - 1 = 24$ , working up to  $25 - 10 = 15$ . Then go back to  $25 - 9 = 16$ . Guide the students towards seeing that 16 is 1 greater than 15. Repeat with other examples, e.g.,  $61 - 29$ , until they grasp the concept.

### Student Debrief (10 minutes)

**Lesson Objective:** Add and subtract multiples of 10 and some ones within 100.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the problem set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- For Problem 1(a), how does knowing  $38 + 20$  help you to solve the other problems in that set?
- For Problem 1(c), how does knowing  $34 - 10$  help you to solve the other problems in that set?
- How did using the arrow way help you to solve Problem 1(d)? What careful observations can you make about the numbers you subtracted?
- Share and compare with a partner: What were your simplifying strategies for solving Problem 2(d)? How were they the same or different?
- How does knowing the tens help us to mentally add and subtract numbers that are close to tens, like 19 and 41?

### Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 3 Problem Set 2•4

Name: Alexa Date: \_\_\_\_\_

1. Solve each using the arrow way.

a.

$38 + 20$	$38 \xrightarrow{+20} 58$
$38 + 21$	$38 \xrightarrow{+20} 58 \xrightarrow{+1} 59$
$38 + 19$	$38 \xrightarrow{+20} 58 \xrightarrow{-1} 57$

b.

$47 + 40$	$47 \xrightarrow{+40} 87$
$47 + 41$	$47 \xrightarrow{+40} 87 \xrightarrow{+1} 88$
$47 + 39$	$47 \xrightarrow{+40} 87 \xrightarrow{-1} 86$

c.

$34 - 10$	$34 \xrightarrow{-10} 24$
$34 - 11$	$34 \xrightarrow{-10} 24 \xrightarrow{-1} 23$
$34 - 9$	$34 \xrightarrow{-10} 24 \xrightarrow{+1} 25$

d.

$45 - 20$	$45 \xrightarrow{-20} 25$
$45 - 21$	$45 \xrightarrow{-20} 25 \xrightarrow{-1} 24$
$45 - 29$	$45 \xrightarrow{-30} 15 \xrightarrow{+1} 16$

COMMON CORE Lesson 3: Add and subtract multiples of 10 and some ones within 100. Date: 7/3/13 engage<sup>ny</sup> 4.A.33

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 3 Problem Set 2•4

2. Solve using the arrow way, number bonds or mental math. Use scratch paper if needed.

a.

$49 + 20 = 69$	$21 + 49 = 70$	$49 + 19 = 68$
$49 \xrightarrow{+20} 69$	$20 + 50$	$50 + 18$

b.

$23 + 70 = 93$	$23 + 71 = 94$	$69 + 23 = 92$
$23 \xrightarrow{+70} 93$	$24 + 70$	$70 + 22$

c.

$84 - 20 = 64$	$84 - 21 = 63$	$84 - 19 = 65$
$84 \xrightarrow{-20} 64$	$84 \xrightarrow{-20} 64 \xrightarrow{-1} 63$	$84 \xrightarrow{-20} 64 \xrightarrow{+1} 65$

d.

$94 - 41 = 53$	$94 - 39 = 55$	$94 - 37 = 57$
$94 \xrightarrow{-40} 54 \xrightarrow{-1} 53$	$94 \xrightarrow{-40} 54 \xrightarrow{+1} 55$	$94 \xrightarrow{-40} 54 \xrightarrow{+3} 57$

e.

$73 - 29 = 44$	$52 - 29 = 23$	$85 - 29 = 56$
$73 \xrightarrow{-30} 43 \xrightarrow{+1} 44$	$52 \xrightarrow{-30} 22 \xrightarrow{+1} 23$	$85 \xrightarrow{-30} 55 \xrightarrow{+1} 56$

3. Jessie's mom buys snacks for his classroom. She buys 22 apples, 19 oranges and 49 strawberries. How many pieces of fruit does Jessie's mom buy?

$22 \xrightarrow{+20} 42 \xrightarrow{+1} 43$   
 $43 \xrightarrow{+50} 93 \xrightarrow{-1} 92$

COMMON CORE Lesson 3: Add and subtract multiples of 10 and some ones within 100. Date: 7/3/13 engage<sup>ny</sup> 4.A.34

**A**

# Correct \_\_\_\_\_

Add or subtract.

1	$3 + 1 =$		23	$50 + 30 =$	
2	$30 + 10 =$		24	$54 + 30 =$	
3	$31 + 10 =$		25	$54 + 3 =$	
4	$31 + 1 =$		26	$50 - 30 =$	
5	$3 - 1 =$		27	$59 - 30 =$	
6	$30 - 10 =$		28	$59 - 3 =$	
7	$35 - 10 =$		29	$67 + 30 =$	
8	$35 - 1 =$		30	$67 - 30 =$	
9	$47 + 10 =$		31	$67 - 3 =$	
10	$10 - 1 =$		32	$40 - 3 =$	
11	$80 - 1 =$		33	$42 - 3 =$	
12	$40 + 20 =$		34	$30 + 40 =$	
13	$43 + 20 =$		35	$32 + 40 =$	
14	$43 + 2 =$		36	$32 + 4 =$	
15	$40 - 20 =$		37	$70 - 40 =$	
16	$45 - 20 =$		38	$76 - 40 =$	
17	$45 - 2 =$		39	$76 - 4 =$	
18	$57 + 2 =$		40	$53 + 40 =$	
19	$57 - 20 =$		41	$53 + 4 =$	
20	$10 - 2 =$		42	$53 - 40 =$	
21	$50 - 2 =$		43	$90 - 4 =$	
22	$51 - 2 =$		44	$92 - 4 =$	

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**B**

Improvement \_\_\_\_\_

# Correct \_\_\_\_\_

Add or subtract.

1	$2 + 1 =$		23	$40 + 30 =$	
2	$20 + 10 =$		24	$45 + 30 =$	
3	$21 + 10 =$		25	$45 + 3 =$	
4	$21 + 1 =$		26	$40 - 30 =$	
5	$2 - 1 =$		27	$49 - 30 =$	
6	$20 - 10 =$		28	$49 - 3 =$	
7	$25 - 10 =$		29	$57 + 30 =$	
8	$25 - 1 =$		30	$57 - 30 =$	
9	$37 + 10 =$		31	$57 - 3 =$	
10	$10 - 1 =$		32	$50 - 3 =$	
11	$70 - 1 =$		33	$52 - 3 =$	
12	$50 + 20 =$		34	$20 + 40 =$	
13	$53 + 20 =$		35	$23 + 40 =$	
14	$53 + 2 =$		36	$23 + 4 =$	
15	$50 - 20 =$		37	$80 - 40 =$	
16	$54 - 20 =$		38	$86 - 40 =$	
17	$54 - 2 =$		39	$86 - 4 =$	
18	$64 + 2 =$		40	$43 + 40 =$	
19	$64 - 20 =$		41	$43 + 4 =$	
20	$10 - 2 =$		42	$63 - 40 =$	
21	$60 - 2 =$		43	$80 - 4 =$	
22	$61 - 2 =$		44	$82 - 4 =$	

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Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve each using the arrow way.

a.

$38 + 20$

$38 + 21$

$38 + 19$

b.

$47 + 40$

$47 + 41$

$47 + 39$

c.

$34 - 10$

$34 - 11$

$34 - 9$

d.

$45 - 20$

$45 - 21$

$45 - 29$

2. Solve using the arrow way, number bonds, or mental math. Use scratch paper if needed.

a.  $49 + 20 = \underline{\hspace{2cm}}$

$21 + 49 = \underline{\hspace{2cm}}$

$49 + 19 = \underline{\hspace{2cm}}$

b.  $23 + 70 = \underline{\hspace{2cm}}$

$23 + 71 = \underline{\hspace{2cm}}$

$69 + 23 = \underline{\hspace{2cm}}$

c.  $84 - 20 = \underline{\hspace{2cm}}$

$84 - 21 = \underline{\hspace{2cm}}$

$84 - 19 = \underline{\hspace{2cm}}$

d.  $94 - 41 = \underline{\hspace{2cm}}$

$94 - 39 = \underline{\hspace{2cm}}$

$94 - 37 = \underline{\hspace{2cm}}$

e.  $73 - 29 = \underline{\hspace{2cm}}$

$52 - 29 = \underline{\hspace{2cm}}$

$85 - 29 = \underline{\hspace{2cm}}$

3. Jessie's mom buys snacks for his classroom. She buys 22 apples, 19 oranges and 49 strawberries. How many pieces of fruit does Jessie's mom buy?

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using the arrow way or number bonds.

a.  $43 + 30 =$  \_\_\_\_\_

b.  $68 + 24 =$  \_\_\_\_\_

c.  $82 - 51 =$  \_\_\_\_\_

d.  $28 - 19 =$  \_\_\_\_\_

2. Show or explain how you used mental math to solve one of the problems above.

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using the arrow way. The first set is done for you.

$67 + 20 = \underline{87}$ $67 \xrightarrow{+20} \underline{87}$ $67 + 21 = \underline{88}$ $67 \xrightarrow{+20} \underline{87} \xrightarrow{+1} \underline{88}$ $67 + 19 = \underline{86}$ $67 \xrightarrow{+20} \underline{87} \xrightarrow{-1} \underline{86}$	$56 + 40 = \underline{\quad}$ $56 + 41 = \underline{\quad}$ $56 + 39 = \underline{\quad}$
$68 - 40 = \underline{\quad}$ $68 - 41 = \underline{\quad}$ $69 - 39 = \underline{\quad}$	$87 - 50 = \underline{\quad}$ $87 - 51 = \underline{\quad}$ $87 - 49 = \underline{\quad}$

2. Solve using the arrow way, number bonds, or mental math. Use scratch paper if needed.

$48 - 20 = \underline{\quad}$	$86 - 50 = \underline{\quad}$	$37 + 40 = \underline{\quad}$
$48 - 21 = \underline{\quad}$	$86 - 51 = \underline{\quad}$	$37 + 41 = \underline{\quad}$
$48 - 19 = \underline{\quad}$	$86 - 49 = \underline{\quad}$	$37 + 39 = \underline{\quad}$
$62 + 30 = \underline{\quad}$	$77 - 40 = \underline{\quad}$	$28 + 50 = \underline{\quad}$
$62 + 31 = \underline{\quad}$	$77 - 41 = \underline{\quad}$	$28 + 51 = \underline{\quad}$
$62 + 29 = \underline{\quad}$	$77 - 39 = \underline{\quad}$	$28 + 49 = \underline{\quad}$

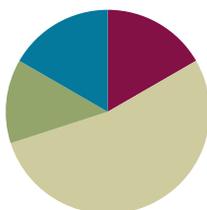
3. Marcy had \$84 in the bank. She took \$39 out of her account. How much does she have in her account now?
4. Brian has 92 cm of rope. He cuts off a piece 49 cm long to tie a package.
- How much rope does Brian have left?
  - Brian needs another piece 8 cm shorter than the piece used to tie a different package. Does he have enough rope left?

## Lesson 4

Objective: Add and subtract multiples of 10 and some ones within 100.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Concept Development	(32 minutes)
■ Application Problem	(8 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (10 minutes)

- Place Value **2.NBT.1** (3 minutes)
- Making a Ten Drill **2.NBT.5** (2 minutes)
- Making the Next Ten to Add **2.NBT.5** (5 minutes)

### Place Value (3 minutes)

Note: Reviewing and practicing place value skills in isolation will prepare students for success with adding and subtracting tens and ones in the lesson.

- T: (Write 174.) Say the number.  
 S: 174.  
 T: What digit is in the tens place?  
 S: 7.  
 T: (Underline 7.) What's the value of the 7?  
 S: 70.  
 T: State the value of the 1.  
 S: 100.  
 T: State the place of the 4.  
 S: Ones place.

Repeat for the following possible sequence: 258, 734, 860, and 902.

### Making a Ten Drill (2 minutes)

Note: This fluency will review foundations that lead into today's lesson.

- T: (Post  $7 + \underline{\quad} = 10$  on the board.) Let's find missing parts to make ten. If I say 7, you would say 3.

- T: Ready? 7.  
 S: 3.  
 T: Number sentence.  
 S:  $7 + 3 = 10$ .

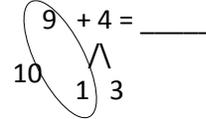
Continue with the following possible sequences: 4, 3, 7, 17, 13, 23, 27, 42, 48, and 58.

### Making the Next Ten to Add (5 minutes)

Note: This fluency will review foundations that lead into today’s lesson.

- T: When I say,  $9 + 4$ , you say  $10 + 3$ . Ready?  $9 + 4$ .  
 S:  $10 + 3$ .  
 T: Answer.  
 S: 13.

Post on board:

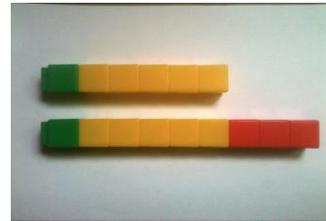
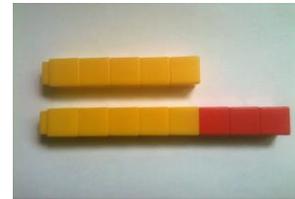


Continue with the following possible sequences:  $19 + 4$ ,  $29 + 4$ ,  $49 + 4$ ,  $79 + 4$ ,  $9 + 6$ ,  $19 + 6$ ,  $29 + 6$ ,  $59 + 6$ ,  $8 + 3$ ,  $18 + 3$ ,  $48 + 3$ ,  $8 + 5$ ,  $18 + 5$ ,  $88 + 5$ ,  $7 + 6$ ,  $17 + 6$ ,  $27 + 6$ ,  $7 + 4$ ,  $17 + 4$ , and  $67 + 4$ .

### Concept Development (32 minutes)

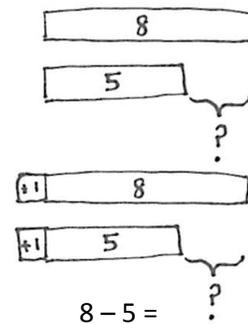
Materials: (T) Linking cubes in three colors (S) Personal white boards

Show one row of 8 linking cubes made up of 5 in (yellow) and 3 in (red) and one row of 5 linking cubes made up of 5 (yellow) cubes.



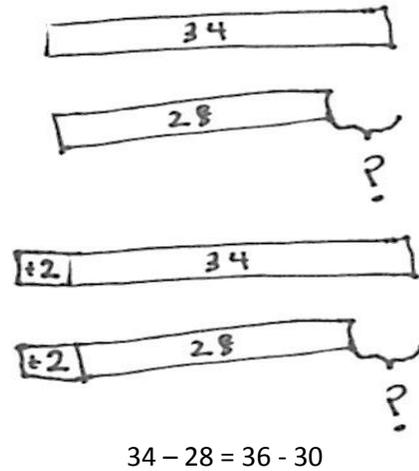
$8 - 5 = 9 - 6$

- T: There are 5 yellow cubes. How many linking cubes am I holding in this stick? (Hold up stick of 8.)  
 S: 8!  
 T: How many in this stick? (Show 5.)  
 S: 5.  
 T: What is the difference between 8 and 5? (Break off the 3 cubes that represent the difference.)  
 S: 3.  
 T: What number sentence could I use to represent the difference between 8 and 5?  
 S:  $8 - 5 = 3$ .  
 T: (Add one green cube to each stick.)  
 T: Has the difference changed?  
 S: No. (Break off the difference again.)  
 T: But what new number sentence can I use to represent the difference between my two sticks?



MP.2

- S:  $9 - 6 = 3$ .
- T: The difference is still 3?
- S: Yes!
- T: (Draw a two-bar tape diagram to represent the two sets of cubes.)
- T: I add one more to each bar. (Model as shown to the right.) Did the difference change?
- S: No!
- T: Let's test this idea. When we add the same amount to each number in a subtraction sentence, the difference stays the same.
- T: Now let's try this with a new problem. (Write  $34 - 28$  on the board.)
- T: Now that is challenging!
- T: Try this one:  $36 - 30$ .
- S: 6!
- T: How did you know the answer so fast?
- S: Just take away 3 tens!  $\rightarrow$  Because 3 tens  $-$  3 tens = 0 tens so you know you only have 6 ones left.
- T: Yes! Is it easier to subtract just tens!



MP.2

Draw a tape diagram on the board to represent  $34 - 28$ . Direct students to do the same. Call a student volunteer forward to label the tape diagram.

- T: Now, can you tell me how  $34 - 28$  and my other problem,  $36 - 30$ , are related? Turn and talk.
- S:  $34 - 28$  is the same as  $36 - 30$  but you added two more to each number.  $\rightarrow$  The difference is the same.

Call a volunteer to add two to each bar on the board to change the model to  $36 - 30$ . Students do the same at their seats.

- T: Now how long is each bar?
- S: The bottom bar is 36, and the top bar is 30.
- T: We added 2 to each bar to make the problem easy!
- T: Now it's your turn. On your white board, solve these problems by making a tape diagram. Add on to both numbers to make the problem easier. (Write on the board:  $22 - 8$ ,  $26 - 19$ ,  $33 - 18$ .)



**NOTES ON  
MULTIPLE MEANS OF  
REPRESENTATION:**

- Use a ruler to remind students that the length of an object, for example, a pencil, remains the same regardless of where it starts on the ruler.
- Use a number line to show that age differences don't change when people age. For example, *Mark and Robert are 8 and 6 years old now. How old will they be in 3 years? What will be the difference in their ages?*

T: There are 6 red cubes on one end and 4 red on the other end. How many yellows are in the middle?



S: 1!

T: The total number of cubes is?

S: 11.

T: Let's make 2 different addition sentences. Join the 1 yellow with 4 red (point), what is the addition sentence for the total number of cubes?



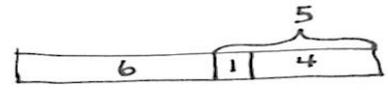
S:  $6 + 5 = 11$

T: Now instead join the 1 yellow with the 6 red.

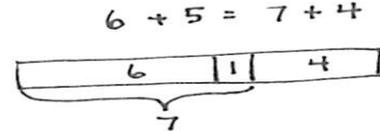


S:  $7 + 4 = 11$

T: How do you know this is true  $6 + 5 = 7 + 4$ ? (Draw the model.)



S: Yes! → Both equal eleven. → It's just the 1 moved from one number to the other number. → You can see that the number of cubes didn't change.



T: Let's use that same idea with larger numbers to make tens.

T: Let's solve  $28 + 36$ .

T: (Draw a bar and label it 28.)

T: What does 28 need to be the next ten?

S: 2. (Add another chunk of 2 on to the right end of the bar of 28.)

T: What is 2 less than 36?

S: 34. (Draw the second bar to show the 34.)

T: Why did I draw 34 instead of 36? Explain to your partner.

S: Because you used 2 to make 28 into 30. → Because it's easy to add tens so we put 2 more on 28 to have 3 tens.

T: How do you know this is true:  $28 + 36 = 30 + 34$ ?

S: You can see on the model. → The two can go with the 28 or the 34. → It was easy to make 28 to 30 because it is close to the next ten.

T: We can also show 2 more for 28 with our number bond.

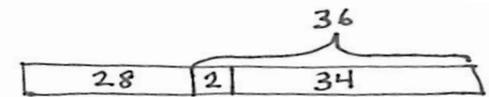
Write the number bond pictured to the right, working interactively with students as you see is best for your class.

You might then have them write both models into their journals and explain them to a partner before giving more practice problems such as the following:  $19 + 35$ ,  $36 + 29$ ,  $78 + 24$ , and  $37 + 46$ .

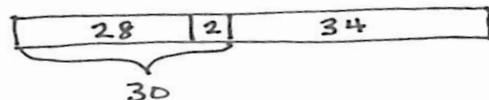


**NOTES ON  
MULTIPLE MEANS OF  
ENGAGEMENT:**

Students with dysgraphia may benefit from using the model drawing tools on [thinkingblocks.com](http://thinkingblocks.com).



$$28 + 36 = 30 + 34$$



$$28 + 36 = 64$$

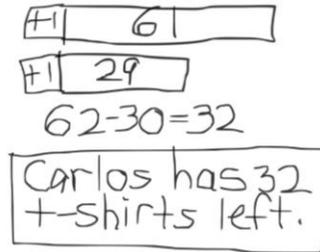
$$28 + 2 = 30$$

$$30 + 34 = 64$$

**Application Problem (8 minutes)**

Carlos bought 61 t-shirts. He gave 29 of them to his friends. How many t-shirts does Carlos have left?

Note: This Application Problem comes after the Concept Development so that students can apply what they have learned about making easy numbers (i.e., a multiple of 10) to subtract. You may choose to lead students through the RDW process or have students work independently and then share their work.



**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first.

If you find that students need additional practice with tape diagrams or number bonds, then provide more practice with those models. For example, if students struggle to complete Problem 1, then give them more problems where they will add on to the subtrahend to make a multiple of 10.

**Student Debrief (10 minutes)**

**Lesson Objective:** Add and subtract multiples of 10 and some ones within 100.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the problem set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- How did you label your tape diagram in Problem 1(b)? Why?
- Share your tape diagram for Problem 2(b) with a partner. How did you label it to add tens?
- Look at Problem 2(c):  $61 + 29 = 60 + 30$ . Is this true? How do you know?

- What other special strategy could you use to solve Parts (a–d) of Problem 1? How could you use the arrow way to solve these problems?
- What do you notice about the numbers in the Problem Set today? When is the best time to use the tape diagram to solve?
- What is the goal in using the tape diagram as a simplifying strategy?

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 4 Problem Set 2•4

2. Solve. Draw and label a tape diagram to add tens. Write the new number sentence.

a.  $29 + 46$

$29 + 46 = 30 + 45 = 75$

b.  $38 + 45$

$40 + 43 = 83$

c.  $61 + 29$

$60 + 30 = 90$

d.  $27 + 68$

$25 + 70 = 95$

COMMON CORE Lesson 4: Add and subtract multiples of 10 and some ones within 100. Date: 7/4/13 engage<sup>ny</sup> 4.A.46

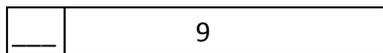
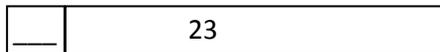
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Name \_\_\_\_\_

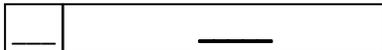
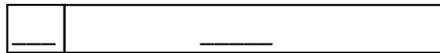
Date \_\_\_\_\_

1. Solve. Draw and label a tape diagram to subtract tens. Write the new number sentence.

a.  $23 - 9 = \underline{24 - 10} = \underline{\hspace{2cm}}$



b.  $32 - 19$



c.  $50 - 29$

d.  $47 - 28$

2. Solve. Draw and label a tape diagram to add tens. Write the new number sentence.

a.  $29 + 46$

29	1	45
----	---	----

b.  $38 + 45$

c.  $61 + 29$

d.  $27 + 68$

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve.

a.  $26 + 38 =$

b.  $83 - 46 =$

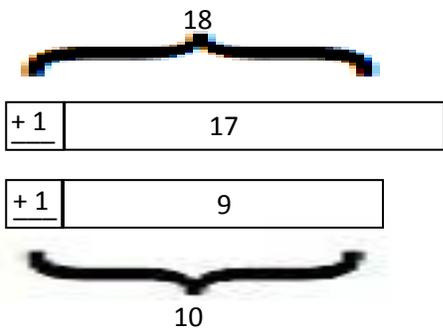
2. Craig checked out 28 books at the library. He read and returned some books. He still has 19 books checked out. How many books did Craig return? Draw a tape diagram or number bond to solve.

Name \_\_\_\_\_

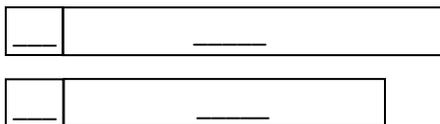
Date \_\_\_\_\_

1. Solve by drawing or completing a tape diagram to subtract 10, 20, 30, 40, etc.

a.  $17 - 9 = \underline{18 - 10} = \underline{\quad}$



b.  $33 - 19$



c.  $60 - 29$

d.  $56 - 38$

2. Solve by drawing a number bond to add 10, 20, 30, 40, etc.

a.  $28 + 43 = \underline{30 + 41} = \underline{\quad}$

b.  $49 + 26 = \underline{\quad} = \underline{\quad}$

c.  $43 + 19 = \underline{\quad} = \underline{\quad}$

d.  $67 + 28 = \underline{\quad} = \underline{\quad}$

3. Use a number bond or tape diagram to solve. Write your answer in a complete sentence.

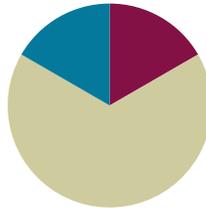
Kylie has 28 more oranges than Cynthia. Kylie has 63 oranges. How many oranges does Cynthia have?

## Lesson 5

**Objective:** Solve one- and two-step word problems within 100 using strategies based on place value.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Concept Development	(40 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



#### A NOTE ON LESSON STRUCTURE:

The Application Problems are not a separate component of this lesson. They are the focus of today's Concept Development.

### Fluency Practice (10 minutes)

- Rename the Units: Choral Response **2.NBT.1** (1 minute)
- Sprint: Add and Subtract Ones and Tens **2.NBT.5** (9 minutes)

#### Rename the Units: Choral Response (1 minute)

Note: This fluency will review place value foundations that will lead into Lesson 6.

- T: (Write 10 ones = \_\_\_\_ ten. Draw 10 ones place value disks on the board in ten-frame format and circle them when the students say 10 ones = 1 ten.) I'm going to give you some number of ones. I want you to pull out as many tens as you can, and then tell me how many tens and ones. If there are no ones, only say the tens. Ready?
- T: Say the number sentence.
- S: 10 ones = 1 ten.
- T: (Write 20 ones = \_\_\_\_ tens.) Say the number sentence.
- S: 20 ones = 2 tens.
- T: 23 ones.
- S: 23 ones = 2 tens 3 ones.

Repeat the process for 60 ones, 63 ones, 70 ones, 75 ones, 79 ones, 90 ones, and 97 ones.

#### Sprint: Add and Subtract Ones and Tens (9 minutes)

Materials: (S) Two-Digit Addition and Subtraction Sprint (repeated from G2–M4–Lesson 3)

Note: This Sprint reviews addition and subtraction of multiples of 10 and some ones.

**Concept Development (40 minutes)**

Materials: (S) Problem Set

**Suggested Delivery of Instruction for Solving Topic A's Word Problems****1. Model the problem.**

Invite two pairs of students who you think can successfully model the problem to work at the board while the others work independently or in pairs at their seats. Review the following questions before solving the first problem.

- Can you draw something?
- What can you draw?
- What conclusions can you make from your drawing?

As students work, circulate. Reiterate the questions above and guide them in drawing their tape diagrams.

After two minutes, have the two pairs of students share *only* their labeled diagrams.

For about one minute, encourage the demonstrating students to respond to feedback and questions from their peers.

**2. Solve and write a statement.**

Discuss strategies for solving, drawing attention to the strategy chart created during the Debrief in Lesson 3. Give students two minutes to solve and complete the question, sharing their work and thought processes with a peer.

Then, instruct students to write their equations and statements of the answer.

**3. Assess the solution for reasonableness.**

Give students one or two minutes to assess and explain the reasonableness of their solution.

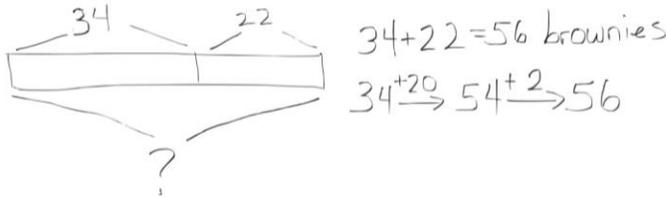
**NOTES ON  
MULTIPLE MEANS OF  
ACTION AND  
EXPRESSION:**

Invite students who finish early to write their own word problems similar to the ones that have been modeled. After they have checked their own solutions, instruct students to swap problems with a partner, solve, and share problem-solving strategies.

Students working below grade level may continue to need additional support in adding numbers together using place value charts and disks.

**Problem 1: Solve a single-step word problem using a tape diagram and the Arrow way.**

Don has 34 brownies. He bakes 22 more. How many brownies does he have now?



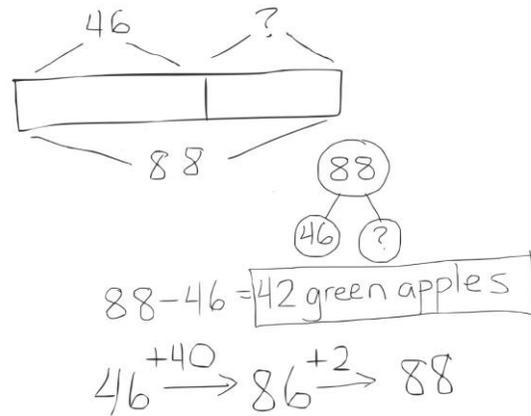
**NOTES ON MULTIPLE MEANS OF ENGAGEMENT:**

Provide graph paper for students who need support to make tape diagrams.

Support students by eliciting the response that we know both parts, and need to find the whole. Students may use a number bond or tape diagram to represent the missing whole and then apply the Arrow way to solve.

**Problem 2: Solve a single-step word problem by drawing a tape diagram and using a number bond or the Arrow way to solve.**

Sam has 46 red apples and some green apples. He has a total of 88 apples. How many green apples does he have?



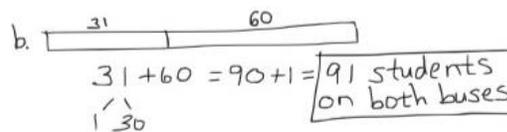
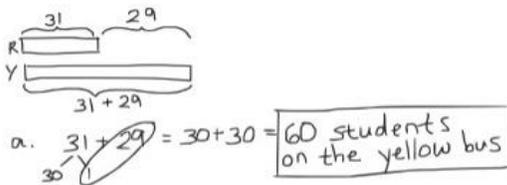
**MP.1**

Circulate and support students by guiding them to the realization that the unknown is a missing part. Encourage them to write a statement using the word *fewer* when talking about things you can count. For example, I have *fewer* cookies than you do but *less* juice.

**Problem 3: Solve a two-step problem by drawing a tape diagram and using a number bond to solve.**

- There are 31 students on the red bus. There are 29 more students on the yellow bus than on the red bus. How many students are on the yellow bus?
- How many students are on both buses combined?

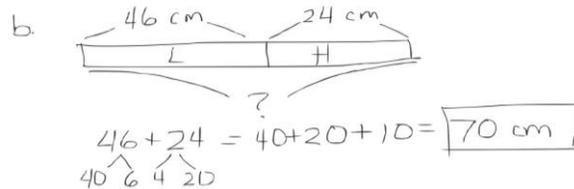
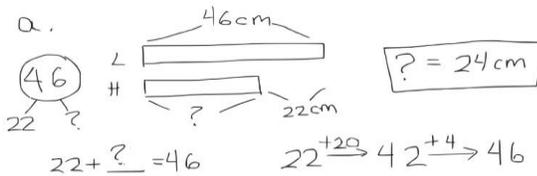
Many students will want to draw this as a single bar, showing the total number of students to start. This works. However, the second step will most likely require a new double bar to compare the number of students on each bus. It is likely that you will need to model this for them.



**Problem 4: Solve a two-step problem by drawing a tape diagram and using the Arrow way to solve.**

- a. Ms. Lopez cut 46 cm of yarn. Ms. Hamilton cut 22 cm fewer than Ms. Lopez. How many centimeters of yarn did Ms. Hamilton cut?
- b. How many centimeters of yarn did they have altogether?

MP.1



Circulate and guide students toward realizing again that the unknown is a missing part; therefore, we subtract to find the answer, or count on.

**Problem Set (10 minutes)**

Be aware that the timing of this lesson will vary widely based on your students' experience with problem solving. You may not get to the Problem Set at all. It might be used by a small group while you work with others. It might be used by the whole class.

**Student Debrief (10 minutes)**

**Lesson Objective:** Solve one- and two-step word problems within 100 using strategies based on place value.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- Which simplifying strategy did you use to solve Problem 1? Why did you choose that strategy? Could you have solved this problem another way?

COMMON CORE MATHEMATICS CURRICULUM Lesson 5: Solve one- and two-step word problems within 100 using strategies based on place value. engage<sup>ny</sup> 4.A.5

- Which operation did you choose to solve Problem 2? Why? How did drawing a tape diagram help you to solve?
- How did you show your thinking in Problem 4(a)? Can you write an equation that describes the situation in this problem? Did you use this same operation to solve?
- What is the most challenging part about drawing a tape diagram for Problem 5(a)? Based on that diagram, which simplifying strategy did you choose to solve?
- Let's chart the different problem solving strategies we have used today (to be referenced in future lessons throughout the module). What did today's problem solving strategies have in common?

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 5 Problem Set 2•4

4. Matthew has 68 stickers. His brother has 29 fewer stickers.

a. How many stickers does Matthew's brother have?

$$68 - 29$$

$$68 \begin{array}{r} -30 \\ \hline \end{array} 38 \begin{array}{r} +1 \\ \hline \end{array} 39$$

b. How many stickers do Matthew and his brother have altogether?

$$68 + 39$$

$$68 \begin{array}{r} +40 \\ \hline \end{array} 108 \begin{array}{r} -1 \\ \hline \end{array} 107$$

5. There are 47 photos in the blue album. The blue album has 32 more photos than the red album.

a. How many photos are in the red album?

$$47 - 32$$

$$47 \begin{array}{r} -30 \\ \hline \end{array} 17 \begin{array}{r} -2 \\ \hline \end{array} (15)$$

b. How many photos are in the red and blue album altogether?

$$(47 + 15)$$

$$\begin{array}{r} 47 \\ +15 \\ \hline 3 \\ \hline \end{array} \begin{array}{r} 12 \\ \hline \end{array} 50 + 12 = 62$$

6. Kiera has 62 blocks and Pete has 37 blocks. They give away 75 blocks. How many blocks do they have left?

$$62 \begin{array}{r} +30 \\ \hline \end{array} 92 \begin{array}{r} +7 \\ \hline \end{array} 99$$

$$99 - 75$$

$$99 \begin{array}{r} -70 \\ \hline \end{array} 29 \begin{array}{r} -5 \\ \hline \end{array} (24)$$

COMMON CORE | Lesson 5: Solve one- and two-step word problems within 100 using strategies based on place value. 7/1/13 | engage<sup>ny</sup> 4.A.55

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Name \_\_\_\_\_

Date \_\_\_\_\_

Solve and show your strategy.

1. 39 books were on the top bookshelf. Marcy added 48 more books to the top shelf. How many books are on the top shelf now?

2. There are 53 regular pencils and some colored pencils in the bin. There are a total of 91 pencils in the bin. How many colored pencils are in the bin?

3. Henry solved 24 of his homework problems. There were 51 left to do. How many math problems were there on his homework sheet?

4. Matthew has 68 stickers. His brother has 29 fewer stickers.
- How many stickers does Matthew's brother have?
  
  
  
  
  
  
  
  
  
  
  - How many stickers do Matthew and his brother have altogether?
5. There are 47 photos in the blue album. The blue album has 32 more photos than the red album.
- How many photos are in the red album?
  
  
  
  
  
  
  
  
  
  
  - How many photos are in the red and blue album altogether?
6. Kiera has 62 blocks and Pete has 37 blocks. They give away 75 blocks. How many blocks do they have left?

Name \_\_\_\_\_

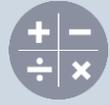
Date \_\_\_\_\_

Solve and show your strategy.

1. A store sold 58 t-shirts and had 25 t-shirts left.
  - a. How many t-shirts did the store have at first?
  
  
  
  
  
  
  
  
  
  
  - b. If 17 t-shirts are returned. How many t-shirts does the store have now?
  
  
  
  
  
  
  
  
  
  
2. Steve swam 23 laps in the pool on Saturday, 28 laps on Sunday, and 36 laps on Monday.
  - a. How many laps did Steve swim?



4. Halle has two ribbons. The blue ribbon is 58 cm. The green ribbon is 38 cm longer than the blue ribbon.
- How long is the green ribbon?
  
  
  
  
  
  
  
  
  
  
  - Halle uses 67 cm of green ribbon to wrap a present. How much green ribbon is left?
5. Chad bought a shirt for \$19 and a pair of shoes for \$28 more than the shirt.
- How much was the pair of shoes?
  
  
  
  
  
  
  
  
  
  
  - How much money did Chad spend on the shirt and shoes?
  
  
  
  
  
  
  
  
  
  
  - If Chad had \$13 left over, how much money did Chad have before buying the shirt and shoes?



## Topic B

## Strategies for Composing a Ten

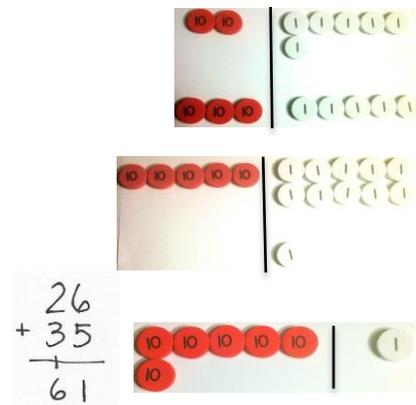
2.NBT.7, 2.NBT.9, 2.OA.1, 2.NBT.5

<b>Focus Standard:</b>	2.NBT.7	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
	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.)
<b>Instructional Days:</b>	5	
<b>Coherence</b>	<b>-Links from:</b> G1–M4	Place Value, Comparison, Addition and Subtraction to 40
	<b>-Links to:</b> G2–M5	Addition and Subtraction Within 1000 with Word Problems to 100
	G3–M2	Place Value and Problem Solving with Units of Measure

In Topic B, students apply their understanding of place value strategies to the addition algorithm, moving from horizontal to vertical notation. Their understanding of vertical addition starts with concrete work with number disks, moving to pictorial place value chart drawings, and ending with abstract calculation. Consistent use of number disks on a place value chart strengthens students' place value understanding and helps them to systematically model the standard addition algorithm including the composition of a ten. It is important to note that the algorithm is introduced at this level and is connected deeply to the understanding of place value. However, fluency with the algorithm is a Grade 3 standard and is not expected at this level.

In Lesson 6, students use number disks on a place value chart to represent the composition of 10 ones as 1 ten with two-digit addends. The use of manipulatives reminds students that they must add like units (e.g.,  $26 + 35$  is 2 tens + 3 tens and 6 ones + 5 ones).

Lesson 7 builds upon this understanding as students relate manipulatives to a written method, recording compositions as *new groups below* in vertical form (as shown at right). As they move the manipulatives, students use place value language to express the action as they physically make a ten with 10 ones and exchange them for 1 ten. They record each change in the written method, step by step.

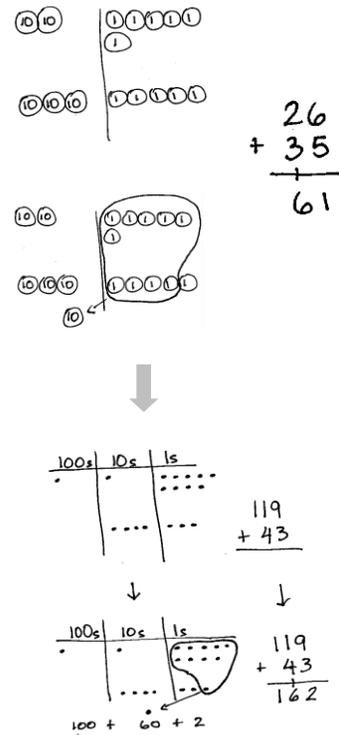


In Lesson 8, students move from concrete to pictorial as they draw unlabeled place value charts with labeled disks to represent addition (as shown at right). As they did with the manipulatives, students record each action in their drawings step by step on the written method.

In Lessons 9 and 10, students work within 200, representing the composition of 10 ones as 1 ten when adding a two-digit addend to a three-digit addend. This provides practice drawing three-digit numbers without the complexity of composing a hundred. It also provides practice with adding like units. As student understanding of the relationship between their drawings and the algorithm deepens, they move to the more abstract *chip model*, in which place value disks are replaced by circles or dots (as shown below right).

It is important to note that students must attend to precision in their drawings. Disks and dots are drawn in horizontal arrays of 5, recalling student work with 5-groups in Kindergarten and Grade 1. This visual reference enables students to clearly see the composition of the ten.

While some students may come into this topic already having learned vertical addition, including carrying above the tens, the process of connecting their understanding to the concrete and pictorial representations develops meaning and understanding of why the process works, not just how to use it. Therefore, students will be less prone to making place value errors.



**A Teaching Sequence Towards Mastery of Strategies for Composing a Ten**

**Objective 1:** Use manipulatives to represent the composition of 10 ones as 1 ten with two-digit addends. (Lesson 6)

**Objective 2:** Relate addition using manipulatives to a written vertical method. (Lesson 7)

**Objective 3:** Use math drawings to represent the composition and relate drawings to a written method. (Lesson 8)

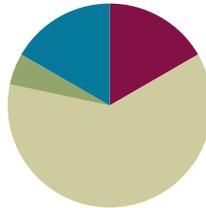
**Objective 4:** Use math drawings to represent the composition when adding a two-digit to a three-digit addend. (Lessons 9–10)

## Lesson 6

**Objective:** Use manipulatives to represent the composition of 10 ones as 1 ten with two-digit addends.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Application Problems	(3 minutes)
■ Concept Development	(37 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (10 minutes)

- Finding Doubles **2.NBT.5** (2 minutes)
- Say Ten Counting **2.NBT.1** (3 minutes)
- Say Ten Counting to the Next Ten **2.NBT.1** (5 minutes)

### Finding Doubles (2 minutes)

Note: Practicing finding doubles gives students another mental strategy to add.

T: I'll say a number sentence and you say the doubles fact within the number sentence and add on the rest. So if I say  $5 + 6$ , you say  $5 + 5 + 1$ . Ready?

T:  $4 + 5$ .

S:  $4 + 4 + 1$ .

T: Answer.

S: 9.

T:  $8 + 7$ .

S:  $7 + 7 + 1$ .

T: Answer.

S: 15.



#### NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Some students may combine addition and subtraction with double facts. For example, with  $5 + 4$ , they may think  $5 + 5 - 1$ . Encourage students to be versatile in their thinking, and praise different approaches that work.

Continue with the following possible sequence:  $4 + 3$ ,  $8 + 9$ ,  $7 + 6$ ,  $10 + 11$ ,  $12 + 13$ .

### Say Ten Counting (3 minutes)

Note: Reviewing and practicing saying numbers the Say Ten way in isolation will prepare students for success when adding numbers during the lesson. Use a Rekenrek to model the first few to help students visualize.

T: Let's count the Say Ten way. When I say 46, you say 4 tens 6. Ready? 57.

S: 5 tens 7.

T: 78.

S: 7 tens 8.

T: 100.

S: 10 tens.

T: 113.

S: 11 tens 3.

Continue with following possible sequence: 103, 123, 127, 137, 132, 142, 143, 163, 168, 188, 198, and 200. Be aware that the Say Ten way could also mean reading the numbers as 1 hundred 2 tens 3. Today however, we are just reading tens.

### Say Ten Counting to the Next Ten (5 minutes)

Note: Practicing this fluency helps students see a connection with counting the Say Ten way and making a ten. It provides a practice adding ones to make a multiple of 10.

T: Let's add to make the next ten the Say Ten way. I say 4 tens 2, you say 4 tens 2 + 8 = 5 tens. Ready? 6 tens 2.

S: 6 tens 2 + 8 = 7 tens.

T: 5 tens 1.

S: 5 tens 1 + 9 = 6 tens.

T: 7 tens 8.

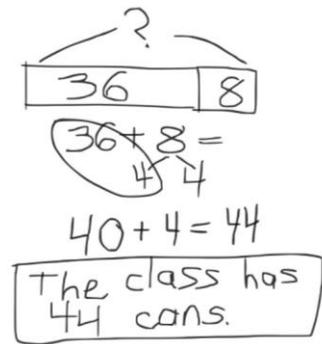
S: 7 tens 8 + 2 = 8 tens.

Continue with the following possible sequence: 8 tens 4, 8 tens 5, 8 tens 9, 9 tens 6, 9 tens 3, and 9 tens 9.

### Application Problem (3 minutes)

Mr. Wally's class collects 36 cans for the recycling program. Then Azniv brings in 8 more cans. How many cans does the class have now?

Note: This problem is intended as independent work. It primes students to connect the make a ten strategy with the composition of 10 ones as 1 ten that is the focus of today's Concept Development.



**Concept Development (37 minutes)**

Materials: (T) Place value disks, place value chart (S) Per pair: place value disks (9 tens, 18 ones), place value chart

Project or draw a place value chart on the board.

T: Watch as I model  $35 + 5$  on my place value chart. (See image at right.)



T: What do you notice in the ones place?

S: There are two 5-groups. → You can make a ten.

T: I can! Show me your magic counting sticks. (Students hold up all 10 fingers.) Each finger represents one. Count with me.



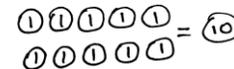
S: One, two, ...10! (On 10, students clasp their hands together with a loud clap, interlacing their fingers to make one unit of 10.)



T: What happens when we add the ones and get a total of 10 or more?

S: We bundle it! → 10 ones equals 1 ten!

T: Yes! (Draw image at right on the board.) 10 ones equals 1 ten. We can **compose**, or make, a ten.



T: Where do units of 10 belong?

S: In the tens place!

T: (Point to the model.) So we bundle 10 ones as 1 ten. (Gather and remove the 10 ones and put a tens disk in the tens place.) I change these 10 ones for 1 ten.

T: 3 tens and a new ten equals?

S: 4 tens!

**MP.4**

Pass out place value disks and a chart to each pair of students.

T: Your turn! Partner A, show 35 on your place value chart. Partner B, show 6. Be sure to arrange the disks in 5-groups.

S: (Students model the addends.)

T: Partner A, move the disks to add the ones. 5 ones + 6 ones?

S: (Partner A moves the ones together to make a ten.) 11 ones!

T: The Say Ten way?

S: 1 ten 1!

T: You've composed a unit of 10! 11 ones is the same as 1 ten 1. Partner B, changes 10 ones disks for 1 tens disk.

S: (Partner B removes 10 ones and places a tens disk in the tens place.)

T: How many ones in the ones place?



**NOTES ON  
MULTIPLE MEANS OF  
REPRESENTATION:**

For students who are struggling with disks, create a station in the classroom with a Rekenrek, so they can model the problems. Once they have mastered this, encourage students to move to the disks and place value chart.

- S: 1!
- T: How many tens in the tens place?
- S: 4!
- T:  $35 + 6$  the Say Ten way?
- S: 4 tens 1!
- T: Let's model another addition problem. Partner B, show 35. Partner A, show 26.
- T: How is this problem different from the first one?
- S: Now you're adding 2 tens. → It's 20 more than the one we just did.
- T: Partner B, move the disks to add the ones. How many ones?
- S: 11 ones!
- T: Partner B, change 10 ones disks for 1 tens disk.
- S: (Partner B removes 10 ones and places a tens disk in the tens place.)
- T: How many ones in the ones place?
- S: 1!
- T: Partner A, add the tens disks. How many tens?
- S: 6 tens!
- T:  $35 + 26$  the Say Ten way?
- S: 6 tens 1!
- T: Talk with your partner. What patterns do you notice as we're adding?
- S: I add the ones together, and then I add the tens. → If we see partners to ten we know we have to make a new ten. → We change 10 ones for 1 ten, and we put the new ten in the tens place.

MP.4

Continue with the following possible sequence:  $48 + 37$ ,  $59 + 23$ ,  $66 + 18$ ,  $74 + 19$ ,  $28 + 58$ , and  $18 + 39$ . Have partners take turns composing the ten. Release students to work on the Problem Set as they show proficiency composing 1 ten from 10 ones.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.



Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using mental math if you can. Use your place value chart and number disks to solve those you cannot solve mentally.

a.  $6 + 8 = \underline{\quad}$        $30 + 8 = \underline{\quad}$        $36 + 8 = \underline{\quad}$        $36 + 48 = \underline{\quad}$

b.  $5 + 7 = \underline{\quad}$        $20 + 7 = \underline{\quad}$        $25 + 7 = \underline{\quad}$        $25 + 57 = \underline{\quad}$

2. Solve the following problems using your place value chart and number disks, composing a ten when necessary. Think about which ones you could solve mentally, too!

a.  $35 + 5 = \underline{\quad}$

$35 + 6 = \underline{\quad}$

b.  $26 + 4 = \underline{\quad}$

$26 + 5 = \underline{\quad}$

c.  $54 + 15 = \underline{\quad}$

$54 + 18 = \underline{\quad}$

d.  $67 + 23 = \underline{\quad}$

$67 + 25 = \underline{\quad}$

e.  $45 + 26 = \underline{\quad}$

$45 + 23 = \underline{\quad}$

f.  $58 + 23 = \underline{\quad}$

$58 + 25 = \underline{\quad}$

g.  $49 + 37 = \underline{\quad}$

$52 + 36 = \underline{\quad}$

h.  $58 + 23 = \underline{\quad}$

$58 + 25 = \underline{\quad}$

i.  $49 + 37 = \underline{\quad}$

$52 + 39 = \underline{\quad}$

3. There are 47 blue buttons and 25 black buttons in Sean's drawer. How many buttons are in his drawer?

For early finishers:

4. Leslie has 24 blue and 24 pink hair ribbons. She buys 17 more blue ribbons and 13 more pink ribbons from the store.
- a. How many blue hair ribbons does she have now?
- b. How many pink hair ribbons does she have now?
- c. Jada has 29 more pink ribbons than Leslie. How many pink ribbons does Jada have?

Name \_\_\_\_\_

Date \_\_\_\_\_

Solve using your place value chart and number disks, composing a ten when necessary.

a.  $53 + 19 =$  \_\_\_\_\_

b.  $44 + 27 =$  \_\_\_\_\_

c.  $64 + 28 =$  \_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using mental math if you can. Use your place value chart and number disks to solve those you cannot do mentally.

a.  $4 + 9 =$  \_\_\_\_\_       $30 + 9 =$  \_\_\_\_\_       $34 + 9 =$  \_\_\_\_\_       $34 + 49 =$  \_\_\_\_\_

b.  $6 + 8 =$  \_\_\_\_\_       $20 + 8 =$  \_\_\_\_\_       $26 + 8 =$  \_\_\_\_\_       $26 + 58 =$  \_\_\_\_\_

2. Solve the following problems using your place value chart and number disks, composing a ten when necessary.

a.  $21 + 9 =$  \_\_\_\_\_       $22 + 9 =$  \_\_\_\_\_

b.  $28 + 2 =$  \_\_\_\_\_       $28 + 4 =$  \_\_\_\_\_

c.  $32 + 16 =$  \_\_\_\_\_       $34 + 17 =$  \_\_\_\_\_

d.  $47 + 23 =$  \_\_\_\_\_       $47 + 25 =$  \_\_\_\_\_

e.  $53 + 35 =$  \_\_\_\_\_       $58 + 35 =$  \_\_\_\_\_

f.  $58 + 42 =$  \_\_\_\_\_       $58 + 45 =$  \_\_\_\_\_

g.  $69 + 32 =$  \_\_\_\_\_       $36 + 62 =$  \_\_\_\_\_

h.  $77 + 13 =$  \_\_\_\_\_       $16 + 77 =$  \_\_\_\_\_

i.  $59 + 34 =$  \_\_\_\_\_       $31 + 58 =$  \_\_\_\_\_

Solve using a place value chart.

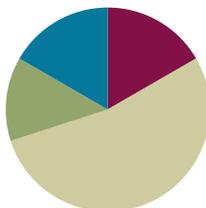
3. Melissa has 36 more crayons than her brother. Her brother has 49 crayons. How many crayons does Melissa have?
  
  
  
  
  
  
  
  
  
  
4. There were 67 candles on Grandma's birthday cake and 26 left in the box. How many candles were there in all?
  
  
  
  
  
  
  
  
  
  
5. Frank's mother gave him \$25 to save. If he already had \$38 saved, how much money does Frank have saved now?

## Lesson 7

**Objective:** Relate addition using manipulatives to a written vertical method.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Application Problem	(8 minutes)
■ Concept Development	(32 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (10 minutes)

- Place Value **2.NBT.1** (3 minutes)
- Say Ten Counting **2.NBT.1** (3 minutes)
- Take Out the Tens **2.NBT.1** (4 minutes)

### Place Value (3 minutes)

Note: This fluency reviews place value concepts from Module 3 to prepare students for the lesson's content.

T: (Write 157 on the board.) Say the number in standard form.

S: 157.

T: Say 157 in unit form.

S: 1 hundred 5 tens 7 ones.

T: Say 157 in expanded form.

S:  $100 + 50 + 7$ .

T: How many ones are in 157?

S: 157 ones.

T: How many tens are in 157?

S: 15 tens.

T: What digit is in the ones place?

S: 7.

T: How many more ones does 7 ones need to make a ten?

S: 3 ones.

T: What is  $157 + 3$ ?

S: 160.

Continue with the following possible sequence:  $157 + 4$ . What is 1 less than 157? 1 more? 10 less? 10 more? 100 more? 100 less?

### Say Ten Counting (3 minutes)

Note: Students practice making a ten in unit form to prepare for composing a ten on the place value chart in the lesson.

T: What is 3 ones + 4 ones?

S: 7 ones.

T: 6 ones + 4 ones?

S: 10 ones.

T: What is another name for 10 ones?

S: 1 ten.

T: When we make a ten, let's say the number in tens and ones. Ready? 6 ones + 5 ones.

S: 1 ten 1 one.

Repeat process for 7 ones + 4 ones; 6 ones + 7 ones; 8 ones + 4 ones; 9 ones + 3 ones; 4 ones + 4 ones + 4 ones; and 5 ones + 3 ones + 4 ones.

### Take Out the Tens (4 minutes)

Note: Decomposing whole numbers into tens and ones is foundational for the lesson.

T: (Write  $43 \text{ ones} = \underline{\quad} \text{ tens } \underline{\quad} \text{ ones}$ .) Say the number sentence.

S:  $43 \text{ ones} = 4 \text{ tens } 3 \text{ ones}$ .

Repeat the process for 67 ones, 39 ones, 77 ones, 89 ones, 100 ones, 118 ones, and 126 ones.

T: Now let's take out the tens for each addition sentence.

T:  $21 + 30$ .

S: 5 tens 1 one.

T:  $40 + 58$ .

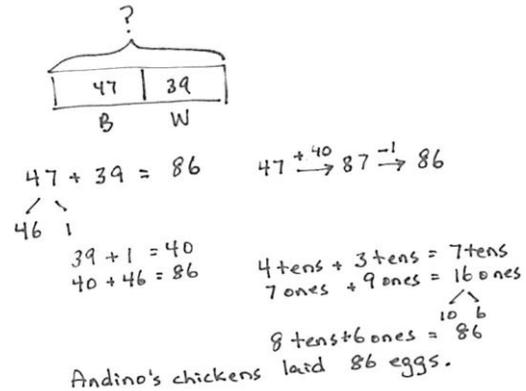
S: 9 tens 8 ones.

Repeat the process for  $50 + 37$ ,  $21 + 31$ ,  $42 + 21$ ,  $71 + 12$ , and  $83 + 15$ .

**Application Problem (8 minutes)**

Farmer Andino’s chickens laid 47 brown eggs and 39 white eggs. How many eggs did the chickens lay in all?

Note: This problem is intended for independent practice, giving students the opportunity to choose a preferred strategy or try a new one. Encourage students to use the RDW process. Then, students may wish to use place value disks, a number bond, or arrow notation. It is an *add to with result unknown* problem, the easiest word problem type, so use it as an opportunity to show each of the solution strategies.



**Concept Development (32 minutes)**

Materials: (T) Place value disks, place value chart (S) Per pair: personal white board, place value chart, place value disks (9 tens, 18 ones)

Note: In the following modeled activity, it is important to relate each action on the place value chart to the written vertical method for addition.

Project or draw a place value chart on the board.

- T: We’ve learned to add numbers horizontally using different mental strategies. Let’s learn another way to add. (Write  $24 + 15$  on the board vertically.)
- T: We can also write one number above the other, so that each digit is in the correct place value column.
- T: Let’s use our place value chart and number disks. Count with me as I model the addends. Remember that I always place my disks from left to right and create 5-groups whenever possible. It’s similar to filling a ten-frame.
- S: (Count as you place 24 above with 2 tens and 4 ones.) 10, 20, 21, 22, 23, 24. (Count as you place 15 below with 1 ten and 5 ones.) 10, 11, 12, 13, 14, 15.
- T: Does this model match the written vertical addition?
- S: Yes!
- T: (Point to the ones in the written addition, then point to the ones disks.) 4 ones + 5 ones. Count the units of one with me.
- S: (Count.) 4, 5, 6, 7, 8, 9.
- T: Did we compose a ten?
- S: No!

MP.4

**NOTES ON MULTIPLE MEANS OF REPRESENTATION:**

Show the same process on a Rekenrek or on an interactive whiteboard abacus. Have struggling students regroup tens on the Rekenrek to show the process. Be sure they write the numbers in vertical form as they are working with the Rekenrek.

- T: So we show 9 ones in our written addition like this. We write the 9 below the line in the ones place. (Write 9.)
- T: (Point to the tens in the written addition, then point to the tens disks.) Now add the units of 10.
- S: 3 tens.
- T: We write the 3 below the line in the tens place. (Write 3.)
- T: Now let's count the value of this number.
- S: (As you point to each disk.) 10, 20, 30, 31, 32, ...39.
- T: So  $24 + 15$  equals 39. Let's try another problem. (Write  $26 + 35$  vertically.)
- T: Count as I model the addends. (See first image below at right.)
- T: What is 6 ones + 5 ones? (Point to the ones in the written addition and on the model.)
- S: 11 ones!
- T: (Move the 4 ones disks to join the 6 ones to form the unit ten. See second image.) What do you see and what should we do?
- S: We made a ten. → We have to change 10 ones for 1 ten. → Take off 10 ones and put a ten in the tens place because 11 ones is 1 ten 1.
- T: That's right! We rename 11 ones as 1 ten 1 one. And where do tens belong?
- S: In the tens place!
- T: Of course! So watch. (Take off 10 ones disks and place a tens disk in the tens place. See third image.) We show this step in the written addition by writing the new unit of ten on the line below the tens place. (Write 1 on the line below the tens place as shown in the last image at right.)
- T: And we write the 1 one below the line in the ones place. This is called **new groups below**.
- T: Now we add the tens, including the new unit. 2 tens + 3 tens is 5 tens, and 1 more ten equals 6 tens. The answer is 61.
- T: Explain to your partner how each change that I modeled on my place value mat matches each step that I recorded in the written addition.
- S: There's only 1 disk left in the ones place and you wrote a 1 under the line in the ones place. → You showed the new ten by writing a 1 on the line below the tens place. → That little 1 under the tens place is close to the 1 under the ones place, so I can see the eleven. Then we just add up the tens.

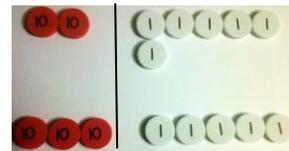


**NOTES ON  
MULTIPLE MEANS OF  
REPRESENTATION:**

The *totals below* method is introduced in Lesson 29. However, some students may benefit from an adaptation of this method earlier as a transitional step from the horizontal to the vertical method. For example:

$$\begin{array}{r} 18 \rightarrow 10 + 8 \\ + 25 \rightarrow 20 + 5 \\ \hline 43 = 30 + 13 \end{array}$$

Demonstrate solving the last step by adding the parts of the expanded form on the right, and then putting the total on the left.



$$\begin{array}{r} 26 \\ + 35 \\ \hline 61 \end{array}$$

MP.4

Pass out place value charts and disks. For each problem, have students whisper count as partners take turns modeling and writing each addend. They can count the regular way (10, 20, 30, ...) or the Say Ten way (1 ten, 2 tens, ...).

- T: Now it's your turn. (Write  $25 + 17$  on the board vertically.) Write  $25 + 17$  as I did.
- T: With your partner, use your disks to model 25. Whisper count as you place the disks on your chart.
- T: Tell me the number of tens and ones on your chart.
- S: 2 tens 5 ones!
- T: Now model 17. How many ones and tens?
- S: 1 ten 7 ones.
- T: Look at the ones place in the written addition. What are you adding?
- S: 5 ones + 7 ones!
- T: Now look at your model. 5 ones + 7 ones is?
- S: 12 ones!
- T: Use your disks to show what we should do here. (Circulate to check for understanding.)
- S: (Remove the 10 ones and place a ten in the tens place on the place value chart.)
- T: What did you do?
- S: We changed 10 ones for 1 ten. → We composed a ten. → We bundled a ten. → We made 12 ones into 1 ten 2 ones just like in our fluency!
- T: Where do I record the new unit of ten?
- S: On the line below the tens place. (Write 1 on the line below the tens place.)
- T: (Record the new ten.) How many ones are in the ones place now?
- S: 2 ones.
- T: Write 2 below the line in the ones place. (Record the 2 ones on the board.)
- S: (Students record 2 ones.)
- T: Now count the tens. Remember to count the new unit. How many tens?
- S: 4 tens!
- T: Write 4 below the line in the tens place.
- T: Explain to your partner how your work with the disks matches the written addition.



### NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Some students will already have learned to write a one above the tens column instead of below it when regrouping. Explain that it is easier to add one at the end than at the beginning, and that seeing the digits closer together helps us to see the whole number. Moreover, each algorithm in *A Story of Units* is designed to work as part of one *coherent system*. Be aware that choices made at this juncture will have implications for the algorithms to come in later grades (e.g. multiplication in Grade 4).

If a student is comfortable in his way and is able to solve problems with ease, allow him to continue with what works for him, but encourage him to try the *new groups below* method so that he is not at a disadvantage later on.

Continue with the following possible sequence:  $18 + 23$ ,  $32 + 29$ ,  $34 + 37$ ,  $25 + 28$ , and  $16 + 49$ . As students demonstrate confidence in relating their models to the written additions, allow them to work independently in the Problem Set.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Relate addition using manipulatives to a written vertical method.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- In Problem 1, which problems were you able to solve mentally? Did you need to compose a ten for all of the problems in the second column? Why not?
- How did you solve Problem 1(c):  $48 + 34$ ,  $46 + 36$ ? How did you change your place value chart to show the problem in the second column? Explain to your partner how you used manipulatives to solve Problem 1(d):  $27 + 68$ . How did this problem help you to solve the second one?
- For Problem 2, how did your work with the number disks match the written addition? How did you show **new groups below**?
- Explain to your partner how you solved Problem 3 using manipulatives and the written method. How could you solve this problem differently using a simplifying strategy?

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 7 Problem Set 2•4

Name Alexa Date \_\_\_\_\_

1. Solve the following problems using the vertical method, your place value chart and number disks. Bundle a ten when necessary. Think about which ones you can solve mentally, too!

a.  $22 + 8$   

$$\begin{array}{r} 22 \\ + 8 \\ \hline 30 \end{array}$$

b.  $34 + 17$   

$$\begin{array}{r} 34 \\ + 17 \\ \hline 51 \end{array}$$

c.  $48 + 34$   

$$\begin{array}{r} 48 \\ + 34 \\ \hline 82 \end{array}$$

d.  $27 + 68$   

$$\begin{array}{r} 27 \\ + 68 \\ \hline 95 \end{array}$$

$21 + 9$   

$$\begin{array}{r} 21 \\ + 9 \\ \hline 30 \end{array}$$

$33 + 18$   

$$\begin{array}{r} 33 \\ + 18 \\ \hline 51 \end{array}$$

$46 + 36$   

$$\begin{array}{r} 46 \\ + 36 \\ \hline 82 \end{array}$$

$26 + 69$   

$$\begin{array}{r} 26 \\ + 69 \\ \hline 95 \end{array}$$

COMMON CORE Lesson 7: Date: 6/17/13 Relate addition using manipulatives to a written vertical method. engage<sup>ny</sup>

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 7 Problem Set 2•4

Extra Practice for Early Finishers: Solve the following problems using your place value chart and number disks. Bundle a ten when necessary.

2. Samantha brought grapes to school for a snack. She had 27 green grapes and 58 red grapes. How many grapes did she bring to school?

$$27 + 58 = 85$$

3. Thomas read 29 pages of his new book on Monday. On Tuesday, he read 35 more pages than he did on Monday.

a. How many pages did Thomas read on Tuesday?

$$29 + 35 = 64$$

b. How many pages did Thomas read on both days?

$$29 + 64 = 93$$

COMMON CORE Lesson 7: Date: 6/17/13 Relate addition using manipulatives to a written vertical method. engage<sup>ny</sup> 4.B.8

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve the following problems using the vertical method, your place value chart and number disks. Bundle a ten when necessary. Think about which ones you can solve mentally, too!

a.  $22 + 8$

$21 + 9$

b.  $34 + 17$

$33 + 18$

c.  $48 + 34$

$46 + 36$

d.  $27 + 68$

$26 + 69$

**Extra Practice for Early Finishers:** Solve the following problems using your place value chart and number disks. Bundle a ten when necessary.

2. Samantha brought grapes to school for a snack. She had 27 green grapes and 58 red grapes. How many grapes did she bring to school?
  
  
  
  
  
  
  
  
  
  
3. Thomas read 29 pages of his new book on Monday. On Tuesday, he read 35 more pages than he did on Monday.
  - a. How many pages did Thomas read on Tuesday?
  
  
  
  
  
  
  
  
  
  
  - b. How many pages did Thomas read on both days?

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve the following problems using your place value chart and number disks, bundle a ten when necessary.

a.  $47 + 34$

b.  $54 + 27$

2. Explain how Problem 1(a) can help you solve Problem 1(b).

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve the following problems using your place value chart and number disks, bundle a ten when necessary.

a.  $31 + 9$

$32 + 8$

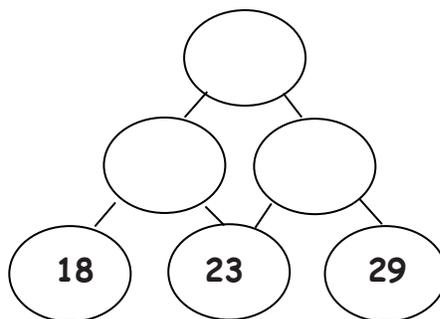
b.  $42 + 18$

$43 + 17$

c.  $26 + 67$

$28 + 65$

2. Add the bottom numbers to find the missing number above it.



**Directions:** Solve the following problems using your place value chart and number disks. Bundle a ten when necessary.

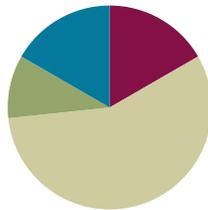
3. Jahsir counted 63 flowers by the door and 28 flowers on the windowsill. How many flowers were by the door and window?
  
  
  
  
  
  
  
  
  
  
4. Antonio's string is 38 centimeters longer than his reading book. The length of his reading book is 26 centimeters.
  - a. What is the length of Antonio's string?
  
  
  
  
  
  
  
  
  
  
  - b. The length of Antonio's reading book is 20 cm shorter than the length of his desk. How long is Antonio's desk?

## Lesson 8

**Objective:** Use math drawings to represent the composition and relate drawings to a written method.

### Suggested Lesson Structure

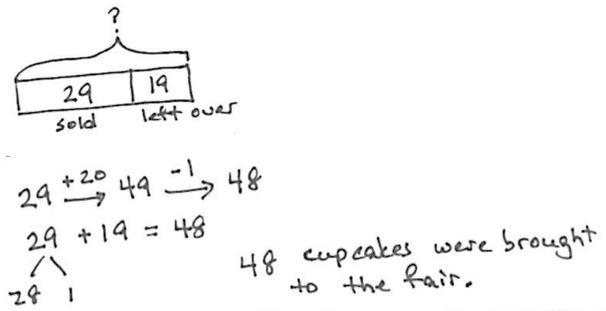
■ Application Problem	(6 minutes)
■ Fluency Practice	(10 minutes)
■ Concept Development	(34 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Application Problem (6 minutes)

At the school fair, 29 cupcakes were sold and 19 were left over. How many cupcakes were brought to the fair?

Note: This problem is intended for guided practice to help students gain familiarity with the *take from with start unknown* problem type. The language of these problem types can be confusing to students; guide them to see that when both parts are known, we add to find the total.



### Fluency Practice (10 minutes)

- Number Patterns **2.NBT.2** (6 minutes)
- Sums to the Teens **2.NBT.4** (4 minutes)

### Number Patterns (6 minutes)

Materials: (S) Personal white boards

Note: Students apply knowledge of adding and subtracting multiples of 10 and 1 to complete patterns.

- T: (Write on board 124, 134, 144, \_\_\_\_.) What is the place value of the digit that’s changing?  
 S: Tens.  
 T: Count with me, saying the value of the digit I’m pointing to.

- S: (Point to the tens digit as students count.) 20, 30, 40.  
 T: On your personal boards, write what number comes next in the pattern.  
 S: (Students write and show 154.)  
 T: What was the pattern?  
 S: Add 10.

Repeat for the following possible sequence, using number disks if students are struggling:

278	268	258	_____
99	109	119	_____
380	379	378	_____
522	542	562	_____
125	225	325	_____

### Sums to the Teens (4 minutes)

Materials: (S) Personal white boards

Note: This fluency will ready students for the day's lesson and allows students to work at different rates. Give about 20 seconds per problem

- T: (Write  $9 + 3$ .)  
 T: This is the basic problem for a pattern. Once you have solved this problem, solve  $19 + 3$ ,  $29 + 3$ ... What would come next?  
 S:  $39 + 3$ .  
 T: Yes. Continue until I say stop and I will give you a new basic problem. Begin with  $9 + 6$ . Go!

When you see the slowest student has completed at least 2 problems, stop the class and give the next equation.

Use the following possible sequence:  $9 + 6$ ,  $9 + 4$ ,  $8 + 4$ ,  $8 + 6$ ,  $7 + 4$ , and  $7 + 6$ .

### Concept Development (34 minutes)

Materials: (T) Place value disks (S) Math journals or paper

As students learn to make math drawings to represent the written vertical method, it is important to teach precision: aligning digits in their proper place, drawing number disks in clear 5-groups, showing new groups below in the correct place. For this reason, in the beginning, students should use pencil and paper, which allows greater precision than a whiteboard marker.

MP.6

- T: (Show place value disks.) We've been modeling addition with place value disks, but we don't have to use these disks. We can draw them! Watch.

**Problem 1: 32 + 24**

T: (Write  $32 + 24$  vertically. Draw a long vertical line, which serves as the place value chart, next to the written addition. (See image at right.)

T: How many tens in 32?

S: 3 tens.

T: Count them as I draw. (Draw.)

S: 10, 20, 30.

T: How many ones should I draw?

S: 2 ones.

T: (Draw 2 ones disks.) Let's count to be sure my drawing is correct. (Point to each disk as students count.)

S: 10, 20, 30, 31, 32.

T: Now I'll add 24 to my drawing. How many tens?

S: 2 tens.

T: (Draw 2 tens disks below the 3 tens.) How many ones should I draw?

S: 4 ones.

T: (Draw 4 ones disks below the 2 ones.) Let's count to be sure my model is correct.

S: 10, 20, 21, 22, 23, 24.

T: Look how easy! And now we solve. Do 2 ones and 4 ones make a ten?

S: No!

T: So we simply write the number of ones, 6, below the line in the ones place.

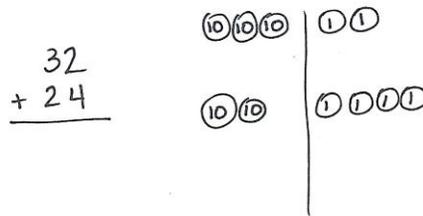
T: 3 tens + 2 tens?

S: 5 tens!

T: So we write 5 below the line in the tens place. Read the whole problem with me.

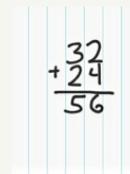
S:  $32 + 24$  equals 56.

T: Talk with your partner about how the drawing matches the written addition.



**NOTES ON MULTIPLE MEANS OF ENGAGEMENT**

To help students line up their problems according to place value, have them use lined paper turned 90 degrees (landscape orientation) and write their numbers between the lines.



MP.6

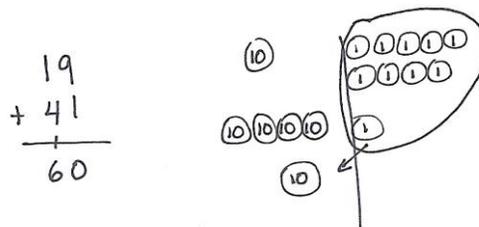
**Problem 2: 19 + 41**

T: Let's work through another problem together. (Repeat the above process to model  $19 + 41$ .)

T: Begin by adding the ones. Look at the written addition and the model. Tell your partner what you notice. How are they the same?

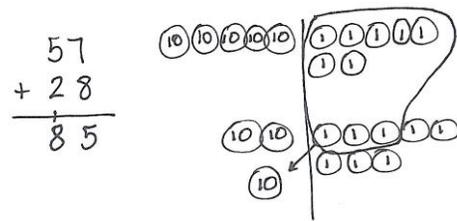
S:  $9 + 1$  is 10. → We need to bundle 10 ones as 1 ten.

→ They both show  $9 + 1$ , but one is numbers and the other is a picture of the numbers.



MP.6

- T: Yes, they are the same! And what we do on the model, we do to the numbers. We composed a ten, so we circle the 10 ones and draw an arrow into the tens place, where we draw the new unit of ten. (See image above.)
- T: On the written addition, we show this new unit of ten by writing a 1 on the line below the tens place. This way we remember to add it in when we count the ten.
- T: We write 0 below the line in the ones place. Looking at the model, we see there are no ones left.
- T: Now we add the tens. Remember to add in the new unit. 1 ten + 4 tens + 1 ten is?
- S: 6 tens!
- T: Read the entire problem.
- S: 19 + 41 equals 60.
- T: Talk with your partner. How do we show the bundling, or renaming, of 10 ones as a unit of ten in the drawing and in the written method? (Allow one or two minutes for discussion.)
- T: Now it's your turn. Draw and solve  $57 + 28$  while I walk around to see how it's going.



Follow the procedure above to guide students as they write  $57 + 28$ , model it, and solve. At each step, remind students to be precise in lining up the digits and in drawing their number disks in neat 5-groups. (See image at right.) Have them share the ways in which each step in the drawing matches what they do in the written addition.

Continue with the following possible sequence:  $15 + 68$ ,  $29 + 52$ ,  $64 + 27$ , and  $56 + 38$ . Continue to support struggling students, but as students demonstrate proficiency, instruct them to work on the Problem Set independently.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.



#### NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Provide colored pencils or crayons for students to draw tens and ones disks in two different colors. These may start by matching the colors of the disks. Then encourage students to use the same colors as they used for the disks for the numbers in the tens and ones places when solving their problems. This may be especially helpful for students who struggle with place value. Change the color daily to be used for the disks so that students continue to read the values rather than relying on a certain color as a signal.

### Student Debrief (10 minutes)

**Lesson Objective:** Use math drawings to represent the composition and relate drawings to a written method.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- For Problem 1(a), did you compose a ten? Why? How many ones were leftover? How did you show it on your place value chart?
- Explain to your partner how to solve Problem 1(b). How did you show a new unit of ten on your model and on the written addition?
- For Problem 1(d), what did you need to be sure to do when you were solving  $33 + 59$  using the written addition?
- How did you rename the ones in Problem 1(f)? How is practicing the Say Ten way helpful when we are adding larger numbers?
- With your partner, compare Problems 1(a) and 1(e). Could you have used Problem 1(a) to solve 1(e) mentally (i.e., without composing a ten)?

### Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 8: Use math drawings to represent the composition and relate drawings to a written method. 2•4

Name: Alexa Date: \_\_\_\_\_

1. Solve vertically. Draw and bundle place value disks on the place value chart.

a.  $27 + 15 =$  \_\_\_\_\_

$$\begin{array}{r} 27 \\ + 15 \\ \hline 42 \end{array}$$

b.  $44 + 26 =$  \_\_\_\_\_

$$\begin{array}{r} 44 \\ + 26 \\ \hline 70 \end{array}$$

c.  $48 + 31 =$  \_\_\_\_\_

$$\begin{array}{r} 48 \\ + 31 \\ \hline 79 \end{array}$$

d.  $33 + 59 =$  \_\_\_\_\_

$$\begin{array}{r} 33 \\ + 59 \\ \hline 92 \end{array}$$

COMMON CORE LESSON 8: Use math drawings to represent the composition and relate drawings to a written method. engage<sup>ny</sup> 4.B.6  
Date: 6/3/13

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 8: Use math drawings to represent the composition and relate drawings to a written method. 2•4

e.  $27 + 45 =$  \_\_\_\_\_

$$\begin{array}{r} 27 \\ + 45 \\ \hline 72 \end{array}$$

f.  $18 + 68 =$  \_\_\_\_\_

$$\begin{array}{r} 18 \\ + 68 \\ \hline 86 \end{array}$$

2. There are 23 laptops in the computer room and 27 laptops in the first grade classroom. How many laptops are in the computer room and first grade classroom altogether?

$$\begin{array}{r} 23 \\ + 27 \\ \hline 50 \end{array}$$

For early finishers:

3. Mrs. Anderson gave 36 pencils to her class and had 48 left over. How many pencils did Mrs. Anderson have at first?

$$\begin{array}{r} 36 \\ + 48 \\ \hline 84 \end{array}$$

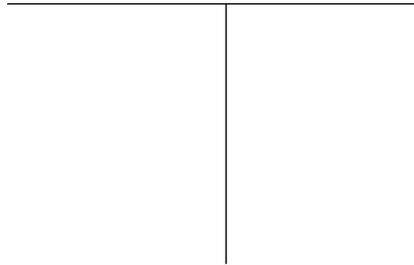
COMMON CORE LESSON 8: Use math drawings to represent the composition and relate drawings to a written method. engage<sup>ny</sup> 4.B.7  
Date: 6/3/13

Name \_\_\_\_\_

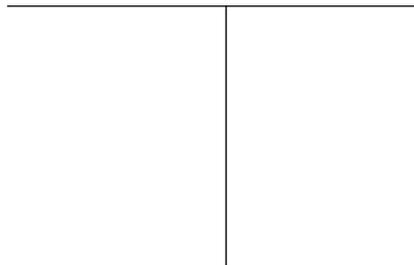
Date \_\_\_\_\_

1. Solve vertically. Draw and bundle place value disks on the place value chart.

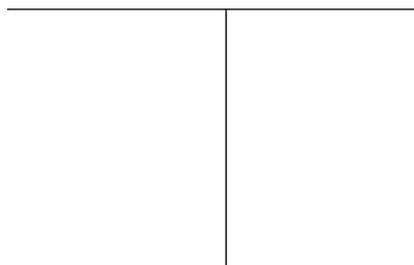
a.  $27 + 15 =$  \_\_\_\_\_



b.  $44 + 26 =$  \_\_\_\_\_



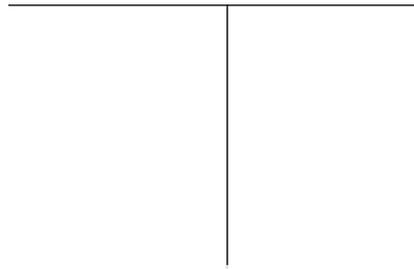
c.  $48 + 31 =$  \_\_\_\_\_



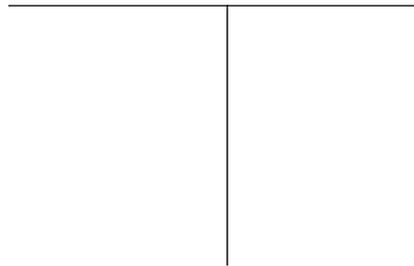
d.  $33 + 59 =$  \_\_\_\_\_



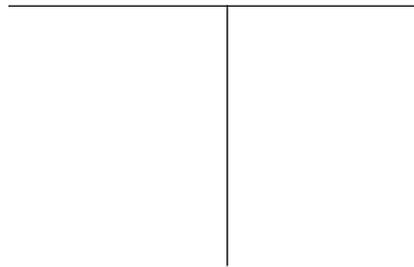
e.  $27 + 45 =$  \_\_\_\_\_



f.  $18 + 68 =$  \_\_\_\_\_

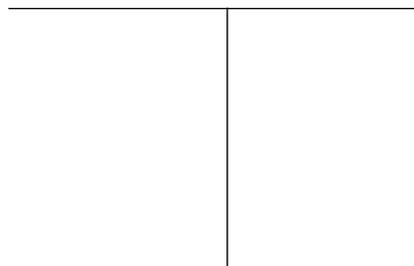


2. There are 23 laptops in the computer room and 27 laptops in the first-grade classroom. How many laptops are in the computer room and first-grade classroom altogether?



For early finishers:

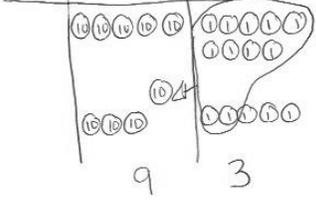
3. Mrs. Anderson gave 36 pencils to her class and had 48 left over. How many pencils did Mrs. Anderson have at first?



Name \_\_\_\_\_

Date \_\_\_\_\_

Use place value language to explain Zane's mistake. Then, solve using the written addition. Draw and bundle number disks on your place value chart.

<u>Zane's Answer</u>	<u>Zane's Mistake</u>	<u>My Answer</u>
<p>1. <math>59 + 35 =</math> _____</p> 		

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw and bundle place value disks on the place value chart.

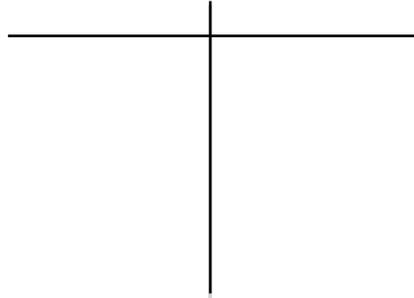
a.  $26 + 35 =$  \_\_\_\_\_


b.  $28 + 14 =$  \_\_\_\_\_

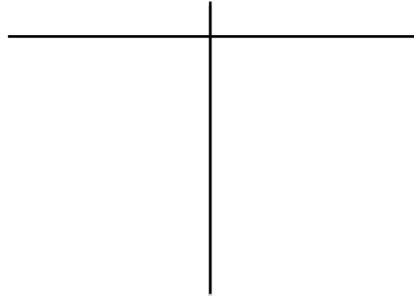

c.  $35 + 27 =$  \_\_\_\_\_


d.  $23 + 46 =$  \_\_\_\_\_

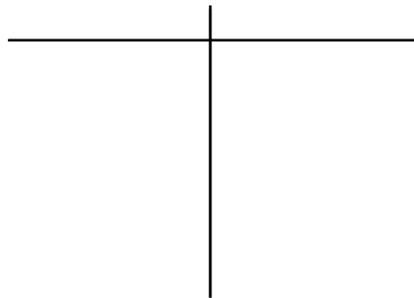

e.  $32 + 59 =$  \_\_\_\_\_



2. Solve. Draw and bundle place value disks on the place value chart.
- a. 28 second-grade students went on a field trip to the zoo. The other 24 students stayed at school. How many second-grade students are there?



- b. Alice cut a 27 cm piece of ribbon and had 39 cm of ribbon left over. How much ribbon did Alice have at first?

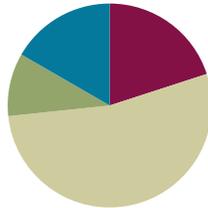


## Lesson 9

**Objective:** Use math drawings to represent the composition when adding a two-digit to a three-digit addend.

### Suggested Lesson Structure

<span style="color: green;">■</span> Application Problem	(6 minutes)
<span style="color: maroon;">■</span> Fluency Practice	(12 minutes)
<span style="color: olive;">■</span> Concept Development	(32 minutes)
<span style="color: blue;">■</span> Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>

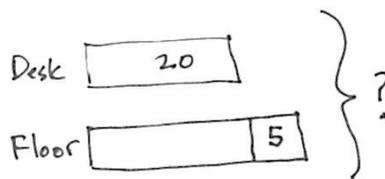


### Application Problem (6 minutes)

Marla spilled a box of paper clips. They landed on her desk and on the floor. 20 of them landed on her desk, and 5 more fell on the floor than landed on her desk. How many paper clips did she spill?

Note: Guide the students through the use of a double bar model to represent this problem. First solve to find the number picked up from the floor, and then add the two amounts.

Remember that if possible, Application Problems can be done at a different time of day apart from the regular math time if they do not directly flow into the lesson, as is the case here.



$$20 + 5 = 25$$

$$25 + 20 = 45$$

Marla spilled 45 paper clips.

### Fluency Practice (12 minutes)

- Place Value Practice **2.NBT.3** (3 minutes)
- Sprint: Sums to the Teens **2.NBT.5** (9 minutes)

### Place Value Practice (3 minutes)

Note: This fluency reviews place value concepts from Module 3 to prepare students for the lesson's content.

T: (Write 352 on the board.) Say the number in standard form.

S: 352.

T: Say the number in expanded form.

- S:  $300 + 50 + 2$ .
- T: Say the number Say Ten way.
- S: 3 hundreds 5 tens 2.
- T: What is 20 more than 352?
- S: 372.

Continue with the following possible sequence: 20 less? 100 more? 100 less? 102 less? 220 less? 510 more?

**Sprint: Sums to the Teens (9 minutes)**

Materials: (S) Sums to the Teens Sprint

Note: This Sprint reviews crossing ten when adding.

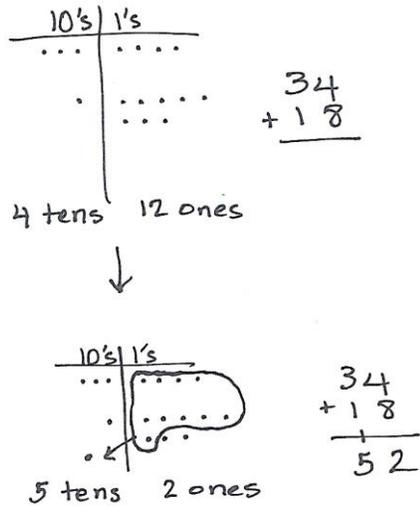
**Concept Development (32 minutes)**

Materials: (S) Math journals or paper

As students learn to make math drawings to represent a written vertical method, it is important to teach precision: aligning digits in their proper place, drawing number disks in clear 5-groups, showing new groups below in the correct place. For this reason, in the beginning, students should use pencil and paper, which allows greater precision than a white board marker.

**Problem 1:  $34 + 18$**

- T: Write  $34 + 18$  the vertical way on your paper.
- T: Now we'll model it by drawing a place value chart. Draw your chart like mine. (Draw tens and ones chart.)
- T: This time, label the tens place and the ones place. This means we don't have to label the disks, because a disk in the ones place is a one, and a disk in the tens place is a ten. The place tells us the value, or how much the disk is worth.
- T: Now let's draw a model of each addend. Since we don't need to label the disks, we'll just draw dots. That's easier and takes less time!
- T: Whisper count as you draw your model. (Draw chip model of  $34 + 18$ . See image at right.)
- S: (Make chip model.) 10, 20, 30, 31, ...34. 10, 11, 12, ...18.
- T: Use place value language to tell your partner how your model matches the written addition.
- S: 3 dots in the tens place is 30 and 4 dots in the ones place is 4, so my picture is the same as 34. → 1 ten 8 ones is 18, and that's what I drew on my model.
- T: What is 4 ones + 8 ones?
- S: 12 ones!



**NOTES ON MULTIPLE MEANS OF ENGAGEMENT:**

For students who need support drawing rows, columns, and dots, provide graph paper, and encourage them to place one dot into each grid square.

MP.6

- T: The Say Ten way?  
 S: Ten 2.  
 T: The written addition way is also called an **algorithm**. An algorithm is a way to solve problems using steps that help us work more quickly. Tell your partner what to do on your model and using the algorithm.  
 S: We made a ten. Circle it! → Bundle ten ones and put a ten in the tens place. → Show the new unit on the line below the tens place.  
 T: Yes! You have a new unit of ten. We're renaming 12 ones as 1 ten 2 ones. Let's show that on our models and using the algorithm.  
 S: (Circle 10 ones, draw an arrow to the tens place and add a dot, write 1 on the line below the tens place, and add the tens digits. See image above.)  
 T: Partners, check each other's work to be sure it matches my model and the algorithm.  
 T: On the algorithm, you have written a 1 on the line. On your mat, point to what the 1 stands for. Who can tell us? (Choose a volunteer.)  
 S: (Point to the new ten on the model.) It's this new ten we drew in the tens place.  
 T: Yes! (Point to each part.) 4 ones + 8 ones is 12 ones, so we write the 1 new ten on the line below the tens place, and we write 2 ones below the line in the ones place. What do we do next?  
 S: We add 3 tens + 1 ten + 1 ten = 5 tens. So 34 + 18 equals 52.  
 T: Yes! We renamed 4 tens 12 ones as 5 tens 2 ones.



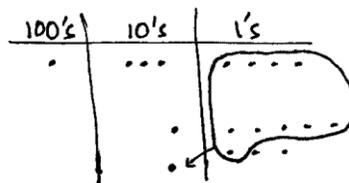
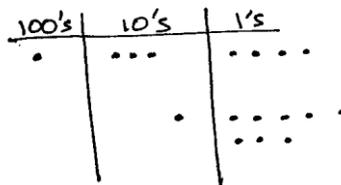
**NOTES ON  
 MULTIPLE MEANS OF  
 REPRESENTATION:**

For students performing below grade level, use manipulatives such as straws to model rebundling with three-digit addends. Once the student understands the concept of creating a new unit, move to the disks and chip model, connecting them to the written addition.

MP.6

**Problem 2: 134 + 18**

- T: Let's look at this problem. Write  $134 + 18$ , like this. (Write  $134 + 18$  vertically.) Be sure you line up the ones and tens.  
 T: What is different about this problem, and how can I show this on a place value chart?  
 S: We're adding the ones and the tens the same way we just did, but now we also have hundreds.  
 T: Let's show it. (Draw a place value chart with hundreds, tens, and ones.) Draw a chart like mine.  
 T: Now my place value chart has hundreds, tens, and ones. Count with me as we model  $134 + 18$ . (See image at right.)  
 S: (Count as they draw.) 100, 110, 120, 130, 131, ...134. 10, 11, 12, ...18.



$$\begin{array}{r} 134 \\ + 18 \\ \hline 152 \end{array}$$

MP.6

- T: Again, use place value language to tell to your partner how your model matches the algorithm. (Allow about one minute.)
- T: (Point to the ones on the model.) We see our 12 ones, which become a new ten and 2 ones. Let's show that on our models. (Circle 10 ones, draw an arrow into the tens place, and draw a dot for the new ten. See image at right.)
- T: How do we show the new ten and 2 ones using the algorithm?
- S: Write a 1 on the line below the tens place, and write 2 under the line below the ones place.
- T: Correct! Let's show that. (Model the change on the written addition.)
- T: Now we add the tens. 3 tens + 1 ten + 1 ten is 5 tens, so we record 5 below the line in the tens place. (Record it.)
- T: And we have 1 hundred. We're not adding anything to it, so we record 1 below the line in the hundreds place. (Record it.)
- T:  $134 + 18$  is?
- S: 152!
- T: Talk with your partner. How does having a hundred change how you solved the problem?
- S: We had to draw a hundreds place on our charts. → We solved the same way; we added the ones and tens like before, and then we just added in the hundred.

Follow the procedure above to guide students as they write, model, and solve  $107 + 63$ . At each step, remind students to be precise in aligning the digits and in drawing their dots in neat 5-groups. Have them share how each step in the drawing matches each step in the algorithm.

Continue with the following possible sequence:  $114 + 37$ ,  $158 + 26$ ,  $163 + 29$ , and  $48 + 147$ . Continue to support students who struggle, but as students demonstrate proficiency, instruct them to work on the Problem set independently.

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

1. Solve using the algorithm. Draw and bundle chips on the place value chart.

a.  $123 + 16 =$  \_\_\_\_\_

Hundreds	Tens	Ones
1	3	9

b.  $111 + 79 =$  \_\_\_\_\_

Hundreds	Tens	Ones
1	9	0

c.  $109 + 33 =$  \_\_\_\_\_

Hundreds	Tens	Ones
1	4	2

COMMON CORE Lesson 9: Use math drawings to represent the composition when adding a two-digit to a three-digit addend. 4.B.38  
engage ny  
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**Student Debrief (10 minutes)**

**Lesson Objective:** Use math drawings to represent the composition when adding a two-digit to a three-digit addend.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- Explain to your partner how you solved Problems 1(a) and (b). What significant differences do you notice about the place value charts for these two problems?
- For Problem 1(c), use place value language to explain to your partner how your model matches the **algorithm**.
- One student’s answer for Problem 1(d),  $57 + 138$ , was 285. What mistake did he make in the algorithm?
- For Problem 2, how did having a three-digit addend (as opposed to two-digit) change the way you solved the problem?
- How are your math drawings today different from the ones you made yesterday? How are the written addition problems different?

The image shows a student's work on a problem set page. It includes three addition problems, each with a vertical algorithm and a place value chart. Problem 1(a) is  $127 + 35 = 162$ . Problem 1(b) is  $162 + 19 = 181$ . Problem 1(d) is  $57 + 138 = 195$ . Each problem includes a place value chart with 'Hundreds', 'Tens', and 'Ones' columns, and a drawing of bundled chips representing the numbers and their sum. The page also includes the Common Core logo, lesson title, date, and EngageNY logo.

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

**A**

# Correct \_\_\_\_\_

Add.

1	$9 + 1 =$		23	$7 + 3 =$	
2	$9 + 2 =$		24	$7 + 4 =$	
3	$9 + 3 =$		25	$7 + 5 =$	
4	$9 + 9 =$		26	$7 + 9 =$	
5	$8 + 2 =$		27	$6 + 4 =$	
6	$8 + 3 =$		28	$6 + 5 =$	
7	$8 + 4 =$		29	$6 + 6 =$	
8	$8 + 9 =$		30	$6 + 9 =$	
9	$9 + 1 =$		31	$5 + 5 =$	
10	$9 + 4 =$		32	$5 + 6 =$	
11	$9 + 5 =$		33	$5 + 7 =$	
12	$9 + 8 =$		34	$5 + 9 =$	
13	$8 + 2 =$		35	$4 + 6 =$	
14	$8 + 5 =$		36	$4 + 7 =$	
15	$8 + 6 =$		37	$4 + 9 =$	
16	$8 + 8 =$		38	$3 + 7 =$	
17	$9 + 1 =$		39	$3 + 9 =$	
18	$9 + 7 =$		40	$5 + 8 =$	
19	$8 + 2 =$		41	$2 + 8 =$	
20	$8 + 7 =$		42	$4 + 8 =$	
21	$9 + 1 =$		43	$1 + 9 =$	
22	$9 + 6 =$		44	$2 + 9 =$	

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**B**

Improvement \_\_\_\_\_

# Correct \_\_\_\_\_

Add.

1	$8 + 2 =$		23	$7 + 3 =$	
2	$8 + 3 =$		24	$7 + 4 =$	
3	$8 + 4 =$		25	$7 + 5 =$	
4	$8 + 8 =$		26	$7 + 8 =$	
5	$9 + 1 =$		27	$6 + 4 =$	
6	$9 + 2 =$		28	$6 + 5 =$	
7	$9 + 3 =$		29	$6 + 6 =$	
8	$9 + 8 =$		30	$6 + 8 =$	
9	$8 + 2 =$		31	$5 + 5 =$	
10	$8 + 5 =$		32	$5 + 6 =$	
11	$8 + 6 =$		33	$5 + 7 =$	
12	$8 + 9 =$		34	$5 + 8 =$	
13	$9 + 1 =$		35	$4 + 6 =$	
14	$9 + 4 =$		36	$4 + 7 =$	
15	$9 + 5 =$		37	$4 + 8 =$	
16	$9 + 9 =$		38	$3 + 7 =$	
17	$9 + 1 =$		39	$3 + 9 =$	
18	$9 + 7 =$		40	$5 + 9 =$	
19	$8 + 2 =$		41	$2 + 8 =$	
20	$8 + 7 =$		42	$4 + 9 =$	
21	$9 + 1 =$		43	$1 + 9 =$	
22	$9 + 6 =$		44	$2 + 9 =$	

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Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using the algorithm. Draw and bundle chips on the place value chart.

a.  $123 + 16 =$  \_\_\_\_\_

Hundreds	Tens	Ones

b.  $111 + 79 =$  \_\_\_\_\_

Hundreds	Tens	Ones

c.  $109 + 33 =$  \_\_\_\_\_

Hundreds	Tens	Ones

d.  $57 + 138 =$  \_\_\_\_\_

Hundreds	Tens	Ones

Solve vertically. Draw and bundle chips on the place value chart.

2. Jose sold 127 books in the morning. He sold another 35 books in the afternoon. At the end of the day he had 19 books left.

a. How many books did Jose sell?

Hundreds	Tens	Ones

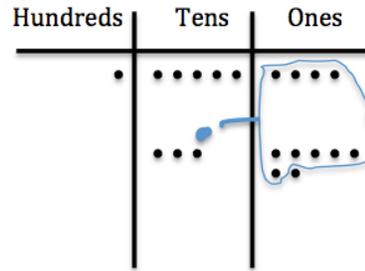
b. How many books did Jose have at the beginning of the day?

Hundreds	Tens	Ones

Name \_\_\_\_\_

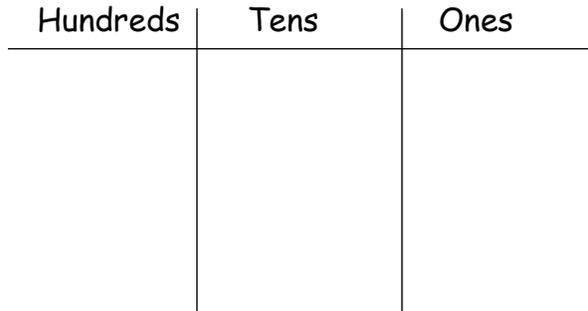
Date \_\_\_\_\_

1. Solve using the algorithm. Write a number sentence for the problem modeled on the place value chart.



2. Solve using the algorithm. Draw and bundle chips on the place value chart.

$136 + 39 = \underline{\hspace{2cm}}$



Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using the algorithm. Draw and bundle chips on the place value chart.

a.  $127 + 14 =$  \_\_\_\_\_

Hundreds	Tens	Ones

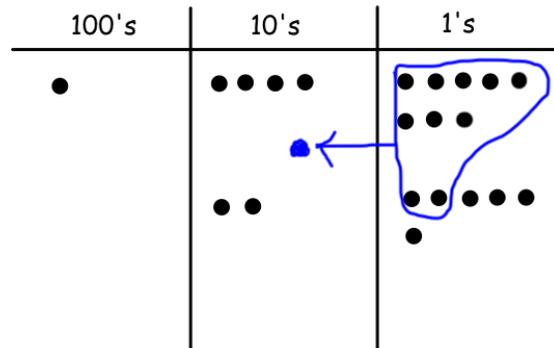
b.  $135 + 46 =$  \_\_\_\_\_

Hundreds	Tens	Ones

c.  $108 + 37 =$  \_\_\_\_\_

Hundreds	Tens	Ones

2. Solve using the algorithm. Write a number sentence for the problem modeled on the place value chart.



Solve using the algorithm. Draw and bundle chips on the place value chart.

3. Jane made 48 lemon bars and 72 cookies.

a. How many snacks did Jane make?

Hundreds	Tens	Ones

b. Jane made 69 more lemon bars. How many lemon bars does she have?

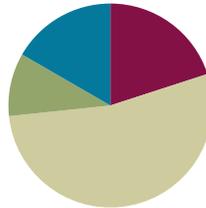
Hundreds	Tens	Ones

# Lesson 10

**Objective:** Use math drawings to represent the composition when adding a two-digit to a three-digit addend.

## Suggested Lesson Structure

■ Application Problem	(6 minutes)
■ Fluency Practice	(12 minutes)
■ Concept Development	(32 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Application Problem (6 minutes)

Moses sold 24 raffle tickets on Monday and 4 fewer on Tuesday. How many tickets did he sell in all on both days?

Note: This two-step problem gets students thinking about relationships and gives them an embedded opportunity to add multiples of 10. It is done at the beginning of the lesson since the fluency exercises flow into the day’s Concept Development.

Monday 

20	4
----	---

Tuesday 

--

} ?

$24 - 4 = 20$   
 $24 + 20 = 44$

Moses sold 44 tickets on both days.

### Fluency Practice (12 minutes)

- Compensation **2.NBT.5** (3 minutes)
- Sprint: Subtraction from Teens **2.OA.2** (9 minutes)

### Compensation (3 minutes)

Note: This fluency drill reviews the mental math strategy taught in Lesson 4, to use compensation by breaking apart one addend to make the other addend into a multiple of 10, and therefore easier to add mentally. To use compensation with subtraction, add the same number to the minuend and subtrahend to make a multiple of 10.

- T: (Write  $52 - 39 = \underline{\quad}$ .) Let’s use a mental math strategy to subtract. How much more does 39 need to make the next ten?
- S: 1 more.
- T: Add 1 to each number and give me the number sentence.

S:  $53 - 40 = 13$ .

T:  $37 - 19$ .

S:  $38 - 20 = 18$ .

Continue with the following possible sequence:  $29 + 23$ ,  $38 + 19$ ,  $32 - 19$ ,  $24 - 19$ , and  $34 + 19$ .

### Sprint: Subtraction from Teens (9 minutes)

Materials: (S) Subtraction from Teens Sprint

Note: This Sprint builds fluency with subtracting within 20 using mental strategies.

### Concept Development (32 minutes)

Materials: (S) Math journals or paper

The goal of place value models is to help students understand the quantities involved in written addition. As this understanding deepens, students will no longer need to use models; they will be able to solve with numbers alone.

This lesson is designed to give students ample time working with bare numbers and chip models to develop conceptual understanding and procedural fluency with the written method. It anticipates that students will grasp this understanding at different rates. As students demonstrate proficiency (i.e., they are able to explain why they composed a ten using place value language), encourage them to dispense with the models.

T: Copy the following problem on your paper in vertical form:  $26 + 147$ .

T: Use place value language to prove to your partner that you have lined the numbers up correctly.

S: (Explain that 6 and 7 are in the ones place, 2 and 4 are in the tens place, and 1 is in the hundreds place.)

T: Next to the written addition, draw a chip model to solve, and record each change using the algorithm.

T: When you're finished, check your work with a partner, and explain how your model matches the written addition. Use place value language to explain each step.



#### NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Allow students to use disks, labeled disk drawings, and chip models for as long as is necessary to demonstrate proficiency with this method.



#### NOTES ON MULTIPLE MEANS OF REPRESENTATION:

For students who need additional support with the vertical method, provide lined paper so they can write their problems in columns. Instruct them to turn their paper 90 degrees and to use the vertical lines as columns, making sure the right-hand column (ones place) is aligned first. It may help to write the problems starting with the ones place and moving left.

MP.3

Circulate to listen in on conversations and offer support as needed.

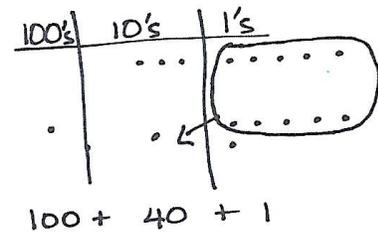
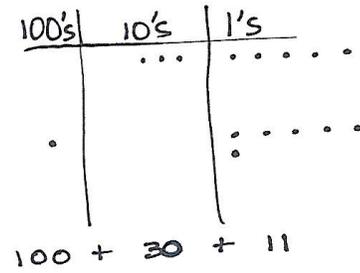
MP.3

T: Who would like to share his or her work with the class? Use place value language to explain how the model helps you to understand the written addition. (Choose a student.)

Repeat the procedure for the original activity in which students solve written additions by drawing chip models. Use the following possible sequence:  $35 + 106$ ,  $81 + 109$ ,  $117 + 48$ , and  $23 + 159$ .

When students have finished, invite two volunteers to the board. One draws a model of  $35 + 106$  *before* bundling a ten. The other draws the model *after* bundling the ten. Encourage the remaining students to be active observers and to notice the similarities and differences between the models.

- T: Talk with your partner. Describe how the models are similar and different before and after bundling a ten.
- S: Before you bundle a ten there is 1 hundred, 3 tens, and 11 ones. → After bundling, there is 1 hundred, 4 tens, 1 one. → We renamed 3 tens 11 ones as 4 tens 1, but the hundred stayed the same. →  $100 + 30 + 11$  is the same as  $100 + 40 + 1$ .
- T: (Label the drawings. See image at right.)



Continue to support students who need assistance. Release students who demonstrate proficiency with the models and written additions to work on the Problem Set independently.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Use math drawings to represent the composition when adding a two-digit to a three-digit addend.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- When you used the chip model for Problem 1(a), how did you know whether or not to bundle a new unit of ten?
- For Problem 1(b), where did you write the new ten in the written addition? How did it match your chip model?
- For Problem 1, can you tell if you will need to bundle ones just by looking at the digits in the ones place? What mental strategy helps you to know? (Partners to ten.)
- For Problem 1(d), does it matter what number you draw first on your place value chart? Why not? Does adding a three-digit number change how you add?
- Look at Problem 1(e). Think of the word *re-naming*. How did we use bundling to rename the solution? Use place value language (i.e., hundreds, tens, and ones) to explain.

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 10 Problem Set 2•4

e.  $79 + 107 =$  \_\_\_\_\_

$$\begin{array}{r} 107 \\ + 79 \\ \hline 186 \end{array}$$

Before bundling a ten

Hundreds	Tens	Ones
1	8	6

After bundling a ten

1	8	6
1	8	6

Solve by drawing chips on a place value chart and bundling when needed.

2. a. On Saturday, Colleen earned 4 ten-dollar bills, and 18 one-dollar bills working on the farm. How much money did Colleen earn?

$$\begin{array}{r} 40 \\ + 18 \\ \hline 58 \end{array}$$

100	10	1
5	8	0

b. On Sunday, Colleen earned 3 ten-dollar-bills and 16 one-dollar-bills. How much money did she earn on both days?

$$\begin{array}{r} 58 \\ + 16 \\ \hline 74 \end{array}$$

100	10	1
7	4	0

COMMON CORE Lesson 10: Use math drawings to represent the composition when adding a two-digit to a three-digit addend. Date: 7/4/13 engage<sup>ny</sup> 4.B.5

### Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

**A**

# Correct \_\_\_\_\_

Subtract.

1	$11 - 10 =$		23	$19 - 9 =$	
2	$12 - 10 =$		24	$15 - 6 =$	
3	$13 - 10 =$		25	$15 - 7 =$	
4	$19 - 10 =$		26	$15 - 9 =$	
5	$11 - 1 =$		27	$20 - 10 =$	
6	$12 - 2 =$		28	$14 - 5 =$	
7	$13 - 3 =$		29	$14 - 6 =$	
8	$17 - 7 =$		30	$14 - 7 =$	
9	$11 - 2 =$		31	$14 - 9 =$	
10	$11 - 3 =$		32	$15 - 5 =$	
11	$11 - 4 =$		33	$17 - 8 =$	
12	$11 - 8 =$		34	$17 - 9 =$	
13	$18 - 8 =$		35	$18 - 8 =$	
14	$13 - 4 =$		36	$16 - 7 =$	
15	$13 - 5 =$		37	$16 - 8 =$	
16	$13 - 6 =$		38	$16 - 9 =$	
17	$13 - 8 =$		39	$17 - 10 =$	
18	$16 - 6 =$		40	$12 - 8 =$	
19	$12 - 3 =$		41	$18 - 9 =$	
20	$12 - 4 =$		42	$11 - 9 =$	
21	$12 - 5 =$		43	$15 - 8 =$	
22	$12 - 9 =$		44	$13 - 7 =$	

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**B**

Improvement \_\_\_\_\_

# Correct \_\_\_\_\_

Subtract.

1	$11 - 1 =$		23	$16 - 6 =$	
2	$12 - 2 =$		24	$14 - 5 =$	
3	$13 - 3 =$		25	$14 - 6 =$	
4	$18 - 8 =$		26	$14 - 7 =$	
5	$11 - 10 =$		27	$14 - 9 =$	
6	$12 - 10 =$		28	$20 - 10 =$	
7	$13 - 10 =$		29	$15 - 6 =$	
8	$18 - 10 =$		30	$15 - 7 =$	
9	$11 - 2 =$		31	$15 - 9 =$	
10	$11 - 3 =$		32	$14 - 4 =$	
11	$11 - 4 =$		33	$16 - 7 =$	
12	$11 - 7 =$		34	$16 - 8 =$	
13	$19 - 9 =$		35	$16 - 9 =$	
14	$12 - 3 =$		36	$20 - 10 =$	
15	$12 - 4 =$		37	$17 - 8 =$	
16	$12 - 5 =$		38	$17 - 9 =$	
17	$12 - 8 =$		39	$16 - 10 =$	
18	$17 - 7 =$		40	$18 - 9 =$	
19	$13 - 4 =$		41	$12 - 9 =$	
20	$13 - 5 =$		42	$13 - 7 =$	
21	$13 - 6 =$		43	$11 - 8 =$	
22	$13 - 9 =$		44	$15 - 8 =$	

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Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using the algorithm. Draw chips and bundle when you can.

a.  $127 + 18 =$  \_\_\_\_\_

Hundreds	Tens	Ones

b.  $136 + 16 =$  \_\_\_\_\_

Hundreds	Tens	Ones

c.  $109 + 41 =$  \_\_\_\_\_

Hundreds	Tens	Ones

d.  $29 + 148 =$  \_\_\_\_\_

Hundreds	Tens	Ones

e.  $79 + 107 =$  \_\_\_\_\_

Hundreds	Tens	Ones

Before bundling a ten      \_\_\_\_\_ hundreds      \_\_\_\_\_ tens      \_\_\_\_\_ ones

After bundling a ten      \_\_\_\_\_ hundreds      \_\_\_\_\_ tens      \_\_\_\_\_ ones

Solve by drawing chips on a place value chart and bundling when needed.

2. a. On Saturday, Colleen earned 4 ten-dollar bills and 18 one-dollar bills working on the farm. How much money did Colleen earn?

b. On Sunday, Colleen earned 3 ten dollar-bills and 16 one dollar-bills. How much money did she earn on both days?

Name \_\_\_\_\_

Date \_\_\_\_\_

Solve using the algorithm. Draw chips on the place value chart and bundle when you can.

$27 + 137$

Hundreds	Tens	Ones

Using the previous problem, fill in the blanks. Use place value language to explain how you used bundling to rename the solution.

Before bundling a ten \_\_\_\_\_ hundreds \_\_\_\_\_ tens \_\_\_\_\_ ones

After bundling a ten \_\_\_\_\_ hundreds \_\_\_\_\_ tens \_\_\_\_\_ ones

Explanation

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using the algorithm. Draw chips and bundle when you can.

a.  $125 + 17 =$  \_\_\_\_\_

Hundreds	Tens	Ones

b.  $148 + 14 =$  \_\_\_\_\_

Hundreds	Tens	Ones

c.  $107 + 56 =$  \_\_\_\_\_

Hundreds	Tens	Ones

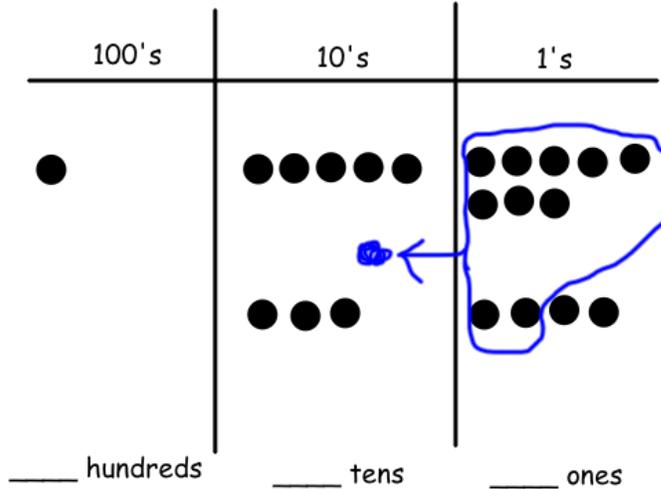
d.  $38 + 149 =$  \_\_\_\_\_

Hundreds	Tens	Ones

Jamie started to solve this problem when she accidentally dropped paint on her sheet. Can you figure out what problem she was given and her answer from her work?

e. 1  = \_\_\_\_\_

\_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_



Solve by drawing chips on a place value chart and bundling when needed.

2. a. In the morning, Mateo borrowed 4 bundles of ten markers and 17 loose markers from the art teacher. How many markers did Mateo borrow?

b. In the afternoon, Mateo borrowed 2 bundles of ten crayons and 15 loose crayons. How many markers and crayons did Mateo borrow in all?



## Topic C

## Strategies for Decomposing a Ten

2.OA.1, 2.NBT.7, 2.NBT.9, 2.NBT.5

<b>Focus Standard:</b>	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, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
	2.NBT.7	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
	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.)
<b>Instructional Days:</b>	6	
<b>Coherence -Links from:</b>	G1–M4	Place Value, Comparison, Addition and Subtraction to 40
<b>-Links to:</b>	G2–M5	Addition and Subtraction Within 1000 with Word Problems to 100
	G3–M2	Place Value and Problem Solving with Units of Measure

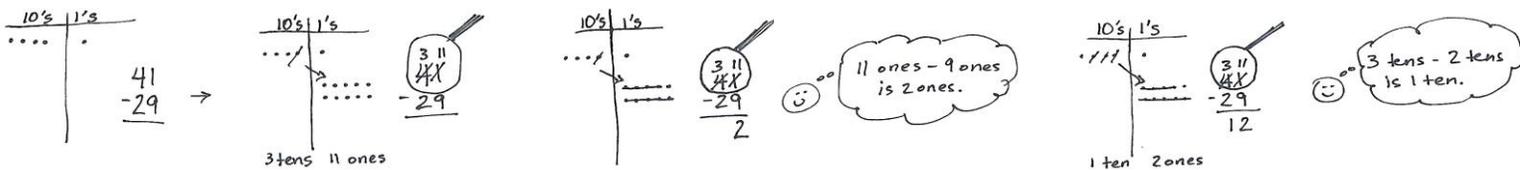
Topic C parallels Topic B, as students apply their understanding of place value strategies to the subtraction algorithm, moving from concrete to pictorial to abstract. It is important to note that the algorithm is introduced at this level and is connected deeply to the understanding of place value. However, fluency with the algorithm is a Grade 3 standard.

In Lesson 11, students use number disks on a place value chart to subtract like units (e.g.,  $76 - 43$  is 7 tens – 4 tens and 6 ones – 3 ones). They practice modeling the standard subtraction algorithm within 100 without decompositions, and then progress to problems that require exchanging 1 ten for 10 ones (e.g., in  $76 - 47$  students must recompose 7 tens 6 ones as 6 tens 16 ones). The use of manipulatives allows students to physically experience the renaming and understand the *why* behind recomposing a quantity.

Lesson 12 builds upon this understanding as students relate manipulatives to a written method, recording recompositions in vertical form. In subtraction, a common error is for students to switch the top and bottom digits in a given place when renaming is necessary. They perceive the digits as a column of unrelated numbers, rather than part of a larger total, and simply subtract the smaller from the larger. Hence, many students would solve  $41 - 29$  as 28, instead of understanding that they can take 9 ones from 41 ones. To prevent this error and aid students in seeing the top number as the whole, students use a “magnifying glass”

to examine the minuend. They draw a circle around the top number and add a handle (see image below). Before subtracting, they look inside the magnifying glass at the whole number and determine if each digit is big enough to subtract the number below it. If not, they decompose one of the next larger units to make ten of the unit they need. In Lesson 13, this is used in conjunction with the chip model (shown below); students record each change they make to their model simultaneously on the algorithm.

In Lessons 14–15, students move to the more abstract dot drawings on their place value charts and follow the same procedure for decomposing a ten and relating it to the written method. Here, however, students subtract a two-digit subtrahend from a three-digit minuend (e.g.,  $164 - 36$ ). This provides practice working



with and drawing three-digit numbers without the complexity of decomposing a hundred.

As in Topic A, Topic C closes with a lesson that focuses on one- and two-step word problems within 100. Students apply their place value reasoning, mental strategies, and understanding of compositions and decompositions to negotiate different problem types with unknowns in various positions. Because two different problem types (i.e., *add to*, *take from*, *put together/take apart*, *compare*) are often combined in two-step word problems, some quantities will involve single-digit addends, especially when students are working with the more challenging comparison problems. They are encouraged to be flexible in their thinking and to use drawings and/or models to explain their thinking. Students continue to use tape diagrams to solve word problems, relating the diagrams to a situation equation (e.g.,  $8 + \underline{\quad} = 41$ ) and rewriting it as a solution equation (e.g.,  $41 - 8 = \underline{\quad}$ ), thus illustrating the relationship between operations. Students find success when using their mental strategies of making a multiple of 10 and counting on (e.g., 9, 10, 20, 30 40, 41) as they experience the relationships between quantities within a context.

**A Teaching Sequence Towards Mastery of Strategies for Decomposing a Ten**

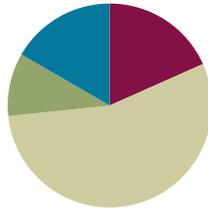
- Objective 1:** Represent subtraction with and without the decomposition of 1 ten as 10 ones with manipulatives.  
(Lesson 11)
- Objective 2:** Relate manipulative representations to a written method.  
(Lesson 12)
- Objective 3:** Use math drawings to represent subtraction with and without decomposition and relate drawings to a written method.  
(Lesson 13)
- Objective 4:** Represent subtraction with and without the decomposition when there is a three-digit minuend.  
(Lessons 14–15)
- Objective 5:** Solve one- and two-step word problems within 100 using strategies based on place value.  
(Lesson 16)

## Lesson 11

**Objective:** Represent subtraction with and without the decomposition of 1 ten as 10 ones with manipulatives.

### Suggested Lesson Structure

■ Fluency Practice	(11 minutes)
■ Application Problem	(6 minutes)
■ Concept Development	(33 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (11 minutes)

- 2 Less **2.NBT.5** (2 minutes)
- Using 10 to Subtract **2.NBT.5** (3 minutes)
- Subtract Common Units **2.NBT.5** (6 minutes)

#### 2 Less (2 minutes)

Note: Practicing giving 2 less helps students to use the nearest ten to subtract fluently.

T: For every number I say, you say 2 less. If I say 10, you say 8. Ready?

T: 10.

S: 8.

T: 11.

S: 9.

Continues with the following possible sequence: 20, 21, 30, 31, 40, 41, 51, 61.

#### Using 10 to Subtract (3 minutes)

Note: Reviewing the first grade skill of counting up and down to 10 to subtract gives students a mental strategy to subtract fluently.

T: (Post  $16 - 9$  on the board.)

T: The answer is? Wait for the signal. (Wait for all to be ready.)

S: 7.

T: (Write in the bond.)  $10 - 9$  is \_\_\_?

S: 1.

T:  $1 + 6$  is?

S: 7.

Continue with the following possible sequence:  $15 - 9$ ,  $13 - 8$ ,  $15 - 7$ ,  $16 - 7$ ,  $12 - 9$ , and  $13 - 7$ .

### Subtract Common Units (6 minutes)

Materials: (S) Personal white boards

Note: Reviewing this mental math fluency will prepare students for understanding the importance of the subtraction algorithm.

T: (Project 77.) Say the number in unit form.

S: 7 tens 7 ones.

T: (Write  $77 - 22 = \underline{\quad}$ .) Say the subtraction sentence and answer in unit form.

S: 7 tens 7 ones  $-$  2 tens 2 ones  $=$  5 tens 5 ones.

T: Write the subtraction sentence on your personal white boards.

Repeat the process and sequence for  $88 - 33$ ,  $99 - 22$ ,  $66 - 44$ ,  $166 - 44$ ,  $55 - 33$ , and  $155 - 33$ .

### Application Problem (6 minutes)

Shelby picks 35 oranges. 5 are rotten. How many of Shelby's oranges are not rotten?

Rosa picks 35 oranges, too, but 6 are rotten. How many of Rosas oranges are not rotten?

Note: This problem shifts students' attention to subtraction in and anticipates the opening of the Concept Development lesson. In debriefing the problem, have students notice that Rosa has 29 while Shelby has 30 oranges.

Shelby's:  
 $35 - 5 = \boxed{30 \text{ oranges}}$

Rosa's:  
 $35 - 6 = \boxed{29 \text{ oranges}}$   
 $35 - 5 \rightarrow 30 - 1 \rightarrow 29$

### Concept Development (33 minutes)

Materials: (T) Number disks (19 ones, 9 tens), place value chart  
 (S) Number disks (19 ones, 9 tens), place value charts



#### NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

If students struggle with these mental math problems, encourage them to discuss solutions with a partner before responding to the questions. Partners can also jot problems and answers to one another on personal white boards to check for accuracy.

**Problem 1: 35 – 9**

- T:  $35 - 5$ ?  
 S: 30.  
 T:  $35 - 6$ ?  
 S: 29.  
 T: (Continue with two to three more sequences:  $24 - 4$ ,  $24 - 5$ ;  $17 - 7$ ,  $17 - 8$ .)  
 T: (Write  $35 - 9$  on the board.) How can you solve  $35 - 9$ ?  
 S: Count back. → Use the arrow method to add 1, and then 20, and 5 more. → Subtract 10 and then put 1 back. I can show that with arrows too! → Add 1 to both numbers to make it an easier problem, like  $36 - 10$ .  
 T: Those are great strategies. Let me show you another one.

Show 35 on the place value chart using number disks as shown at right.

- T: How many tens do you see?  
 S: 3 tens.  
 T: How many ones?  
 S: 5 ones.  
 T: How many am I subtracting?  
 S: 9 ones.  
 T: Can I subtract 9 ones from 5 ones?  
 S: No.  
 T: How many ones are in a unit of ten?  
 S: 10.  
 T: I can break apart, or unbundle, a unit of ten into 10 ones. We also call this **decomposing**. So, if I decompose one of these tens to make 10 ones, how many ones will I have?  
 S: 15!  
 T: Yes! So will I have enough ones to subtract 9 ones?  
 S: Yes!  
 T: Take 1 ten and change it for 10 ones. (Remove a ten, counting out 10 ones and placing the 10 ones in 5-groups as shown at right.)  
 T: Now I have 15 ones on my chart, and I can subtract 9 ones. (Take away 9 ones as shown above.)  
 T: How many tens and ones do you see?  
 S: 2 tens, 6 ones.

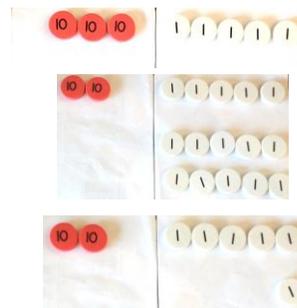


### NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Offer a relatable example to scaffold understanding.

- Imagine you have 2 cookies. You have 3 friends come over. Do you have enough cookies for each friend to get one?
- Imagine you have 5 cookies. You have 9 people over. Can you give each person a whole cookie?

Offer similar examples until the student demonstrates understanding.



MP.4

MP.4

**Problem 2: 46 – 18**

T: Let’s do another problem. This time, use your disks. (Write  $46 - 18$  on the board.)

T: Do you have to show 18 with your disks?

S: No!

T: No, we don’t because now we are finding a missing part, not the total. We are going to remove a part, 18, from the whole, 46.

T: Model with your disks the number 46. Count the Say Ten way as you put out your disks.

S: 1 ten, 2 tens, 3 tens, 4 tens, 4 tens 1, 4 tens 2...4 tens 6. (Arrange the number disks on the place value chart as shown at right. Direct students to arrange their place value charts in the same way.)

T: Let’s start with the ones. Can I subtract 8 ones from 6 ones?

S: No. You need to decompose a ten. → No, we have to change 1 ten for 10 ones.

T: (Model unbundling a ten and direct students to do the same, arranging the ten ones in 5-groups.)

T: Now I can subtract 8 ones. Do it with me. (Count chorally as you remove 8 white ones from the place value chart.)

T: Am I done?

S: No. You need to subtract a ten.

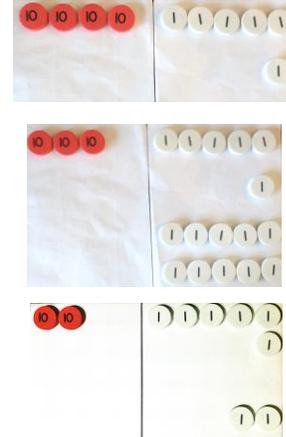
T: (Remove a ten while students do the same.)

T: So  $46 - 18$  is?

S: 28.

T: The Say Ten way? (Point to disks.)

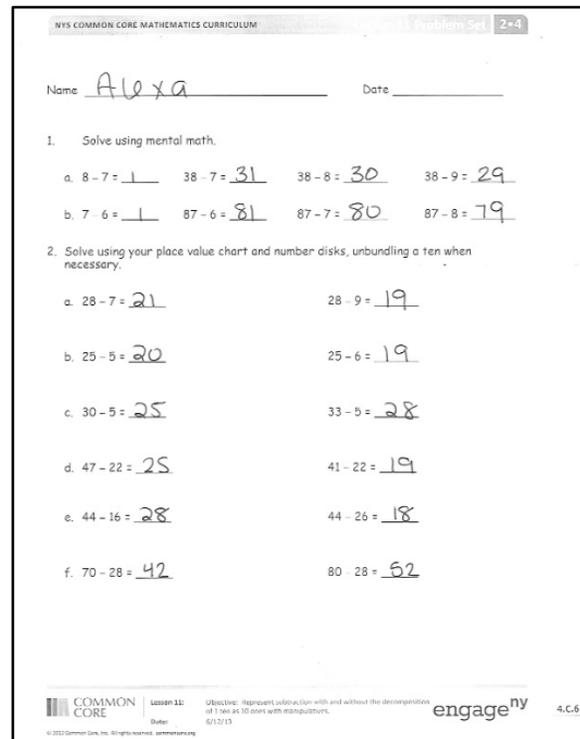
S: 2 tens 8.



If necessary, repeat the above sequence with more problems until students show proficiency. (Suggested sequence:  $22 - 15$ ,  $41 - 23$ ,  $46 - 12$ ,  $32 - 29$ .) Then, allow them to begin working on the Problem Set independently as they are able.

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.



## Student Debrief (10 minutes)

**Lesson Objective:** Represent subtraction with and without the decomposition of 1 ten as 10 ones with manipulatives.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class.

Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- How did the sequence in Problem 1(a) help you to solve  $38 - 9$  mentally? Did you need to **decompose** a ten to solve?
- Look at Problem 2. How could you avoid the extra work of modeling the problems in the second column? Use the words *more* or *less* to describe how the second column relates to the first one.
- Explain to your partner how to solve Problem 3. Did you need to unbundle a ten to solve? How did you know?
- For Problem 4, did you decompose a unit of ten? Could you have solved this problem differently?
- How do you know when you must unbundle a ten to subtract? Must you always unbundle when solving a problem like  $86 - 39$ ?

3. Solve  $56 - 28$  and explain your strategy.

$56 - 28 = 28$   
I used my place value disks to solve. I could not take 8 from 6 so I unbundled a ten and then subtracted.

For early finishers:

4. There are 63 problems on the math test. Tamara answered 48 problems correctly, but the rest were incorrect. How many problems did she answer incorrectly?

$63 - 48 = 15$

5. Mr. Ross has 7 fewer students than Mrs. Jordan. Mr. Ross has 35 students. How many students does Mrs. Jordan have?

$35 + 7 = 42$

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Date: 6/2/13  
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## Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using mental math.

a.  $8 - 7 =$  \_\_\_\_\_       $38 - 7 =$  \_\_\_\_\_       $38 - 8 =$  \_\_\_\_\_       $38 - 9 =$  \_\_\_\_\_

b.  $7 - 6 =$  \_\_\_\_\_       $87 - 6 =$  \_\_\_\_\_       $87 - 7 =$  \_\_\_\_\_       $87 - 8 =$  \_\_\_\_\_

2. Solve using your place value chart and number disks, unbundling a ten when necessary.

a.  $28 - 7 =$  \_\_\_\_\_       $28 - 9 =$  \_\_\_\_\_

b.  $25 - 5 =$  \_\_\_\_\_       $25 - 6 =$  \_\_\_\_\_

c.  $30 - 5 =$  \_\_\_\_\_       $33 - 5 =$  \_\_\_\_\_

d.  $47 - 22 =$  \_\_\_\_\_       $41 - 22 =$  \_\_\_\_\_

e.  $44 - 16 =$  \_\_\_\_\_       $44 - 26 =$  \_\_\_\_\_

f.  $70 - 28 =$  \_\_\_\_\_       $80 - 28 =$  \_\_\_\_\_

3. Solve  $56 - 28$  and explain your strategy.

**For early finishers:**

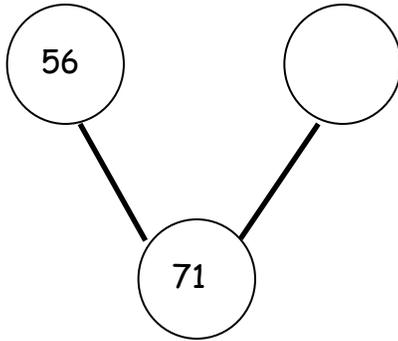
4. There are 63 problems on the math test. Tamara answered 48 problems correctly, but the rest were incorrect. How many problems did she answer incorrectly?
5. Mr. Ross has 7 fewer students than Mrs. Jordan. Mr. Ross has 35 students. How many students does Mrs. Jordan have?

Name \_\_\_\_\_

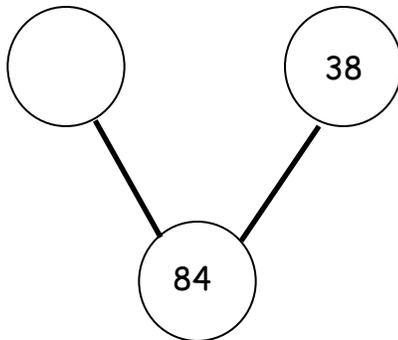
Date \_\_\_\_\_

1. Solve for the missing part. Use your place value chart and number disks.

a.



b.





3. Solve and explain your strategy.

<p>a.</p> $41 - 27 = \underline{\quad}$
<p>b.</p> $67 - 28 = \underline{\quad}$

4. The number of marbles in each jar is marked on the front. Miss Clark took 37 marbles out of each jar. How many marbles are left in each jar? Complete the number sentence to find out.



45

\_\_\_\_\_ - \_\_\_\_\_ = \_\_\_\_\_



52

\_\_\_\_\_ - \_\_\_\_\_ = \_\_\_\_\_



48

\_\_\_\_\_ - \_\_\_\_\_ = \_\_\_\_\_



55

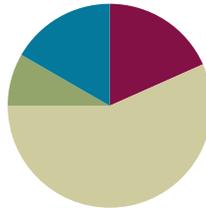
\_\_\_\_\_ - \_\_\_\_\_ = \_\_\_\_\_

## Lesson 12

Objective: Relate manipulative representations to a written method.

### Suggested Lesson Structure

■ Fluency Practice	(11 minutes)
■ Application Problem	(5 minutes)
■ Concept Development	(34 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (11 minutes)

- Using 10 to Subtract **2.NBT.5** (3 minutes)
- Get the Ten Out to Subtract **2.NBT.5** (5 minutes)
- How Many More Tens **2.NBT.5** (3 minutes)

### Using 10 to Subtract (3 minutes)

Repeat the fluency from G2–M4–Lesson 10.

### Get the Ten Out and Subtract (5 minutes)

Note: Students practice taking out the ten and subtracting to prepare for unbundling a ten in the lesson.

T: For every number sentence I give, subtract the ones from ten. When I say  $12 - 4$ , you say  $10 - 4 = 6$ .  
Ready?

T:  $12 - 4$ .

S:  $10 - 4 = 6$ .

T:  $13 - 7$ .

S:  $10 - 7 = 3$ .

Practice taking the ten out of number sentences fluently before adding the ones back.

T: Now let's add back the ones.

T:  $12 - 4$ . Take from ten.

S:  $10 - 4 = 6$ .

T: Now add back the ones.

S:  $6 + 2 = 8$ .

Continue with the following possible sequence: 13 – 7, 11 – 8, 13 – 9, 15 – 7, 14 – 8.

**How Many More Tens? (3 minutes)**

Materials: (S) Personal white boards

Note: Practicing adding and subtracting multiples of 10 will prepare students for the lesson.

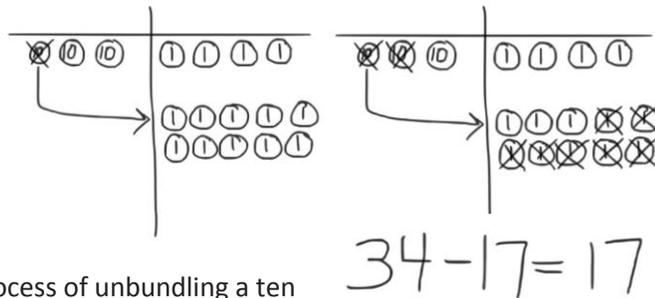
- T: If I say 45 – 35, you say 10. To say it in a sentence you say 45 is 10 more than 35. Ready?
- T: 65 – 45.
- S: 20.
- T: Say it in a sentence.
- S: 65 is 20 more than 45.

Continue with the following possible sequence: 85 – 45, 74 – 24, 59 – 29, 38 – 18, 99 – 19.

**Application Problem (5 minutes)**

Barb has a bag of 34 cherries. She eats 17 cherries for a snack. How many cherries does she have left?

Note: This problem is designed for independent practice and serves to reinforce the concept of decomposing 1 ten as 10 ones with manipulatives. Allow students to use number disks when solving. If students need support, guide them through the process of unbundling a ten with number disks.



**Concept Development (34 minutes)**

Materials: (T) Number disks (19 ones and 9 tens), place value chart (S) Number disks (19 ones and 9 tens), place value charts, personal white boards

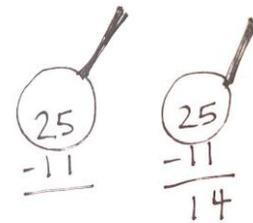
**Problem 1: 25 – 11**

- T: (Write 25 – 11 on the board.) Read this problem with me.
- S: 25 minus 11. (Read the problem chorally.)
- T: (Draw a blank number bond on the board.) What is the whole?
- S: 25.
- T: What is the part that we know?
- S: 11.
- T: What do we need to find?
- S: The missing part.

MP.2

MP.2

- T: That’s right. When we use number disks to solve a subtraction problem, we only put the whole on our chart. Turn to your neighbor and tell him or her, why do we only show the whole when subtracting?
- S: You will take away one part from the whole. → You are not adding two parts; you are taking away. → 11 is inside 25 and we are finding it and taking it out.
- T: Count the total value of the disks as I place them. Say the units, too. 1 ten, 2 tens, 2 tens 1 one, 2 tens 2 ones, 2 tens 3 ones, 2 tens 4 ones, 2 tens 5 ones. (Place 2 tens and 5 ones on your place value chart. Direct students to do the same.)
- T: Today, as we solve subtraction problems, we are going to record our work in the written subtraction on my white board. (Write the problem in vertical form.)
- T: What is the whole we are subtracting from?
- S: 25.
- T: We want to look carefully at the whole when subtracting, like a detective, to see if we need to do any unbundling. Let’s draw an imaginary magnifying glass around 25. (Draw the magnifying glass as shown at right.)
- T: Let’s start by looking at the smallest place value, the ones: Can we take 1 one from 5 ones?
- S: Yes!
- T: Let’s move to the tens column. Can I take 1 ten from 2 tens?
- S: Yes!
- T: We are ready to subtract because we have checked to make sure we have enough units in each place value.
- T: Take 1 one from the 5 ones.
- T: How many ones are left?
- S: 4.
- T: (Record 4 in the ones column in the answer space.) Take 1 ten from 2 tens. (Remove 1 ten from the place value chart and record the answer in the answer space. Students do the same.)
- T: What is  $25 - 11$ ?
- S: 14.

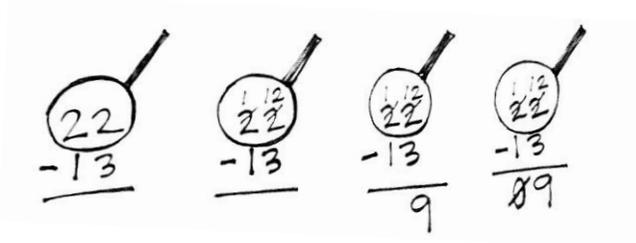


**Problem 2: 22 – 13**

- T: Let’s try another problem together. This time I want you to record your answers in written subtraction as I do. (Write  $22 - 13$  on the board in vertical form. Students do the same.)
- T: What should I do first?
- S: Find out if we need to unbundle. (Draw the magnifying glass with enough space to write renaming, and instruct students do the same.)
- T: Okay, I’m looking closely at it. Where do I start?
- S: Start in the ones column. → Check to see if you can subtract the ones.
- T: Can I subtract 3 ones from 2 ones?
- S: No!

MP.2

- T: What should I do?  
 S: Decompose a ten.  
 T: (Change a ten for 10 ones. Arrange them in 5-groups on your place value chart. Instruct students to do the same.)  
 T: Whatever I do to my number disks, I must also do to my equation. How should I record unbundling a ten?  
 S: Cross out the 2 in the tens place and write 1 above it. Cross out the 2 in the ones place and write 12 above it. → Change 2 tens to 1 ten and 2 ones to 12 ones.  
 T: Now how many tens and ones do you see on my place value chart?  
 S: 1 ten, 12 ones.  
 T: Can I subtract 3 ones now?  
 S: Yes!  
 T: Can I subtract 1 ten now?  
 S: Yes!  
 T: Then we are ready to subtract! What are we?  
 S: Ready to subtract!  
 T: Then let's subtract!  
 T: What is the answer to  $22 - 13$ ?  
 S: 9.



**NOTES ON MULTIPLE MEANS OF ENGAGEMENT:**

Encourage students to use the place value disks for the Problem Set until they are comfortable enough with the process to use the vertical method alone. If a student is comfortable solving the algorithm without needing the disks, allow him to work without them.

Repeat the process above with the following sequence:  $31 - 18$ ,  $46 - 28$ ,  $32 - 19$ .

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Relate manipulative representations to a written method.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class.

Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- How did unbundling a ten help you to solve Problem 1(b)?
- How did you solve Problem 1(c)? How did you change your place value chart to show decomposing a ten?
- Explain to your partner how you used number disks to solve Problem 1(d). How did your work with the number disks match the written subtraction?
- How did you solve Problem 1(e) using number disks and the written subtraction? How could you have solved this problem differently using a simplifying strategy?
- For Problem 2, explain to your partner how you know who is correct, Terry or Pam?
- For Problem 3, how does Part A help us to solve Part B?

### Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

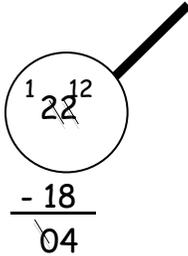
Name \_\_\_\_\_

Date \_\_\_\_\_

1. Use place value disks to solve each problem. Rewrite the problem vertically and record each step as shown in the example.

a.  $28 - 12$

b.  $20 - 12$



$$\begin{array}{r} 1 \quad 2 \\ 28 \\ - 12 \\ \hline 04 \end{array}$$

c.  $34 - 25$

d.  $25 - 18$

e.  $53 - 29$

f.  $71 - 27$

2. Terry and Pam both solved the problem  $64 - 49$ . They came up with different answers and can't agree on who is correct. Terry answered 25 and Pam answered 15. Use place value disks to explain who is correct and rewrite the problem vertically to solve.

**For early finishers:**

3. Samantha has 42 marbles and Graham has 17 marbles.
- How many more marbles does Samantha have than Graham?
  - James has 25 fewer marbles than Samantha. How many marbles does James have?

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Sherry made a mistake while subtracting. Explain what her mistake was.

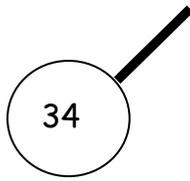
$\begin{array}{r} 14 \\ 44 \\ -26 \\ \hline 28 \end{array}$	<p>Explanation:</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
---	---

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Use place value disks to solve each problem. Rewrite the problem vertically and record each step as shown in the example.

a.  $34 - 13$


$$\begin{array}{r} 34 \\ - 13 \\ \hline 21 \end{array}$$

b.  $41 - 16$

c.  $33 - 15$

d.  $46 - 18$

e.  $62 - 27$

f.  $81 - 34$

2. Some first and second grade students voted on their favorite drink. The table shows the number of votes for each drink.

Drinks	Number of Votes
Milk	28
Apple Juice	19
Grape Juice	16
Fruit Punch	37
Orange Juice	44

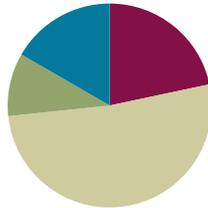
- a. How many more students voted for fruit punch than for milk? Show your work.
- b. How many more students voted for orange juice than for grape juice? Show your work.
- c. How many fewer students voted for apple juice than for milk? Show your work.

## Lesson 13

**Objective:** Use math drawings to represent subtraction with and without decomposition and relate drawings to a written method.

### Suggested Lesson Structure

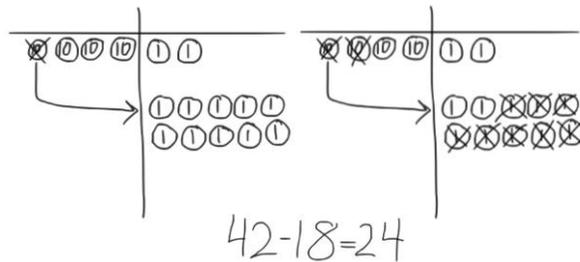
■ Application Problem	(6 minutes)
■ Fluency Practice	(13 minutes)
■ Concept Development	(31 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



#### Application Problem (6 minutes)

Mrs. Beachy went shopping with \$42. She spent \$18. How much money did she have left?

Note: This problem provides students an opportunity to apply learning from the previous day’s lesson in getting ready to subtract. It is a simple word problem type, *take from with result unknown*. Therefore, let the students use place value disks to solve to avoid the complexity of both a tape diagram and manipulatives.



#### Fluency Practice (13 minutes)

- Subtraction from Tens **2.NBT.5** (5 minutes)
- Sprint: Subtraction Patterns **2.NBT.5** (8 minutes)

#### Subtraction from Tens (5 minutes)

Note: This allows students to see how their take-from-ten facts help them to solve many, many problems. It also prepares them for today’s Sprint.

T: I say a basic fact, you add ten to the whole and continue until I say to stop. So after  $10 - 5$ , you would solve  $20 - 5$  then?

S:  $30 - 5$ ,  $40 - 5$ ,  $50 - 5$ .

T: Yes, as high as you can before I give the signal to stop. Let’s begin.  $10 - 5$ .

Students work. Stop them when you see the slowest student has completed at least two problems.

Continue with the following possible sequence:  $10 - 8$ ,  $11 - 2$ ,  $12 - 4$ ,  $11 - 5$ .

**Sprint: Subtraction Patterns (8 minutes)**

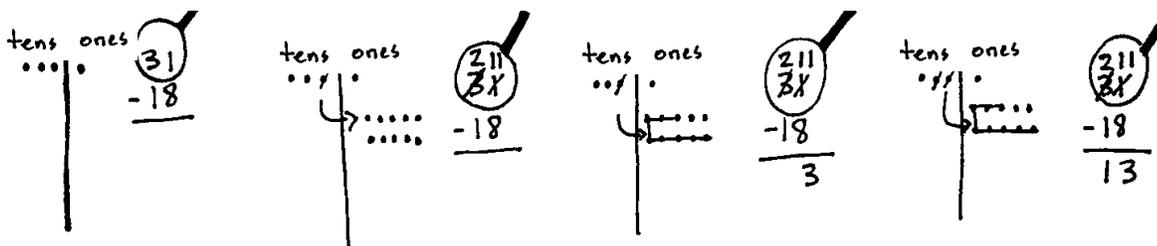
Materials: (S) Subtraction Patterns Sprint

Note: Students are given the opportunity to use mental math strategies when crossing tens to subtract.

**Concept Development (31 minutes)**

Materials: (S) Personal white boards

**Problem 1:  $31 - 18$**



Write  $31 - 18$  on the board in vertical form. Draw a blank place value chart with place value headings on the board.

- T: What is the whole?
- S: 31.
- T: What is the part that we know?
- S: 18.
- T: What should I do first?
- S: Count out 3 tens and 1 one.
- T: Today we're just going to draw a simple chip model with dots, like we did with addition.
- T: Turn and talk: Why do I only draw a value of 31 to solve  $31 - 18$ ?
- S: 31 is the whole. → You only draw the number you are subtracting from. → We are looking for a missing part. → 18 plus something equals 31. We have to take out 18 to find out what it is.
- T: (Draw a chip model that represents 31.) How many tens and ones chips did I draw on my place value chart?
- S: 3 tens 1 one.
- T: (Draw the magnifying glass around 31.) What next?

MP.2



**NOTES ON MULTIPLE MEANS OF REPRESENTATION:**

Observe your students carefully during the lesson. If any seem confused about how to relate the chip model to the bare numbers, work with them using the place value disks or other manipulatives until they realize the connection between the manipulatives, the drawing, and the equation.

- S: Get ready to subtract. Check to make sure we can subtract in every place value.
- T: Can I subtract 8 ones from 1 one?
- S: No!
- T: What should I do?
- S: Change 1 ten for 10 ones. → Unbundle a ten and show 10 ones.
- T: (Cross out a ten, draw an arrow to show the change of 1 ten to 10 ones, and then draw 10 chips to represent the 10 ones.) Whatever we do with the chips, we show with the written subtraction.
- T: How many tens do I have now?
- S: 2. (Cross out the 3 in the tens column and write a 2 above it.)
- T: How many ones do I have now?
- S: 11. (Cross out 1 in the ones column and write 11 above it.)
- T: Do we also see 2 tens and 11 ones in the chip model?
- S: Yes!
- T: Then we are...?
- S: Ready to subtract!!
- T: 11 ones minus 8 ones is? (Cross out 8 ones in the chip model.)
- S: 3 ones. (Write 3 in the ones column.)
- T: 2 tens minus 1 ten is?
- S: 1 ten.
- T: (Cross out 1 chip in the tens column and write 1 in the answer space on the written subtraction.) What is the answer?
- S: 13.

Continue modeling subtraction using the vertical form with the magnifying glass and the chip model. Repeat the process above with the following sequence:  $56 - 29$ ,  $72 - 36$ ,  $85 - 48$ .

**Problem 2:  $40 - 24$  and  $33 - 17$**

- T: Let's try a few together. (Write  $40 - 24 = 33 - 17$ .)
- T: I would like to know, is this true or false? What I write, you write.
- T: (Write  $40 - 24$  in vertical form. Draw the magnifying glass around 40. Draw 4 tens chips in the tens column. Students do the same.) Let's get ready to subtract.
- T: Can I subtract 4 ones from 0 ones?
- S: No.
- T: What should I do?
- S: Decompose a ten. → Cross out a ten on the chip model and draw 10 ones.
- T: (Cross out a ten chip in the tens column, draw an arrow to show the change, and draw 10 ones disks.



**NOTES ON  
MULTIPLE MEANS OF  
ACTION AND  
EXPRESSION:**

Play Race to Zero to practice unbundling in a fun way. After pairing them, give students 5 tens disks each. Have them take turns rolling a die (or dice, for a faster game), subtracting the quantity on the die each turn, and unbundling 10 when necessary. The first one to reach 0 wins. Make it more challenging by requiring them to reach exactly 0.

For students ready for even more challenge, have them start with a single hundreds disk and race to zero.

Students do the same. Cross out the 4 in the tens column and write a 3. Change the 0 to a 10. Students do the same.)

T: Now, can I subtract 4 ones from 10 ones?

S: Yes!

T: (Cross out 4 ones on the chip model and write 6 in the answer space. Students do the same.) What next?

S: Take away 2 tens. → 3 tens minus 2 tens is 1 ten.

T: (Cross out 1 ten on the chip model and write 1 in the answer space on the written subtraction. Students do the same.) What is  $40 - 24$ ?

S: 16!

T: Now, I need to see, does  $33 - 17$  also equal 16?

Repeat the process above with the problem  $33 - 17$ .

T: What is  $33 - 17$ ?

S: 16.

T: So is  $40 - 24$  equal to  $33 - 17$ ?

S: They're both 16, so yes!

As students show proficiency, allow them to move on to the Problem Set.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Use math drawings to represent subtraction with and without decomposition and relate drawings to a written method.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 13 Problem Set 2•4

Name Alexa Date \_\_\_\_\_

1. Solve vertically. Draw a place value chart and chips to model each problem. Show how you change 1 ten for 10 ones when necessary.

a. $31 - 19 =$ $\begin{array}{r} 31 \\ -19 \\ \hline 12 \end{array}$	b. $46 - 24 =$ $\begin{array}{r} 46 \\ -24 \\ \hline 22 \end{array}$
c. $51 - 33 =$ $\begin{array}{r} 51 \\ -33 \\ \hline 18 \end{array}$	d. $67 - 49 =$ $\begin{array}{r} 67 \\ -49 \\ \hline 18 \end{array}$
e. $66 - 48 =$ $\begin{array}{r} 66 \\ -48 \\ \hline 18 \end{array}$	f. $77 - 58 =$ $\begin{array}{r} 77 \\ -58 \\ \hline 19 \end{array}$

COMMON CORE Lesson 13: Use math drawings to represent subtraction with and without decomposition and relate drawings to a written method. Date: 6/12/13 engage<sup>ny</sup> 4.C.8

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 13 Problem Set 2•4

2. Solve  $31 - 27$  and  $25 - 15$  vertically using the space below. Circle to tell if the number sentence is true or false.

$\begin{array}{r} 31 \\ -27 \\ \hline 4 \end{array}$	True/False <input checked="" type="radio"/> True <input type="radio"/> False $31 - 27 = 25 - 15$	$\begin{array}{r} 25 \\ -15 \\ \hline 10 \end{array}$
--	--	---

3. Solve  $78 - 43$  and  $81 - 46$  vertically using the space below. Circle to tell if the number sentence is true or false.

$\begin{array}{r} 78 \\ -43 \\ \hline 35 \end{array}$	True/False <input checked="" type="radio"/> True <input type="radio"/> False $78 - 43 = 81 - 46$	$\begin{array}{r} 81 \\ -46 \\ \hline 35 \end{array}$
---	--	---

4. Mrs. Smith has 39 tomatoes in her garden. Mrs. Thompson has 52 tomatoes in her garden. How many fewer tomatoes does Mrs. Smith have than Mrs. Thompson?

$\begin{array}{r} 52 \\ -39 \\ \hline 13 \end{array}$
---

COMMON CORE Lesson 13: Use math drawings to represent subtraction with and without decomposition and relate drawings to a written method. Date: 6/12/13 engage<sup>ny</sup> 4.C.9

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class.

Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- For Problem 1(a), did you decompose a ten? Why? Then, how many ones did you have? How many tens were leftover?
- Explain to your partner how to solve Problem 1(c). How did you show decomposing a ten on your model and on the written subtraction? Could you have solved this problem mentally?
- Compare Problems 1(e) and 1(f) with a partner. How did you solve these two problems? Could you have solved 1(f) without unbundling? How does it relate to 1(e)?
- For Problem 2, what did you need to be sure to do when solving  $31 - 27$  using the written subtraction? Did you solve  $25 - 15$  mentally? What was your strategy?
- How did you subtract in Problem 3? What is the relationship between  $78 - 43$  and  $81 - 46$ ? What easy simplifying strategy could you use to answer the true/false question?

### Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

**A**

# Correct \_\_\_\_\_

Subtract.

1	$10 - 5 =$		23	$14 - 6 =$	
2	$20 - 5 =$		24	$24 - 6 =$	
3	$30 - 5 =$		25	$34 - 6 =$	
4	$10 - 2 =$		26	$15 - 7 =$	
5	$20 - 2 =$		27	$25 - 7 =$	
6	$30 - 2 =$		28	$35 - 7 =$	
7	$11 - 2 =$		29	$11 - 4 =$	
8	$21 - 2 =$		30	$21 - 4 =$	
9	$31 - 2 =$		31	$31 - 4 =$	
10	$10 - 8 =$		32	$12 - 6 =$	
11	$11 - 8 =$		33	$22 - 6 =$	
12	$21 - 8 =$		34	$32 - 6 =$	
13	$31 - 8 =$		35	$21 - 6 =$	
14	$14 - 5 =$		36	$31 - 6 =$	
15	$24 - 5 =$		37	$12 - 8 =$	
16	$34 - 5 =$		38	$32 - 8 =$	
17	$15 - 6 =$		39	$21 - 8 =$	
18	$25 - 6 =$		40	$31 - 8 =$	
19	$35 - 6 =$		41	$28 - 9 =$	
20	$10 - 7 =$		42	$27 - 8 =$	
21	$20 - 8 =$		43	$38 - 9 =$	
22	$30 - 9 =$		44	$37 - 8 =$	

© Bill Davidson



Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw a place value chart and chips to model each problem. Show how you change 1 ten for 10 ones when necessary.

a. $31 - 19 =$ _____	b. $46 - 24 =$ _____
c. $51 - 33 =$ _____	d. $67 - 49 =$ _____
e. $66 - 48 =$ _____	f. $77 - 58 =$ _____

2. Solve  $31 - 27$  and  $25 - 15$  vertically using the space below. Circle to tell if the number sentence is true or false.

True/False

$$31 - 27 = 25 - 15$$

3. Solve  $78 - 43$  and  $81 - 46$  vertically using the space below. Circle to tell if the number sentence is true or false.

True/False

$$78 - 43 = 81 - 46$$

4. Mrs. Smith has 39 tomatoes in her garden. Mrs. Thompson has 52 tomatoes in her garden. How many fewer tomatoes does Mrs. Smith have than Mrs. Thompson?

Name \_\_\_\_\_

Date \_\_\_\_\_

Directions: Solve vertically. Draw a place value chart and chips to model each problem.

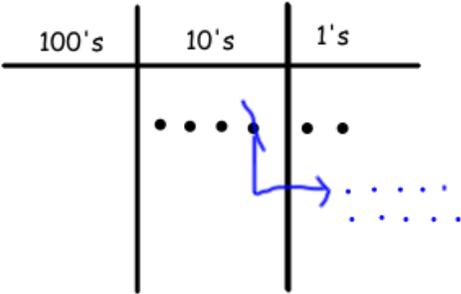
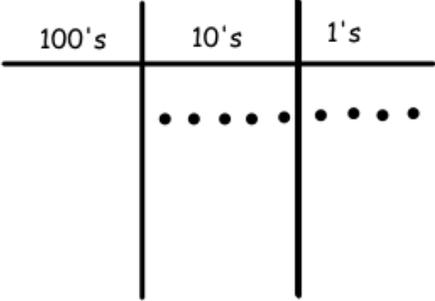
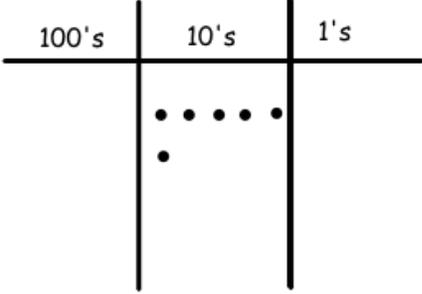
1.  $75 - 28 =$  \_\_\_\_\_

2.  $63 - 35 =$  \_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Complete the problem by subtracting vertically. Use the place value chart and chips to model each problem. Show how you change 1 ten for 10 ones when necessary. The first one has been started for you.

<p>a.</p> $42 - 26 = \underline{\quad}$	
<p>b.</p> $54 - 28 = \underline{\quad}$	
<p>c.</p> $60 - 17 = \underline{\quad}$	

2. Solve vertically. Draw a place value chart and chips to model each problem. Show how you change 1 ten for 10 ones when necessary.

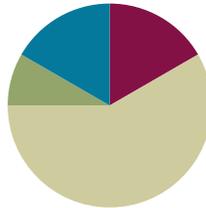
a. $31 - 19 = \underline{\quad}$	b. $47 - 24 = \underline{\quad}$
c. $51 - 39 = \underline{\quad}$	d. $67 - 44 = \underline{\quad}$
c. $76 - 54 = \underline{\quad}$	d. $82 - 59 = \underline{\quad}$

## Lesson 14

**Objective:** Represent subtraction with and without the decomposition when there is a three-digit minuend.

### Suggested Lesson Structure

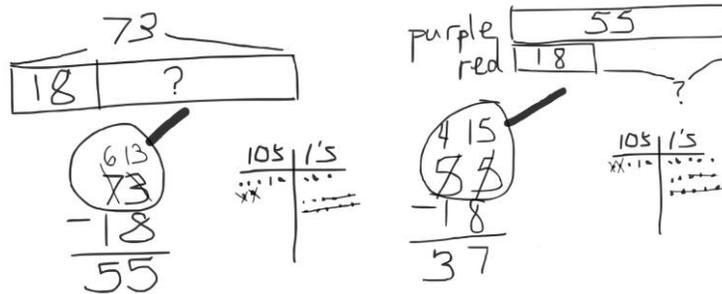
■ Application Problem	(5 minutes)
■ Fluency Practice	(10 minutes)
■ Concept Development	(35 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Application Problem (5 minutes)

The total length of a red string and a purple string is 73 cm. The red string is 18 cm long. How long is the purple string?

This Application Problem allows students to practice yesterday’s skill. In order to keep their work simple, perhaps draw the tape diagram together and then let them solve the subtraction and write their solutions independently. Early finishers can find the difference in length between the two strings.



### Fluency Practice (10 minutes)

- Place Value **2.NBT.1** (3 minutes)
- Rename the Units: Choral Response **2.NBT.1** (5 minutes)
- Take from the Tens or Ones **2.NBT.5** (2 minutes)

### Place Value (3 minutes)

Note: Practicing these skills in isolation will help lay a foundation for conceptually understanding this lesson’s content.

T: (Write 184.) Say the number.  
S: 184.

- T: What digit is in the tens place?  
S: 8.  
T: (Underline 8.) What's the value of the 8?  
S: 80.  
T: State the value of the digit 1.  
S: 100.  
T: 4?  
S: 4.

Repeat using the following possible sequence: 173, 256, 398.

### Rename the Units: Choral Response (5 minutes)

Note: This fluency will review foundations that will lead into today's lesson.

- T: (Write 10 ones = \_\_\_\_ ten.) Say the number sentence.  
S: 10 ones = 1 ten.  
T: (Write 20 ones = 1 ten \_\_\_\_ ones.) Say the number sentence.  
S: 20 ones = 1 ten 10 ones.  
T: (Write 24 ones = 1 ten \_\_\_\_ ones.) Say the number sentence.  
S: 24 ones = 1 ten 14 ones.  
T: (30 ones = 2 tens \_\_\_\_ ones.) Say the number sentence.  
S: 30 ones = 2 tens 10 ones.

Repeat the process for 30, 32, 38, 40, 41, 46, 50, 63, 88.

### Take from the Tens or Ones (2 minutes)

Note: This fluency helps students to know when to unbundle a ten to subtract and when not to. This is a foundational skill for the lesson.

- T: For every number sentence I say you tell me if I take from the tens or the ones. When I say  $46 - 5$ , you say take from the ones, but if I say  $46 - 7$ , you say take from the tens. Ready?  
T:  $46 - 6$ .  
S: Take from the ones.  
T:  $46 - 9$ .  
S: Take from the tens.

Continue with the following possible sequence:  $52 - 1$ ,  $52 - 4$ ,  $63 - 6$ ,  $64 - 5$ ,  $65 - 4$ ,  $68 - 8$ ,  $70 - 3$ .

**Concept Development (35 minutes)**

Materials: (S) Math journals or paper

- T: Write  $126 - 19$  the vertical way on your paper.
- T: Today, let's draw the magnifying glass around the total, 126. (Draw the magnifying glass as students do the same.)
- T: Draw your place value chart. (Or use a template with the units already labeled.)



- T: Whisper count the Say Ten way as you draw the place value units of 126. (Model drawing chips to represent the minuend as students do the same.)
- S: 1 hundred, 1 hundred 1 ten, 1 hundred 2 tens, 1 hundred 2 tens 1 ... 1 hundred 2 tens 6.
- T: Use place value language to tell your partner how your model matches the written subtraction.
- S: I drew 1 dot in the hundreds place, 2 dots in the tens place, and 6 dots in the ones place, so that is one hundred, twenty-six. → 1 hundred, 2 tens, 6 ones is the same as one hundred twenty-six.
- T: What next?
- S: Check to see if you can subtract ones. → See if there are enough ones to subtract.
- T: Can I subtract 9 ones from 6 ones?
- S: You have to unbundle a ten. → Rename a ten as 10 ones.
- T: What I draw, you draw. (Model crossing out a dot in the tens place, drawing an arrow to show the exchange and adding 10 ones to the ones column as students do the same.)
- T: What should I do in my written problem?
- S: Cross out 2 tens, make 1 ten; cross out the 6 ones, make it a 16 ones. → Change 1 ten for 10 ones.
- T: Now that we've renamed, let's say the new problem using place value language.
- S: 1 hundred, 1 ten, 16 ones minus 1 ten, 9 ones.
- T: Am I ready to subtract?
- S: Yes!



**NOTES ON  
MULTIPLE MEANS OF  
ACTION AND  
EXPRESSION:**

For students who start subtracting with the hundreds place, use disks and a chart to model how complicated it becomes when you have to decompose. For example,  $125 - 13$  is easy, but if students have  $125 - 37$  and start with the hundreds place, they will have to unbundle the 100 to subtract the 30 from the 20. Then students will face the same problem in the ones place.

MP.6

Work through the tens and ones, subtracting using the language of units.

- T: Now this part is new. We have 1 hundred. Turn and talk, what do I do next?
- S: 1 hundred minus 0 is 1 hundred. → Subtract 0 from 1.
- T: If I have 1 hundred and I take away 0, how many hundreds do I have left?
- S: 1.
- T: Should I change my chip model?
- S: No.
- T: Then where do I record my answer?
- S: In the hundreds place in the written subtraction!

MP.6

Model writing 1 in the hundreds place for your answer as students do the same.

- T: Read the answer the Say Ten way.
- S: 1 hundred, 7.
- T: The regular way?
- S: One hundred seven.
- T: Talk with your partner. How does having a hundred change how you solved the problem?
- S: We had to draw a hundreds place on our charts. → We solved the same way; we subtracted the ones and tens like before.

Follow the procedure above to guide students as they write, model, and solve  $137 - 28$ . At each step, remind students to be precise in aligning the digits and in drawing their dots in neat 5-groups. Have them share how each step in the drawing matches each step in the written subtraction method.

Continue with the following possible sequence:  $165 - 18$ ,  $153 - 29$ ,  $186 - 47$ . Continue to support students who struggle, but as students demonstrate proficiency, instruct them to work on the Problem set independently.

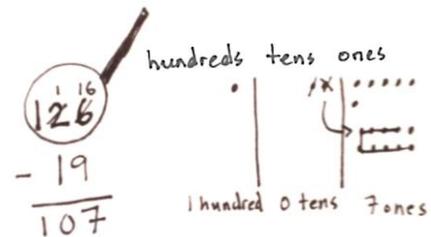
### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.



#### NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Use the Rekenrek to represent subtraction with decomposing a ten as an alternate method for students who have trouble grasping the concept.



NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 14 Problem Set 2•4

Name Alexa Date \_\_\_\_\_

1. Solve by writing the problem vertically and checking your result by drawing chips on the place value chart. Change 1 ten for 10 ones when needed.

<p>a. <math>134 - 23 =</math> _____</p> $\begin{array}{r} 134 \\ - 23 \\ \hline 111 \end{array}$	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 33%;">Hundreds</th> <th style="width: 33%;">Tens</th> <th style="width: 33%;">Ones</th> </tr> <tr> <td style="text-align: center;">•</td> <td style="text-align: center;">•••••</td> <td style="text-align: center;">•••••</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> </table>	Hundreds	Tens	Ones	•	•••••	•••••	1	1	1
Hundreds	Tens	Ones								
•	•••••	•••••								
1	1	1								
<p>b. <math>140 - 12 =</math> _____</p> $\begin{array}{r} 140 \\ - 12 \\ \hline 128 \end{array}$	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 33%;">Hundreds</th> <th style="width: 33%;">Tens</th> <th style="width: 33%;">Ones</th> </tr> <tr> <td style="text-align: center;">•</td> <td style="text-align: center;">•••••</td> <td style="text-align: center;">•••••</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">8</td> </tr> </table>	Hundreds	Tens	Ones	•	•••••	•••••	1	2	8
Hundreds	Tens	Ones								
•	•••••	•••••								
1	2	8								
<p>c. <math>121 - 14 =</math> _____</p> $\begin{array}{r} 121 \\ - 14 \\ \hline 107 \end{array}$	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 33%;">Hundreds</th> <th style="width: 33%;">Tens</th> <th style="width: 33%;">Ones</th> </tr> <tr> <td style="text-align: center;">•</td> <td style="text-align: center;">•••••</td> <td style="text-align: center;">•••••</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">7</td> </tr> </table>	Hundreds	Tens	Ones	•	•••••	•••••	1	0	7
Hundreds	Tens	Ones								
•	•••••	•••••								
1	0	7								

COMMON CORE Lesson 14: Represent subtraction with and without the decomposition when there is a three-digit minuend. ©2013 Common Core, Inc. All rights reserved. engage<sup>ny</sup> 2.C.6

**Student Debrief (10 minutes)**

**Lesson Objective:** Represent subtraction with and without the decomposition when there is a three-digit minuend.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- Explain to your partner how you solved Problems 1(a) and (b). What significant differences do you notice about the written subtraction and place value charts for these two problems (i.e., did you have to unbundle a ten)? Why?
- For Problem 1(c), use place value language to explain to your partner how your model matches the written subtraction. Why does your answer include a zero in the tens place?
- For Problem 1(d), how did having a three-digit addend (as opposed to two-digit) change the way you solved the problem?
- One student’s answer for Problem 1(e),  $187 - 49$ , was 148. What mistake did she make in the written subtraction? How would the chip model have helped her to figure out the correct answer?
- How are your math drawings and written subtractions today similar to and different from the ones you did yesterday?

The image shows student work for four subtraction problems. Problem d:  $161 - 26 = 135$ . The student used a place value chart with 1 hundred, 6 tens, and 1 one. They decomposed one ten into ten ones, resulting in 1 hundred, 5 tens, and 11 ones. Problem e:  $187 - 49 = 138$ . The student used a place value chart with 1 hundred, 8 tens, and 7 ones. They decomposed one ten into ten ones, resulting in 1 hundred, 7 tens, and 17 ones. Problem 2a:  $63 - 28 = 35$ . The student used a place value chart with 6 tens and 3 ones. They decomposed one ten into ten ones, resulting in 5 tens and 13 ones. Problem 2b:  $163 - 28 = 135$ . The student used a place value chart with 1 hundred, 6 tens, and 3 ones. They decomposed one ten into ten ones, resulting in 1 hundred, 5 tens, and 13 ones.

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve by writing the problem vertically and checking your result by drawing chips on the place value chart. Change 1 ten for 10 ones when needed.

a.  $134 - 23 =$  \_\_\_\_\_

Hundreds	Tens	Ones

b.  $140 - 12 =$  \_\_\_\_\_

Hundreds	Tens	Ones

c.  $121 - 14 =$  \_\_\_\_\_

Hundreds	Tens	Ones

d.  $161 - 26 = \underline{\hspace{2cm}}$

Hundreds	Tens	Ones

e.  $187 - 49 = \underline{\hspace{2cm}}$

Hundreds	Tens	Ones

2. Solve the following problems vertically without a place value chart.

<p>a. <math>63 - 28 = \underline{\hspace{2cm}}</math></p>	<p>b. <math>163 - 28 = \underline{\hspace{2cm}}</math></p>
---	--

Name \_\_\_\_\_

Date \_\_\_\_\_

Solve by writing the problem vertically and checking your result by drawing chips on the place value chart. Change 1 ten for 10 ones when needed.

1.  $145 - 28 =$  \_\_\_\_\_

Hundreds	Tens	Ones

2.  $151 - 39 =$  \_\_\_\_\_

Hundreds	Tens	Ones

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve by writing the problem vertically and checking your result by drawing chips on the place value chart. Change 1 ten for 10 ones when needed.

a.  $156 - 42 =$  \_\_\_\_\_

Hundreds	Tens	Ones

b.  $150 - 36 =$  \_\_\_\_\_

Hundreds	Tens	Ones

c.  $163 - 45 =$  \_\_\_\_\_

Hundreds	Tens	Ones

2. Solve the following problems without a place value chart.

a.  $\begin{array}{r} 134 \\ - 29 \\ \hline \end{array}$	b.  $\begin{array}{r} 154 \\ - 37 \\ \hline \end{array}$
--	--

3. Solve and show your work. Draw a place value chart and chips if needed.

a. Aniyah has 165 seashells. She has 28 more than Ralph. How many seashells does Ralph have?

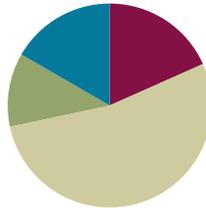
b. Aniyah and Ralph each give 19 seashells to Harold. How many seashells does Aniyah have left? How many seashells does Ralph have left?

## Lesson 15

**Objective:** Represent subtraction with and without the decomposition when there is a three-digit minuend.

### Suggested Lesson Structure

■ Fluency Practice	(11 minutes)
■ Application Problem	(7 minutes)
■ Concept Development	(32 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (11 minutes)

- Subtraction from Tens **2.NBT.5** (2 minutes)
- Sprint: Two-Digit Subtraction **2.NBT.5** (9 minutes)

### Subtraction from Tens (2 minutes)

- T: Just like yesterday, when I say a basic fact, you add ten to the whole and continue until I say to stop. So after  $11 - 9$ , you would solve  $21 - 9$  then?
- S:  $31 - 9$ ,  $41 - 9$ ,  $51 - 9$ .
- T: Yes, as high as you can before I give the signal to stop. Let's begin.  $11 - 9$ .
- S: (Students work. Stop them when you see the slowest student has completed at least two problems.)

Continue with the following possible sequence:  $12 - 8$ ,  $11 - 8$ ,  $13 - 9$ .

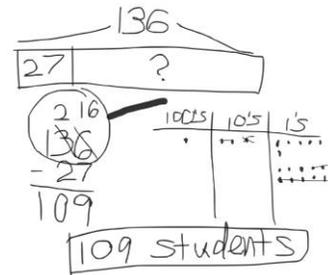
### Sprint: Two-Digit Subtraction (9 minutes)

Materials: (S) Two-Digit Subtraction Sprint

Note: This Sprint reviews subtraction with unbundling to prepare students for the lesson.

### Application Problem (7 minutes)

There are 136 students in the second grade at Miles Davis Elementary. 27 of them brought sack lunches to school. The rest buy the hot lunch. How many students are buying a hot lunch?



Note: This Application Problem asks students to apply their understanding of decomposing when there is a three-digit minuend. Again, perhaps analyze part-whole relationships together, draw the tape diagram together and let them solve the problem independently. When they have finished, share exemplary but diverse student work so that students see how others are drawing their disks or chips.

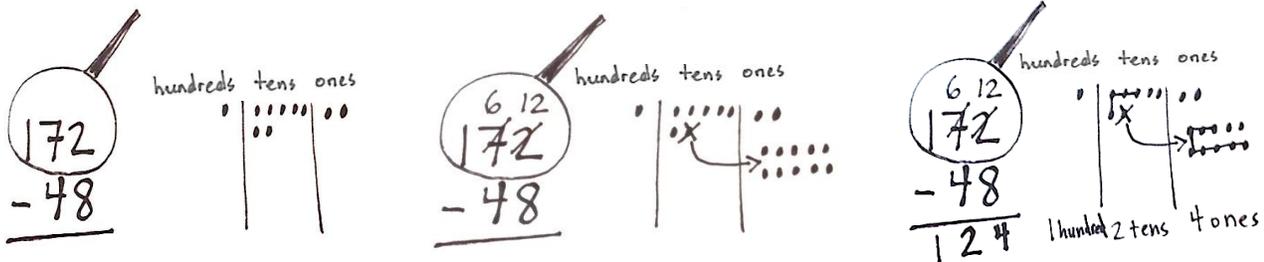
**Concept Development (32 minutes)**

Materials: (S) Math journals or paper

The goal of place value models is to help students understand the quantities involved in written computation. As this understanding deepens, students will no longer need to use models; they will be able to solve with numbers alone.

This lesson is designed to give students ample time working with bare numbers and chip models to develop conceptual understanding and procedural fluency with the written method. It anticipates that students will grasp this understanding at different rates. As students demonstrate proficiency (i.e., they are able to explain why they decomposed a ten using place value language), encourage them to dispense with the models.

**Problem 1: 172 – 48**



- T: Copy the following problem onto your paper in vertical form: 172 – 48.
- T: Before I can begin subtracting in vertical form, what must I always do?
- S: Get ready to subtract!
- T: For now, draw the chip model. Whisper count as you add dots to the place value chart. (Circulate as students set up their chip models, listening and looking to see that they are drawing them correctly.)
- S: (Whisper as they add 1 hundred, 7 tens, and 2 ones to their chip models.)
- T: Use place value language to tell your partner how you set up your drawing.



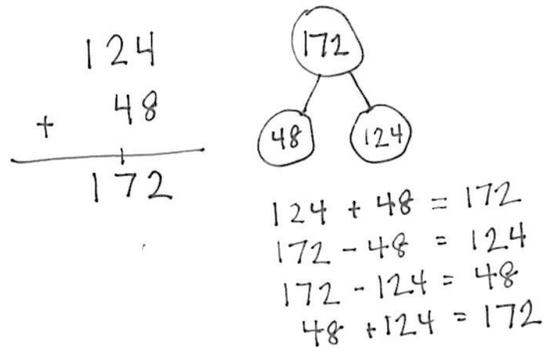
**NOTES ON  
MULTIPLE MEANS OF  
ACTION AND  
EXPRESSION:**

Allow students to use disks, labeled disk drawings, and chip models for as long as is necessary to demonstrate proficiency in this method.

- S: I put 1 unit in the hundreds place, 7 units in the tens place, and 2 units in the ones place. → I put 1 dot for 1 hundred, 7 dots for 70, and 2 dots for 2. → I showed the right number of units for each digit.
- T: Solve the problem using your chip model. As you solve, record your changes and answer in the vertical form.
- T: When you're finished, check your work with a partner, and explain how your model matches the written subtraction. Use place value language to explain each step.

Circulate to listen in on conversations and offer support as needed.

- T: The answer to  $172 - 48$  is?
- S: 124.
- T: Let's draw a number bond to show that. What was our total?
- S: 172.
- T: Our parts?
- S: 48 and 124.
- T: If we add together the parts, what should the total be?
- S: 172.
- T: Do that now. Add together the parts to see if you get the correct total.
- S: It's the same! → Yeah, we got it right! → If we got it wrong, the total would be different.
- T: Let's make two addition and two subtraction sentences for this number bond.



Have the students either generate as a whole class or work to write them down. Seeing the number bond with larger numbers helps bridge their part-whole understandings from smaller numbers to larger.

Repeat the procedure for the original activity in which students solve the written subtraction by drawing chip models. Use the following possible sequence:  $154 - 39$ ,  $142 - 18$ ,  $135 - 27$ .

Continue to support students who need assistance. Allow students who demonstrate proficiency with the models and written subtractions to work on the Problem Set independently.



**NOTES ON  
MULTIPLE MEANS OF  
ENGAGEMENT:**

On the Problem Set, encourage early finishers to check their answers by using addition. Both parts should add up to the original whole (i.e., the difference plus the subtrahend should equal the minuend). If they made a mistake, encourage them to work with a partner to discover the reason why and to correct the problem. This can help prevent the habit of valuing speed over accuracy, as it discourages students from habituating to incorrect procedures.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Represent subtraction with and without the decomposition when there is a three-digit minuend.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

MP.3

- When you used the chip model for Problem 1(a), how did you know whether or not to unbundle a ten? Was this the same in Problem 1(b)?
- For Problem 1(b), where did you write the unbundled ten as ones in the written subtraction? How did it match your chip model?
- For Problem 1(c), what number(s) did you draw on your place value chart? Why? Does subtracting a three-digit number change how you subtract?
- For Problem 1(d) and (e), can you tell if you will need to decompose a ten just by looking at the digits in the ones place? Explain how you know.
- Look at Problems 2(a) and (b). How did you solve these problems without using a place value chart? Did you draw a magnifying glass? What can you visualize?

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

Name: Alexa Date: \_\_\_\_\_

1. Solve each problem using the vertical method. Show the subtraction on the place value chart with chips. Exchange 1 ten for 10 ones when necessary.

a.  $173 - 42$

$$\begin{array}{r} 173 \\ - 42 \\ \hline 131 \end{array}$$

Hundreds	Tens	Ones
1	3	1

b.  $173 - 38$

$$\begin{array}{r} 173 \\ - 38 \\ \hline 135 \end{array}$$

Hundreds	Tens	Ones
1	3	5

c.  $170 - 44$

$$\begin{array}{r} 170 \\ - 44 \\ \hline 126 \end{array}$$

Hundreds	Tens	Ones
1	2	6

COMMON CORE Lesson 15: Represent subtraction with and without the decomposition when there is a three-digit minuend. Date: 6/12/13 engage<sup>ny</sup> 4.C.7

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

d.  $150 - 19$

$$\begin{array}{r} 150 \\ - 19 \\ \hline 131 \end{array}$$

Hundreds	Tens	Ones
1	3	1

e.  $186 - 57$

$$\begin{array}{r} 186 \\ - 57 \\ \hline 129 \end{array}$$

Hundreds	Tens	Ones
1	2	9

2. Solve the following problems without using a place value chart.

a.  $73 - 56$

$$\begin{array}{r} 73 \\ - 56 \\ \hline 17 \end{array}$$

b.  $170 - 53$

$$\begin{array}{r} 170 \\ - 53 \\ \hline 117 \end{array}$$

COMMON CORE Lesson 15: Represent subtraction with and without the decomposition when there is a three-digit minuend. Date: 6/12/13 engage<sup>ny</sup> 4.C.8

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

**A**

# Correct \_\_\_\_\_

Subtract.

1	$53 - 2 =$		23	$84 - 40 =$	
2	$65 - 3 =$		24	$80 - 50 =$	
3	$77 - 4 =$		25	$86 - 50 =$	
4	$89 - 5 =$		26	$70 - 60 =$	
5	$99 - 6 =$		27	$77 - 60 =$	
6	$28 - 7 =$		28	$80 - 70 =$	
7	$39 - 8 =$		29	$88 - 70 =$	
8	$31 - 2 =$		30	$48 - 4 =$	
9	$41 - 3 =$		31	$80 - 40 =$	
10	$51 - 4 =$		32	$81 - 40 =$	
11	$61 - 5 =$		33	$46 - 3 =$	
12	$30 - 9 =$		34	$60 - 30 =$	
13	$40 - 8 =$		35	$68 - 30 =$	
14	$50 - 7 =$		36	$67 - 4 =$	
15	$60 - 6 =$		37	$67 - 40 =$	
16	$40 - 30 =$		38	$89 - 6 =$	
17	$41 - 30 =$		39	$89 - 60 =$	
18	$40 - 20 =$		40	$76 - 2 =$	
19	$42 - 20 =$		41	$76 - 20 =$	
20	$80 - 50 =$		42	$54 - 6 =$	
21	$85 - 50 =$		43	$65 - 8 =$	
22	$80 - 40 =$		44	$87 - 9 =$	

© Bill Davidson



Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve each problem using the vertical method. Show the subtraction on the place value chart with chips. Exchange 1 ten for 10 ones when necessary.

a.  $173 - 42$

Hundreds	Tens	Ones

b.  $173 - 38$

Hundreds	Tens	Ones

c.  $170 - 44$

Hundreds	Tens	Ones

d.  $150 - 19$

Hundreds	Tens	Ones

e.  $186 - 57$

Hundreds	Tens	Ones

2. Solve the following problems without using a place value chart.

<p>a. <math>73 - 56</math></p>          	<p>b. <math>170 - 53</math></p>          
--	---

Name \_\_\_\_\_

Date \_\_\_\_\_

Solve using the vertical method. Show the subtraction on a place value chart with chips. Exchange 1 ten for 10 ones when necessary.

1.  $164 - 49$

Hundreds	Tens	Ones

2.  $181 - 73$

Hundreds	Tens	Ones

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve each problem using the vertical method. Show the subtraction on the place value chart with chips. Exchange 1 ten for 10 ones when necessary.

a.  $153 - 31$

Hundreds	Tens	Ones

b.  $153 - 38$

Hundreds	Tens	Ones

c.  $160 - 37$

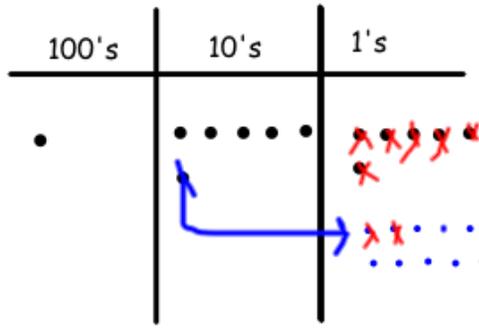
Hundreds	Tens	Ones

d.  $182 - 59$

Hundreds	Tens	Ones

2. Lisa solved  $166 - 48$  vertically and on her place value chart. Explain what Lisa did correctly and what she needs to fix.

$$\begin{array}{r}
 \overset{5}{1} \overset{16}{\cancel{6}} \\
 - 48 \\
 \hline
 108
 \end{array}$$



a. Lisa correctly \_\_\_\_\_

\_\_\_\_\_

b. Lisa needs to fix \_\_\_\_\_

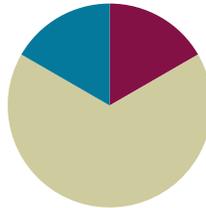
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## Lesson 16

**Objective:** Solve one- and two-step word problems within 100 using strategies based on place value.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Concept Development	(40 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



#### A NOTE ON LESSON STRUCTURE:

The Application Problems are not a separate component of this lesson. They are the focus of today's Concept Development.

### Fluency Practice (10 minutes)

- Find the Total **2.NBT.5** (5 minutes)
- Find the Difference **2.NBT.5** (5 minutes)

#### Find the Total (5 minutes)

Materials: (S) Personal white boards

Note: Reviewing this mental math fluency will prepare students for understanding the importance of the addition algorithm. Students will be adding to solve word problems in the lesson.

T: (Write  $25 + 73 = \underline{\quad}$ .) Solve using any method.

T: Write 1 hundred to change 25 to 125. What is the total now?

S: 198.

Repeat the process and sequence with  $35 + 54$  and  $135 + 54$ ;  $38 + 22$  and  $138 + 22$ ;  $42 + 38$  and  $142 + 38$ .

#### Find the Difference (5 minutes)

Materials: (S) Personal white boards

Note: Reviewing subtraction problems in sets will prepare students for understanding the importance of the subtraction algorithm. Students will be subtracting to solve word problems in the lesson.

T: (Write  $48 - 24 = \underline{\quad}$ .) Write a subtraction sentence horizontally or vertically.

Repeat the process and sequence for  $48 - 24$ ,  $40 - 24$ ;  $56 - 15$ ,  $50 - 15$ ,  $52 - 15$ ;  $4 - 38$ ,  $60 - 38$ ,  $61 - 38$ .

**Concept Development (40 minutes)**

Materials: (S) Problem Set

**Suggested Delivery of Instruction for Solving Topic C's Word Problems****1. Model the problem.**

Invite two pairs of students who you think can successfully model the problem to work at the board while the others work independently or in pairs at their seats. Review the following questions before solving the first problem.

- Can you draw something?
- What can you draw?
- What conclusions can you make from your drawing?

As students work, circulate. Reiterate the questions above and guide them in drawing their tape diagrams.

After two minutes, have the two pairs of students share *only* their labeled diagrams.

For about one minute, encourage the demonstrating students to respond to feedback and questions from their peers.

**2. Solve and write a statement.**

Discuss strategies for solving problems, drawing attention to the strategy chart created during the Debrief in Lesson 3. Give students two minutes to solve and complete the question, sharing their work and thought processes with a peer. Then, instruct students to write their equations and statements of the answer.

**3. Assess the solution for reasonableness.**

Give students one to two minutes to assess and explain the reasonableness of their solution.

**NOTES ON  
MULTIPLE MEANS OF  
ENGAGEMENT:**

For students who still struggle with making tape diagrams, start with easier subtraction problems that require no regrouping. When they are proficient with drawing the tape diagrams for easier problems, raise the level of difficulty of the problems.

**Problem 1: Solve a single-step *take from with change unknown* word problem using a tape diagram and chip model.**

Seneca put 56 beads on a necklace. Some beads fell off, but he still has 28 left. How many beads did he lose?

Handwritten student work for Problem 1:

- Tape Diagram:** A tape diagram with a top bar labeled "56 beads" and a bottom bar divided into two sections. The left section is labeled "?" and "fell off", and the right section is labeled "28 left".
- Chip Model:** Two rows of chips. The top row has a "+2" chip and a "56" chip. The bottom row has a "+2" chip and a "28" chip.
- Equations:**

$$56 - 28 = 28$$

$$56 + 2 = 58$$

$$28 + 2 = 30$$

$$58 - 30 = 28$$
- Number Line:** A vertical number line with "10's" and "1's" columns. It shows a starting point at 56 and a subtraction of 28, with arrows indicating the process.
- Subtraction Problem:** A standard subtraction problem:
 
$$\begin{array}{r} 4 \text{ } 16 \\ - 28 \\ \hline 28 \end{array}$$
- Text:** "He lost 28 beads."

Circulate and ask guiding questions as needed to help students see that we know the whole and one part; therefore, we subtract. By now, students have many strategies at their disposal. As they are successful with the tape diagram and chip model, encourage students to show more than one way to solve. For example, some students may use compensation and show  $56 - 28 = 58 - 30 = 28$ .



**NOTES ON MULTIPLE MEANS OF REPRESENTATION:**

Remind students that tape diagrams are like part-part-whole (or part-part-part-whole) representations of the problem. If they can identify which are the parts, and which is the whole, and which of those they need to find, they

**Problem 2: Solve a single-step word problem by drawing a tape diagram and chip model.**

70 students voted for a field trip to the zoo. 34 students voted for the museum. How many more students voted for the zoo than the museum?

Support students by eliciting the response that we are comparing numbers; we subtract to find how much more 70 is than 34. Again, encourage students to solve in multiple ways once they have correctly modeled and solved using the tape diagram and chip model.

Handwritten student work for Problem 2:

- Tape Diagram:** A tape diagram with a top bar labeled "70" and a bottom bar divided into two sections. The left section is labeled "34" and the right section is labeled "?".
- Chip Model:** A vertical number line with "10's" and "1's" columns. It shows a starting point at 70 and a subtraction of 34, with arrows indicating the process.
- Subtraction Problem:** A standard subtraction problem:
 
$$\begin{array}{r} 6 \text{ } 10 \\ - 34 \\ \hline 36 \end{array}$$
- Text:** "36 more students voted for the zoo."
- Equations:**

$$34 + 30 = 64$$

$$64 + 6 = 70$$

**Problem 3: Solve a two-step problem by drawing a tape diagram and chip model.**

- a. Suki has 44 cents. She spends 25 cents on a pencil. How much money does she have left?
- b. She finds 33 cents more. How much money does she have now?

a.

She has 19¢ left.

b.

She has 52¢ now.

Circulate and ask guiding questions as needed to remind students that for each step they must decide if they are finding a missing part or a total.

**Problem 4: Solve a two-step problem by using a preferred method.**

Farmer Ben picks 87 apples. 26 apples are green, 20 are yellow, and the rest are red. How many apples are red?

Circulate and encourage students to use their favorite method to solve. Students should be alert to the relationship of the numbers and recognize when mental strategies are most efficient. Remind them to be prepared to explain their strategy using place value language.

41 apples are red.

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

**Student Debrief (10 minutes)**

**Lesson Objective:** Solve one- and two-step word problems within 100 using strategies based on place value.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- How could you use a tape diagram to solve Problem 1? Which strategy did you use to solve? Could you have used a different simplifying strategy?
- Which operation did you choose to solve Problem 2? Why? How does a tape diagram help you to show the situation?
- How did you show your thinking in Problem 3? What simplifying strategy can you use to solve? Why choose that one?
- Explain to your partner the steps you took to solve Problem 4. How did you represent this multi-step problem? What simplifying strategy did you use instead of unbundling a ten for the first portion of the problem?
- For Problem 5, share your drawings with a partner. What did you need to know before you could figure out how many books were in the yellow bin? How did you show it?

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

Name: Alexa Date: \_\_\_\_\_

Solve the following word problems. Use the RDW process.

1. Frederick counted a total of 80 flowers in the garden. There were 39 white flowers, and the rest were pink. How many flowers were pink?

$80 - 39$

41 flowers were pink.

2. The clothing store had 42 shirts. After selling some, there were 16 left. How many shirts were sold?

$42 - 16$

$$\begin{array}{r} 312 \\ 42 \\ - 16 \\ \hline 26 \end{array}$$

26 shirts were sold.

3. There were 26 magazines on shelf A and 60 magazines on shelf B. How many more magazines were on shelf B than shelf A?

$60 - 26$

$60 \rightarrow 40 \rightarrow 34$

There are 34 more on shelf B than shelf A.

COMMON CORE Lesson 16: Solve one- and two-step word problems within 100 using strategies based on place value. Date: 6/13/13 engageNY 4.C.6

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

4. Andy spent 71 hours studying in November. In December, he studied 19 hours less. Rachel studied 22 hours more than Andy studied in December. How many hours did Rachel study in December?

$71 - 19$

$72 - 20 = 52$

$52 + 22$   $52 \xrightarrow{+20} 72 \xrightarrow{+2} 74$

Rachel studied for 74 hours.

5. 36 books are in the blue bin. The blue bin has 18 more books than the red bin. The yellow bin has 7 more books than the red bin.

a. How many books were in the red bin?

$36 - 18$

$$\begin{array}{r} 210 \\ 36 \\ - 18 \\ \hline 18 \end{array}$$

There are 18 books in the red bin.

b. How many books are in the yellow bin?

$18 + 7$

There are 25 books in the yellow bin.

COMMON CORE Lesson 16: Solve one- and two-step word problems within 100 using strategies based on place value. Date: 6/12/13 engageNY 4.C.7



4. Andy spent 71 hours studying in November.  
In December, he studied 19 hours less.  
Rachel studied 22 hours more than Andy studied in December.  
How many hours did Rachel study in December?
5. 36 books are in the blue bin.  
The blue bin has 18 more books than the red bin.  
The yellow bin has 7 more books than the red bin.
- a. How many books were in the red bin?
- a. How many books are in the yellow bin?



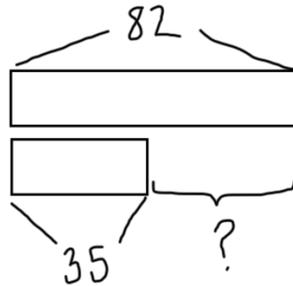
Name \_\_\_\_\_

Date \_\_\_\_\_

Solve the following word problems. Use the RDW process.

1. Vicki modeled the following problem with a tape diagram.

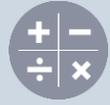
82 students are in the math club. 35 students are in the science club. How many more students are in the math club than science club?



Show another model to solve the problem. Write your answer in a sentence.

2. 46 birds sat on a wire. Some flew away, but 29 stayed. How many birds flew away?  
Show your work.

3. Ian bought a pack of 47 water balloons. 19 were red, 16 were yellow, and the rest were blue. How many water balloons were blue? Show your work.
4. Daniel read 54 pages of his book in the morning. He read 27 fewer pages in the afternoon. How many pages did Daniel read altogether? Show your work.



## Topic D

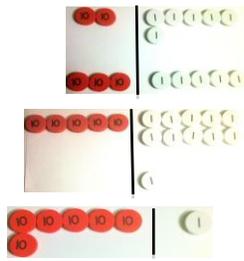
# Strategies for Composing Tens and Hundreds

## 2.NBT.6, 2.NBT.7, 2.NBT.8, 2.NBT.9

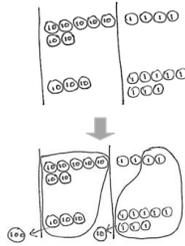
<b>Focus Standard:</b>	2.NBT.6	Add up to four two-digit numbers using strategies based on place value and properties of operations.
	2.NBT.7	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
	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.)
<b>Instructional Days:</b>	6	
<b>Coherence</b>	<b>-Links from:</b>	G1–M4 Place Value, Comparison, Addition and Subtraction to 40
	<b>-Links to:</b>	G2–M5 Addition and Subtraction Within 1000 with Word Problems to 100
		G3–M2 Place Value and Problem Solving with Units of Measure

In Lesson 17 of Topic D, students extend the base ten understanding developed in Topic A to numbers within 200. Having worked with manipulatives to compose 10 ones as 1 ten, students relate this to composing 10 tens as 1 hundred. For example, students might solve  $50 + 80$  by thinking  $5 \text{ ones} + 8 \text{ ones} = 13 \text{ ones}$ , so  $5 \text{ tens} + 8 \text{ tens} = 13 \text{ tens} = 130$ . They use place value language to explain when they make a new hundred. They also relate 100 more from Module 3 to  $+ 100$  and mentally add 100 to given numbers.

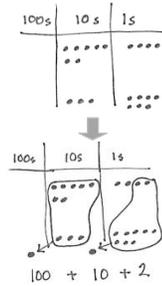
In Lesson 18, students use number disks on a place value chart to represent additions with the composition of 1 ten and 1 hundred. They use place value language to explain when they make a new ten and a new hundred, as well as where to show each new unit on the place value chart. In Lesson 19, students relate manipulatives to a written method, recording compositions as *new groups below* in vertical form. As they did in Topic B, students use place value language to express the action as they physically make 1 hundred with 10 tens disks and 1 ten with 10 ones disks. Working in partners, one student records each change in the written method step by step as the other partner moves the manipulatives.



Place value disks



Place value chart with labeled disks



Chip model



New groups below

In Lessons 20 and 21, students move from concrete to pictorial as they use math drawings to represent compositions of 1 ten and 1 hundred. Some students may need the continued support of place value drawings with labeled disks, while others use the chip model. In both cases, students relate their drawings to a written method, recording each change they make to their model on the numerical representation. They use place value language to explain these changes.

Lesson 22 focuses on adding up to four two-digit addends with totals within 200. Students now have multiple strategies for composing and decomposing numbers, and they use properties of operations (i.e., the associative property) to add numbers in an order that is easiest to compute. For example, when solving  $24 + 36 + 55$ , when adding the ones, a student may make a ten first with 4 and 6. Another student may decompose the 6 to make 3 fives (by adding 1 to the 4).

**A Teaching Sequence Towards Mastery of Strategies for Composing Tens and Hundreds**

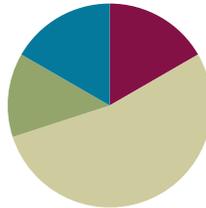
- Objective 1: Use mental strategies to relate compositions of 10 tens as 1 hundred to 10 ones as 1 ten. (Lesson 17)**
- Objective 2: Use manipulatives to represent additions with two compositions. (Lesson 18)**
- Objective 3: Relate manipulative representations to a written method. (Lesson 19)**
- Objective 4: Use math drawings to represent additions with up to two compositions and relate drawings to a written method. (Lessons 20–21)**
- Objective 5: Solve additions with up to four addends with totals within 200 with and without two compositions of larger units. (Lessons 22)**

## Lesson 17

**Objective:** Use mental strategies to relate compositions of 10 tens as 1 hundred to 10 ones as 1 ten.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Concept Development	(32 minutes)
■ Application Problem	(8 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (10 minutes)

- Compensation **2.NBT.5** (5 minutes)
- Rename the Units **2.NBT.1** (5 minutes)

#### Compensation (5 minutes)

Note: This fluency drill reviews the mental math strategy taught in Lesson 4, using compensation to add the same amount to each addend. By making a multiple of 10, students solve a much simpler addition problem.

T: (Write  $42 + 19 = \underline{\quad}$ .) Let's use a mental math strategy to add. How much more does 19 need to make the next ten?

S: 1 more.

T: Where can 19 get 1 more from?

S: From the 42!

T: Take 1 from 42 and give it to 19. Say the new number sentence, with the answer.

S:  $41 + 20 = 61$ .

T:  $37 + 19$ .

S:  $36 + 20 = 56$ .

Continue with the following possible sequence:  $29 + 23$ ,  $38 + 19$ ,  $32 + 19$ ,  $24 + 17$ ,  $34 + 19$ .

#### Rename the Units (5 minutes)

Note: This fluency reviews foundational concepts that support today's lesson.

T: (Write 10 ones =  $\underline{\quad}$  ten  $\underline{\quad}$  ones.) Say the number sentence.

S: 10 ones = 1 ten 0 ones.

- T: (Write 20 ones = 1 ten \_\_\_\_ ones.) Say the number sentence.
- S: 20 ones = 1 ten 10 ones.
- T: (Write 24 ones = 1 ten \_\_\_\_ ones.) Say the number sentence.
- S: 24 ones = 1 ten 14 ones.
- T: (30 ones = 2 tens \_\_\_\_ ones.) Say the number sentence.
- S: 30 ones = 2 tens 10 ones.

Repeat the process for 30, 32, 38, 40, 41, 46, 50, 63, 88.

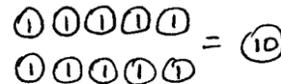
 **NOTES ON MULTIPLE MEANS OF ENGAGEMENT:**

Have the students skip-count by tens from 0 to 200 and back to 0. Improve concentration by having the students touch their lifted right knee with their left hand, and vice versa, alternating with each count.

### Concept Development (32 minutes)

- T: Show me your magic counting sticks. (Students hold up all 10 fingers.) Give them a value of one. Count with me.
- S: 1, 2, ...10! (On 10, students clasp their hands together with a loud clap, interlacing their fingers to make one unit of 10.)

- T: How many ones in 1 ten?
- S: 10 ones!
- T: Yes! (Draw image at right on the board.) 10 ones equal 1 ten.



- T: Hold up your magic counting sticks again. This time, give them each a value of ten. Count with me.



- S: 10, 20, ...100!
- T: How many tens in 1 hundred?
- S: 10 tens!
- T: Correct! (Draw image at right on the board.) 10 tens equal 1 hundred.
- T: (Write 1 one + \_\_\_\_ = 10 ones = 1 ten.) Read these sentences aloud, filling in the blanks.
- S: 1 one plus 9 ones equals 10 ones equals 1 ten.
- T: (Write 1 ten + \_\_\_\_ = 10 tens = 1 hundred.) Read these sentences.
- S: 1 ten plus 9 tens equals 10 tens equals 1 hundred.
- T: Talk with your partner. How are these statements the same and different?
- S: Both have 1 plus 9, the only thing that changes is if it's ones or tens. → They both have a group of 10, but when you add 10 ones you make a ten, and when you add 10 tens you make a hundred.
- T: How is making a ten similar to making a hundred?
- S: It's the same, but instead of using ones to make a ten you use tens to make a hundred. → 10 ones make a ten and 10 tens make a hundred. → Ten of the same unit makes 1 of the next higher unit, like 10 ones makes 1 ten, and 10 tens makes 1 hundred. → Ten of the same unit makes a unit of the next higher place value.
- T: What's 6 ones + 4 ones?

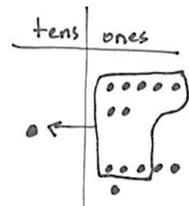
- S: 10 ones → 1 ten!  
 T: 6 tens + 4 tens?  
 S: 10 tens! → 1 hundred!  
 T: 60 + 40?  
 S: 100!  
 T: 7 ones + 6 ones?  
 S: 13 ones.  
 T: 7 + 6?  
 S: 13.  
 T: 7 tens + 6 tens?  
 S: 13 tens.  
 T: 13 tens equals?  
 S: 130.  
 T: 70 + 60?  
 S: 130.  
 T: Pretend your partner is a family member. How can you prove to her that 13 tens is the same as 130?  
 S: Count by tens 13 times. → Show 13 tens on a place value chart. When you circle 10 tens you get a hundred, and there are still 3 tens left. → Show him 13 tens the break apart way, so he sees 13 tens is the same as 10 tens + 3 tens,  $100 + 30 = 130!$   
 T: Excellent reasoning! So 10 tens is?  
 S: 100!  
 T: 11 tens?  
 S: 110!  
 T: 16 tens?  
 S: 160!  
 T: 19 tens?  
 S: 190!  
 T: 20 tens?  
 S: 200!  
 T: Now let's make tens and hundreds. (On the board, write the problem pictured at right.)  
 T: Talk with your partner. What numbers go into the blanks?

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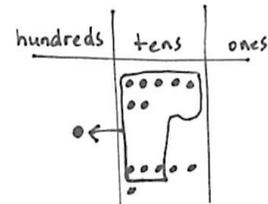


**NOTES ON MULTIPLE MEANS OF REPRESENTATION:**

Explain to students who are struggling with the concept that tens are like apples. If you add 12 apples and 5 apples, you get 17 apples. It's the same with tens: If you add 12 tens (120) and 5 tens (50), you get 17 tens (170). Demonstrate with place value disks if students continue to struggle.



$$7 \text{ ones} + 6 \text{ ones} = 1 \text{ ten} + 3 \text{ ones} = 13$$

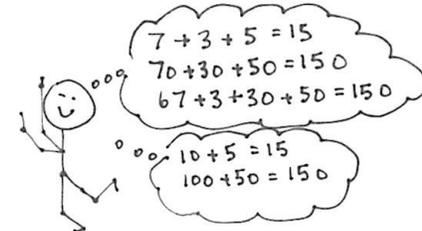


$$7 \text{ tens} + 6 \text{ tens} = 1 \text{ hundred} + 3 \text{ tens} = 130$$

$$7 \xrightarrow{+3} \underline{\quad} \xrightarrow{+5} \underline{\quad}$$

$$70 \xrightarrow{+30} \underline{\quad} \xrightarrow{+50} \underline{\quad}$$

$$67 \xrightarrow{+3} \underline{\quad} \xrightarrow{+30} \underline{\quad} \xrightarrow{+50} \underline{\quad}$$



- S: The numbers in the blanks were 10, 15, and 100, 150 and 70, 100, 150. → I see a pattern.  
 T: Find the total in each problem.  
 S: 15 and 150!  
 T: Explain the relationship between the first problem to the later two problems.  
 S: First we made a ten and then we made a hundred. → And all the answers are alike, 15 ones and 15 tens. → The last one had an extra step because we had to get to the ten.

Repeat with the following problems:  $64 + 6 + 10 + 10 + 10$ ,  $85 + 5 + 10 + 100$ ,  $171 + 9 + 20$ .

As students demonstrate understanding adding 10 or 100, allow them to work on the Problem Set independently.

### Application Problem (8 minutes)

Erasers come in boxes of 10. Victor has 14 boxes. Gabby has 5 boxes.

- How many erasers does Victor have?
- How many erasers does Gabby have?
- If Gabby gets another box, how many erasers do they have in all?

ten 10's → 100 for tens → 40  
 140  
 5 10's → 50  
 190 + 10 = 200

Note: This problem follows the Concept Development, inviting students to apply their understanding of mental strategies for composing 1 hundred and 1 ten to a real world context.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Use mental strategies to relate compositions of 10 tens as 1 hundred to 10 ones as 1 ten.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class.

COMMON CORE Lesson 17: Use mental strategies to relate compositions of 10 tens as 1 hundred to 10 ones as 1 ten. engage<sup>ny</sup> 4.6

Name: Debbie Date: \_\_\_\_\_

1. Solve mentally.

a. 2 ones + 8 = 1 ten      2 + 8 = 10  
 2 tens + 80 = 1 hundred      20 + 80 = 100

b. 1 ten = 4 + 6 ones      10 = 4 + 6  
 1 hundred = 40 + 6 tens      100 = 40 + 60

2. Solve mentally.

a. 3 ones + 7 ones = 10      3 + 7 = 10  
 3 tens + 7 tens = 100      30 + 70 = 100  
 13 tens + 7 tens = 200      130 + 70 = 200

b. 6 ones + 4 ones = 10      6 + 4 = 10  
 16 tens + 4 tens = 200      160 + 40 = 200

c. 12 ones + 8 ones = 20      12 + 8 = 20  
 12 tens + 8 tens = 200      120 + 80 = 200

3. Solve.

a. 9 ones + 4 ones = 1 ten 3 ones      9 + 4 = 13  
 9 tens + 4 tens = 1 hundred 3 tens      90 + 40 = 130

b. 4 ones + 8 ones = 1 ten 2 ones      4 + 8 = 12

Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- What was the total for each problem in 2(a)? What pattern do you notice? What is the relationship between the first problem and the other two problems?
- For Problem 2(b), prove to your partner that 16 tens is the same as 160. Use what you know about the place value chart to support your reasoning.
- How are the problems in 3(a) the same and different? What is the relationship between the first and second problem?
- For Problem 4(a) and (b), why do we add 6 ones first? How does adding 6 ones and then 7 tens change the totals in each problem?
- Ones, tens, and hundreds are part of a base ten system. Why do you think it is called *base ten*? What important connection did we make today between ones, tens, and hundreds?

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 17 2•4

4 tens + 8 tens = 1 hundred 2 tens       $40 + 80 = 120$

c. 6 ones + 7 ones = 1 ten 3 ones       $6 + 7 = 13$

6 tens + 7 tens = 1 hundred 3 tens       $60 + 70 = 130$

4. Fill in the blanks. Rewrite each as an addition sentence with 2 parts. The first one is done for you.

a.  $24 + 30 = 100$       b.  $124 + 130 = 200$

$24 + 76 = 100$        $124 + 71e = 200$

c.  $7 + 10 = 100$       d.  $70 + 130 = 200$

$7 + 193 = 200$        $70 + 130 = 200$

e.  $38 + 40 = 130$       f.  $98 + 100 = 140$

$38 + 92 = 130$        $98 + 48 = 140$

COMMON CORE    Lesson 17    Use mental strategies to relate compositions of 10 tens as 1 hundred to 10 ones as 1 ten.    engage<sup>ny</sup>  
Date: 7/19/13

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve mentally.

a. 2 ones + \_\_\_\_\_ = 1 ten

2 + \_\_\_\_\_ = 10

2 tens + \_\_\_\_\_ = 1 hundred

20 + \_\_\_\_\_ = 100

b. 1 ten = \_\_\_\_\_ + 6 ones

10 = \_\_\_\_\_ + 6

1 hundred = \_\_\_\_\_ + 6 tens

100 = \_\_\_\_\_ + 60

2. Solve mentally.

a. 3 ones + 7 ones = \_\_\_\_\_

3 + 7 = \_\_\_\_\_

3 tens + 7 tens = \_\_\_\_\_

30 + 70 = \_\_\_\_\_

13 tens + 7 tens = \_\_\_\_\_

130 + 70 = \_\_\_\_\_

b. 6 ones + 4 ones = \_\_\_\_\_

6 + 4 = \_\_\_\_\_

16 tens + 4 tens = \_\_\_\_\_

160 + 40 = \_\_\_\_\_

c. 12 ones + 8 ones = \_\_\_\_\_

12 + 8 = \_\_\_\_\_

12 tens + 8 tens = \_\_\_\_\_

120 + 80 = \_\_\_\_\_

3. Solve.

a. 9 ones + 4 ones = \_\_\_\_ ten \_\_\_\_ ones

9 + 4 = \_\_\_\_\_

9 tens + 4 tens = \_\_\_\_ hundred \_\_\_\_ tens

90 + 40 = \_\_\_\_\_

b. 4 ones + 8 ones = \_\_\_\_ ten \_\_\_\_ ones

4 + 8 = \_\_\_\_\_

4 tens + 8 tens = \_\_\_\_ hundred \_\_\_\_ tens

40 + 80 = \_\_\_\_\_

c. 6 ones + 7 ones = \_\_\_\_ ten \_\_\_\_ ones

6 + 7 = \_\_\_\_\_

6 tens + 7 tens = \_\_\_\_ hundred \_\_\_\_ tens

60 + 70 = \_\_\_\_\_

4. Fill in the blanks. Rewrite each as an addition sentence with two parts. The first one is done for you.

a.  $24 \xrightarrow{+6} 30 \xrightarrow{+70} 100$

b.  $124 \xrightarrow{+6} \underline{\hspace{2cm}} \xrightarrow{+70} \underline{\hspace{2cm}}$

$24 + 76 = 100$

$124 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

c.  $7 \xrightarrow{+3} \underline{\hspace{2cm}} \xrightarrow{+90} \underline{\hspace{2cm}} \xrightarrow{+100} \underline{\hspace{2cm}}$

d.  $70 \xrightarrow{+30} \underline{\hspace{2cm}} \xrightarrow{+90} \underline{\hspace{2cm}} \xrightarrow{+10} \underline{\hspace{2cm}}$

$7 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

$70 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

e.  $38 \xrightarrow{+2} \underline{\hspace{2cm}} \xrightarrow{+60} \underline{\hspace{2cm}} \xrightarrow{+30} \underline{\hspace{2cm}}$

f.  $98 \xrightarrow{+2} \underline{\hspace{2cm}} \xrightarrow{+6} \underline{\hspace{2cm}} \xrightarrow{+40} \underline{\hspace{2cm}}$

$38 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

$98 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve mentally.

a. 4 ones + \_\_\_\_\_ = 1 ten

4 + \_\_\_\_\_ = 10

4 tens + \_\_\_\_\_ = 1 hundred

40 + \_\_\_\_\_ = 100

b. 2 ones + 8 ones = \_\_\_\_\_

2 + 8 = \_\_\_\_\_

2 tens + 18 tens = \_\_\_\_\_

20 + 180 = \_\_\_\_\_

2. Fill in the blanks. Rewrite each as an addition sentence with two parts.

$$63 \xrightarrow{+7} \underline{\quad} \xrightarrow{+10} \underline{\quad} \xrightarrow{+10} \underline{\quad} \xrightarrow{+10} \underline{\quad}$$

63 + \_\_\_\_\_ = \_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_

## 1. Solve mentally.

a. 4 ones + \_\_\_\_\_ = 1 ten

4 + \_\_\_\_\_ = 10

4 tens + \_\_\_\_\_ = 1 hundred

40 + \_\_\_\_\_ = 100

b. 1 ten = \_\_\_\_\_ + 7 ones

10 = \_\_\_\_\_ + 7

1 hundred = \_\_\_\_\_ + 7 tens

100 = \_\_\_\_\_ + 70

c. 1 ten more than 9 ones = \_\_\_\_\_

10 + 9 = \_\_\_\_\_

1 hundred more than 9 ones = \_\_\_\_\_

100 + 9 = \_\_\_\_\_

1 hundred more than 9 tens = \_\_\_\_\_

100 + 90 = \_\_\_\_\_

## 2. Solve mentally.

a. 2 ones + 8 ones = \_\_\_\_\_

2 + 8 = \_\_\_\_\_

2 tens + 8 tens = \_\_\_\_\_

20 + 80 = \_\_\_\_\_

b. 5 ones + 6 ones = \_\_\_\_\_

5 + 6 = \_\_\_\_\_

5 tens + 6 tens = \_\_\_\_\_

50 + 60 = \_\_\_\_\_

c. 14 ones + 4 ones = \_\_\_\_\_

14 + 4 = \_\_\_\_\_

14 tens + 4 tens = \_\_\_\_\_

140 + 40 = \_\_\_\_\_

3. Solve.

a. 6 ones + 5 ones = \_\_\_\_ ten \_\_\_\_ one

$6 + 5 =$  \_\_\_\_\_

6 tens + 5 tens = \_\_\_\_ hundred \_\_\_\_ ten

$60 + 50 =$  \_\_\_\_\_

b. 5 ones + 7 ones = \_\_\_\_ ten \_\_\_\_ ones

$5 + 7 =$  \_\_\_\_\_

5 tens + 7 tens = \_\_\_\_ hundred \_\_\_\_ tens

$50 + 70 =$  \_\_\_\_\_

c. 9 ones + 8 ones = \_\_\_\_ ten \_\_\_\_ ones

$9 + 8 =$  \_\_\_\_\_

9 tens + 8 tens = \_\_\_\_ hundred \_\_\_\_ tens

$90 + 80 =$  \_\_\_\_\_

4. Fill in the blanks. Rewrite each as an addition sentence with two parts. The first one is done for you.

a.  $36 \xrightarrow{+4} 40 \xrightarrow{+60} 100 \xrightarrow{+30} 130$

b.  $78 \xrightarrow{+2} \underline{\hspace{2cm}} \xrightarrow{+10} \underline{\hspace{2cm}} \xrightarrow{+10} \underline{\hspace{2cm}}$

$36 + 94 = 130$

$78 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

c.  $61 \xrightarrow{+9} \underline{\hspace{2cm}} \xrightarrow{+10} \underline{\hspace{2cm}} \xrightarrow{+10} \underline{\hspace{2cm}} \xrightarrow{+10} \underline{\hspace{2cm}} \xrightarrow{+100} \underline{\hspace{2cm}}$

$61 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

d.  $27 \xrightarrow{+3} \underline{\hspace{2cm}} \xrightarrow{+70} \underline{\hspace{2cm}} \xrightarrow{+100} \underline{\hspace{2cm}}$

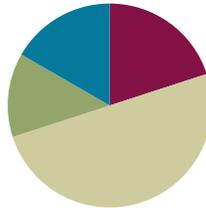
$27 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

## Lesson 18

**Objective:** Use manipulatives to represent additions with two compositions.

### Suggested Lesson Structure

■ Fluency Practice	(12 minutes)
■ Concept Development	(30 minutes)
■ Application Problem	(8 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (12 minutes)

- Making the Next Ten to Add **2.NBT.5** (3 minutes)
- Sprint: Addition Crossing a Ten **2.NBT.5** (9 minutes)

#### Making the Next Ten to Add (3 minutes)

Note: This fluency will review foundations that will lead into today's lesson.

T: When I say  $9 + 4$ , you say  $10 + 3$ . Ready?  $9 + 4$ .

S:  $10 + 3$ .

T: Answer.

S: 13.

Continue with the following possible sequences:  $19 + 4$ ,  $29 + 4$ ,  $79 + 4$ ,  $9 + 6$ ,  $19 + 6$ ,  $29 + 6$ ,  $8 + 3$ ,  $18 + 3$ ,  $48 + 3$ ,  $8 + 5$ ,  $18 + 5$ ,  $88 + 5$ ,  $7 + 6$ ,  $27 + 6$ ,  $7 + 4$ ,  $17 + 4$ ,  $67 + 4$ .

Post on board:

$$\begin{array}{r} 9 + 4 = \underline{\quad} \\ \wedge \\ 1 \quad 3 \end{array}$$

#### Sprint: Addition Crossing a Ten (9 minutes)

Materials: (S) Addition Crossing a Ten Sprint

Note: This Sprint reviews completing or crossing a ten when adding a single-digit number to a two-digit number.

**Concept Development (30 minutes)**

Materials: (S) Per pair: place value chart, number disks (2 hundreds, 18 tens, 18 ones)

**Problem 1: 40 + 70**

T: (Write  $40 + 70$  on the board.) Partner A, show 40 on your place value chart. Partner B, show 70. Be sure to arrange the disks in 5-groups.

T: Partner A, put your disks together with your partner's disks. 4 tens + 7 tens?

S: (Partner A moves the tens together to make two 5-groups and 1 more ten.) 11 tens!

T: 11 tens equals?

S: 110! → 1 hundred 1 ten.

T: You've made a unit of 1 hundred! 11 tens is the same as 1 hundred 1 ten. Partner B, exchange 10 tens disks for 1 hundreds disk.

S: (Partner B changes 10 tens for 1 hundreds disk and places it in the hundreds place.)

T: How many ones in the ones place?

S: 0!

T: How many tens in the tens place?

S: 1 ten!

T: How many hundreds in the hundreds place?

S: 1 hundred!

T: 1 hundred + 1 ten equals?

S: 110!

T:  $40 + 70$  equals?

S: 110!

**Problem 2: 49 + 73**

T: Let's now include ones in our addends.

T: Partner A, change your number from 40 to 49. Partner B, change your number from 70 to 73.

T: Now we have a new related addition problem. (Write  $49 + 73$ .) Discuss with your partner how this problem will be different than  $40 + 70$ .

S: This time we have ones, too. → The total of the ones is more than 9 so we are going to be changing 10 ones for 1 ten. → So this time, we are going to bundle two times!

T: Partner B, move the ones together. How many ones?

S: (Move disks.) 12 ones.

T: What do you do next?



### NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Earlier in the day, before the lesson, review important terminology and their meanings:

- *addend*
- *rename*
- *bundle*
- *expanded form*
- *partners to ten*

Keep these words accessible on a math word wall or on the board for students to see as they are working.

MP.4

- S: Bundle 10 ones to make 1 ten. → Rename 12 ones as 1 ten 2 ones, and put a ten in the tens place.
- T: Partner B, show that change on your model. (Students model.) What's the next step?
- S: Add the tens!
- T: Partner A, move the tens. How many tens?
- S: (Move disks.) 12 tens.
- T: What do you do now?
- S: Bundle 10 tens and change it for a new unit of 100 in the hundreds place. → Rename 12 tens as 1 hundred 2 tens.
- T: Partner A, show that change on your model. (Students model.)
- T: Using your model, what's  $49 + 73$  in expanded form?
- S:  $100 + 20 + 2 = 122$ .
- T: Talk with your partner. How is making a hundred the same as making a ten?
- S: We can use partners to ten for both. →  $6 + 4 = 10$ , just like 6 tens + 4 tens is 10 tens, or 1 hundred. → When we put together 10 ones we make a ten, and when we put together 10 tens we make a hundred. → We trade 10 of a smaller unit for 1 of the next bigger unit: 10 ones for 1 ten and 10 tens for 1 hundred.



#### NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

At times, pair students performing above grade level with struggling students. Encourage them to dialogue in turn-and-talk moments in the lesson. Listen carefully to their conversations, and encourage leadership in the advanced students and participation from the struggling students.

MP.4

#### Problem 3: $136 + 64$

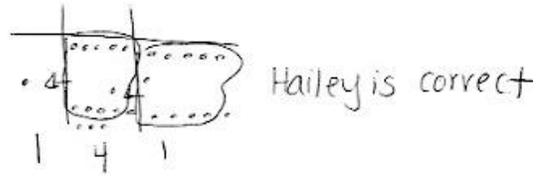
- T: Yes! Let's use what you've discovered to solve another problem. (Write  $136 + 64$ .) Work with your partner to model these addends, these two parts, while I walk around to see how it's going.
- T: For each step in the addition, I will make a statement. As you move the disks to add, tell me if the statement is true or false. Raise your hand once you've moved the disks and you have your answer.
- T: I change 10 ones for 1 ten.
- S: (Add the ones and rename.) True!
- T: I change 10 tens for 1 hundred?
- S: (Add the tens.) True!
- T: The total of the two parts is 200?
- S: True!
- T: Explain to your partner how you know when to rename.
- S: We rename when we have enough to make a group of 10. → We rename when we make ten in any place. → We rename when we have more than 9 ones or tens.

As students demonstrate understanding of renaming, allow them to work on the Problem Set independently. Continue to support struggling students' conceptual understanding at the concrete level.

**Application Problem (8 minutes)**

Hailey and Gio solve  $56 + 85$ . Gio says the answer is 131. Hailey says the answer is 141. Explain whose answer is correct using numbers, pictures, or words.

Note: This problem prompts students to synthesize the concepts developed in today’s lesson. Each time they make ten of a given unit, they rename it as 1 of the next larger unit. Have students solve independently and then share their thinking with the class.



**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

**Student Debrief (10 minutes)**

**Lesson Objective:** Use manipulatives to represent additions with two compositions.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- Look at Problem 1(a–c). How do the problems in the first column help you to solve the problems in the second column? Did you need to model the problems in the second column? (Did you need to compose a ten or a hundred?)
- For Problem 2, how did you use your number disks to determine whether the statements were true or false?

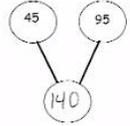
- Use place value language and explain to your partner how you solved Problem 3. Did you need to compose a ten or a hundred to solve? Or, did you solve mentally? Which method is easier?
- For Problem 5, share your work with a partner. Who was correct, Kim or Stacy? Defend your response.
- Make a prediction. What will happen when you have 10 hundreds disks? How do you know? What happens when you have 10 of a given unit?

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

3. Write an addition sentence that corresponds to the following number bond. Solve the problem using your number disks and fill in the missing total.

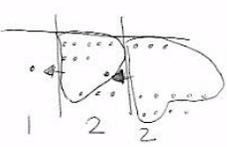


$45 + 95 = 140$

4. There are 50 girls and 80 boys in the after school program. How many children are in the after school program?

$50 + 80 = 130$

5. Kim and Stacy solved  $83 + 39$ . Kim’s answer was less than 120. Stacy’s answer was more than 120. One of the answers was correct. Whose answer was incorrect? Explain how you know using words, pictures, or numbers.



Stacy was correct

COMMON CORE Lesson 18: Use manipulatives to represent additions with two compositions. engage<sup>ny</sup> 4  
Date: 7/13/13  
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**A**

# Correct \_\_\_\_\_

Add.

1	$38 + 1 =$		23	$85 + 7 =$	
2	$47 + 2 =$		24	$85 + 9 =$	
3	$56 + 3 =$		25	$76 + 4 =$	
4	$65 + 4 =$		26	$76 + 5 =$	
5	$31 + 8 =$		27	$76 + 6 =$	
6	$42 + 7 =$		28	$76 + 9 =$	
7	$53 + 6 =$		29	$64 + 6 =$	
8	$64 + 5 =$		30	$64 + 7 =$	
9	$49 + 1 =$		31	$76 + 8 =$	
10	$49 + 2 =$		32	$43 + 7 =$	
11	$49 + 3 =$		33	$43 + 8 =$	
12	$49 + 5 =$		34	$43 + 9 =$	
13	$58 + 2 =$		35	$52 + 8 =$	
14	$58 + 3 =$		36	$52 + 9 =$	
15	$58 + 4 =$		37	$59 + 1 =$	
16	$58 + 6 =$		38	$59 + 3 =$	
17	$67 + 3 =$		39	$58 + 2 =$	
18	$57 + 4 =$		40	$58 + 4 =$	
19	$57 + 5 =$		41	$77 + 3 =$	
20	$57 + 7 =$		42	$77 + 5 =$	
21	$85 + 5 =$		43	$35 + 5 =$	
22	$85 + 6 =$		44	$35 + 8 =$	

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**B** Improvement \_\_\_\_\_ # Correct \_\_\_\_\_

Add.					
1	$28 + 1 =$		23	$75 + 7 =$	
2	$37 + 2 =$		24	$75 + 9 =$	
3	$46 + 3 =$		25	$66 + 4 =$	
4	$55 + 4 =$		26	$66 + 5 =$	
5	$21 + 8 =$		27	$66 + 6 =$	
6	$32 + 7 =$		28	$66 + 9 =$	
7	$43 + 6 =$		29	$54 + 6 =$	
8	$54 + 5 =$		30	$54 + 7 =$	
9	$39 + 1 =$		31	$54 + 8 =$	
10	$39 + 2 =$		32	$33 + 7 =$	
11	$39 + 3 =$		33	$33 + 8 =$	
12	$39 + 5 =$		34	$33 + 9 =$	
13	$48 + 2 =$		35	$42 + 8 =$	
14	$48 + 3 =$		36	$42 + 9 =$	
15	$48 + 4 =$		37	$49 + 1 =$	
16	$48 + 6 =$		38	$49 + 3 =$	
17	$57 + 3 =$		39	$58 + 2 =$	
18	$57 + 4 =$		40	$58 + 4 =$	
19	$57 + 5 =$		41	$67 + 3 =$	
20	$57 + 7 =$		42	$67 + 5 =$	
21	$75 + 5 =$		43	$85 + 5 =$	
22	$75 + 6 =$		44	$85 + 8 =$	

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Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using your place value chart and number disks.

a.  $80 + 30 =$  \_\_\_\_\_

$90 + 40 =$  \_\_\_\_\_

b.  $73 + 38 =$  \_\_\_\_\_

$73 + 49 =$  \_\_\_\_\_

c.  $93 + 38 =$  \_\_\_\_\_

$42 + 99 =$  \_\_\_\_\_

d.  $84 + 37 =$  \_\_\_\_\_

$69 + 63 =$  \_\_\_\_\_

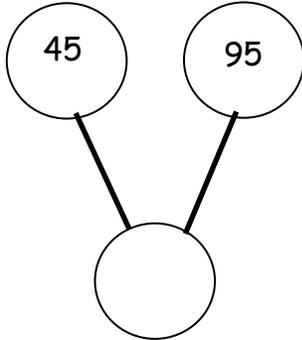
e.  $113 + 78 =$  \_\_\_\_\_

$128 + 72 =$  \_\_\_\_\_

2. Circle the statements that are true as you solve each problem using number disks.

<p><math>47 + 123</math></p> <p>I change 10 ones for 1 ten.</p> <p>I change 10 tens for 1 hundred.</p> <p>The total of the two parts is 160.</p> <p>The total of the two parts is 170.</p>	<p><math>97 + 54</math></p> <p>I change 10 ones for 1 ten.</p> <p>I change 10 tens for 1 hundred.</p> <p>The total of the two parts is 141.</p> <p>The total of the two parts is 151.</p>
--	---

3. Write an addition sentence that corresponds to the following number bond. Solve the problem using your number disks and fill in the missing total.



4. There are 50 girls and 80 boys in the after school program. How many children are in the after school program?
5. Kim and Stacy solved  $83 + 39$ . Kim's answer was less than 120. Stacy's answer was more than 120. One of the answers was correct. Whose answer was incorrect? Explain how you know using words, pictures, or numbers.

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using your place value chart and number disks.

a.  $46 + 54 =$  \_\_\_\_\_

b.  $49 + 56 =$  \_\_\_\_\_

c.  $28 + 63 =$  \_\_\_\_\_

d.  $67 + 89 =$  \_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using your place value chart and number disks.

a.  $20 + 90 =$  \_\_\_\_\_

$60 + 70 =$  \_\_\_\_\_

b.  $29 + 93 =$  \_\_\_\_\_

$69 + 72 =$  \_\_\_\_\_

c.  $45 + 86 =$  \_\_\_\_\_

$46 + 96 =$  \_\_\_\_\_

d.  $47 + 115 =$  \_\_\_\_\_

$47 + 95 =$  \_\_\_\_\_

e.  $28 + 72 =$  \_\_\_\_\_

$128 + 72 =$  \_\_\_\_\_

2. Circle the statements that are true as you solve each problem using number disks.

$68 + 51$	$127 + 46$
I change 10 ones for 1 ten.	I change 10 ones for 1 ten.
I change 10 tens for 1 hundred.	I change 10 tens for 1 hundred.
The total of the two parts is 109.	The total of the two parts is 163.
The total of the two parts is 119.	The total of the two parts is 173.

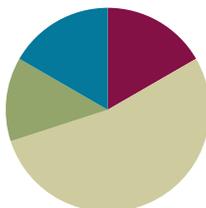


## Lesson 19

Objective: Relate manipulative representations to a written method.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Application Problem	(8 minutes)
■ Concept Development	(32 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (10 minutes)

- Addition Fact Flash Cards **2.OA.2** (2 minutes)
- Adding Ones to Make Tens **2.NBT.5** (4 minutes)
- Adding Tens and Ones **2.NBT.5** (4 minutes)

### Addition Fact Flash Cards (2 minutes)

Materials: (T) Flash Cards Set 1

Note: This is a teacher-directed, whole-class activity. By practicing addition facts, students will gain fluency adding within 20.

### Adding Ones to Make Tens (4 minutes)

Note: Students practice changing ones for tens in preparation for the lesson.

- T: What is 1 more than 29 ones?  
 S: 30 ones.
- T: How many tens are in 30 ones?  
 S: 3 tens.
- T: 2 more than 58 ones.  
 S: 60 ones.
- T: How many tens are in 60 ones?  
 S: 6 tens.

Continue with the following possible sequence: 3 more than 37 ones, 5 more than 75 ones, 8 more than 92 ones.

### Adding Tens and Ones (4 minutes)

Note: This supports students in seeing the effect of the combined number of ones on the number of tens in the total.

T: (Write  $60 + 20 = \underline{\quad}$ .)

T:  $60 + 20$  is?

S: 80.

T: (Write  $6 + 4$  below.)  $6 + 4$ ?

S: 10.

T: (Write  $80 + 10$  to the right.)  $80 + 10$ ?

S: 90.

T: (Write  $66 + 24$  below  $6 + 4$ .)  $66 + 24$ ?

S: 90.

$$60 + 20 = 80$$

$$\begin{array}{r} 6 + 4 = 10 \end{array}$$

$$66 + 24 = 90$$

Continue with the following possible sequence:  $35 + 25$ ,  $44 + 26$ ,  $57 + 33$ ,  $58 + 52$ , and  $66 + 64$ .

### Application Problem (8 minutes)

There are 35 note cards in one box. The other box holds 67 cards. How many cards are there in all?

Note: This problem provides a simple context for students to focus on their place value model and the calculation. Encourage students to use the RDW process and to solve independently using the vertical written method and a place value chart.

$$\begin{array}{r} 35 \\ +67 \\ \hline 102 \end{array}$$

There are 102 cards in all.

### Concept Development (32 minutes)

Materials: (T) Place value disks, place value chart (S) Per pair: personal white board, place value chart with no headings (for use with numbered disks), place value disks (2 hundreds, 18 tens, 18 ones)

Note: In the following activity, students work with a partner. For each problem, students whisper count as they take turns modeling and writing each addend. They may count the regular way (10, 20, 30, ...) or the Say Ten way (1 ten, 2 tens, ...). One student records each change in the written method step by step as the other partner moves the number disks.

Project or draw a place value chart on the board.

T: Partner A, write  $54 + 68$  on your board. (Write  $54 + 68$  on the board vertically.)

T: Whisper count as Partner B models 54 and 68 on your place value chart. Remember to place your disks from left to right and create 5-groups whenever possible.

T: Where do we begin adding?

MP.4

- S: Add the ones.
- T: Look at your ones column. Can we make a unit of 10?
- S: Yes!
- T: Now look at the written addition. Use place value language to explain to your partner how you know, just by looking at the digits in the ones place, if you need to rename (or bundle) the ones.
- S: 8 only needs 2 to make 10, and 4 is more than 2.  $\rightarrow$  4 ones and 8 ones is 12 ones. That's 1 ten and 2 ones.
- T: Rename 12 ones on your model. How do we show this on the written addition?
- S: Write the new ten on the line below the tens place and write 2 below the line in the ones place.
- T: Partner A, let's record that. (Model the step on the written addition.) What should we do next?
- S: Add the tens.
- T: This time, look at the digits in the tens place before using the disks. Tell your partner whether you'll need to rename, and explain why.
- S: We need to rename because I know my partners to ten. 5 only needs 5 more to make a ten.  $\rightarrow$  5 tens + 6 tens + 1 ten is 12 tens. That's 120.  $\rightarrow$  50 + 60 + 10 is 120.
- T: Rename 12 tens on your model.
- S: (Rename 12 tens as 1 hundred 2 tens.)
- T: How do we show this with the algorithm?
- S: Write the new hundred on the line below the hundreds place, and write 2 below the line in the tens place.
- T: Let's record that. (Model the step on the written addition.) How many hundreds do we have?
- S: 1 hundred.
- T: Read the entire problem.
- S:  $54 + 68 = 122$ .
- T: Talk with your partner. Explain each change you made on your model, and how you showed each step on the written addition.
- T: Partners, it's time to solve some addition problems on your own! Be sure to explain how each change you make on the place value chart matches each step in the written addition.



### NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

For students who are not fluent in their partners to ten, choose from a variety of tools to promote automaticity, such as the ones listed below:

- Number bond flash cards.
- Music videos like "They're Friends of Ten," at <http://www.youtube.com/watch?v=o0bKleYdvCc>.
- A Rekenrek, where they can see and handle the pairs that make ten.

As you choose supplementary materials, consider what best suits each individual student needing remediation.



### NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

If students think of creative methods to solve the problem, invite them to demonstrate these to the rest of the class. For example,

S: I added 54 to 68 by remembering my doubles, so  $50 + 50 = 100$ , then one ten left over, so 110, and then  $4 + 8 = 12$ , so the whole thing is 122.

Repeat the procedure above with the following possible sequence:  $38 + 65$ ,  $19 + 92$ ,  $126 + 57$ ,  $115 + 85$ . Circulate to check for understanding. As students demonstrate proficiency in relating their models to the written additions, allow them to work independently on the Problem Set.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Relate manipulative representations to a written method.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- For Problem 1(a), did you compose a ten? A hundred? How did you show it on your place value chart?
- Explain to your partner how to solve Problem 1(b). How did you show a new unit of ten or a hundred on your model and in the written addition?
- What do you notice about the totals in 1(a) and 1(c)?
- For Problem 1(c), what did you need to be sure to do when you were solving  $68 + 75$  using the written addition? Did anyone try to solve this mentally? How?
- What is the answer for Problem 1(c),  $96 + 47$ ? How many tens and ones are in the answer (i.e.,  $143 = \underline{\hspace{1cm}} \text{ tens } \underline{\hspace{1cm}} \text{ ones}$ )? How did you rename those tens in the algorithm?

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

Name: Debbie Date: \_\_\_\_\_

1. Solve the following problems using the vertical written algorithm, your place value chart and number disks. Bundle a ten or hundred when necessary. Show your work for each problem.

a.  $72 + 19$   $28 + 91$

$$\begin{array}{r} 72 \\ + 19 \\ \hline 91 \end{array}$$

$$\begin{array}{r} 28 \\ + 91 \\ \hline 119 \end{array}$$

b.  $68 + 61$   $97 + 35$

$$\begin{array}{r} 68 \\ + 61 \\ \hline 129 \end{array}$$

$$\begin{array}{r} 97 \\ + 35 \\ \hline 132 \end{array}$$

c.  $68 + 75$   $96 + 47$

$$\begin{array}{r} 68 \\ + 75 \\ \hline 143 \end{array}$$

$$\begin{array}{r} 96 \\ + 47 \\ \hline 143 \end{array}$$

COMMON CORE Lesson 19: Relate manipulative representations to a written method. Date: 6/28/13 engage<sup>ny</sup> 4.0

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

d.  $177 + 23$   $146 + 54$

$$\begin{array}{r} 177 \\ + 23 \\ \hline 200 \end{array}$$

$$\begin{array}{r} 146 \\ + 54 \\ \hline 200 \end{array}$$

2. 38 fewer girls attended summer camp than boys. 79 girls attended.

a. How many boys attended summer camp?

$$\begin{array}{r} 79 \\ + 38 \\ \hline 117 \end{array}$$

b. How many children attended summer camp?

$$\begin{array}{r} 117 \\ + 79 \\ \hline 196 \end{array}$$

COMMON CORE Lesson 19: Relate manipulative representations to a written method. Date: 6/12/13 engage<sup>ny</sup> 4.0

- Look again at Problem 1(d),  $146 + 54$ . How could you have used a number bond as a simplifying strategy to solve this problem?

### Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve the following problems using the vertical written algorithm, your place value chart, and number disks. Bundle a ten or hundred when necessary. Show your work for each problem.

a.  $72 + 19$

$28 + 91$

b.  $68 + 61$

$97 + 35$

c.  $68 + 75$

$96 + 47$

d.  $177 + 23$

$146 + 54$

2. 38 fewer girls attended summer camp than boys. 79 girls attended.

a. How many boys attended summer camp?

b. How many children attended summer camp?

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve the following problems using the vertical written algorithm, your place value chart, and number disks. Bundle a ten or hundred when necessary. Show your work for each problem.

a.  $47 + 85$

b.  $128 + 39$

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve the following problems using the vertical written algorithm, your place value chart and number disks. Bundle a ten or hundred when necessary. Show your work for each problem.

a.  $84 + 37$

$42 + 79$

b.  $58 + 56$

$46 + 96$

c.  $75 + 69$

$48 + 94$

d.  $162 + 38$

$156 + 44$

2. 74 trees were planted in the garden. 49 more bushes were planted than trees.

a. How many bushes were planted in the garden?

b. How many trees and bushes were planted?

$9 + \underline{\quad} = 10$

$2 + 9$

$9 + 3$

$4 + 9$

$5 + \underline{\quad} = 14$

$9 + 6$

$7 + 9$

$9 + \underline{\quad} = 17$

$9 + 9$

$10 + 9$

$$8 + \underline{\quad} = 9$$

$$2 + 8$$

$$8 + 3$$

$$4 + 8$$

$$5 + 8$$

$$8 + 6$$

$$8 + \underline{\quad} = 15$$

$$8 + 8$$

$$9 + \underline{\quad} = 17$$

$$10 + 8$$

$1 + 7$

$2 + \underline{\quad} = 9$

$7 + 3$

$4 + 7$

$5 + \underline{\quad} = 12$

$6 + 7$

$7 + \underline{\quad} = 14$

$7 + 8$

$9 + 7$

$7 + 10$

$1 + 6$

$6 + 2$

$6 + \underline{\quad} = 9$

$4 + 6$

$6 + 5$

$6 + \underline{\quad} = 12$

$7 + 6$

$8 + 6$

$9 + \underline{\quad} = 15$

$6 + 10$

$$5 + 1$$

$$2 + 5$$

$$5 + \underline{\quad} = 8$$

$$4 + \underline{\quad} = 9$$

$$5 + 5$$

$$6 + \underline{\quad} = 11$$

$$7 + 5$$

$$5 + 8$$

$$5 + \underline{\quad} = 14$$

$$10 + 5$$

$$4 + 1$$

$$2 + 4$$

$$4 + \underline{\quad} = 7$$

$$4 + \underline{\quad} = 8$$

$$4 + 5$$

$$6 + \underline{\quad} = 10$$

$$7 + 4$$

$$4 + 8$$

$$4 + \underline{\quad} = 13$$

$$10 + 4$$

$$1 + 3$$

$$2 + 3$$

$$3 + \underline{\quad} = 6$$

$$4 + 3$$

$$3 + 5$$

$$6 + 3$$

$$7 + \underline{\quad} = 10$$

$$3 + \underline{\quad} = 11$$

$$3 + 9$$

$$13 = 3 + \underline{\quad}$$

$$2 + 1$$

$$2 + 2$$

$$3 + \underline{\quad} = 5$$

$$4 + 2$$

$$2 + 5$$

$$6 + 2$$

$$7 + \underline{\quad} = 9$$

$$8 + 2$$

$$2 + 9$$

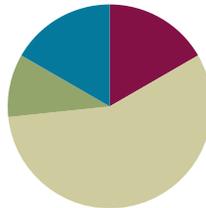
$$10 + 2$$

## Lesson 20

**Objective:** Use math drawings to represent additions with up to two compositions and relate drawings to a written method.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Application Problem	(6 minutes)
■ Concept Development	(34 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (10 minutes)

- Addition Fact Flash Cards **2.OA.2** (2 minutes)
- Sprint: Addition Crossing a Ten **2.NBT.5** (8 minutes)

### Addition Fact Flash Cards (2 minutes)

Materials: (T) Flash Cards Set 1

Note: By practicing addition facts, students will gain fluency adding within 20.

### Sprint: Addition Crossing a Ten (8 minutes)

Materials: (S) Addition Crossing a Ten Sprint

Note: This Sprint reviews crossing the ten when adding a two-digit and a one-digit number.

### Application Problem (6 minutes)

Kendra and Jojo are counting their marbles. Kendra has 38 and Jojo has 62. Kendra says they have 100 marbles altogether, but Jojo says they have 90. Use words, numbers, or a model to prove who is correct.

Note: This problem assesses the students' understanding of composing a new unit—in this case, a ten. Students may use mental strategies, solve vertically, or draw a chip model to explain their reasoning. Encourage students to work independently to solve, afterwards inviting them to share the different ways in which they solved.

$$38 + 62$$

$$\begin{array}{r} 38 \\ + 62 \\ \hline 100 \end{array}$$

Kendra is right

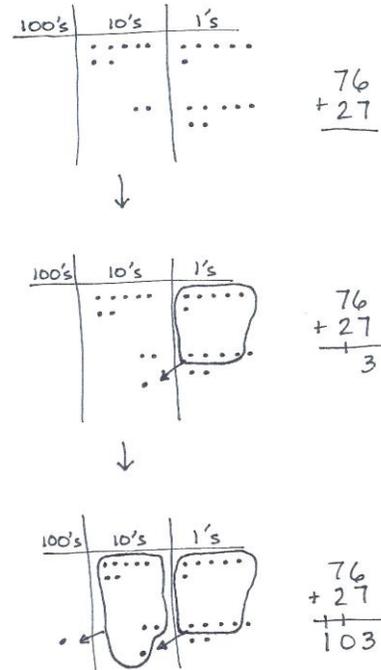
**Concept Development (34 minutes)**

Materials: (S) Math journals or paper

As students write addition problems vertically and make math drawings, remind them to be precise in aligning the digits and in drawing their dots in neat 5-groups.

**Problem 1: 76 + 27**

- T: Write  $76 + 27$  the vertical way on your paper.
- T: Now we'll model it by drawing a place value chart. Draw your chart like mine. (Draw hundreds, tens, and ones chart.)
- T: Label the hundreds place, the tens place, and the ones place.
- T: Draw a model of each addend. Since each place on our chart is labeled, we don't need to label disks. We'll just draw dots. Remember, the place tells us the value, or how much each dot is worth.
- T: Whisper count as you draw your model. (Draw a chip model of  $76 + 27$ . See image at right.)
- S: (Make a chip model.) 10, 20, 30, ...76. 10, 20, 21, ...27.
- T: Use place value language to tell your partner how your model matches the written addition.
- S: My model shows 7 tens 6 ones and 2 tens 7 ones. That's the same as  $76 + 27$ .
- T: Look at the ones first. What is 6 ones + 7 ones?
- S: 13 ones!
- T: The Say Ten way?
- S: Ten 3.
- T: Tell your partner what to do on your model and on your written problem.
- S: Circle 10 ones and draw an arrow to the tens place; then put a dot to show the new ten. → Write a 3 in the ones place and the new ten on the line below the tens place. → Rename 13 ones as 1 ten 3 ones.
- T: Let's show that on our models and on the written addition.



MP.6

**NOTES ON MULTIPLE MEANS OF ENGAGEMENT:**

As the number of digits increases, it becomes more challenging to keep the places aligned. Remember that lined paper turned 90 degrees, so the lines are vertical, makes a convenient guide to help students line up their numbers.

- S: (Circle 10 ones, draw an arrow to the tens place and a dot representing the new unit, and write 1 on the line below the tens place. See image on the previous page.)
- T: Partners, check each other's work to be sure it is correct.
- T: On your written addition, you have written a 1 on the line. On your chart, point to what the 1 stands for. It's the new...?
- S: (Point to the new ten on the model and respond chorally.) Ten!
- T: Yes! (Point to each part.) 6 ones + 7 ones is 13 ones, 1 ten, and 3 ones, so we write 1 new ten on the line below the tens place, and we write 3 ones below the line in the ones place. What do we do next?
- S: Add the tens.
- T: What is 7 tens + 2 tens + 1 ten?
- S: 10 tens! 100!
- T: Tell your partner what to do on your model and on your written problem.
- S: Circle 10 tens, draw an arrow to the hundreds place, and then draw a dot to show the new hundred. → Write 1 on the line below the hundreds place.
- T: Show this next step on your model and on the written addition. (Students model and write. See image on the previous page.)
- T: What's the value of the 1 on the line below the hundreds place? Point to it on your chart.
- S: (Point to the new hundred.) 100!
- T: Yes! And how many tens should we write below the line in the tens place? Look at your drawing.
- S: 0!
- T: Read the entire problem.
- S:  $76 + 27 = 103$ .
- T: Point to where each digit is represented in your drawing.
- T: How many times did you rename or bundle?
- S: Two times.
- T: Tell your partner how you know when to rename.
- S: When I have more than 9 in one place, and I can make a bundle of 10 of that unit. → It's a pattern! When you have 10 or more in one place, you make 1 of the next biggest unit.



### NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

For students who prefer to solve these problems mentally using the arrow way or compensation, encourage them to do so in order to confirm their answers but also to practice this method.

Explain that as the number of digits increases, it is more challenging to solve these problems mentally.

Some students will benefit from more challenging problems with a greater number of digits. Encourage these students to write problems for each other to solve once they have completed their classwork.

MP.6

Follow the procedure above to guide students as they model, write, and solve  $42 + 96$ . Have students share how each step in the drawing matches each step in the written addition.

Continue with the following possible sequence:  $42 + 67$ ,  $53 + 97$ ,  $86 + 48$ , and  $99 + 99$ . Continue to support students who struggle, but as students demonstrate understanding, instruct them to work on the Problem Set independently.

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. Some problems do not specify a method for solving. This is an intentional reduction of scaffolding that invokes MP.5, Use Appropriate Tools Strategically. Students should solve these problems using the RDW approach used for Application Problems.

**Student Debrief (10 minutes)**

**Lesson Objective:** Use math drawings to represent additions with up to two compositions and relate drawings to a written method.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- Explain to your partner how you solved Problem 1 (a) and (b). What significant differences do you notice about the place value charts for these two parts of the problem? Why?
- For Problem 1(c), use place value language to explain to your partner how your model matches the written addition.
- One student’s answer for Problem 1(d),  $47 + 75$ , was 112. Was she correct? What mistake did she make in the written addition?

Handwritten student work for problem 1. It shows three addition problems: a.  $23 + 57 = 80$ , b.  $65 + 36 = 101$ , and c.  $83 + 29 = 112$ . Each problem is accompanied by a place value chart (100's, 10's, 1's) with dots representing the numbers and arrows indicating the addition process. The student's name is Debbie.

Handwritten student work for problem 2. It shows two addition problems: d.  $47 + 75 = 122$  and e.  $68 + 88 = 156$ . Each problem is accompanied by a place value chart. Below the charts is a question about a student's mistake and an explanation.

2. Jessica's teacher marked her answer wrong for question 3. Jessica can't figure out what she did wrong. If you were Jessica's teacher, how would you explain her mistake?

Jessica's work:  $77 + 32 = 109$

Explanation: I would tell Jessica that she put the 1 in the wrong place. There is 1 hundred and no tens. My answer is 109.

- Look carefully at Problem 1(e),  $68 + 88$ . Could you have solved this problem mentally? How?
- Think about your math drawings. How did you know when to rename ones? Tens? What did that look like on your written additions?

### Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

**A**

# Correct \_\_\_\_\_

Add.

1	$38 + 1 =$		23	$85 + 7 =$	
2	$47 + 2 =$		24	$85 + 9 =$	
3	$56 + 3 =$		25	$76 + 4 =$	
4	$65 + 4 =$		26	$76 + 5 =$	
5	$31 + 8 =$		27	$76 + 6 =$	
6	$42 + 7 =$		28	$76 + 9 =$	
7	$53 + 6 =$		29	$64 + 6 =$	
8	$64 + 5 =$		30	$64 + 7 =$	
9	$49 + 1 =$		31	$76 + 8 =$	
10	$49 + 2 =$		32	$43 + 7 =$	
11	$49 + 3 =$		33	$43 + 8 =$	
12	$49 + 5 =$		34	$43 + 9 =$	
13	$58 + 2 =$		35	$52 + 8 =$	
14	$58 + 3 =$		36	$52 + 9 =$	
15	$58 + 4 =$		37	$59 + 1 =$	
16	$58 + 6 =$		38	$59 + 3 =$	
17	$67 + 3 =$		39	$58 + 2 =$	
18	$57 + 4 =$		40	$58 + 4 =$	
19	$57 + 5 =$		41	$77 + 3 =$	
20	$57 + 7 =$		42	$77 + 5 =$	
21	$85 + 5 =$		43	$35 + 5 =$	
22	$85 + 6 =$		44	$35 + 8 =$	

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Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart and bundle when needed.

a.  $23 + 57$

100's	10's	1's

b.  $65 + 36$

100's	10's	1's

c.  $83 + 29$

100's	10's	1's

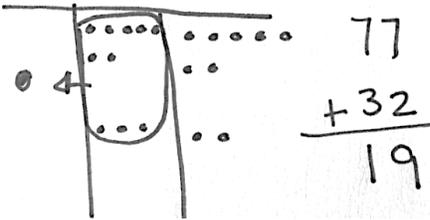
d.  $47 + 75$

100's	10's	1's

e.  $68 + 88$

100's	10's	1's

2. Jessica's teacher marked her answer wrong for Problem 3. Jessica can't figure out what she did wrong. If you were Jessica's teacher, how would you explain her mistake?

<p>Jessica's work:</p>  <p>The drawing shows a ten-frame with 77 dots. To the right of the ten-frame is a written addition problem: <math>77 + 32 = 19</math>. The number 19 is written below the 32, and a horizontal line is drawn above it.</p>	<p>Explanation:</p>
---	---------------------

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart and bundle when needed.

a.  $46 + 65$

100's	10's	1's

b.  $74 + 57$

100's	10's	1's

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart and bundle when needed.

a.  $41 + 39$

100's	10's	1's

b.  $54 + 26$

100's	10's	1's

c.  $96 + 39$

100's	10's	1's

d.  $84 + 79$

100's	10's	1's

e.  $65 + 97$

100's	10's	1's

2. For each box, find and circle two numbers that add up to 150.

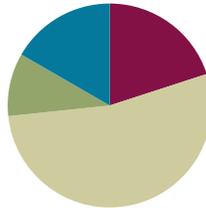
<p>a.</p> <table style="width: 100%; text-align: center;"> <tr> <td>67</td> <td>63</td> </tr> <tr> <td>73</td> <td>83</td> </tr> <tr> <td>57</td> <td> </td> </tr> </table>	67	63	73	83	57		<p>b.</p> <table style="width: 100%; text-align: center;"> <tr> <td>48</td> <td>92</td> </tr> <tr> <td>68</td> <td>62</td> </tr> <tr> <td>58</td> <td> </td> </tr> </table>	48	92	68	62	58		<p>c.</p> <table style="width: 100%; text-align: center;"> <tr> <td>75</td> <td>55</td> </tr> <tr> <td>65</td> <td>45</td> </tr> <tr> <td>75</td> <td> </td> </tr> </table>	75	55	65	45	75	
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## Lesson 21

**Objective:** Use math drawings to represent additions with up to two compositions and relate drawings to a written method.

### Suggested Lesson Structure

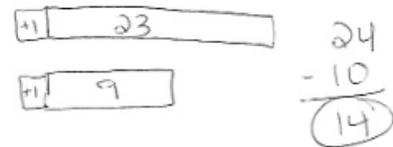
<span style="color: #8ebf42;">■</span> Application Problem	(6 minutes)
<span style="color: #8e233e;">■</span> Fluency Practice	(12 minutes)
<span style="color: #c4c48e;">■</span> Concept Development	(32 minutes)
<span style="color: #0072bc;">■</span> Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Application Problem (6 minutes)

Katrina has 23 stickers and Jennifer has 9. How many more stickers does Jennifer need to have as many as Katrina?

Note: Guide the students through the use of a double bar model to represent this *compare with difference unknown* problem type. Remember that if possible, Application Problems can be completed at a time of day other than the regular math time if they do not directly flow into the lesson, as is the case here.



### Fluency Practice (12 minutes)

- Addition Fact Flash Cards **2.OA.2** (2 minutes)
- Place Value **2.NBT.1** (5 minutes)
- Rename the Units: Choral Response **2.NBT.1** (5 minutes)

### Addition Fact Flash Cards (2 minutes)

Materials: (T) Flash Cards Set 1

Note: By practicing addition facts, students gain fluency adding within 20.

### Place Value (5 minutes)

Note: Practicing place value skills solidifies understanding the reason for bundling.

T: (Write 103.) Say the number.

- S: 103.  
 T: What digit is in the tens place?  
 S: 0.  
 T: (Underline 0.) What's the value of the 0?  
 S: 0.  
 T: State the value of the 1.  
 S: 1 hundred.  
 T: State the value of the 3?  
 S: 3 ones.

Repeat using the following possible sequence: 173, 281, and 428.

### Rename the Units: Choral Response (5 minutes)

Notes: This fluency reviews foundational concepts that support today's lesson.

- T: (Write 10 ones = \_\_\_\_ ten \_\_\_\_ ones.) Say the number sentence.  
 S: 10 ones = 1 ten 0 ones.  
 T: (Write 20 ones = 1 ten \_\_\_\_ ones.) Say the number sentence.  
 S: 20 ones = 1 ten 10 ones.  
 T: (Write 24 ones = 1 ten \_\_\_\_ ones.) Say the number sentence.  
 S: 24 ones = 1 ten 14 ones.  
 T: (30 ones = 2 tens \_\_\_\_ ones.) Say the number sentence.  
 S: 30 ones = 2 tens 10 ones.

Repeat the process for 30, 32, 38, 40, 41, 46, 50, 63, and 88.

### Concept Development (32 minutes)

Materials: (S) Math journals or paper

This lesson is designed to give students ample time working with bare numbers and chip models to develop conceptual understanding of the written method when there are two compositions.

- T: Copy the following problem on your paper in vertical form:  $48 + 93$ .  
 T: Next to the written addition, draw a chip model to solve, and record each change in the written addition.



#### NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Return to the concrete stage (i.e., manipulatives) if a student is unable to grasp concepts at this pictorial stage. Ensure that the student has enough time to practice with manipulatives before moving on to the pictorial stage again.

T: When you're finished, check your work with a partner, and explain how your model matches the written addition. Use place value language to explain each step.

Circulate to listen in on conversations and offer support as needed.

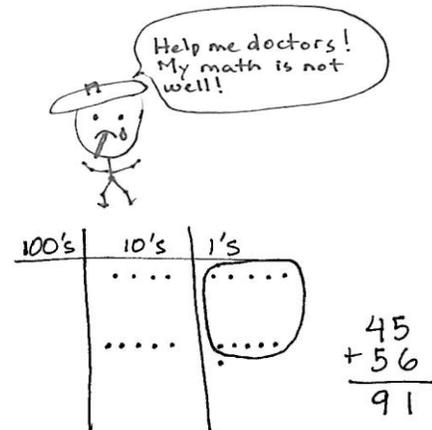
T: Who would like to share his or her work with the class? Use place value language to explain how the model helps you to understand the written addition. (Choose a student.)

Repeat the procedure above, using the following possible sequence:  $37 + 85$ ,  $28 + 82$ ,  $139 + 26$ , and  $142 + 58$ .

When students have finished, write  $45 + 56$  on the board in vertical form. Draw a model that shows the problem solved incorrectly. (See image at right.)

- T: This problem is not feeling well. It is wrong.
- T: Talk with your partner. Use place value language to explain why it is incorrect. Be a math doctor. Figure out how to make it right.
- S: You didn't rename (or bundle) 10 ones as 1 ten. → You circled 10 ones but you forgot to show the new ten in your drawing or in the problem. → 5 ones + 6 ones is 11 ones. You wrote the number of ones below the line but you didn't write the new ten on the line below the tens place. → The answer is 101 because 4 tens + 5 tens + another ten is 10 tens, or 100! And you wrote the ones right!
- T: Who can come up and correct my work? (Choose a student.)
- T: How is renaming ones the same as and different from renaming tens?
- S: You do the same thing for both; you look for partners to ten to make a new unit. → It's the same, because it means you have ten or more in the ones place and the tens place. → It's different because when you rename just once, you only have ten or more in one place, the ones or tens, not both.

Continue to support students who need assistance. Once students demonstrate proficiency with the models and written additions, allow them to work on the Problem Set independently.



MP.3



**NOTES ON MULTIPLE MEANS OF ENGAGEMENT:**

When selecting a "doctor" (a student to correct the mistake), choose someone who has been struggling with the concept. Once the student successfully discovers the mistake (with or without support), praise the student for her hard work and persistence. This models the importance of hard work in achievement and moves the focus of accomplishment away from only those who find the concept easy.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Use math drawings to represent additions with up to two compositions and relate drawings to a written method.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- Explain to your partner how you solved Problem 1 (a) and (b). How can you tell immediately if you are going to need to bundle ones? Tens?
- Could you have solved 1(a) and (b) mentally? Which strategies would be easiest?
- For Problem 1(c), how does knowing partners to ten help you to solve this problem?
- For Problem 1(d), use place value language to explain to your partner how your model matches the written addition.
- Share your responses to Problem 2 with a partner. What does Abby understand about addition? If you were Abby's teacher, what would you focus on teaching her in the next lesson? Why?

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

Name Debbie Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart and bundle when needed.

a.  $65 + 75 =$  \_\_\_\_\_

$$\begin{array}{r} 65 \\ + 75 \\ \hline 140 \end{array}$$

b.  $84 + 29 =$  \_\_\_\_\_

$$\begin{array}{r} 84 \\ + 29 \\ \hline 113 \end{array}$$

c.  $91 + 19 =$  \_\_\_\_\_

$$\begin{array}{r} 91 \\ + 19 \\ \hline 110 \end{array}$$

COMMON CORE Lesson 21: Use math drawings to represent additions with up to two compositions and relate drawings to a written method. Date: 6/18/13 engage<sup>ny</sup>

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

d.  $163 + 27 =$  \_\_\_\_\_

$$\begin{array}{r} 163 \\ + 27 \\ \hline 190 \end{array}$$

2. Abby solved  $99 + 99$  on her place value chart and in vertical form, but she got the incorrect answer. Check Abby's work and correct it.

$$\begin{array}{r} 99 \\ + 99 \\ \hline 188 \end{array}$$

What did Abby do correctly?  
She circled 10 10's and made them 100.

What did Abby do incorrectly?  
She circled 10 ones but did not add another 10.

COMMON CORE Lesson 21: Use math drawings to represent additions with up to two compositions and relate drawings to a written method. Date: 6/18/13 engage<sup>ny</sup>

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart and bundle when needed.

a.  $65 + 75 =$  \_\_\_\_\_

100's	10's	1's

b.  $84 + 29 =$  \_\_\_\_\_

100's	10's	1's

c.  $91 + 19 =$  \_\_\_\_\_

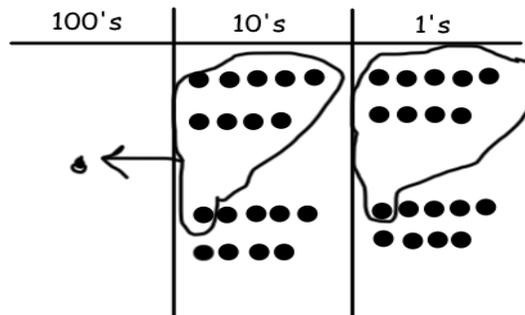
100's	10's	1's

d.  $163 + 27 =$  \_\_\_\_\_

100's	10's	1's

2. Abby solved  $99 + 99$  on her place value chart and in vertical form, but she got an incorrect answer. Check Abby's work and correct it.

$$\begin{array}{r} 99 \\ + 99 \\ \hline 188 \end{array}$$



What did Abby do correctly?

---



---

What did Abby do incorrectly?

---



---

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart and bundle when needed.

a.  $58 + 67 =$  \_\_\_\_\_

100's	10's	1's

b.  $43 + 89 =$  \_\_\_\_\_

100's	10's	1's

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart and bundle when needed.

a.  $45 + 76 =$  \_\_\_\_\_

100's	10's	1's

b.  $62 + 89 =$  \_\_\_\_\_

100's	10's	1's

c.  $97 + 79 =$  \_\_\_\_\_

100's	10's	1's

d.  $127 + 78 =$  \_\_\_\_\_

100's	10's	1's

2. The blue team scored 37 fewer points than the white team. The blue team scored 69 points.

a. How many points did the white team score?

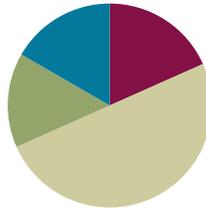
b. How many points did the blue and white team score altogether?

## Lesson 22

**Objective:** Solve additions with up to four addends with totals within 200 with and without two compositions of larger units.

### Suggested Lesson Structure

■ Fluency Practice	(11 minutes)
■ Application Problem	(9 minutes)
■ Concept Development	(30 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (11 minutes)

- Addition Facts Flash Cards **2.OA.2** (2 minutes)
- Subtraction from Tens **2.NBT.5** (5 minutes)
- Crossing a Ten **2.NBT.5** (4 minutes)

### Addition Facts Flash Cards (2 minutes)

Materials: (T) Flash Cards Set 1

Note: By practicing addition facts, students will gain fluency adding within 20.

### Subtraction from Tens (5 minutes)

Note: This allows students to see how their take-from-ten facts help them to solve many, many problems.

T: I say a basic fact. You add 10 to the whole and continue until I say to stop. So after  $10 - 6$ , you would solve  $20 - 6$  then?

S:  $30 - 6$ ,  $40 - 6$ ,  $50 - 6$ .

T: Yes, as high as you can before I give the signal to stop. Let's begin.  $10 - 6$ .

S: (Work.)

T: (Stop everyone when you see the slowest student has completed at least two problems.)

Continue with the following possible sequence:  $10 - 8$ ,  $11 - 2$ ,  $12 - 4$ , and  $11 - 5$ .

**Crossing a Ten (4 minutes)**

Note: Crossing a Ten prepares students for making a multiple of 10 as they solve problems with up to four addends.

T: (Write on board:  $8 + \underline{\quad} = 10$ .) How many more does 8 need to make 10?

S: 2 more.

T: Complete the number sentence.

S:  $8 + 2 = 10$ .

T:  $10 + 1$ .

S: 11.

T:  $8 + 2 + 1$ .

S: 11.

T:  $8 + 3$ .

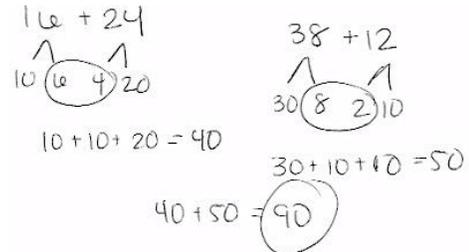
S: 11.

Continues with the following possible sequence:  $7 + 3, 7 + 3 + 1, 7 + 4, 7 + 5, 9 + 1, 9 + 1 + 1, 9 + 1 + 4, 19 + 1 + 4$ .

**Application Problem (9 minutes)**

There are 38 apples, 16 bananas, 24 peaches, and 12 pears in the fruit basket. How many pieces of fruit are in the basket?

Note: In this problem, students apply existing skills, but with more addends. Encourage the use of multiple simplifying strategies. When students have finished, invite them to share different strategies and to explain their thinking. Seeing other methods encourages flexibility in problem solving and can provide access for all learners.



**Concept Development (30 minutes)**

Materials: (S) Personal white boards

For each problem within the set, guide students to look for partners to 10 ones or 10 tens to solve, using the associative property to group the numbers. Within each set of problems, encourage students to relate problems to each other.

MP.3

**Problems 1–3:  $3 + 7 + 6, 23 + 27 + 16, 123 + 27 + 16$**

T: (Write  $3 + 7 + 6$  on the board.) Raise your hand when you think you know the answer.

S: 16!

T: What helped you solve so quickly?

S:  $3 + 7$  equals 10, and  $10 + 6$  is 16!

T: (Write  $23 + 27 + 16$  directly below  $3 + 7 + 6$  so that the ones are aligned.) Talk with your partner. Don't use vertical addition to solve; use mental math. Talk to your partner using place value language to explain how you can solve this problem mentally. Then, show your work.

S: I added  $23 + 27$  first. I added the 2 tens, so  $20 + 20 = 40$ . Then I added the ones.  $7 + 3$  equals 10, and  $40 + 10$  is 50. 50 plus 16 equals 66. → I did the same thing, but I said 4 tens + 1 ten is 5 tens, plus another ten is 6 tens. Then I added 6 ones, so 66. → I added all the tens first, and then I added the ones. So,  $20 + 20 + 10 = 50$ . Plus the 10 from 7 ones and 3 ones makes 60. Then 6 more, so 66. → It's the same as the first problem, just with tens. So you add 50 more!

$$\begin{array}{r}
 50 \\
 \swarrow \searrow \\
 23 + 27 + 16 = 66 \\
 20 + 20 = 40 \\
 7 + 3 = 10 \\
 40 + 10 = 50 \\
 50 + 16 = 66
 \end{array}$$

T: Oh, I like the way you used the first problem to solve the second one! (Write  $123 + 27 + 16$  directly below the prior equation.) Talk with your partner. How is this problem the same as and different from the first two?

S: The ones are the same in all the problems. → In the second and third problems, the tens and ones are the same, but now there's a hundred. → In the first problem, all the numbers have one digit, and then in the next one they have two digits. And in the last problem, one number has three digits. → You can break apart 123 into  $100 + 23$ ; then, it's the same as the second problem with an added hundred.

T: On your board, show your favorite strategy; then, share your work with your partner.

If time permits or students need more practice, repeat the procedure above with the following problem set:  $2 + 8 + 5$ ,  $32 + 28 + 45$ ,  $132 + 28 + 45$ .

**Problems 4–6:  $1 + 3 + 9 + 7$ ,  $31 + 23 + 19 + 47$ ,  $61 + 53 + 19 + 27$ .**

T: (Write  $1 + 3 + 9 + 7$  on the board.) Now, we're adding four addends. Talk with your partner about how you can solve this easily.

S: Add the numbers that make ten. →  $1 + 9$  is 10 and  $3 + 7$  is 10, so 20.

T: Does this mean we can add numbers in any order?

S: Yes!

T: (Write  $31 + 23 + 19 + 47$ .) How is this problem the same as the first one?

S: The ones are the same.

T: How is it different?



**NOTES ON  
MULTIPLE MEANS OF  
ENGAGEMENT:**

Have struggling students circle pairs of addends with ones digits that add up to ten. Review and practice partners to ten with students who need it, using number bonds, ten frames, or a Rekenrek.

MP.3

MP.3

- S: Now there are tens.  
 T: Choose a strategy to solve. Then, use place value language to explain your strategy to your partner.  
 T: Who would like to show his work and explain his thinking? (Choose volunteers.)  
 S: I added all the tens,  $30 + 20 + 10 + 40$ . That's  $50 + 50$ , which is 100. Then I added the ones.  $10 + 10$  equals 20.  $100 + 20 = 120$ .  
 S: I put 31 and 19 together.  $1 + 9$  is 10.  $30 + 10$  is 40.  $40 + 10$  is 50. Then I added 23 and 47.  $3 + 7$  is 10.  $20 + 40$  is 60.  $50 + 60 + 10$  is 120.

$$31 + 23 + 19 + 47 = 120$$

$$50 + 60 + 10 = 120$$

$$31 + 23 + 19 + 47 =$$

$$31 + 19 + 23 + 47 = 12 \text{ tens} = 120$$

Repeat the procedure above for  $61 + 53 + 19 + 27$ . As students are able to solve using place value strategies, allow them to work on the Problem Set independently.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Solve additions with up to four addends with totals within 200 with and without two compositions of larger units.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- For Problem 1(a–c), how are the three columns related? How do the columns build upon each other?

- In Problem 1(a), how many tens are in  $125 + 25 + 17$ ? How do you know?
- In Problem 1(b), how did you group the tens and ones to solve an easy problem? What did you do with 15 ones?
- In Problem 1(c), how did you change the order of the addends to make a simpler problem to solve?
- How did you solve Problem 2 differently from Josh and Keith? Did you change the order of the addends? Did you make 10 ones? How about 10 tens?
- Could we use the vertical method to solve these problems?

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4 Problem Set 2•4

2. Josh and Keith have the same problem  $23 + 35 + 47 + 56$  for homework. The students solved the problem differently, but got the same answer.

Josh's work

$$23 + 35 + 47 + 56$$

$$\begin{array}{r} 78 + 35 + 56 \\ 100 + 61 = 161 \end{array}$$

Keith's work

$$23 + 35 + 47 + 56$$

$$\begin{array}{r} 20 + 30 + 50 + 56 \\ 50 + 106 = 156 + 10 = 166 \end{array}$$

a. Solve  $23 + 35 + 47 + 56$  another way.

$$23 + 35$$

$$20 + 30 + 3 + 5 = 58$$

$$47 + 56$$

$$40 + 50 + 7 + 6 = 103$$

$$103 + 58 = 161$$

3. Melissa bought a dress for \$29, a purse for \$15, a book for \$11, and a hat for \$25. How much did Melissa spend? Show your work.

$$29 + 15 + 11 + 25$$

$$40 + 40 = \$80$$

COMMON CORE Lesson 22: Solve additions with up to four addends with totals within 200 with and without two compositions of larger units. 4.D.69  
Date: 6/18/13 engageNY 4.D.69

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Look to make 10 ones or 10 tens to solve the following problems using place value strategies.

<p>a.  <math>5 + 5 + 7 =</math> _____</p>	<p><math>25 + 25 + 17 =</math> _____</p>	<p><math>125 + 25 + 17 =</math> _____</p>
<p>b.  <math>4 + 6 + 5 =</math> _____</p>	<p><math>24 + 36 + 75 =</math> _____</p>	<p><math>24 + 36 + 85 =</math> _____</p>
<p>c.  <math>2 + 4 + 8 + 6 =</math> _____</p>	<p><math>32 + 24 + 18 + 46 =</math> _____</p>	<p><math>72 + 54 + 18 + 26 =</math> _____</p>

2. Josh and Keith have the same problem for homework:  $23 + 35 + 47 + 56$ . The students solved the problem differently, but got the same answer.

Josh's work

$$23 + 35 + 47 + 56$$

$58 + 47 + 56$   
 $105 + 56$   
 $161$

Keith's work

$$23 + 35 + 47 + 56$$

$70 + 35 + 56$   
 $105 + 56$   
 $161$

- a. Solve  $23 + 35 + 47 + 56$  another way.

3. Melissa bought a dress for \$29, a purse for \$15, a book for \$11, and a hat for \$25. How much did Melissa spend? Show your work.

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Look to make 10 ones or 10 tens to find the sum in the following problems.

a.  $17 + 33 + 48$

b.  $35 + 56 + 89 + 18$

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Look to make 10 ones or 10 tens to solve the following problems using place value strategies.

a. $6 + 3 + 7 =$ _____	$36 + 23 + 17 =$ _____	$126 + 23 + 17 =$ _____
b. $8 + 2 + 5 =$ _____	$38 + 22 + 75 =$ _____	$18 + 62 + 85 =$ _____
c. $9 + 4 + 1 + 6 =$ _____	$29 + 34 + 41 + 16 =$ _____	$81 + 34 + 19 + 56 =$ _____

2. The table shows the top six soccer teams and their total points scored this season.

Teams	Points
Red	29
Yellow	38
Green	41
Blue	76
Orange	52
Black	24

- How many points did the yellow and orange teams score together?
- How many points did the yellow, orange, and blue teams score together?
- How many points did the red, green, and black teams score together?
- Which two teams scored a total of 70 points?
- Which two teams scored a total of 100 points?



## Topic E

# Strategies for Decomposing Tens and Hundreds

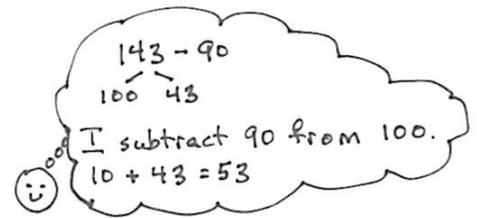
**2.NBT.7, 2.NBT.9**

<b>Focus Standard:</b>	2.NBT.7	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
	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.)
<b>Instructional Days:</b>	6	
<b>Coherence -Links from:</b>	G1–M4	Place Value, Comparison, Addition and Subtraction to 40
<b>-Links to:</b>	G3–M2	Place Value and Problem Solving with Units of Measure
	G4–M1	Place Value, Rounding, and Algorithms for Addition and Subtraction

Topic E begins with an extension of mental math strategies learned in first grade, when students learned to subtract from the ten by using number bonds. In Lesson 23, they return to this strategy to break apart three-digit minuends and subtract from the hundred. For example, in first grade students solved  $14 - 9$  by restating the problem as  $10 - 9 + 4$ . In second grade, students use the same strategy to restate  $143 - 90$  as  $100 - 90 + 43$ .

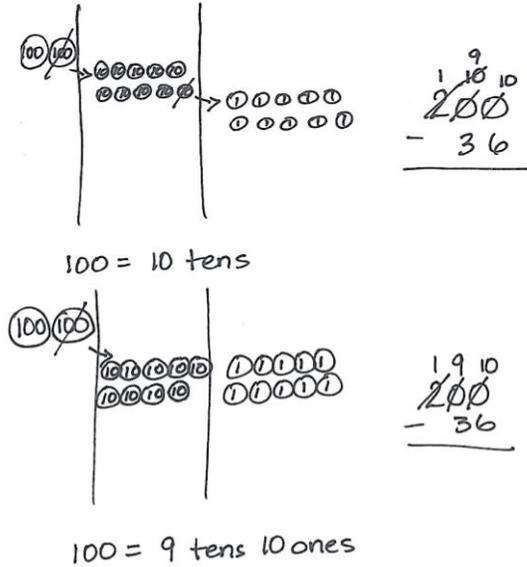
In Lesson 24, students use number disks on a place value chart to represent subtraction and develop an understanding of decomposition of tens and hundreds. This concrete model helps students see the answer to the question, “Do I have enough ones?” or, “Do I have enough tens?” When they do not, they exchange one of the larger units for ten of the smaller units. Repeated practice with this exchange solidifies their understanding that within a unit of ten there are 10 ones, and within a unit of a hundred there are 10 tens. This practice is connected to the strategies they learned with tens and ones; they learn that the only real difference is in place value. The strategies are also connected to addition through part–whole understanding, which is reinforced throughout.

In Lesson 25, students move towards the abstract when they model decompositions on their place value chart while simultaneously recording the changes in the written form. Students draw a magnifying glass around the minuend, as they did in Topic C. They then ask the question, “Do I have enough ones?” They



refer to the place value disks to answer and exchange a ten disk for 10 ones when necessary. They record the change in the written form. Students repeat these steps when subtracting the tens.

Students use math drawings in Lesson 26 as they move away from concrete representations and into the pictorial stage. They follow the same procedure for decomposing numbers as they did in Lesson 25 with the number disks, but now they may use a chip model or number disk drawing. They continue to record changes in the written form as they work with their models.



Topic E closes with the special case of subtracting from 200. Using number disks on a place value chart, students review the concept that a unit of 100 is comprised of 10 tens. They then model 1 hundred as 9 tens and 10 ones and practice counting to 100 both ways (i.e., 10, 20, 30...100 and 10, 20...90, 91, 92, 93...100). Next, they model the decomposition of a hundred either in two steps (as 10 tens then decomposing 1 ten as 10 ones) or one step (as 9 tens and 10 ones) as they represent subtractions from 200 (see image to the right). Students use this same reasoning to subtract from numbers that have zero tens. For example, to subtract 48 from 106, students model the decomposition of 106 as 10 tens 6 ones and as 9 tens 16 ones. Throughout the lesson, students relate their models to a written form step by step.

**A Teaching Sequence Towards Mastery of Strategies for Decomposing Tens and Hundreds**

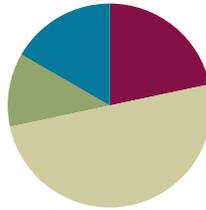
- Objective 1: Use number bonds to break apart three-digit minuends and subtract from the hundred. (Lesson 23)**
- Objective 2: Use manipulatives to represent subtraction with decompositions of 1 hundred as 10 tens and 1 ten as 10 ones. (Lesson 24)**
- Objective 3: Relate manipulative representations to a written method. (Lesson 25)**
- Objective 4: Use math drawings to represent subtraction with up to two decompositions and relate drawings to a written method. (Lesson 26)**
- Objective 5: Subtract from 200 and from numbers with zeroes in the tens place. (Lessons 27–28)**

## Lesson 23

**Objective:** Use number bonds to break apart three-digit minuends and subtract from the hundred.

### Suggested Lesson Structure

■ Fluency Practice	(13 minutes)
■ Application Problem	(7 minutes)
■ Concept Development	(30 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (13 minutes)

- Take from the Ten **2.OA.2** (2 minutes)
- Adding to One Hundred **2.NBT.7** (2 minutes)
- Sprint: Subtraction Patterns **2.NBT.5** (9 minutes)

### Take from the Ten (2 minutes)

Note: Students practice subtracting from the ten as the foundation for subtracting from the hundred in the lesson.

- T:  $16 - 9$ . Take 9 from the ten or the ones?  
 S: Ten.  
 T: Say the number sentence.  
 S:  $10 - 9 = 1$ .  
 T: Now add back the ones.  
 S:  $1 + 6 = 7$ .  
 T: Say the complete number sentence for  $16 - 9$ .  
 S:  $16 - 9 = 7$ .

Continue with the following possible sequence:  $15 - 7$ ,  $14 - 8$ ,  $13 - 6$ ,  $18 - 9$ ,  $12 - 7$ ,  $16 - 7$ .

### Adding to 1 Hundred (2 minutes)

Note: Students practice adding to 1 hundred in preparation for the lesson.

- T: What is the number sentence for 10 more than 100?

- S:  $100 + 10 = 110$ .
- T: 25 more than 100.
- S:  $100 + 25 = 125$ .
- T: 34 more than 100.
- S:  $100 + 34 = 134$ .

Continue with the following possible sequence: 42 more, 50 more, 67 more, 69 more, 70 more, 78 more, 88 more.

**Sprint: Subtraction Patterns (9 minutes)**

Materials: (S) Subtraction Crossing a Ten Sprint

Note: Students are given the opportunity to use mental math strategies when crossing tens to subtract.

**Application Problem (7 minutes)**

Yossef downloaded 115 songs. 100 of them were rock. The rest were hip-hop.

- a. How many of Yossef’s songs were hip-hop?
- b. 80 of his rock songs were oldies. How many rock songs were new?

a.  $115 - 100 = 15$   
 b.  $100 - 80 = 20$

This Application Problem serves to anticipate the day’s Concept Development.

**Concept Development (30 minutes)**

Materials: (S) Personal white boards with insert

**Problem 1: 107 – 90**

T: (Write  $107 - 90$  on the board with number bond arms under 107. Pull out the hundred as shown to the right. Can we break apart 107 by making 100 and some ones? Give me the number sentence.

$107 - 90 = 17$   
 $7 \quad 100$   
 $100 - 90 = 10$   
 $10 + 7 = 17$

S:  $100 + 7 = 107$ .

T: Great! Now we can make an easier problem and subtract from the hundred.

T: What is  $100 - 90$ ? Turn and talk.

S: 90 plus 10 is 100, so the answer is 10.  $\rightarrow 100 - 90 = 10$ .  $\rightarrow 10$  tens – 9 tens is 1 ten.

T: Yes, ten! Am I finished? Does  $107 - 90$  equal 10?

S: No. What about the 7?

T: You’re right, I need to add back the 7 ones! What is  $10 + 7$ ?

S: 17.

T: Yes!  $107 - 90 = 17$ .

MP.2

**Problem 2: 127 – 70**

- T: Let's try another one together.  
 T: (Write  $127 - 70$  on the board.) Can you take out the 100?  
 S: Yes!  
 T: Show me how to break apart 127 into 100 and some more. (Wait as students complete the number bond.)  
 T: If you take out the 100, how many are left in 127?  
 S: 27.  
 T: Now we can subtract easily! What's  $100 - 70$ ?  
 S: 30!  
 T: Great! Now, look at your number bond and add back the rest. Show me your work. (Call on students to share.)  
 S: I know that  $100 - 70$  is 30. I added the 27 back on and I got 57.  $\rightarrow 20 + 27 = 57$ .

$$127 - 70 = 57$$

$$\begin{array}{r} 127 \\ - 70 \\ \hline 27 \end{array} \quad 100$$

$$100 - 70 = 30$$

$$30 + 27 = 57$$

**Problem 3: 133 – 60**

MP.2

- T: Let's try a harder one. (Write  $133 - 60$  on the board.) What should we do first?  
 S: Break apart 133.  $\rightarrow$  Take out the 100.  
 T: Show me.  
 S: (Decompose 133 on personal white boards.)  
 T: (Call on students to share their number bonds.)  
 S: 133 is  $100 + 33$ .  $\rightarrow 133 - 33 = 100$ .  
 T: What next?  
 S: Subtract 60 from 100.  
 T: Yes! Subtract and show me.  
 S: (Students subtract  $100 - 60$  and show their work as pictured at right.)  
 T: How much is  $100 - 60$ ?  
 S: 40.  
 T: What next?  
 S: Put the parts together.  $\rightarrow$  Add  $40 + 33$ .  
 T: Yes! Put the parts together and show me.  
 S: (Add on their personal white boards and hold up their work.)  
 T: What is  $133 - 60$ ?  
 S: 73.

$$133 - 60 = 73$$

$$\begin{array}{r} 133 \\ - 60 \\ \hline 33 \end{array} \quad 100$$

$$100 - 60 = 40$$

$$33 + 40 = 73$$



**NOTES ON  
 MULTIPLE MEANS OF  
 ENGAGEMENT:**

Post a hundreds chart on the wall. Count down from 100 by tens at the start of the lesson. Ask, "What do you notice about the pattern of counting back?" Guide students to realize that the pattern of counting back from 100 by tens is the same as counting back from 10 by ones, with the only difference being place value.

Repeat the above process for the following sequence:  $128 - 70$ ,  $138 - 70$ ,  $139 - 60$ . As you move through the problems, allow students more independence. For the first problem, ask them to set up the problem by decomposing 128 before they show you their boards. For the second problem, ask them to decompose 114 and subtract 60. For the last problem, allow students to complete the whole problem independently as you circulate to offer support. If needed, provide more practice before moving on to the Problem Set.

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

**Student Debrief (10 minutes)**

**Lesson Objective:** Use number bonds to break apart three-digit minuends and subtract from the hundred.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- For Problem 1, how did your drawing match your number bond? How did you show subtracting from the hundred?
- How did the number bond in Problem 1(a) help you to solve 1(b)? What was different about your number bond for 1(b)? How did this affect the answer, in comparison to 1(a)?
- What was the same and different about solving Problem 1(c) and (d)? How did you know that the answer to 1(d) would be one more than 1(c)?
- Explain to your partner how to solve Problem 1(e) in three simple steps. Why does the third step involve addition when this is a subtraction problem?

**A NOTE ON MULTIPLE MEANS OF REPRESENTATION:**

For students who struggle with the concept of adding back during subtraction, encourage them to model the procedure with the disks and place value chart until they understand why it works that way. Then move on to number bond representations.

Handwritten student work for Lesson 23, Problem Set. The student, Debbie, solves six subtraction problems (a-f) using number bonds. Each problem shows a number bond diagram, the subtraction equation, and the final answer. For example, problem (a) shows  $106 - 90 = 16$ , with a number bond for 106 (100 and 6) and the steps  $100 - 90 = 10$ ,  $10 + 6 = 16$ .

- How are Parts (g) and (h) of Problem 1 related? Why are their answers the same even though their number bonds are different?
- When is subtracting from the hundred a good mental strategy?

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

<p>g. <math>119 - 50 = 69</math></p> <p style="text-align: center;"> <math>\begin{array}{r} \phantom{1} \\ \uparrow \\ 100 \phantom{19} \end{array}</math> </p> <p style="text-align: center;"> <math>100 - 50 = 50</math>  <math>50 + 19 = 69</math> </p>	<p>h. <math>129 - 60 = 69</math></p> <p style="text-align: center;"> <math>\begin{array}{r} \phantom{1} \\ \uparrow \\ 100 \phantom{29} \end{array}</math> </p> <p style="text-align: center;"> <math>100 - 60 = 40</math>  <math>40 + 29 = 69</math> </p>
<p>i. <math>156 - 80 = 76</math></p> <p style="text-align: center;"> <math>\begin{array}{r} \phantom{1} \\ \uparrow \\ 100 \phantom{56} \end{array}</math> </p> <p style="text-align: center;"> <math>100 - 80 = 20</math>  <math>20 + 56 = 76</math> </p>	<p>j. <math>142 - 70 = 72</math></p> <p style="text-align: center;"> <math>\begin{array}{r} \phantom{1} \\ \uparrow \\ 100 \phantom{42} \end{array}</math> </p> <p style="text-align: center;"> <math>100 - 70 = 30</math>  <math>30 + 42 = 72</math> </p>

2. Use a number bond to show how you would take 8 tens from 126.

$126 - 80 = 46$   
 $\begin{array}{r} \phantom{1} \\ \uparrow \\ 100 \phantom{26} \end{array}$   
 $100 - 80 = 20$   
 $20 + 26 = 46$

COMMON CORE

Lesson 23: Use number bonds to break apart 3-digit minuends and subtract from the hundred.  
Date: 4/13/13

**A**

# Correct \_\_\_\_\_

Subtract.					
1	$10 - 1 =$		23	$21 - 6 =$	
2	$10 - 2 =$		24	$91 - 6 =$	
3	$20 - 2 =$		25	$10 - 7 =$	
4	$40 - 2 =$		26	$11 - 7 =$	
5	$10 - 2 =$		27	$31 - 7 =$	
6	$11 - 2 =$		28	$10 - 8 =$	
7	$21 - 2 =$		29	$11 - 8 =$	
8	$51 - 2 =$		30	$41 - 8 =$	
9	$10 - 3 =$		31	$10 - 9 =$	
10	$11 - 3 =$		32	$11 - 9 =$	
11	$21 - 3 =$		33	$51 - 9 =$	
12	$61 - 3 =$		34	$12 - 3 =$	
13	$10 - 4 =$		35	$82 - 3 =$	
14	$11 - 4 =$		36	$13 - 5 =$	
15	$21 - 4 =$		37	$73 - 5 =$	
16	$71 - 4 =$		38	$14 - 6 =$	
17	$10 - 5 =$		39	$84 - 6 =$	
18	$11 - 5 =$		40	$15 - 8 =$	
19	$21 - 5 =$		41	$95 - 8 =$	
20	$81 - 5 =$		42	$16 - 7 =$	
21	$10 - 6 =$		43	$46 - 7 =$	
22	$11 - 6 =$		44	$68 - 9 =$	

**B** Improvement \_\_\_\_\_ # Correct \_\_\_\_\_

Subtract.					
1	$10 - 2 =$		23	$21 - 6 =$	
2	$20 - 2 =$		24	$41 - 6 =$	
3	$30 - 2 =$		25	$10 - 7 =$	
4	$50 - 2 =$		26	$11 - 7 =$	
5	$10 - 2 =$		27	$51 - 7 =$	
6	$11 - 2 =$		28	$10 - 8 =$	
7	$21 - 2 =$		29	$11 - 8 =$	
8	$61 - 2 =$		30	$61 - 8 =$	
9	$10 - 3 =$		31	$10 - 9 =$	
10	$11 - 3 =$		32	$11 - 9 =$	
11	$21 - 3 =$		33	$31 - 9 =$	
12	$71 - 3 =$		34	$12 - 3 =$	
13	$10 - 4 =$		35	$92 - 3 =$	
14	$11 - 4 =$		36	$13 - 5 =$	
15	$21 - 4 =$		37	$43 - 5 =$	
16	$81 - 4 =$		38	$14 - 6 =$	
17	$10 - 5 =$		39	$64 - 6 =$	
18	$11 - 5 =$		40	$15 - 8 =$	
19	$21 - 5 =$		41	$85 - 8 =$	
20	$91 - 5 =$		42	$16 - 7 =$	
21	$10 - 6 =$		43	$76 - 7 =$	
22	$11 - 6 =$		44	$58 - 9 =$	

Name \_\_\_\_\_ Date \_\_\_\_\_

1. Solve using number bonds to subtract from 100. The first one has been done for you.

<p>a. <math>106 - 90 = 16</math></p>  <p><math>100 - 90 = 10</math> <math>10 + 6 = 16</math></p>	<p>b. <math>116 - 90</math></p>
<p>c. <math>114 - 80</math></p>	<p>d. <math>115 - 80</math></p>
<p>e. <math>123 - 70</math></p>	<p>f. <math>127 - 60</math></p>

g. $119 - 50$	h. $129 - 60$
i. $156 - 80$	j. $142 - 70$

2. Use a number bond to show how you would take 8 tens from 126.

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using number bonds to subtract from 100.

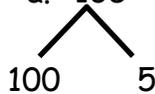
a.  $114 - 50$

b.  $176 - 90$

c.  $134 - 40$

Name \_\_\_\_\_ Date \_\_\_\_\_

1. Solve using number bonds to subtract from 100. The first one has been done for you.

<p>a. <math>105 - 90 = 15</math></p>  <p><math>100 - 90 = 10</math></p> <p><math>10 + 5 = 15</math></p>	<p>b. <math>121 - 90</math></p>
<p>c. <math>112 - 80</math></p>	<p>d. <math>135 - 70</math></p>
<p>e. <math>136 - 60</math></p>	<p>f. <math>129 - 50</math></p>

g.  $156 - 80$

h.  $138 - 40$

2. Monica incorrectly solved  $132 - 70$  to get 102. Show her how to solve it correctly.

Monica's work:

$$132 - 70 = \underline{\quad}$$

$$100 - 30 = 70$$

$$70 + 32 = 102$$

Correct way to solve  $132 - 70$ :

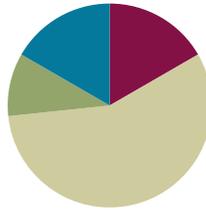
3. Billy sold 50 fewer magazines than Alex. Alex sold 128 magazines. How many magazines did Billy sell?

## Lesson 24

**Objective:** Use manipulatives to represent subtraction with decompositions of 1 hundred as 10 tens and 1 ten as 10 ones.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Application Problem	(6 minutes)
■ Concept Development	(34 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (10 minutes)

- Subtraction Fact Flash Cards **2.OA.2** (3 minutes)
- Adding to 1 Hundred **2.NBT.5** (3 minutes)
- Take from a Ten or from the Ones **2.NBT.5** (4 minutes)

### Subtraction Fact Flash Cards (3 minutes)

Materials: (T) Flash Cards Set 2

Note: By practicing subtraction facts, students will gain fluency subtracting within 20.

### Adding to 1 Hundred (3 minutes)

Note: Students practice adding to 1 hundred in preparation for the lesson.

T: What is the number sentence for 15 more than 100?

S:  $100 + 15 = 115$ .

T: 30 more than 100.

S:  $100 + 30 = 130$ .

T: 41 more than 100.

S:  $100 + 41 = 141$ .

Continue with following possible sequence: 45 more, 60 more, 62 more, 68 more, 80 more, 84 more, 89 more.

**Take from a Ten or from the Ones (4 minutes)**

Note: This fluency helps students to know when to unbundle a ten to subtract and when not to. This is a foundational skill for the lesson.

- T: For every number sentence I say, you tell me if I take from a ten or the ones. When I say  $46 - 5$ , you say take from the ones, but if I say  $46 - 7$ , you say take from a ten. Ready?
- T:  $46 - 6$ .
- S: Take from the ones.
- T:  $46 - 9$ .
- S: Take from a ten.

Continue with the following possible sequence:  $56 - 5$ ,  $52 - 4$ ,  $63 - 6$ ,  $67 - 5$ ,  $65 - 4$ ,  $68 - 8$ ,  $70 - 3$ .

**Application Problem (6 minutes)**

Sammy bought 114 notecards. He used 70 of them. How many notecards did he have left?

Note: This Application Problem provides practice in taking from the hundred, as taught in Lesson 23. To encourage flexible thinking, you might invite some students to count up using the arrow way and invite others to solve by subtracting from the hundred. This serves as a bridge to today’s Concept Development, in which students use number disks to decompose a hundred and a ten to subtract.

$$\begin{array}{r}
 114 - 70 \\
 \uparrow \\
 100 \quad 14 \\
 100 - 70 = 30 \\
 30 + 14 = 44
 \end{array}$$

**Concept Development (34 minutes)**

Materials: (T) Number disks (1 hundreds, 18 tens, 18 ones) (S) Number disks (1 hundreds, 18 tens, 18 ones), place value charts, personal white boards

**Problem 1:  $122 - 80$**

- T: (Write  $122 - 80$  on the board.) Let’s read the problem together.
- T: Yesterday we used number bonds to subtract from the hundred. Today we are going to use our number disks to unbundle the hundred before subtracting. What should I do first?
- S: Count out your number disks.
- T: What number should I model?
- S: 122.
- T: Turn and talk. Why do I only need to model 122 and not 80?

$$122 - 80 =$$



MP.4

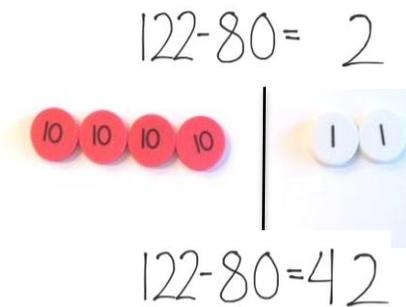
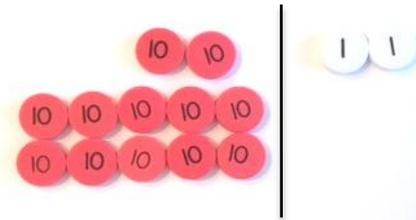
MP.4

- S: Because when we subtract, we only show the whole.  
 → 122 is the whole and 80 is a part. We take away the part.
- T: (Count to 122 using number disks and arrange them on your place value mat as shown at right.) Can I subtract 0 ones from 2 ones?
- S: Yes!
- T: We are ready to subtract in the ones place.
- T: Let's move on to the tens. Can I subtract 8 tens from 2 tens?
- S: No!
- T: I need more tens. What should I do? Turn and talk.
- S: A hundred has 10 tens in it. → Decompose 100. → Take 100 apart and break it into 10 tens.
- T: That's right! Just as we can unbundle a ten for 10 ones, we can also unbundle a hundred for 10 tens.
- T: Watch what I do with my number disks to unbundle a 100. (Remove a hundreds disk from the place value mat, counting 10 tens, and arrange them in 5-groups in the tens place.)
- T: Say the number in tens and ones.
- S: 12 tens, 2 ones.
- T: Can I subtract 8 tens from 12 tens?
- S: Yes!
- T: Great! Now we are ready to subtract in both the ones and the tens places.
- T: 2 ones minus 0 ones is how many?
- S: 2 ones.
- T: (Write 2 on the board as shown at right.) 12 tens minus 8 tens is how many? (Remove 8 tens disks from the place value chart.)
- S: 4 tens.
- T: What is  $122 - 80$  the Say Ten way?
- S: 4 tens 2.
- T: The regular way?
- S: 42.



**NOTES ON  
 MULTIPLE MEANS OF  
 REPRESENTATION:**

For students unclear about the part-whole relationship in subtraction, draw a number bond for the problem. Instruct them to draw a number bond for the problem when they are unable to determine how to solve.



**Problem 2: 174 – 56**

T: This time, work with me. What I do, you do. (Write  $174 - 56$  on the board.) What number should I show on my place value chart now?

S: 174.

T: Show me 174 with your disks. (Give them time to do so.) What number is in the ones place?



S: 4!

T: How many ones do we need to subtract from it?

S: 6!

T: Can we subtract 6 from 4?

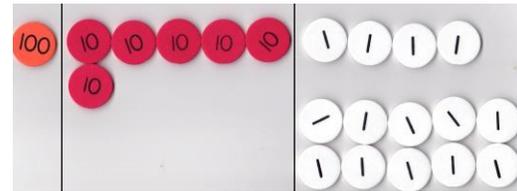
S: No!

T: So what do we do?

S: Decompose a ten. → Change a ten for 10 ones.

T: Let's do it together.

T: (Show taking a tens disk off the chart, counting out 10 ones, and arranging them on the place value chart as shown at right. Students do the same.)



How many ones do we have now?

S: 14 ones.

T: Can we subtract 6 ones from 14 ones?

S: Yes!

T: What about the tens place? How many tens do we have left?

S: 6 tens.

T: Do we have enough tens to take 5 tens away?

S: Yes!

T: I think we are ready to subtract.

T: (Remove 6 ones and record the answer. Then, remove 5 tens and record the answer.)

T: I see we have 1 hundred. How many hundreds are we taking away?

S: None.

T: So how many hundreds do we have left?

S: 1 hundred.

T: (Record this on the board.) What is  $174 - 56$ ?



S: 118.

T: How many hundreds in 118?

S: 1 hundred.

T: How many tens are in a hundred?

S: 10 tens.

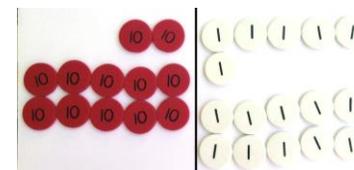
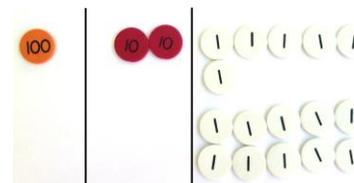
T: How many is 10 tens plus 1 ten?

MP.4

- S: 11 tens.  
 T: So how many tens in 118?  
 S: 11 tens.  
 T: How many ones in 118?  
 S: 8 ones.  
 T: What is  $174 - 56$  the Say Ten way?  
 S: 11 ten 8.  
 T: The regular way?  
 S: 118!

**Problem 3: 136 – 57**

- T: Let’s try another problem. Again, what I do, you do. (Write  $136 - 57$  on the board.) What should we do first?  
 S: Set up the problem with number disks by counting out 1 hundred, 3 tens, and 6 ones.  
 T: (Allow time to do so.) Can we subtract 7 ones from 6 ones?  
 S: No!  
 T: What should we do?  
 S: Unbundle a ten.  
 T: Do this with me. (Model taking a tens disk off the chart, counting out 10 ones, and arranging them on the place value chart as shown at right.) How many ones do we have now?  
 S: 16 ones.  
 T: Can we subtract 7 ones from 16 ones?  
 S: Yes!  
 T: We are ready to subtract in the ones place. Let’s move on to the tens. Can we subtract 5 tens from 2 tens?  
 S: No!  
 T: What should we do?  
 S: Unbundle the hundred. → Take a hundred and rename it 10 tens. → Change 1 hundred for 10 ones.  
 T: (Remove the hundred from the place value chart, counting out 10 tens, and arranging them in 5-groups on the place value chart. Students do the same.) How many tens do we have?  
 S: 12 tens.



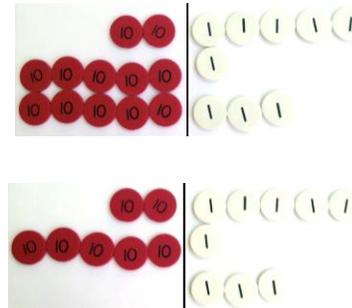
MP.4

**NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:**

Provide straws or similar manipulatives for students to practice literally unbundling if they are unable to grasp the concept with the disks.

MP.4

- T: How many hundreds?  
 S: Zero. → None.  
 T: Can I subtract 5 tens from 12 tens?  
 S: Yes, we are ready to subtract.  
 T: (Remove 7 ones and record the answer. Then, remove 5 tens and record the answer.) What is  $136 - 57$  the Say Ten way?  
 S: 7 ten 9.  
 T: The regular way?  
 S: 79!  
 T: Now it's your turn.



Depending on students' proficiency levels, you may choose to walk them through another two or three problems. Otherwise, instruct them to complete the following suggested problems,  $146 - 67$ ,  $137 - 58$ ,  $112 - 34$ . Allow them to move on to the Problem Set as they show proficiency.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Use manipulatives to represent subtraction with decompositions of 1 hundred as 10 tens and 1 ten and 10 ones.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion. Tell your partner how you solved the problems in set 1 mentally.

- How did the sequence in Problem 1(a) help you to solve  $125 - 26$  mentally?

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

Name Debbie Date \_\_\_\_\_

1. Solve using mental math. If you cannot solve mentally, use your place value chart and number disks.

a.  $25 - 5 = 20$      $25 - 6 = 19$      $125 - 25 = 100$      $125 - 26 = 99$

b.  $160 - 50 = 110$      $160 - 60 = 100$      $160 - 70 = 90$

2. Solve using your place value chart and number disks. Unbundle the hundred and/or ten when necessary. Circle what you did to model each problem.

a. $124 - 60 = 64$ I unbundled the hundred. <input checked="" type="radio"/> Yes <input type="radio"/> No I unbundled a ten. <input type="radio"/> Yes <input checked="" type="radio"/> No	b. $174 - 58 = 116$ I unbundled the hundred. <input type="radio"/> Yes <input checked="" type="radio"/> No I unbundled a ten. <input type="radio"/> Yes <input checked="" type="radio"/> No
c. $121 - 48 = 73$ I unbundled the hundred. <input type="radio"/> Yes <input checked="" type="radio"/> No I unbundled a ten. <input type="radio"/> Yes <input checked="" type="radio"/> No	d. $125 - 67 = 58$ I unbundled the hundred. <input type="radio"/> Yes <input checked="" type="radio"/> No I unbundled a ten. <input type="radio"/> Yes <input checked="" type="radio"/> No
e. $145 - 76 = 69$ I unbundled the hundred. <input type="radio"/> Yes <input checked="" type="radio"/> No I unbundled a ten. <input type="radio"/> Yes <input checked="" type="radio"/> No	f. $181 - 72 =$ _____ I unbundled the hundred. <input type="radio"/> Yes <input checked="" type="radio"/> No I unbundled a ten. <input type="radio"/> Yes <input checked="" type="radio"/> No

COMMON CORE    Lesson 24    Use manipulatives to represent subtraction with decompositions of 1 hundred as 10 tens and 1 ten as 10 ones.    engage<sup>ny</sup>    4

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- Charlie showed how he solved Problem 2(b),  $174 - 58$ . (Represent problem with number disks.) Since there were not enough ones to subtract, he decomposed a hundred. He explained that since you can remove 5 tens disks, you decompose the hundred. Charlie’s answer was 26. How was Charlie’s reasoning incorrect? What does he need to learn?
- For Problem 2(g), did you decompose a hundred or a ten? Why or why not? Could anyone solve this in a different way? What simplifying strategy could you use to solve?
- Explain how you know when to unbundle a hundred or a ten. What is the same about changing these larger units for smaller units? What is different?

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Handwritten student work for Lesson 24, Exit Ticket. The work shows four subtraction problems (g, h, i, j) with student answers and "Yes/No" checkboxes for "I unbundled the hundred" and "I unbundled a ten". Problem 3 asks for the number of apples left (78). Problem 4a asks for Tim's cards (87) and 4b asks for Brady's cards (58).

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using mental math. If you cannot solve mentally, use your place value chart and number disks.

a.  $25 - 5 =$  \_\_\_\_\_  $25 - 6 =$  \_\_\_\_\_  $125 - 25 =$  \_\_\_\_\_  $125 - 26 =$  \_\_\_\_\_

b.  $160 - 50 =$  \_\_\_\_\_  $160 - 60 =$  \_\_\_\_\_  $160 - 70 =$  \_\_\_\_\_

2. Solve using your place value chart and number disks. Unbundle the hundred or ten when necessary. Circle what you did to model each problem.

<p>a.</p> <p style="text-align: center;"><math>124 - 60 =</math> _____</p> <p>I unbundled the hundred.                      Yes No I unbundled a ten.                                Yes No</p>	<p>b.</p> <p style="text-align: center;"><math>174 - 58 =</math> _____</p> <p>I unbundled the hundred.                      Yes No I unbundled a ten.                                Yes No</p>
<p>c.</p> <p style="text-align: center;"><math>121 - 48 =</math> _____</p> <p>I unbundled the hundred.                      Yes No I unbundled a ten.                                Yes No</p>	<p>d.</p> <p style="text-align: center;"><math>125 - 67 =</math> _____</p> <p>I unbundled the hundred.                      Yes No I unbundled a ten.                                Yes No</p>
<p>e.</p> <p style="text-align: center;"><math>145 - 76 =</math> _____</p> <p>I unbundled the hundred.                      Yes No I unbundled a ten.                                Yes No</p>	<p>f.</p> <p style="text-align: center;"><math>181 - 72 =</math> _____</p> <p>I unbundled the hundred.                      Yes No I unbundled a ten.                                Yes No</p>

<p>g.</p> <p style="text-align: center;"><math>111 - 99 = \underline{\hspace{2cm}}</math></p> <p>I unbundled the hundred.      Yes No I unbundled a ten.                Yes No</p>	<p>h.</p> <p style="text-align: center;"><math>131 - 42 = \underline{\hspace{2cm}}</math></p> <p>I unbundled the hundred.      Yes No I unbundled a ten.                Yes No</p>
<p>i.</p> <p style="text-align: center;"><math>123 - 65 = \underline{\hspace{2cm}}</math></p> <p>I unbundled the hundred.      Yes No I unbundled a ten.                Yes No</p>	<p>j.</p> <p style="text-align: center;"><math>132 - 56 = \underline{\hspace{2cm}}</math></p> <p>I unbundled the hundred.      Yes No I unbundled a ten.                Yes No</p>
<p>k.</p> <p style="text-align: center;"><math>145 - 37 = \underline{\hspace{2cm}}</math></p> <p>I unbundled the hundred.      Yes No I unbundled a ten.                Yes No</p>	<p>l.</p> <p style="text-align: center;"><math>115 - 48 = \underline{\hspace{2cm}}</math></p> <p>I unbundled the hundred.      Yes No I unbundled a ten.                Yes No</p>

3. There were 167 apples. The students ate 89 apples. How many apples were left?

4. For early finishers: Tim and John have 175 trading cards together. John has 88 cards.

a. How many cards does Tim have?

b. Brady has 29 fewer cards than Tim. Have many cards does Brady have?

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using your place value chart and number disks. Change 1 hundred for 10 tens and change 1 ten for 10 ones when necessary. Circle what you need to do to model each problem.

<p>a.</p> <p style="text-align: center;"><math>157 - 74 = \underline{\hspace{2cm}}</math></p> <p>I unbundled the hundred. <span style="float: right;">Yes No</span>                  I unbundled a ten. <span style="float: right;">Yes No</span></p>	<p>b.</p> <p style="text-align: center;"><math>124 - 46 = \underline{\hspace{2cm}}</math></p> <p>I unbundled the hundred. <span style="float: right;">Yes No</span>                  I unbundled a ten. <span style="float: right;">Yes No</span></p>
---	---

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve using mental math. If you cannot solve mentally, use your place value chart and number disks.

a.  $38 - 8 =$  \_\_\_\_\_  $38 - 9 =$  \_\_\_\_\_  $138 - 38 =$  \_\_\_\_\_  $138 - 3 =$  \_\_\_\_\_

b.  $130 - 20 =$  \_\_\_\_\_  $130 - 30 =$  \_\_\_\_\_  $130 - 40 =$  \_\_\_\_\_

2. Solve using your place value chart and number disks. Unbundle the hundred or ten when necessary. Circle what you did to model each problem.

<p>a.</p> <p><math>115 - 50 =</math> _____</p> <p>I unbundled the hundred.      Yes No I unbundled a ten.              Yes No</p>	<p>b.</p> <p><math>125 - 57 =</math> _____</p> <p>I unbundled the hundred.      Yes No I unbundled a ten.              Yes No</p>
<p>c.</p> <p><math>88 - 39 =</math> _____</p> <p>I unbundled the hundred.      Yes No I unbundled a ten.              Yes No</p>	<p>d.</p> <p><math>186 - 39 =</math> _____</p> <p>I unbundled the hundred.      Yes No I unbundled a ten.              Yes No</p>
<p>e.</p> <p><math>162 - 85 =</math> _____</p> <p>I unbundled the hundred.      Yes No I unbundled a ten.              Yes No</p>	<p>f.</p> <p><math>172 - 76 =</math> _____</p> <p>I unbundled the hundred.      Yes No I unbundled a ten.              Yes No</p>

<p>g.</p> <p style="text-align: center;"><math>121 - 89 = \underline{\hspace{2cm}}</math></p> <p>I unbundled the hundred.      Yes No                      I unbundled a ten.              Yes No</p>	<p>h.</p> <p style="text-align: center;"><math>131 - 98 = \underline{\hspace{2cm}}</math></p> <p>I unbundled the hundred.      Yes No                      I unbundled a ten.              Yes No</p>
<p>i.</p> <p style="text-align: center;"><math>140 - 65 = \underline{\hspace{2cm}}</math></p> <p>I unbundled the hundred.      Yes No                      I unbundled a ten.              Yes No</p>	<p>j.</p> <p style="text-align: center;"><math>150 - 56 = \underline{\hspace{2cm}}</math></p> <p>I unbundled the hundred.      Yes No                      I unbundled a ten.              Yes No</p>
<p>k.</p> <p style="text-align: center;"><math>163 - 78 = \underline{\hspace{2cm}}</math></p> <p>I unbundled the hundred.      Yes No                      I unbundled a ten.              Yes No</p>	<p>l.</p> <p style="text-align: center;"><math>136 - 87 = \underline{\hspace{2cm}}</math></p> <p>I unbundled the hundred.      Yes No                      I unbundled a ten.              Yes No</p>

3. 96 crayons in the basket are broken. The basket has 182 crayons. How many crayons are not broken?

$9 - 2$

$10 - 2$

$11 - 2$

$12 - 2$

$13 - 2$

$14 - 2$

$15 - 2$

$16 - 2$

$17 - 2$

$18 - 2$

$19 - 2$

$20 - 2$

$9 - 3$

$10 - 3$

$11 - 3$

$12 - 3$

$13 - 3$

$14 - 3$

$15 - 3$

$16 - 3$

$17 - 3$

$18 - 3$

$19 - 3$

$20 - 3$

$9 - 4$

$10 - 4$

$11 - 4$

$12 - 4$

$13 - 4$

$14 - 4$

$15 - 4$

$16 - 4$

$17 - 4$

$18 - 4$

$19 - 4$

$20 - 4$

$9 - 5$

$10 - 5$

$11 - 5$

$12 - 5$

$13 - 5$

$14 - 5$

$15 - 5$

$16 - 5$

$17 - 5$

$18 - 5$

$19 - 5$

$20 - 5$

$9 - 6$

$10 - 6$

$11 - 6$

$12 - 6$

$13 - 6$

$14 - 6$

$15 - 6$

$16 - 6$

$17 - 6$

$18 - 6$

$19 - 6$

$20 - 6$

$9 - 7$

$10 - 7$

$11 - 7$

$12 - 7$

$13 - 7$

$14 - 7$

$15 - 7$

$16 - 7$

$17 - 7$

$18 - 7$

$19 - 7$

$20 - 7$

$9 - 8$

$10 - 8$

$11 - 8$

$12 - 8$

$13 - 8$

$14 - 8$

$15 - 8$

$16 - 8$

$17 - 8$

$18 - 8$

$19 - 8$

$20 - 8$

$9 - 9$

$10 - 9$

$11 - 9$

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$15 - 9$

$16 - 9$

$17 - 9$

$18 - 9$

$19 - 9$

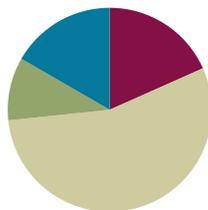
$20 - 9$

## Lesson 25

Objective: Relate manipulative representations to a written method.

### Suggested Lesson Structure

■ Fluency Practice	(11 minutes)
■ Application Problem	(6 minutes)
■ Concept Development	(33 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (11 minutes)

- Subtraction Fact Flash Cards **2.OA.2** (3 minutes)
- Zap to Zero **2.NBT.5** (3 minutes)
- Rename the Units: Choral Response **2.NBT.1** (5 minutes)

### Subtraction Fact Flash Cards (3 minutes)

Materials: (T) Flash Cards Set 2

Note: By practicing subtraction facts, students will gain fluency subtracting within 20.

### Zap to Zero (3 minutes)

Note: Practicing using place value concepts to mentally subtract will help lay a foundation for this lesson's content.

- T: (Write 184.) If I say zap the digit 8 to zero, you say subtract 80. Ready?
- T: Zap the digit 8 to zero.
- S: Subtract 80.
- T: What is the number sentence?
- S:  $184 - 80 = 104$ .
- T: Start again with 184. Zap the digit 1 to zero.
- S: Subtract 100.
- T: What is the number sentence?
- S:  $184 - 100 = 84$

Repeat using the following possible sequence: 173, 256.

### Rename the Units: Choral Response (5 minutes)

Note: This fluency will review foundations that lead into today's lesson.

- T: (Write 30 ones = \_\_\_\_ tens.) Say the number sentence.  
 S: 30 ones = 3 tens.  
 T: (Write 20 ones = 1 ten \_\_\_\_ ones.) Say the number sentence.  
 S: 20 ones = 1 ten 10 ones.  
 T: (Write 24 ones = 1 ten \_\_\_\_ ones.) Say the number sentence.  
 S: 24 ones = 1 ten 14 ones.

Repeat the process for 27, 30, 32, 38, 40, 41, 46, 50, 63, 88.

### Application Problem (6 minutes)

114 people went to the fair. 89 of them went in the evening. How many went during the day?

$$114 - 89 = 25$$

Note: Allow students to choose the strategy to solve the Application Problem. Students may decompose 100, use the arrow way, or use number disks.

### Concept Development (33 minutes)

Materials: (T) Number disks (S) Personal white boards, number disks

Note: It may be better to have one student use the disks and one student use the written method, and then switch.

#### Problem 1: 175 – 56

- T: Today, let's use our number disks to help us solve larger numbers using a vertical written method. (Write  $175 - 56$  in vertical form on the board.) What should I do first?  
 S: Get ready to subtract!  
 T: (Draw the magnifying glass as shown on the next page.) What next?  
 S: Count out your number disks.  
 T: (Model counting 1 hundred, 7 tens, and 5 ones and placing them on your place value mat.) Why do we only show 1 hundred, 7 tens, and 5 ones? Turn and talk.



#### NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Some students may need scaffolding with three-digit minuend problems that only require one unbundling step in the tens. Once they have demonstrated proficiency with these problems, introduce unbundling only the hundreds. Finally, introduce problems with unbundling in both the ones and the tens.

S: Because when you subtract, you only show the whole.  
 → We will subtract from 175. → We are subtracting one part, and the amount that is left is the other part.



T: Ok, what next?

S: Look at the ones column. → See if you have enough ones to subtract.

T: Can we subtract 8 ones from 5 ones?

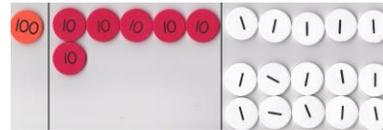
S: No!

T: Turn and talk. What can we do to find some more ones?

S: We have to unbundle a ten. → We have to change a ten for 10 ones.

T: Why don't we get more ones from the hundred? Turn and talk.

S: Because 100 would give us 10 tens, not 10 ones.  
 → A hundred changes into 100 ones. That's too many.  
 → We always go one place to the left, not two places.



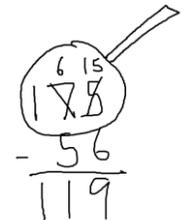
T: (Remove a tens disk from the place value chart, counting out 10 ones and arranging them in 5-groups as shown at right.) How do we represent our model in the written subtraction?

S: Cross out the 7 and make it a 6. Change the 5 to 15.  
 → Change the 7 tens to 6 tens and the 5 ones to 15 ones.

T: (Change the tens to 6 tens and change the ones to 15 ones.) Now, can we subtract 5 tens from 6 tens?

S: Yes!

T: Are we ready to subtract using the vertical written method?



S: Yes!

T: How many is 15 ones minus 6 ones?

S: 9 ones.

T: (Remove 6 ones disks from the place value chart, and record the work in the vertical written method.) Whatever we do to our number disks, we must also do to the written subtraction. What next?

S: Subtract the tens.

T: How many is 6 tens minus 5 tens?

S: 1 ten.

T: (Remove 1 tens disk on the place value chart, and record the work in the vertical form.) 75 – 56 is how many?

S: 19.

T: The Say Ten way?

S: 1 ten 9.

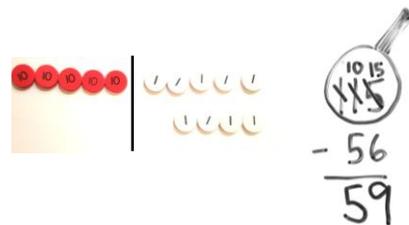
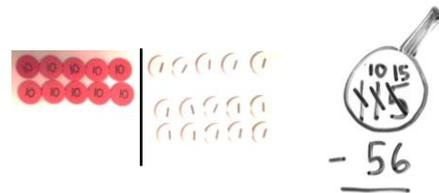
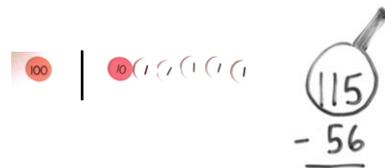
**Problem 2: 115 – 56**

- T: This time, solve with me. What I do, you do. (Write  $115 - 56$  on the board.) Count out your number disks with me.
- S: 1 hundred, 1 ten, 1 one, 5 ones.
- T: (Arrange the number disks on the place value chart and instruct students to do the same.) What should we always do first?
- S: Get ready to subtract!
- T: Turn and talk. How should we set up the problem for subtraction?
- S: You can't take 6 ones from 5 ones, so you have to unbundle a ten. → Check to make sure we can subtract in each place. → Change the whole to 10 tens, 15 ones. → Ask yourself if you have enough ones and tens to subtract.
- T: Can we subtract in the ones place?
- S: No! We need to unbundle a ten.
- T: Show me on your place value charts. (Remove a tens disk from the place value chart, and add 10 ones disks as students do the same.) What we do with the disks we must also do in the written form. Show me on the written subtraction. (Cross out the 1, and write a 0 above it. Cross out the 5, and write a 15 above it. Students do the same.)
- T: Can we subtract 5 tens from 0 tens?
- S: No way! We must unbundle a hundred. → We have to change 1 hundred for 10 tens.
- T: Show me on your place value charts and on the written subtraction. (Remove a hundreds disk from the place value chart and add 10 tens. Record the change in the vertical form. Students do the same.)
- T: Are we ready to subtract?
- S: Yes!
- T: What is 15 ones minus 6 ones?
- S: 9 ones.
- T: (Record the answer in the written subtraction as students do the same.) What is 10 tens minus 5 tens?
- S: 5 tens.
- T: (Record the answer in the written form as students do the same.) What is 0 hundreds minus 0?
- S: 0!
- T: Read the problem and answer using the Say Ten way.



**NOTES ON  
MULTIPLE MEANS OF  
ACTION AND  
EXPRESSION:**

Challenge students performing above grade level to find three different ways to solve  $111 - 99$ . Have them illustrate their work and journal their thinking, and then present the results to the class.



MP.2

- S: 10 tens 15 ones minus 5 tens 6 ones equals 5 tens 9 ones.
- T: Now the regular way.
- S: 115 minus 56 equals 59.

MP.2

Repeat the above process with the following sequence: 107 – 36, 100 – 66, 122 – 89. Guide the students towards proficiency by encouraging them to work more independently on each problem. As students show proficiency, allow them to move on to the Problem Set.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Relate manipulative representations to a written method.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- In Problem 1, which problems could you have solved mentally?
- How did you solve Problem 1(c), 145 – 54? How did you show this on your place value chart? How did you show this with your numbers?
- Explain to your partner how you used number disks to solve Problem 1(c), 167 – 78. How did your place value chart match the vertical written method?

- For Problem 1(d),  $102 - 64$  and  $107 - 78$ , what did you notice about your place value chart when you set these up? What did this tell you immediately?
- In Problem 2, what part did Mrs. Tosh have left? Did anyone write an equation to find the missing addend (or part) and solve by using a simplifying strategy? How does subtraction connect to our understanding that two parts make a whole?

### Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve the following problems using the vertical written method, your place value chart, and number disks. Unbundle a ten or hundred when necessary. Show your work for each problem.

a.  $72 - 49$

$83 - 49$

b.  $118 - 30$

$118 - 85$

c.  $145 - 54$

$167 - 78$

d.  $102 - 64$

$107 - 78$

2. Mrs. Tosh baked 160 cookies for the bake sale. She sold 78 of them. How many cookies did she have left?
3. Tammy had \$154. She bought a watch for \$86. Does she have enough money left over to buy a \$67 bracelet?

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve the following problems using the vertical written method, your place value chart, and number disks. Unbundle a ten or hundred when necessary. Show your work for each problem.

a.  $97 - 69$

b.  $121 - 65$

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve the following problems using the vertical written method, your place value chart, and number disks. Unbundle a ten or hundred when necessary. Show your work for each problem.

a.  $65 - 38$

$66 - 49$

b.  $111 - 60$

$120 - 67$

c.  $163 - 66$

$184 - 95$

d.  $102 - 86$

$108 - 39$

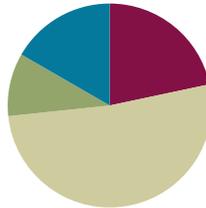
2. Dominic has \$167. He has \$88 more than Mario. How much money does Mario have?
3. Which problem will have the same answer as  $133 - 77$ ? Show your work.
- a.  $155 - 66$
  - b.  $144 - 88$
  - c.  $177 - 33$
  - d.  $139 - 97$

## Lesson 26

**Objective:** Use math drawings to represent subtraction with up to two decompositions and relate drawings to a written method.

### Suggested Lesson Structure

■ Fluency Practice	(13 minutes)
■ Application Problem	(6 minutes)
■ Concept Development	(31 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (13 minutes)

- Subtraction Fact Flash Cards **2.OA.2** (2 minutes)
- Subtraction from Tens **2.NBT.5** (3 minutes)
- Sprint: Subtraction Patterns **2.NBT.5** (8 minutes)

### Subtraction Fact Flash Cards (2 minutes)

Materials: (T) Flash Cards Set 2

Note: By practicing subtraction facts, students will gain fluency subtracting within 20.

### Subtraction from Tens (3 minutes)

Note: This allows students to see how their take-from-ten facts help them to solve many, many problems. It also prepares them for today's Sprint.

T: I say a basic fact, you add ten to the whole and continue until I say to stop. So after  $10 - 5 = 5$ , you would solve  $20 - 5$ , and then...?

S:  $30 - 5 = 25$ ,  $40 - 5 = 35$ ,  $50 - 5 = 45$ .

T: Yes, as high as you can before I give the signal to stop. Let's begin.  $10 - 5$ .

Students work. Stop everyone when you see the slowest student has completed at least two problems.

Continue with the following possible sequence:  $10 - 8$ ,  $11 - 2$ .

**Sprint: Subtraction Patterns (8 minutes)**

Materials: (S) Subtraction Crossing a Ten Sprint

Note: Students are given the opportunity to use mental math strategies when crossing tens to subtract.

**Application Problem (6 minutes)**

Chloe needs 153 beads to make a bag. She only has 49. How many more beads does she need?

This Application Problem serves as practice of Lesson 25 Concept Development.

$$\begin{array}{r} 713 \\ - 49 \\ \hline 104 \end{array}$$

**Concept Development (31 minutes)**

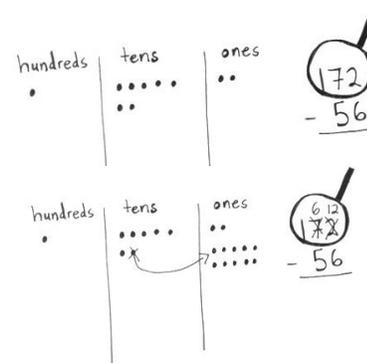
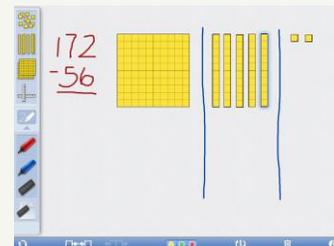
Materials: (S) Personal white boards

**Problem 1: 172 – 56**

- T: (Write  $172 - 56$  in the vertical written form on the board.) Turn and talk. Use place value language to tell your partner how you could show this problem with a chip model.
- S: Draw 1 dot in the hundreds, 7 dots in the tens, and 2 dots in the ones. → I know that you only show the whole, so I would show 1 hundred, 7 tens, and 2 ones by drawing dots in the correct columns on my chart.
- T: (Create a chip model to solve  $172 - 56$ . Remind students that when subtracting, we only draw the whole.) Let's record our work in writing as we solve. When we are subtracting, what should we always do first?
- S: Set up the problem for subtraction. → Make sure we have enough ones and tens to solve. → Get ready to subtract.
- T: Yes. Let's draw our magnifying glass to help us do that.
- T: Can we subtract 6 ones from 2 ones?
- S: No! We need to unbundle a ten.
- T: Could I get the ones I need from the hundred?
- S: No, just tens. → Yes, you can. Hey, can we unbundle the hundred instead? → Do you want a hundred dots? That's not easy. Let's just change 1 ten for 10 ones.

**NOTES ON MULTIPLE MEANS OF REPRESENTATION:**

Engage struggling students with technology. If you have access to iPads or other tablets, use an app such as Number Pieces to represent the problem with manipulatives that can be unbundled.



MP.6

T: Yes, changing 10 ones for 1 ten is a lot simpler, though I like that you realize there are ones inside the hundred, too.

T: (Cross out a dot in the tens place, adding 10 dots to the ones place. Record the change in the written subtraction.)

T: Can we subtract 5 tens from 6 tens?

S: Yes!

T: Are we ready to subtract?

S: Yes!

T: What is 12 ones minus 6 ones? (Cross out 6 dots in the ones column on the chip model.)

S: 6 ones.

T: (Record the ones in the written subtraction.) What is 6 tens minus 5 tens? (Cross out 5 dots in the tens place on the chip model.)

S: 1 ten.

T: (Record the tens in the written subtraction.) What is 1 hundred minus 0 hundreds?

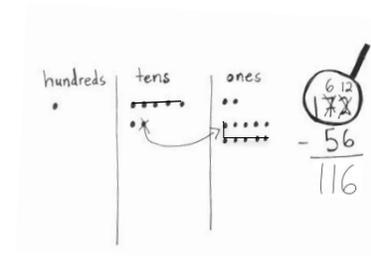
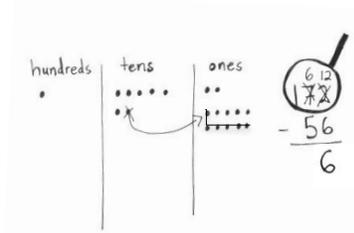
S: 1 hundred.

T: Read the answer the Say Ten way.

S: 1 hundred 1 ten 6.

T: The regular way?

S: 1 hundred sixteen.



MP.6

**Problem 2: 137 – 45**

T: This time, you do what I do. (Write 137 – 45 on the board in the vertical form as students do the same on their personal white boards. Ask students to leave space on the left for a place value chart. Draw a chip model to represent 137 – 45 as students do the same.) What should we do first with our written numbers?

S: Set up the problem for subtraction. → Make sure we have enough ones and tens to subtract.

T: Can we subtract 5 ones from 7 ones?

S: Yes!

T: Are we ready to subtract in the ones?

S: Yes!

T: Can we subtract 4 tens from 3 tens?

S: No! Unbundle the hundred.

T: (Cross out the dot in the hundreds place, adding 10 dots to the tens place. Record the change in the algorithm. Instruct students to do the same.) Are we ready to subtract in the tens?

S: Yes!



**NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:**

Some students may be able to go directly from the previous lesson with concrete models to the vertical written method. Allow those students to demonstrate proficiency with the chip model in the first few problems of the Problem Set and then continue without drawing. Have them write challenging problems for each other to solve, after solving them first, if they finish early.

MP.6

T: Let's begin. What is 7 ones minus 5 ones? (Cross out 5 dots in the ones place on the chip model as students do the same.)

S: 2 ones.

T: Let's record that in the algorithm. (Write 2 in the ones place as students do the same.) What is 13 tens minus 4 tens? (Cross out 3 dots in the tens place on the chip model as students do the same.)

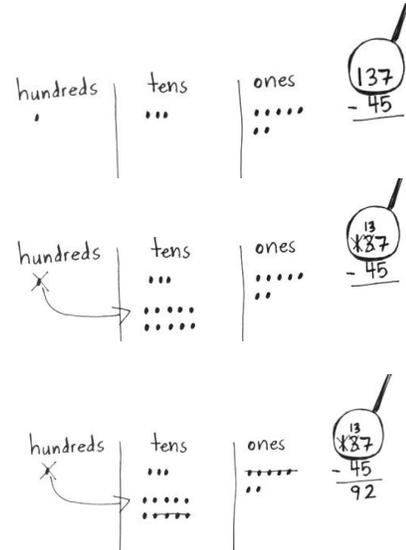
S: 9 tens.

T: Let's record that in the written subtraction. (Write 9 in the tens place as students do the same.) What is  $137 - 45$ ?

S: 92.

T: The Say Ten way?

S: 9 ten 2.



Repeat the above process with  $112 - 75$ . If students show proficiency, allow them to move on to the Problem Set. Those who need more support might be guided through the following sequence:  $127 - 19$ ,  $116 - 36$ ,  $123 - 86$ .

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Use math drawings to represent subtraction with up to two decompositions and relate drawings to a written method.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

Name: Debbie Date: \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart and unbundle when needed.

a.  $181 - 63 =$  \_\_\_\_\_

$$\begin{array}{r} 181 \\ - 63 \\ \hline 118 \end{array}$$

b.  $134 - 52 =$  \_\_\_\_\_

$$\begin{array}{r} 134 \\ - 52 \\ \hline 82 \end{array}$$

c.  $175 - 79 =$  \_\_\_\_\_

$$\begin{array}{r} 175 \\ - 79 \\ \hline 96 \end{array}$$

COMMON CORE Lesson 26: Use math drawings to represent subtraction with up to two decompositions and relate drawings to a written method. © 2013 Common Core, Inc. All rights reserved. commoncore.org Date: 6/18/13 engage<sup>ny</sup>

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- Explain to your partner how you solved 1(a) and (b). Compare the unbundling you had to do for each of these problems. How was it different and how was it the same?
- For Problem 1(c), use place value language to explain to your partner how your chip model matches the algorithm. Could you have used a mental strategy to solve, too?
- For Problem 1(e), what did you do when you needed more ones, but there weren't any tens to unbundle? How did you decompose the hundred into tens and ones? Could you have used a mental strategy to solve, too?
- For Problem 2, explain to your partner whose drawing was incorrect and why. Use place value language to defend your reasoning.

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

**A**

# Correct \_\_\_\_\_

Subtract.

1	$30 - 1 =$		23	$31 - 2 =$	
2	$40 - 2 =$		24	$31 - 3 =$	
3	$50 - 3 =$		25	$31 - 4 =$	
4	$50 - 4 =$		26	$41 - 4 =$	
5	$50 - 5 =$		27	$51 - 5 =$	
6	$50 - 9 =$		28	$61 - 6 =$	
7	$51 - 9 =$		29	$71 - 7 =$	
8	$61 - 9 =$		30	$81 - 8 =$	
9	$81 - 9 =$		31	$82 - 8 =$	
10	$82 - 9 =$		32	$82 - 7 =$	
11	$92 - 9 =$		33	$82 - 6 =$	
12	$93 - 9 =$		34	$82 - 3 =$	
13	$93 - 8 =$		35	$34 - 5 =$	
14	$83 - 8 =$		36	$45 - 6 =$	
15	$33 - 8 =$		37	$56 - 7 =$	
16	$33 - 7 =$		38	$67 - 8 =$	
17	$43 - 7 =$		39	$78 - 9 =$	
18	$53 - 6 =$		40	$77 - 9 =$	
19	$63 - 6 =$		41	$64 - 6 =$	
20	$63 - 5 =$		42	$24 - 8 =$	
21	$73 - 5 =$		43	$35 - 8 =$	
22	$93 - 5 =$		44	$36 - 8 =$	

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Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart. Unbundle when needed.

a.  $181 - 63 =$  \_\_\_\_\_

hundreds	tens	ones

b.  $134 - 52 =$  \_\_\_\_\_

hundreds	tens	ones

c.  $175 - 79 =$  \_\_\_\_\_

hundreds	tens	ones

d.  $115 - 26 =$  \_\_\_\_\_

hundreds	tens	one

e.  $100 - 64 =$  \_\_\_\_\_

hundreds	tens	ones

2. Tanisha and James drew models on their place value charts to solve this problem:  $102 - 47$ . Tell whose model is incorrect and why.

James

Tanisha

Hundreds	Tens	Ones
	<del>XX</del> <del>XX</del> . .....	<del>XX</del> <del>XX</del> <del>XX</del> <del>XX</del> YX .....

My math is sick!

Hundreds	Tens	Ones
	..... .....	<del>XX</del> <del>XX</del> <del>XX</del> <del>XX</del> <del>XX</del> .....

\_\_\_\_\_ 's model is incorrect because \_\_\_\_\_

\_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart. Unbundle when needed.

a.  $153 - 46 =$  \_\_\_\_\_

hundreds	tens	ones

b.  $107 - 68 =$  \_\_\_\_\_

hundreds	tens	ones

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart. Unbundle when needed.

a.  $114 - 65 =$  \_\_\_\_\_

hundreds	tens	ones

b.  $120 - 37 =$  \_\_\_\_\_

hundreds	tens	ones

c.  $141 - 89 =$  \_\_\_\_\_

hundreds	tens	ones

d.  $136 - 77 = \underline{\hspace{2cm}}$

hundreds	tens	ones

e.  $100 - 42 = \underline{\hspace{2cm}}$

hundreds	tens	ones

2. Fill in the missing number to complete the number sentence. Draw a place value chart and chips to model.

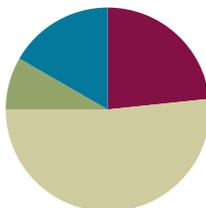
<p>a.</p> $\begin{array}{r} 123 \\ - 5\boxed{\phantom{0}} \\ \hline 69 \end{array}$	
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## Lesson 27

**Objective:** Subtract from 200 and from numbers with zeros in the tens place.

### Suggested Lesson Structure

■ Fluency Practice	(14 minutes)
■ Application Problem	(5 minutes)
■ Concept Development	(31 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (14 minutes)

- Subtraction Facts Flash Cards **2.OA.2** (2 minutes)
- Subtraction from Tens **2.NBT.5** (3 minutes)
- Sprint: Subtraction from a Ten or a Hundred **2.NBT.5** (9 minutes)

### Subtraction Facts Flash Cards (2 minutes)

Materials: (T) Flash Cards Set 2

Note: By practicing subtraction facts, students will gain fluency subtracting within 20.

### Subtraction from Tens (3 minutes)

Note: This allows students to see how their take-from-ten facts help them to solve many, many problems. It also prepares them for today's Sprint.

T: I say a basic fact, you add ten to the whole and continue until I say to stop. So after  $10 - 8 = 2$ , you would solve  $20 - 8$ , and then...?

S:  $30 - 8 = 22$ ,  $40 - 8 = 32$ ,  $50 - 8 = 42$ .

T: Yes, as high as you can before I give the signal to stop. Let's begin.  $10 - 8 = 2$ .

Students work. Stop everyone when you see the slowest student has completed at least two problems.

Continue with the following possible sequence:  $100 - 80$ ,  $10 - 6$ ,  $100 - 60$ ,  $100 - 59$ .

**Sprint: Subtraction from a Ten or a Hundred (9 minutes)**

Materials: (S) Subtraction from a Ten or a Hundred Sprint

Note: Students are given the opportunity to use mental math strategies when subtracting from 10 or 100.

**Application Problem (5 minutes)**

Mr. Ramos has 139 pencils and 88 erasers. How many more pencils than erasers does he have?

Note: Allow students to use varied strategies. Invite pairs of students committed to different strategies to solve at the board while others work at their seats. Have those who worked at the board quickly present their solutions to their peers.

$$\begin{array}{r} 139 \\ - 88 \\ \hline 51 \end{array}$$

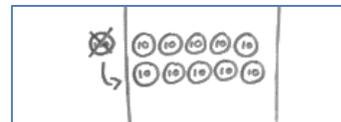
**Concept Development (31 minutes)**

Materials: (S) Personal white boards

Note: In the previous lesson, students used the chip model to subtract with up to two decompositions. We will be modeling today’s lesson with number disks, simply to remind you that students can work with the manipulative that best suits their level of development. From simple to complex, that would include bundles of straws, bills, concrete number disks, drawn number disks, and the chip model.

**Problem 1: Model 100 as 9 tens and 10 ones and relate to a number written with changed units.**

- T: Show me 100 with the fewest disks possible.
- T: What is the value of your disk?
- S: 100.
- T: Change 1 hundred for 10 tens.
- S: (Draw 10 tens arranged in 5-groups.)
- T: Say the number in hundreds.
- S: 1 hundred.
- T: Now say the number in tens.
- S: 10 tens.
- T: Did the value change?
- S: No!
- T: Show me 100 by changing 1 ten for 10 ones.
- T: Say the number in hundreds.



2 steps:  $\begin{array}{r} 0 \ 10 \\ \cancel{1} \ 0 \end{array} \rightarrow \begin{array}{r} 0 \ 9 \ 10 \\ \cancel{1} \ 0 \end{array}$

1 step:  $\begin{array}{r} 0 \ 9 \ 10 \\ \cancel{1} \ 0 \end{array}$

MP.4

- S: 1 hundred.  
 T: Say the number in tens and ones.  
 S: 9 tens and 10 ones.  
 T: Did the value change?  
 S: No! It's still a hundred!  
 T: Let's record this change on the written number.  
 T: Look at what I have written and relate it to what we just did with the disks.  
 S: In the first way, you change 1 hundred to 0 hundreds and 10 tens. Then you change 10 tens to 9 tens and 10 ones. → Or, you can do it all at once, and just change 1 hundred to 0 hundreds, 9 tens, and 10 ones. It makes it easier for me.  $90 + 10 = 100$ .



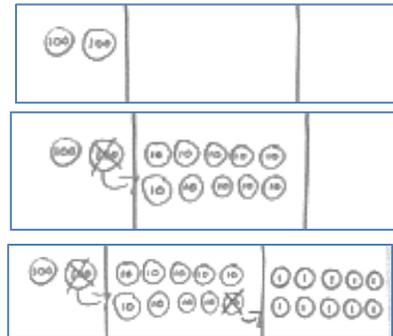
**NOTES ON  
 MULTIPLE MEANS OF  
 ACTION AND  
 EXPRESSION:**

Give students enough time to come up with the answers. While they may be obvious to adults, these questions are new to the children and necessitate some processing time.

**Problem 2: Model 200 as 1 hundred, 9 tens, and 10 ones and relate to a number written with changed units.**

MP.4

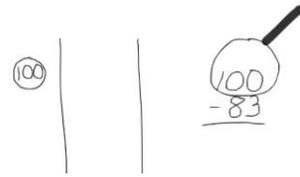
- T: Show me 200 with the fewest disks possible.  
 S: (Draw 2 hundreds disks.)  
 T: Change 1 hundred for 10 tens.  
 T: Say the number in hundreds.  
 S: 2 hundreds.  
 T: Say the number in hundreds and tens.  
 S: 1 hundred, 10 tens.  
 T: Did the value change?  
 S: No!  
 T: Now show me 200 by unbundling a ten.  
 S: (Draw 1 hundred, 9 tens, and 10 ones.)  
 T: Say the number in hundreds, tens, and ones.  
 S: 1 hundred, 9 tens, 10 ones.  
 T: Did the value change?  
 S: No!  
 T: Relate your work with the disks to these numbers showing the changed units.  
 S: In the first way, you change 2 hundreds to 1 hundred and 10 tens. Then, you change 10 tens to 9 tens and 10 ones. → In faster way, you just change 2 hundreds to 1 hundred, 9 tens, and 10 ones.  $190 + 10 = 200$ .



2 steps:  $\begin{array}{r} 1 \text{ } 10 \\ 200 \end{array} \rightarrow \begin{array}{r} 1 \text{ } 9 \text{ } 10 \\ 190 \end{array}$   
 1 step:  $\begin{array}{r} 1 \text{ } 9 \text{ } 10 \\ 190 \end{array}$

**Problem 3: 100 – 83**

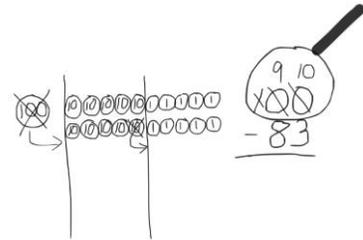
T: Why would we want to show 100 as 9 tens and 10 ones?  
 S: Sometimes when you subtract, both the tens and the ones need more.  
 → You need ones if you want to subtract ones. → 9 tens 10 ones is the same as 100.



T: Let's see how knowing this will help us to solve some subtraction problems today.  
 (Write 100 – 83 on the board in the vertical form.)

T: What do we do first?

T: When I set up to subtract, I am going to draw my number disks to show the whole. (Draw 100 in number disks.) How many do you see on my place value chart?



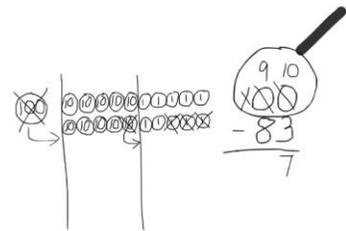
S: 1 hundred, 0 tens, 0 ones.

T: Can we subtract 3 ones from 0 ones?

S: No! We need to change 1 ten for 10 ones.

T: But there are no tens. Does that mean we are stuck?

S: No because a hundred has tens in it. → Yeah, from the tens we can get some ones. → It's what we just did. Let's change 1 hundred for 9 tens and ten ones.



**MP.4**

T: Okay. Let's do that. Tell me what to do.

S: Just what she said. Change 1 hundred for 9 tens and 10 ones, and show that on your numbers, too, by crossing out.

T: (Work with disks and numbers.) Now, am I ready to subtract in the ones place?

S: Yes!

T: Am I ready to subtract in the tens place?

S: Yes!

T: 10 ones – 3 ones is?

S: 7 ones.

T: 9 tens – 8 tens is?

S: 1 ten.

T: Read me the full number sentence.

S: 100 – 83 = 17.

T: So the missing part was 17. How can I check to see if my subtraction is correct?

S: Add the two parts to see if you get the whole.

T: What are the two parts?

S: 17 and 83.

T: The whole.



**NOTES ON MULTIPLE MEANS OF ENGAGEMENT:**

If you see some students demonstrating proficiency during the lesson, have one or more lead the class in modeling these problems.

S: 100.

T: When we add the two parts do we get the whole?

S: Yes.  $80 + 10 = 90$ ,  $90 + 3 + 7 = 90 + 10 = 100$ .  $\rightarrow$  8 tens, 1 ten, and 10 ones is 100.

**Problem 4: 200 – 8**

T: (Draw 2 hundreds on the place value chart and write  $200 - 8$  on the board. Draw the magnifying glass.) Let's start at the ones place. Can I subtract 8 ones from 0 ones?



S: No!

T: Where am I going to find some ones? Talk to your partner.

**MP.4**

S: It's like the last problem we did.  $\rightarrow$  After you decompose 1 hundred, you have 1 hundred, 9 tens, and 10 ones.  $\rightarrow$  Unbundle a 100; then unbundle a 10.  $\rightarrow$  You can make 200 into 100, 10 tens, and then change 1 of the tens for 10 ones.  $\rightarrow$  You can change 1 hundred for 10 tens, and then change a ten for 10 ones.

T: (Unbundle 200 to make 1 hundred, 9 tens, and 10 ones.) Are we ready to subtract?



S: Yes!

T: Solve the problem by crossing out number disks, starting with the ones, and recording each step in the written form.

Have the students analyze the problem for parts and wholes as in Problem 1 and check to see the total of the parts is 200.

Guide students through solving two or three more problems that require renaming 200 as 1 hundred, 9 tens, and 10 ones. You might use the following suggested sequence:  $200 - 78$ ,  $200 - 143$ ,  $200 - 111$ . As students show proficiency, allow them to work independently on the Problem Set.

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

Name Debbie Date \_\_\_\_\_

1. Make each equation true.

a. 1 hundred = 10 tens

b. 1 hundred = 9 tens 10 ones

c. 2 hundreds = 1 hundred 10 tens

d. 2 hundreds = 1 hundred 9 tens 10 ones

2. Solve vertically. Draw chips on the place value chart and unbundle when needed.

a.  $100 - 61 =$  \_\_\_\_\_

$$\begin{array}{r} 9 \phantom{0} \\ 9 \cancel{0}^{\phantom{0}} \\ - 61 \\ \hline 39 \end{array}$$

hundreds	tens	ones
1	0	0
0	3	9

b.  $100 - 79 =$  \_\_\_\_\_

$$\begin{array}{r} 9 \phantom{0} \\ 9 \cancel{0}^{\phantom{0}} \\ - 79 \\ \hline 21 \end{array}$$

hundreds	tens	ones
1	0	0
0	2	1

COMMON CORE Lesson 27: Subtract from 200 and from numbers with zeros in the tens place. 6/15/13 engage<sup>ny</sup>

**Student Debrief (10 minutes)**

**Lesson Objective:** Subtract from 200 and from numbers with zeros in the tens place.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- Look at Problem 1. What possible combinations of tens and ones do you notice within a unit of 100?
- How can I unbundle 100 on a place value chart? How can I do it in two steps? How can I do it in one step?
- What are two different ways that I can unbundle 200 using tens and ones? Now look at Problem 2(c). Which way did you choose to decompose? Why?
- How is Problem 2(d) significantly different from Problem 2(b)?
- Explain to your partner how you unbundled Problem 2(d),  $200 - 87$ . Did you do it in one or two steps? Which way is easier for you?
- When you are subtracting, what clues tell you that you will have to unbundle a hundred?

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

The image shows three examples of student work for subtraction problems. Each example consists of a standard algorithm and a place value chart.

- Problem c:**  $200 - 7 =$  The standard algorithm shows  $200 - 7 = 193$ . The place value chart has 2 hundreds, 0 tens, and 0 ones. A circled 2 in the hundreds column has an arrow pointing to a 1 in the hundreds column and a 10 in the tens column. The 10 in the tens column has an arrow pointing to a 9 in the tens column and a 10 in the ones column. The final result is 1 hundred, 9 tens, and 3 ones.
- Problem d:**  $200 - 87 =$  The standard algorithm shows  $200 - 87 = 113$ . The place value chart has 2 hundreds, 0 tens, and 0 ones. A circled 2 in the hundreds column has an arrow pointing to a 1 in the hundreds column and a 10 in the tens column. The 10 in the tens column has an arrow pointing to a 9 in the tens column and a 10 in the ones column. The 9 in the tens column has an arrow pointing to an 8 in the tens column and a 10 in the ones column. The final result is 1 hundred, 1 ten, and 3 ones.
- Problem e:**  $200 - 126 =$  The standard algorithm shows  $200 - 126 = 74$ . The place value chart has 2 hundreds, 0 tens, and 0 ones. A circled 2 in the hundreds column has an arrow pointing to a 1 in the hundreds column and a 10 in the tens column. The 10 in the tens column has an arrow pointing to a 9 in the tens column and a 10 in the ones column. The 9 in the tens column has an arrow pointing to an 8 in the tens column and a 10 in the ones column. The 8 in the tens column has an arrow pointing to a 7 in the tens column and a 10 in the ones column. The final result is 0 hundreds, 7 tens, and 4 ones.

**A**

# Correct \_\_\_\_\_

Subtract.					
1	$10 - 1 =$		23	$100 - 82 =$	
2	$100 - 10 =$		24	$100 - 85 =$	
3	$90 - 1 =$		25	$100 - 15 =$	
4	$100 - 11 =$		26	$100 - 70 =$	
5	$10 - 2 =$		27	$100 - 71 =$	
6	$100 - 20 =$		28	$100 - 72 =$	
7	$80 - 1 =$		29	$100 - 75 =$	
8	$100 - 21 =$		30	$100 - 25 =$	
9	$10 - 5 =$		31	$100 - 10 =$	
10	$100 - 50 =$		32	$100 - 11 =$	
11	$50 - 2 =$		33	$100 - 12 =$	
12	$100 - 52 =$		34	$100 - 18 =$	
13	$10 - 4 =$		35	$100 - 82 =$	
14	$100 - 40 =$		36	$100 - 60 =$	
15	$60 - 1 =$		37	$100 - 6 =$	
16	$100 - 41 =$		38	$100 - 70 =$	
17	$10 - 3 =$		39	$100 - 7 =$	
18	$100 - 30 =$		40	$100 - 43 =$	
19	$70 - 5 =$		41	$100 - 8 =$	
20	$100 - 35 =$		42	$100 - 59 =$	
21	$100 - 80 =$		43	$100 - 4 =$	
22	$100 - 81 =$		44	$100 - 68 =$	

<b>B</b>		Improvement _____	# Correct _____
	Subtract.		
1	$10 - 5 =$	23	$100 - 72 =$
2	$100 - 50 =$	24	$100 - 75 =$
3	$50 - 1 =$	25	$100 - 25 =$
4	$100 - 51 =$	26	$100 - 80 =$
5	$10 - 2 =$	27	$100 - 81 =$
6	$100 - 20 =$	28	$100 - 82 =$
7	$80 - 1 =$	29	$100 - 85 =$
8	$100 - 21 =$	30	$100 - 15 =$
9	$10 - 1 =$	31	$100 - 10 =$
10	$100 - 10 =$	32	$100 - 11 =$
11	$90 - 2 =$	33	$100 - 12 =$
12	$100 - 12 =$	34	$100 - 17 =$
13	$10 - 3 =$	35	$100 - 83 =$
14	$100 - 30 =$	36	$100 - 70 =$
15	$70 - 1 =$	37	$100 - 7 =$
16	$100 - 31 =$	38	$100 - 60 =$
17	$10 - 4 =$	39	$100 - 6 =$
18	$100 - 40 =$	40	$100 - 42 =$
19	$60 - 5 =$	41	$100 - 4 =$
20	$100 - 45 =$	42	$100 - 58 =$
21	$100 - 70 =$	43	$100 - 8 =$
22	$100 - 71 =$	44	$100 - 67 =$

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Name \_\_\_\_\_

Date \_\_\_\_\_

1. Make each equation true.

a. 1 hundred = \_\_\_\_\_ tens

b. 1 hundred = 9 tens \_\_\_\_\_ ones

c. 2 hundreds = 1 hundred \_\_\_\_\_ tens

d. 2 hundreds = 1 hundred 9 tens \_\_\_\_\_ ones

2. Solve vertically. Draw chips on the place value chart. Unbundle when needed.

a.  $100 - 61 =$  \_\_\_\_\_

hundreds	tens	ones

b.  $100 - 79 =$  \_\_\_\_\_

hundreds	tens	ones

c.  $200 - 7 =$  \_\_\_\_\_

hundreds	tens	ones

d.  $200 - 87 =$  \_\_\_\_\_

hundreds	tens	ones

e.  $200 - 126 =$  \_\_\_\_\_

hundreds	tens	ones

Name \_\_\_\_\_ Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart. Unbundle when needed.

a.  $100 - 44 =$  \_\_\_\_\_

hundreds	tens	ones

b.  $200 - 76 =$  \_\_\_\_\_

hundreds	tens	ones

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart. Unbundle when needed.

a.  $100 - 37 =$  \_\_\_\_\_

hundreds	tens	ones

b.  $100 - 49 =$  \_\_\_\_\_

hundreds	tens	ones

c.  $200 - 49 =$  \_\_\_\_\_

hundreds	tens	ones

d.  $200 - 57 =$  \_\_\_\_\_

hundreds	tens	ones

e.  $200 - 83 =$  \_\_\_\_\_

hundreds	tens	ones

2. Susan solved  $200 - 91$  and decided to add her answer to 91 to check her work. Explain why this strategy works.

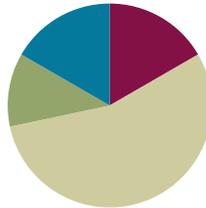
<p>Susan's work:</p> $\begin{array}{r} 190 \\ - 91 \\ \hline 109 \end{array}$ $\begin{array}{r} 109 \\ + 91 \\ \hline 200 \end{array}$	<p>Explanation:</p> <hr/> <hr/> <hr/> <hr/>
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## Lesson 28

**Objective:** Subtract from 200 and from numbers with zeros in the tens place.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Application Problem	(7 minutes)
■ Concept Development	(33 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (10 minutes)

- Subtraction Fact Flash Cards **2.OA.2** (2 minutes)
- Rename the Units: Choral Response **2.NBT.1** (6 minutes)
- Take from the Tens or Ones **2.NBT.5** (2 minutes)

### Subtraction Fact Flash Cards (2 minutes)

Materials: (T) Flash Cards Set 2

Note: By practicing subtraction facts, students will gain fluency subtracting within 20.

### Rename the Units: Choral Response (6 minutes)

Note: This fluency will review foundations that will lead into today's lesson.

T: (Write 10 ones = \_\_\_\_ ten.) Say the number sentence.

S: 10 ones = 1 ten.

T: (Write 20 ones = 1 ten \_\_\_\_ ones.) Say the number sentence.

S: 20 ones = 1 ten 10 ones.

T: (Write 24 ones = 1 ten \_\_\_\_ ones.) Say the number sentence.

S: 24 ones = 1 ten 14 ones.

Repeat the process for 27, 30, 32, 38, 40, 41, 46, 50, 63, 88.

T: (Write 100 = 9 tens \_\_\_\_ ones.) Say the number sentence.

S: 100 = 9 tens 10 ones.

T: (Write 101 = 9 tens \_\_\_\_ ones.) Say the number sentence.

S:  $101 = 9 \text{ tens } 11 \text{ ones.}$

T: 9 tens 11 ones is?

S: 101.

T: 9 tens 12 ones is?

S: 102.

Repeat the process for 103, 104, 105, 106, 107, 108, 109, 110.

### Take from the Tens or Ones (2 minutes)

Note: This fluency helps students to know when to unbundle a ten to subtract and when not to. This is a foundational skill for the lesson.

T: For every number sentence I say, you tell me if I take from the tens or the ones. When I say  $46 - 5$ , you say take from the ones, but if I say  $46 - 7$ , you say take from the tens. Ready?

T:  $46 - 6$ .

S: Take from the ones.

T:  $46 - 9$ .

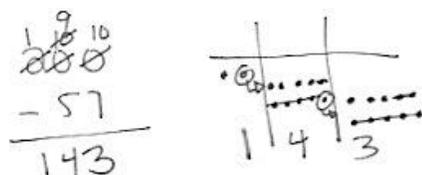
S: Take from the tens.

Continue with the following possible sequence:  $52 - 1$ ,  $52 - 4$ ,  $63 - 6$ ,  $64 - 5$ ,  $65 - 4$ ,  $68 - 8$ ,  $70 - 3$ .

### Application Problem (7 minutes)

Jerry made 200 pizzas. He sold some of them and had 57 pizzas left. How many did he sell?

Note: Instruct students to set up a place value chart to solve this Application Problem. Some students may relate this problem to the previous day's lesson by drawing number disks on their place value charts. Others may choose to represent the problem using a tape diagram or the arrow way.



### Concept Development (33 minutes)

Materials: (S) Personal white boards

This Concept Development is intentionally designed for students to practice concepts taught in Lesson 27. Encourage students to choose any accurate math drawing to represent the subtraction. While some students may be comfortable drawing chip models, others may choose to represent the problem using number disk drawings. In either case, all students should relate their drawings to the written method.

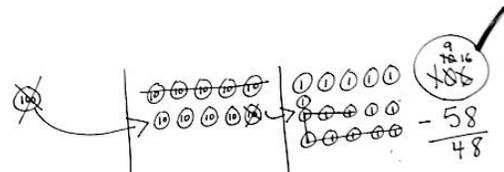


#### A NOTE ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Have manipulatives available for students who have not yet mastered the ability to solve these problems without a concrete representation.

**Problem 1: 106 – 58**

- T: (Write  $106 - 58$  on the board.)
- T: Let's solve  $106 - 58$  using a math drawing. Choose whether you want to use a disk drawing or a chip model. What number are we going to draw?
- S: 106.
- T: And what should I draw on my model to show that number?
- S: 1 hundred and 6 ones.
- T: Great. Which place do we look at first to see if we need to do any renaming?
- S: The ones!
- T: Are we ready to subtract in the ones place?
- S: No.
- T: What should we do? Turn and talk to your partner.
- S: There are no tens either, so let's rename a hundred as 9 tens and 10 ones. → That makes it 9 tens and 16 ones, because we already had 6 ones. → We can change 1 hundred into 10 tens, and then change 10 tens into 9 tens 10 ones.
- T: Okay, let's do it. Record each change.
- T: Are we ready to subtract in the ones place?
- S: Yes.
- T: In the tens?
- S: Yes.
- T: Show your answer in the written subtraction. What is our first step? Tell the units.
- S: 16 ones – 8 ones.
- T: (Model on your drawing and algorithm.) How many ones are left?
- S: 8.
- T: Great. Let's try the tens. What is our problem?
- S: 9 tens – 5 tens.
- T: How many tens do we have left?
- S: 4 tens. (Show this on the drawing and algorithm.)
- T: Do we subtract any hundreds?
- S: No!

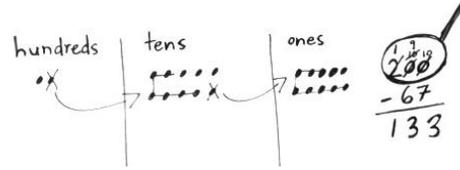


Invite students to share their work. Analyze the parts and join them to see if they total 106.

MP.4

**Problem 2: 200 – 67**

- T: (Write 200 – 67 on the board.)
- T: We are now going to do the same thing with another problem. Make a math drawing that represents the number we will be subtracting from. (Give them time to make their drawings.)
- T: What did you draw?
- S: 200. → 2 hundreds.
- T: How can we rename 200 to solve 200 – 67? Turn and talk.
- S: We can rename it as 1 hundred, 9 tens, and 10 ones. → Since you can't subtract from the ones or tens, we can unbundle a hundred, then unbundle a ten.
- T: What place will you start subtracting?
- S: The ones.
- T: On your own, solve 200 – 67 using a math drawing. Again, record each change and show your answer in the written subtraction.



Repeat the above activity with this suggested sequence: 200 – 33, 103 – 59, 200 – 49. Before students begin each problem, instruct them to rename the whole. Emphasize the renaming of 200 as 1 hundred, 9 tens, 10 ones. As you circulate, remind students to draw the magnifying glass, to represent the problem using a math drawing, and to record each step in the written subtraction.

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

**A NOTE ON MULTIPLE MEANS OF ENGAGEMENT:**

Allow students who prefer to work in groups to work with a partner on the Problem Set; likewise, allow students who concentrate better alone to work independently.

Handwritten student work for three subtraction problems. Each problem includes a written equation, a place value chart with chips, and a written solution.

**a. 109 - 56 =**

Written solution: 
$$\begin{array}{r} 109 \\ - 56 \\ \hline 53 \end{array}$$

Place value chart: hundreds (1 chip), tens (0 chips), ones (9 chips). An arrow points from the tens column to the ones column, and another arrow points from the hundreds column to the tens column. The tens column now has 9 chips and the ones column has 10 chips.

**b. 103 - 34 =**

Written solution: 
$$\begin{array}{r} 103 \\ - 34 \\ \hline 69 \end{array}$$

Place value chart: hundreds (1 chip), tens (0 chips), ones (3 chips). An arrow points from the tens column to the ones column, and another arrow points from the hundreds column to the tens column. The tens column now has 9 chips and the ones column has 13 chips.

**c. 200 - 155 =**

Written solution: 
$$\begin{array}{r} 200 \\ - 155 \\ \hline 45 \end{array}$$

Place value chart: hundreds (2 chips), tens (0 chips), ones (0 chips). An arrow points from the tens column to the ones column, and another arrow points from the hundreds column to the tens column. The tens column now has 9 chips and the ones column has 10 chips.

### Student Debrief (10 minutes)

**Lesson Objective:** Subtract from 200 and from numbers with zeros in the tens place.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- Look at Problem 1 (a) and (b). When you are subtracting, and the whole (i.e., larger number) has a zero in the tens place, what do you know for sure? How do you know if that zero will become a 10 or a 9?
- For Problem 1(c), how did you unbundle 200 on your place value chart? Did you do it in one or two steps?
- For Problem 1(d), how did you unbundle 200 on your place value chart? Why did you show 200 that way? How did it match your written subtraction?
- Problem 2,  $200 - 48$ , asked you to solve vertically. Could you also have solved mentally? How? Which way is quicker and easier?
- In your work today, how was unbundling 200 similar to and different from unbundling 100?

### Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Handwritten student work for Lesson 28, Problem Set. The work includes three problems:

- Problem 1(d):  $200 - 123 = 77$ . The student shows a place value chart with 2 hundreds, 0 tens, and 0 ones. A circled 0 in the tens place is crossed out, and a 10 is written above it. The vertical subtraction shows  $200 - 123 = 77$ .
- Problem 2:  $200 - 148 = 52$ . The student shows vertical subtraction:  $200 - 148 = 52$ .
- Problem 3: A word problem: "Ralph has 137 fewer stamps than his older brother. His older brother has 200 stamps. How many stamps does Ralph have?" The student shows a place value chart with 2 hundreds, 0 tens, and 0 ones. A circled 0 in the tens place is crossed out, and a 10 is written above it. The vertical subtraction shows  $200 - 137 = 63$ .

COMMON CORE | Lesson 28: Subtract from 200 and from numbers with zeros in the tens place. | engage<sup>ny</sup>

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart. Unbundle when needed.

a.  $109 - 56 =$  \_\_\_\_\_

hundreds	tens	ones

b.  $103 - 34 =$  \_\_\_\_\_

hundreds	tens	ones

c.  $200 - 155 =$  \_\_\_\_\_

hundreds	tens	ones

d.  $200 - 123 = \underline{\hspace{2cm}}$

hundreds	tens	ones

2. Solve vertically without a place value chart.

$200 - 148 = \underline{\hspace{2cm}}$

3. Solve vertically. Draw a place value chart and chips.

Ralph has 137 fewer stamps than his older brother. His older brother has 200 stamps. How many stamps does Ralph have?

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart. Unbundle when needed.

a.  $108 - 79 =$  \_\_\_\_\_

hundreds	tens	ones

b.  $200 - 126 =$  \_\_\_\_\_

hundreds	tens	ones

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve vertically. Draw chips on the place value chart. Unbundle when needed.

a.  $136 - 94 =$  \_\_\_\_\_

hundreds	tens	ones

b.  $105 - 57 =$  \_\_\_\_\_

hundreds	tens	ones

c.  $200 - 61 =$  \_\_\_\_\_

hundreds	tens	ones

d.  $200 - 107 =$  \_\_\_\_\_

hundreds	tens	ones

e.  $200 - 143 =$  \_\_\_\_\_

hundreds	tens	ones

2. Herman collected 200 shells on the beach. Of those, he kept 136 shells and left the rest on the beach. How many shells did he leave on the beach?



## Topic F

# Student Explanations of Written Methods

## 2.OA.1, 2.NBT.7, 2.NBT.9

<b>Focus Standard:</b>	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, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
	2.NBT.7	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
	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.)
<b>Instructional Days:</b>	3	
<b>Coherence -Links from:</b>	G1–M2	Introduction to Place Value Through Addition and Subtraction Within 20
	<b>-Links to:</b> G3–M2	Place Value and Problem Solving with Units of Measure
	G4–M1	Place Value, Rounding, and Algorithms for Addition and Subtraction

Module 4 culminates with Topic F, in which students think about and discuss the multiple strategies they have learned to represent and solve addition and subtraction problems. They share their reasoning as they link their drawings to two written methods, and discuss the similarities, differences, and efficacy of each approach.

In Lesson 29, students learn the *totals below* written method. Throughout Grades 1 and 2, students decompose numbers into expanded form to recognize place value and to understand that they must add like units. These problems are written horizontally. Here, students use this prior learning to solve addition problems in a similar way. They decompose two- and three-digit numbers, then add like units and record the totals horizontally (see image below). They then transition into the vertical form of the method when they decompose the numbers mentally, add like units, and record the totals below. The totals below method gives students the option of adding from left to right or from right to left. Students explain how each step of their math drawing relates to this written method.

Horizontal Notation

$$\begin{array}{r} 127 \rightarrow 100 + 20 + 7 \\ + 59 \rightarrow + \quad 50 + 9 \\ \hline 186 = \quad 100 + 70 + 16 \end{array}$$

Totals Below

$$\begin{array}{r} 127 \\ + 59 \\ \hline 100 \\ 70 \\ 16 \\ \hline 186 \end{array} \qquad \begin{array}{r} 127 \\ + 59 \\ \hline 16 \\ 70 \\ 100 \\ \hline 186 \end{array}$$

Left to Right    Right to Left

In Lesson 30, students represent and solve problems using both the totals below and the new groups below methods (students used the latter method throughout the module). They relate both methods to their math drawings and discuss the differences and similarities between the two.

In Lesson 31, students apply knowledge of addition and subtraction strategies to solve two-step word problems. Students are challenged to make sense of more complex relationships as they are guided through more difficult problem types, such as comparison problems. These problems will involve smaller numbers and will be scaffolded to address the heightened level of difficulty.

### A Teaching Sequence Towards Mastery of Student Explanations of Written Methods

**Objective 1:** Use and explain the *totals below* written method using words, math drawings, and numbers.  
(Lesson 29)

**Objective 2:** Compare *totals below* to *new groups below* as written methods.  
(Lesson 30)

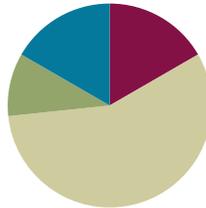
**Objective 3:** Solve two-step word problems within 100.  
(Lesson 31)

## Lesson 29

**Objective:** Use and explain the *totals below* written method using words, math drawings, and numbers.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Application Problem	(6 minutes)
■ Concept Development	(34 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (10 minutes)

- Crossing a Ten **2.NBT.5** (5 minutes)
- Rename the Units: Choral Response **2.NBT.1** (5 minutes)

### Crossing a Ten (5 minutes)

Note: Crossing a Ten reviews making a multiple of 10 to solve problems with up to four addends.

T: (Write on board:  $8 + \underline{\quad} = 10$ .) How many more does 8 need to make ten?

S: 2 more.

T: Complete the number sentence.

S:  $8 + 2 = 10$ .

T:  $10 + 1$ .

S: 11.

T:  $8 + 2 + 1$ .

S: 11.

T:  $8 + 3$ .

S: 11.

Continue with the following possible sequence:  $7 + 3$ ,  $7 + 3 + 1$ ,  $7 + 4$ ,  $7 + 5$ ,  $9 + 1$ ,  $9 + 1 + 1$ ,  $9 + 1 + 4$ ,  $19 + 1 + 4$ .

### Rename the Units: Choral Response (5 minutes)

Note: This fluency will review foundations that will lead into today’s lesson.

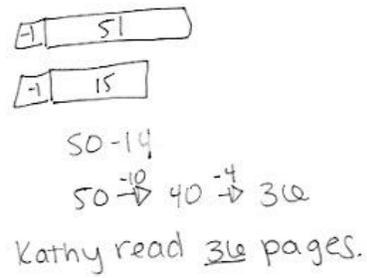
- T: (Write 10 tens = \_\_\_\_\_ hundred.) Say the number sentence.
- S: 10 tens = 1 hundred.
- T: (Write 11 tens = 1 hundred \_\_\_\_\_ ten.) Say the number sentence.
- S: 11 tens = 1 hundred 1 ten.
- T: (Write 14 tens = 1 hundred \_\_\_\_\_ tens.) Say the number sentence.
- S: 14 tens = 1 hundred 4 tens.

Repeat the process for teen numbers of tens up to 20 tens.

### Application Problem (6 minutes)

Kathy read 15 fewer pages than Lucy. Lucy read 51 pages. How many pages did Kathy read?

Note: Encourage students to use the RDW process to reason through the relationships in this problem. Can they draw a number bond or tape diagram to represent the part–whole relationship? What place value strategies can they use to solve? Invite students to share their strategies using place value language.

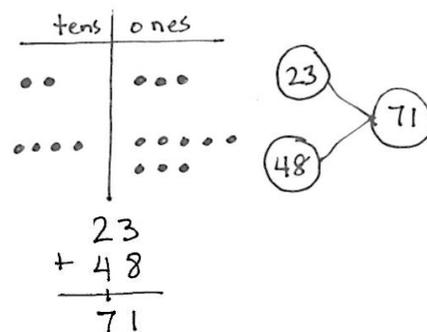


### Concept Development (34 minutes)

Materials: (T) Hide Zero cards (S) Math journals or paper

#### Method 1: New Groups Below

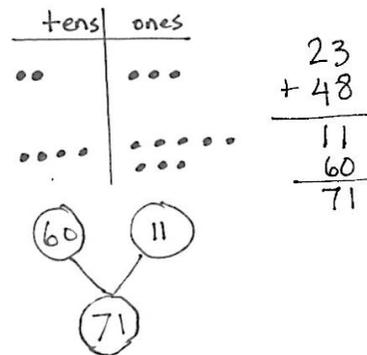
- T: (Draw a chip model of  $23 + 48$ .) What equation are you modeling?
- S:  $23 + 48$ .
- T: (Write vertically.) We know how to do this. (Record while talking.) 11 ones and 6 tens.
- T: Let’s look at this as a number bond. (Draw the bond as they answer.) What are the parts?
- S: 23 and 48.
- T: What is the total?
- S: 71.



**Method 2: Totals Below**

- T: Let's look at this same place value model another way. (See image at right.) 3 ones + 8 ones?
- S: 11 ones.
- T: (Record 11 into one part of a new number bond.)
- T: 2 tens + 4 tens?
- S: 6 tens. → Sixty.
- T: Talk to your partner about the sum of 60 and 11.
- S:  $60 + 10 + 1$  is 71. → It's one more than 70. → Just add ten and add one more.
- T: So both of these number bonds have the same total?
- S: Yes!
- T: Let's record these totals while we add our numbers vertically.
- T: 3 ones + 8 ones is?
- S: 11 ones.
- S: The Say Ten way? (Point to each digit in 11.)
- S: Ten 1.
- T: Can I write it like this? (Point to each digit in 11.) 1 ten 1 one? (Write it as a full total as pictured above.)
- S: Yes!
- T: Now let's add the tens. 2 tens and 4 tens?
- S: 6 tens.
- T: (Record 60.) Let's add up to see what these two totals equal.  $60 + 11$ ?
- S: 71!
- T: Look! The answer is the same. (Indicate the total in the other representations.)
- T: We added the ones first, and then the tens. Talk with your partner. Would we get the same answer if we added the tens first and then added the ones?
- S: Yes, because the number of tens and ones would still be the same. → Yes, we would still get 11 and 60 because we're adding the same parts. → Yes, we can add in either direction!

MP.1



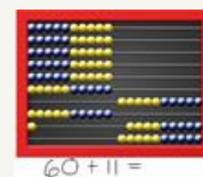
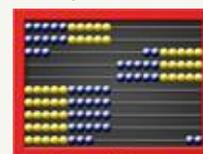
**A NOTE ON MULTIPLE MEANS OF ENGAGEMENT:**

While the *totals below* strategy is conceptually useful for all students, some will be able to solve the problems without it. After showing proficiency using this method, allow students to solve problems as they work best.



**A NOTE ON MULTIPLE MEANS OF REPRESENTATION:**

Use a ten-row Rekenrek to model  $23 + 48$  for students who need a concrete representation. Show the number bond by having the addends in separate groups; then combine them to show the steps to 71.



T: Let's see if that's true. (Write the **totals below** method again, and add tens first, then ones.) The total is the same! So, yes, we can add in either direction! When we add this way, no matter where we start, we can see the different parts, 11 ones and 6 tens. (Point to 11 ones and 6 tens on the chip model and the numbers in the vertical totals below problems.) So, 71 isn't just  $23 + 48$ . It's also  $60 + 11$ . (Draw that bond.)

T: Talk with your partner. How are these written methods the same and different? How do they relate to the math drawings?

Invite students to the board. Point to parts of the drawings or written methods as students explain their thinking.

T: Let's practice doing some problems together using the totals below way.

MP.1

Repeat this procedure with the following possible sequence:  $45 + 37$ ,  $179 + 18$ ,  $56 + 82$ ,  $65 + 47$ ,  $125 + 75$ . See images below for  $125 + 75$ .

S: I see 23 in all of them. → They show the same parts and the same total. → They all equal 71.  
 → They all show 2 tens 3 ones and 4 tens 8 ones, but sometimes you are adding tens and ones together, like 6 tens 11 ones. → When I look at the chip model, I can see  $23 + 48$ , but I also see  $60 + 11$ .

T: Let's practice doing some problems the totals below way.

Repeat this procedure with the following possible sequence:  $45 + 37$ ,  $179 + 18$ ,  $56 + 82$ ,  $65 + 47$ ,  $125 + 75$ . See images below for  $125 + 75$ .

$$\begin{array}{r} 125 \\ + 75 \\ \hline 100 \\ 90 \\ + 10 \\ \hline 200 \end{array} \quad \text{or} \quad \begin{array}{r} 125 \\ + 75 \\ \hline 10 \\ 90 \\ 100 \\ \hline 200 \end{array}$$

As students demonstrate proficiency with the totals below method, allow them to work on the Problem Set independently.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Use and explain the *totals below* written method using words, math drawings, and numbers.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- For Problem 1, what connections can you make between the **totals below** method and number bonds? Place value chart?
- For Problem 1(b) how were the two written methods the same and different? How did you show your understanding of place value?
- In Problem 2(a), how did you record the totals below? Why does the answer include a hundred when you are only adding tens and ones?
- For Problem 2(b), let's make a chip model to show the addition (draw on board). How does our model relate to the totals below method?
- Pretend you are explaining the totals below method to a first grader: Why are we decomposing numbers first and then adding?

### Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

NYS COMMON CORE MATHEMATICS CURRICULUM K-5

Name: Debbie Date: \_\_\_\_\_

1. Solve each addition equation using both the totals below and new groups below methods. Draw a place value chart with disks and 2 different number bonds to represent each.

a.  $27 + 19$

$$\begin{array}{r} 27 \\ + 19 \\ \hline 16 \\ 30 \\ \hline 46 \end{array}$$

$$\begin{array}{r} 27 \\ + 19 \\ \hline 46 \end{array}$$

b.  $57 + 36$

$$\begin{array}{r} 57 \\ + 36 \\ \hline 13 \\ 80 \\ \hline 93 \end{array}$$

$$\begin{array}{r} 57 \\ + 36 \\ \hline 93 \end{array}$$

COMMON CORE Lesson 29 Use and explain the totals below written method using words, math drawings, and numbers. Date: 6/13/13 engage<sup>ny</sup> 4.F.6

NYS COMMON CORE MATHEMATICS CURRICULUM K-5

2. Add like units and record the totals below.

a. 
$$\begin{array}{r} 87 \\ + 95 \\ \hline 12(7+5) \\ 170(80+90) \\ \hline 182 \end{array}$$

b. 
$$\begin{array}{r} 106 \\ + 24 \\ \hline 10 \\ 20 \\ \hline 100 \\ \hline 130 \end{array}$$

c. 
$$\begin{array}{r} 151 \\ + 45 \\ \hline 16 \\ 90 \\ \hline 100 \\ \hline 196 \end{array}$$

d. 
$$\begin{array}{r} 126 \\ + 72 \\ \hline 8 \\ 90 \\ \hline 100 \\ \hline 198 \end{array}$$

e. 
$$\begin{array}{r} 159 \\ + 30 \\ \hline 9 \\ 80 \\ \hline 100 \\ \hline 189 \end{array}$$

f. 
$$\begin{array}{r} 108 \\ + 91 \\ \hline 8 \\ 90 \\ \hline 100 \\ \hline 198 \end{array}$$

COMMON CORE Lesson 29 Use and explain the totals below written method using words, math drawings, and numbers. Date: 6/13/13 engage<sup>ny</sup> 4.F.6

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve each addition equation using both the totals below and new groups below methods. Draw a place value chart with disks and two different number bonds to represent each.

a.  $27 + 19$

b.  $57 + 36$

2. Add like units and record the totals below.

<p>a.</p> $\begin{array}{r} 87 \\ + 95 \\ \hline \end{array}$ <p>_____ (7 + 5)</p> <p>_____ (80 + 90)</p> <div style="border: 1px solid black; width: 100px; height: 30px; margin-top: 10px;"></div>	<p>b.</p> $\begin{array}{r} 106 \\ + 24 \\ \hline \end{array}$ <p>_____</p> <p>_____</p> <p>_____</p> <div style="border: 1px solid black; width: 100px; height: 30px; margin-top: 10px;"></div>
<p>c.</p> $\begin{array}{r} 151 \\ + 45 \\ \hline \end{array}$ <p>_____</p> <p>_____</p> <p>_____</p> <div style="border: 1px solid black; width: 100px; height: 30px; margin-top: 10px;"></div>	<p>d.</p> $\begin{array}{r} 126 \\ + 72 \\ \hline \end{array}$ <p>_____</p> <p>_____</p> <p>_____</p> <div style="border: 1px solid black; width: 100px; height: 30px; margin-top: 10px;"></div>
<p>e.</p> $\begin{array}{r} 159 \\ + 30 \\ \hline \end{array}$ <p>_____</p> <p>_____</p> <p>_____</p> <div style="border: 1px solid black; width: 100px; height: 30px; margin-top: 10px;"></div>	<p>f.</p> $\begin{array}{r} 108 \\ + 91 \\ \hline \end{array}$ <p>_____</p> <p>_____</p> <p>_____</p> <div style="border: 1px solid black; width: 100px; height: 30px; margin-top: 10px;"></div>

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Add like units and record the totals below.

<p>a.</p> $\begin{array}{r} 45 \\ + 64 \\ \hline \\ \hline \\ \hline \end{array}$	<p>b.</p> $\begin{array}{r} 109 \\ + 72 \\ \hline \\ \hline \\ \hline \end{array}$
<p>c.</p> $\begin{array}{r} 144 \\ + 58 \\ \hline \\ \hline \\ \hline \end{array}$	<p>d.</p> $\begin{array}{r} 167 \\ + 52 \\ \hline \\ \hline \\ \hline \end{array}$

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Add like units and record the totals below.

<p>a. <math display="block">\begin{array}{r} 48 \\ + 27 \\ \hline \phantom{00} \\ \hline \phantom{00} \\ \hline \phantom{00} \\ \hline \phantom{00} \end{array}</math></p>	<p>b. <math display="block">\begin{array}{r} 118 \\ + 73 \\ \hline \phantom{000} \\ \hline \phantom{000} \\ \hline \phantom{000} \\ \hline \phantom{000} \end{array}</math></p>
<p>c. <math display="block">\begin{array}{r} 156 \\ + 62 \\ \hline \phantom{000} \\ \hline \phantom{000} \\ \hline \phantom{000} \\ \hline \phantom{000} \end{array}</math></p>	<p>d. <math display="block">\begin{array}{r} 137 \\ + 82 \\ \hline \phantom{000} \\ \hline \phantom{000} \\ \hline \phantom{000} \\ \hline \phantom{000} \end{array}</math></p>

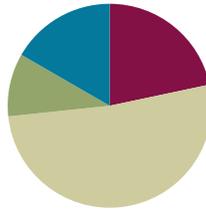


## Lesson 30

Objective: Compare *totals below* to *new groups below* as written methods.

### Suggested Lesson Structure

■ Fluency Practice	(13 minutes)
■ Application Problem	(6 minutes)
■ Concept Development	(31 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (13 minutes)

- Find the Difference **2.NBT.5** (4 minutes)
- Sprint: Subtraction Crossing a Ten **2.NBT.5** (9 minutes)

### Find the Difference (4 minutes)

Materials: (S) Personal white boards

Note: Reviewing subtraction problems in sets prepares students for understanding the importance of the subtraction algorithm.

T: (Write  $44 - 3 = \underline{\quad}$ .) Write a subtraction sentence horizontally or vertically.

Continue with the following possible sequence:  $40 - 5$ ,  $41 - 5$ ;  $57 - 6$ ,  $50 - 6$ ,  $51 - 6$ ;  $68 - 7$ ,  $60 - 7$ ,  $61 - 7$ .

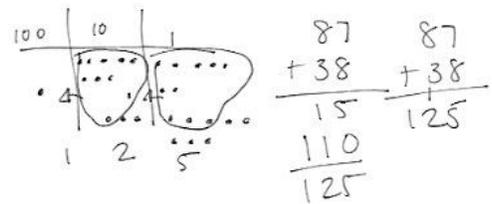
### Sprint: Subtraction Crossing a Ten (9 minutes)

Materials: (S) Subtraction Crossing a Ten Sprint

Note: Students will use mental math strategies to mentally unbundle when subtracting.

### Application Problem (6 minutes)

Eli spent 87 cents for a notebook and 38 cents for a pencil. How much money did he spend in all?



Note: Direct students to draw a tape diagram and chip model. Then have them use both the totals below and new groups below methods to solve this problem. When students have finished, have them share their work with a partner, using place

value language to relate their work to their drawings. This leads directly into today’s Concept Development, in which students will compare the two written methods.

**Concept Development (31 minutes)**

Materials: (S) Math journals or paper

As students compare the two written methods, circulate, observe student work, and listen for place value language to share with the class.

**Problem 1: 134 + 28**

T: Let’s look at different ways I can solve this problem. (Solve  $134 + 28$  on the board as shown.)

T: Talk with your partner. Compare these different methods and explain why they all work. You can make a math drawing or use numbers, but you must use place value language to explain.

$$\begin{array}{r} 134 \\ + 28 \\ \hline 162 \end{array}$$

$$\begin{array}{r} 134 \\ + 28 \\ \hline 12 \\ 50 \\ 100 \\ \hline 162 \end{array}$$

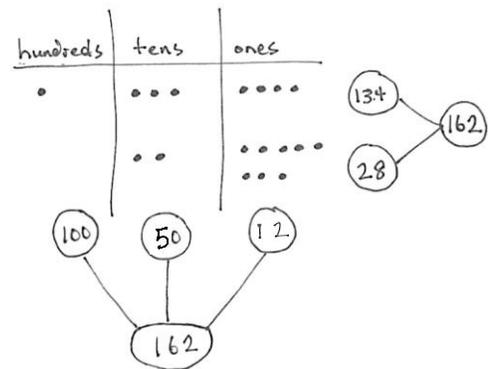
$$\begin{array}{r} 134 \\ + 28 \\ \hline 100 \\ 50 \\ 12 \\ \hline 162 \end{array}$$

Project selected student work on the board. Invite students to stand next to their work so they can point to the parts and clarify their explanations. Invite remaining students to ask questions and to provide feedback; give presenters time to defend their answers.

S1: I drew a number bond to show why the algorithm works. The total is 162 and the parts are 134 and 28.

S2: I drew a number bond to show why the totals below method works. 162 is the whole, and, since we added 134 and 28, the parts are 12, 50, and 100. We added the hundreds, tens, and ones by themselves to get each of the numbers we see below the problem. Then we added those parts up!

S3: I drew a chip model that shows why they all work. It shows the parts that are 134 and 28 by themselves, but when you circle the dots to rename, you can see how 1 hundred 5 tens 12 ones becomes 1 hundred 6 tens 2 ones.



MP.3

**Problem 2: 176 + 59**

T: Now it’s your turn. (Write  $176 + 59$  on the board horizontally.)

T: Solve this problem using totals below and the algorithm.

T: While you’re solving, think about which method is easiest for you. Why? Which is most efficient, or fastest?

**A NOTE ON MULTIPLE MEANS OF ENGAGEMENT:**

If a student says, “I solved it using mental math,” praise them, and then ask them to use place value language to explain how they solved it mentally.

Project student work on the board and encourage students to share their thinking.

MP.3

S: I like writing all the totals, because I like starting in the hundreds place. → I like writing all the totals because you can add the value of the digits in each place. → I like to write the addition problem vertically and put the new tens and hundreds on the line below. New groups below is fastest!



**A NOTE ON MULTIPLE MEANS OF REPRESENTATION:**

Continue to support struggling students with Hide Zero cards, horizontal notation, and/or chip models to help them see the value of the digits in each number.

**Problem 3: 105 + 89, 149 + 39, 118 + 82**

T: This time, solve using either method. You decide!

Circulate to check for understanding. As students demonstrate proficiency with both methods, allow them to work on the Problem Set independently.

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

**Student Debrief (10 minutes)**

**Lesson Objective:** Compare *totals below* with *new groups below* as written methods.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- For Problem 1, explain to your partner why Linda and Keith are both correct. How did each method show the addition of the ones, 7 + 9?

- For Problem 2, how did you record the totals below? Did you start with ones or hundreds? Does it matter?
- For Problem 3, explain to your partner how you solved one of the problems two different ways (i.e., new groups below and totals below)? How were they the same and different?
- What do you need to know before you can record totals below correctly? How is this method similar to writing numbers in expanded form?
- Which method, new groups below or totals below, did you choose for Problem 4? Which method is fastest and/or easiest for you? Why?

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

3. Solve each problem two different ways.

<p>a. <math>134 + 48</math></p> $\begin{array}{r} 134 \\ + 48 \\ \hline 12 \\ 70 \\ 100 \\ \hline 182 \end{array}$ $\begin{array}{r} 134 \\ + 48 \\ \hline 182 \end{array}$	<p>b. <math>83 + 69</math></p> $\begin{array}{r} 83 \\ + 69 \\ \hline 12 \\ 140 \\ \hline 152 \end{array}$ $\begin{array}{r} 83 \\ + 69 \\ \hline 152 \end{array}$
<p>c. <math>46 + 75</math></p> $\begin{array}{r} 46 \\ + 75 \\ \hline 11 \\ 110 \\ \hline 121 \end{array}$ $\begin{array}{r} 46 \\ + 75 \\ \hline 121 \end{array}$	<p>d. <math>63 + 128</math></p> $\begin{array}{r} 63 \\ + 128 \\ \hline 11 \\ 80 \\ 100 \\ \hline 191 \end{array}$ $\begin{array}{r} 63 \\ + 128 \\ \hline 191 \end{array}$

COMMON CORE Lesson 30: Compare totals below to new groups below as written methods. 6/28/13 engage<sup>ny</sup>

**A**

# Correct \_\_\_\_\_

Subtract.

1	$30 - 1 =$		23	$31 - 2 =$	
2	$40 - 2 =$		24	$31 - 3 =$	
3	$50 - 3 =$		25	$31 - 4 =$	
4	$50 - 4 =$		26	$41 - 4 =$	
5	$50 - 5 =$		27	$51 - 5 =$	
6	$50 - 9 =$		28	$61 - 6 =$	
7	$51 - 9 =$		29	$71 - 7 =$	
8	$61 - 9 =$		30	$81 - 8 =$	
9	$81 - 9 =$		31	$82 - 8 =$	
10	$82 - 9 =$		32	$82 - 7 =$	
11	$92 - 9 =$		33	$82 - 6 =$	
12	$93 - 9 =$		34	$82 - 3 =$	
13	$93 - 8 =$		35	$34 - 5 =$	
14	$83 - 8 =$		36	$45 - 6 =$	
15	$33 - 8 =$		37	$56 - 7 =$	
16	$33 - 7 =$		38	$67 - 8 =$	
17	$43 - 7 =$		39	$78 - 9 =$	
18	$53 - 6 =$		40	$77 - 9 =$	
19	$63 - 6 =$		41	$64 - 6 =$	
20	$63 - 5 =$		42	$24 - 8 =$	
21	$73 - 5 =$		43	$35 - 8 =$	
22	$93 - 5 =$		44	$36 - 8 =$	

© Bill Davidson



Name \_\_\_\_\_

Date \_\_\_\_\_

1. Linda and Keith added  $127 + 59$  differently. Explain why Linda and Keith's work are both correct.

Linda's work:	Keith's work:
$  \begin{array}{r}  127 \\  + 59 \\  \hline  16 \\  70 \\  + 100 \\  \hline  186  \end{array}  $	$  \begin{array}{r}  127 \\  + 59 \\  \hline  186  \end{array}  $

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2. Jake solved  $124 + 69$  below. Solve the same problem another way.

$$\begin{array}{r}
 124 \\
 + 69 \\
 \hline
 193
 \end{array}$$

3. Solve each problem two different ways.

a.  $134 + 48$

b.  $83 + 69$

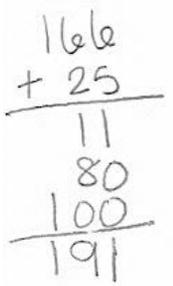
c.  $46 + 75$

d.  $63 + 128$

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Kevin solved  $166 + 25$  below. Solve the same problem another way.



Handwritten work for  $166 + 25$  using the decomposition method:

$$\begin{array}{r} 166 \\ + 25 \\ \hline 11 \\ 80 \\ \hline 100 \\ 191 \end{array}$$

2. Explain how Kevin's work and your work are similar.

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Name \_\_\_\_\_

Date \_\_\_\_\_

1. Kari and Marty solved  $136 + 56$ .

Kari's work:	Marty's work:
$\begin{array}{r} 136 \\ + 56 \\ \hline 192 \end{array}$	$\begin{array}{r} 136 \\ + 56 \\ \hline 12 \\ 80 \\ + 100 \\ \hline 192 \end{array}$

- a. Explain what is different about how Kari and Marty solved the problem.

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2. Here is one way to solve  $145 + 67$ . For (a), solve  $145 + 67$  another way.

$\begin{array}{r} 145 \\ + 67 \\ \hline 212 \end{array}$	<p>a.</p>
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b. Explain how the two ways to solve  $145 + 67$  are similar.

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3. Show another way to solve  $142 + 39$ .

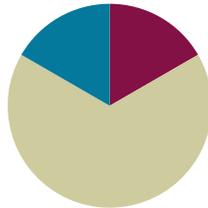
$\begin{array}{r} 142 \\ + 39 \\ \hline 11 \\ 70 \\ \hline 100 \\ 181 \end{array}$	
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## Lesson 31

Objective: Solve two-step word problems within 100.

### Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Concept Development	(40 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



#### A NOTE ON LESSON STRUCTURE:

The Application Problems are not a separate component of this lesson. They are the focus of today's Concept Development.

### Fluency Practice (10 minutes)

- Find the Total **2.NBT.5** (5 minutes)
- Find the Difference **2.NBT.5** (5 minutes)

#### Find the Total (5 minutes)

Materials: (S) Personal white boards

Note: Reviewing this mental math fluency prepares students to solve word problems in the lesson.

T: (Write  $32 + 64 = \underline{\quad}$ .) Solve using any method.

T: Write 1 hundred to change 32 to 132. What is the total now?

S: 196.

Repeat process and sequence with  $25 + 74$  and  $125 + 74$ ;  $58 + 32$  and  $158 + 32$ ;  $32 + 48$  and  $132 + 48$ .

#### Find the Difference (5 minutes)

Materials: (S) Personal white boards

Note: Reviewing subtraction problems in sets prepares students to solve word problems in the lesson.

T: (Write  $48 - 24 = \underline{\quad}$ .) Write a subtraction sentence horizontally or vertically.

Repeat process and sequence for  $48 - 24$ ,  $40 - 24$ ;  $56 - 15$ ,  $50 - 15$ ,  $52 - 15$ ;  $64 - 38$ ,  $60 - 38$ ,  $61 - 38$ .

**Concept Development (40 minutes)**

Materials: (S) Problem Set

**Suggested Delivery of Instruction for Solving Topic F’s Word Problems**

**1. Model the problem.**

Invite two pairs of students who you think can successfully model the problem to work at the board while the others work independently or in pairs at their seats. Review the following questions before solving the first problem.

- Can you draw something?
- What can you draw?
- What conclusions can you make from your drawing?

As students work, circulate. Reiterate the questions above and guide them in drawing their tape diagrams.

After two minutes, have the two pairs of students share *only* their labeled diagrams.

For about one minute, encourage the demonstrating students to respond to feedback and questions from their peers.

**2. Solve and write a statement.**

Discuss strategies for solving problems, drawing attention to the strategy chart created during the Debrief in G5–M2–Lesson 5. Give students two minutes to solve and complete the question, sharing their work and thought processes with a peer.

Then instruct students to write their equations and statements of the answer.

**3. Assess the solution for reasonableness.**

Give students one to two minutes to assess and explain the reasonableness of their solution.

**Problem 1**

Solve a two-step *add to with result unknown* word problem using a tape diagram.

Mei picked 26 berries. Luis picked 37 more berries than Mei.

- a) How many berries did Luis pick?
- b) How many berries did they pick in all?

**NOTES ON MULTIPLE MEANS OF ENGAGEMENT:**

Students who are struggling will also benefit from an opportunity to model the problems on the board. Encourage them to try. Guide them if they are stuck, or encourage them to seek help from a friend. Praise their hard work when they successfully achieve the desired results.

MP.1

Circulate and ask guiding questions as needed to help students identify the steps in the problem and to determine if they are looking for the whole or a missing part. Once they draw their tape diagram, they may solve using any written method that they can explain and relate to their drawings.

**Problem 2**

Solve a two-step *take from/add to with result unknown* word problem by drawing a tape diagram. Then, students may use any strategy they have learned to solve.

Kevin has 53 balloons. His cat pops 17 of them. His father gives him 18 more balloons. How many balloons does Kevin have now?

Drawing tape diagrams is essential to understanding the relationships within the problem. Equally important is that teachers encourage students to be flexible in their thinking while solving. Note that a student might recognize that 17 balloons were popped and 18 given, so Kevin has 1 more than he started with.

**Problem 3**

Solve a two-step *change unknown* problem by drawing a tape diagram.

Lee’s fish tank has 24 goldfish and some silver fish. In all, there are 59 fish in the aquarium. Lee puts in some more silver fish. Now there are 51 silver fish. How many silver fish did Lee put in the tank?

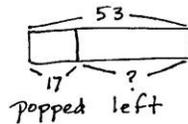
Solve this as a guided practice. Have students talk through each piece of information in the problem, drawing and labeling as they go. Prompt them with the question, “What do we know?” Then write an equation that matches that situation. Allow students to solve using methods they are comfortable with; problem solving is about sense-making. Mental math is acceptable.



**NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:**

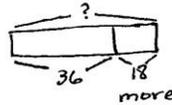
Encourage students who haven’t mastered the computation methods to focus on understanding the word problem and using manipulatives to

MP.1



$$53 - 17 = \square$$

$$17 + \square = 53$$

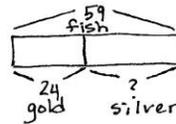


$$36 + 18 = 54$$

$$18 + 2 = 20$$

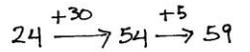
$$34 + 20 = 54$$

Kevin has 54 balloons.

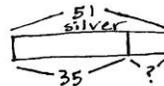


$$59 - 24 = \square$$

$$24 + \square = 59$$

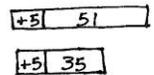


There are 35 silver fish.



$$35 + \square = 51$$

$$51 - 35 = \square$$



$$56 - 40 = 16$$

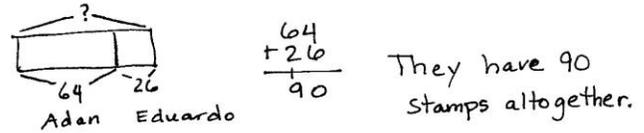
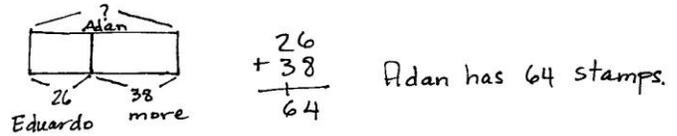
Lee put in 16 silver fish.

**Problem 4**

Solve a two-step comparison problem by drawing a tape diagram and using a preferred method to solve.

Eduardo collects 26 stamps. Adan collects 38 more than Eduardo. How many stamps do they have altogether?

Circulate and encourage students to use their favorite method to solve. Remind them to be prepared to explain their strategy using place value language.



MP.1

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

**Student Debrief (10 minutes)**

**Lesson Objective:** Solve two-step word problems within 100.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the questions below to lead the discussion.

- Explain the strategy you used to solve Problem 1. Use place value language to defend the reasonableness of your solution.
- How did you draw a tape diagram for Problem 3(a)? Explain to your partner the conclusions you can make from your drawing. How did your drawing help you to choose a strategy to solve?
- In Problem 3(b), what is tricky about the word *more*? How did you represent this situation in your tape diagram? Explain the strategy you used to solve.

- In Problem 4, how did you match each piece of information in the problem with your labeled tape diagram? Which strategy did you use to solve? Why?
- What steps do you recommend for solving word problems? What questions do you ask yourself before, during, and after solving?

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

NYS COMMON CORE MATHEMATICS CURRICULUM 2•4

3. Mark collected 27 fewer coins than Craig. Mark collected 58 coins.

a. How many coins did Craig collect?

b. Mark collected 18 more coins than Shawn. How many coins did Shawn collect?

4. There were 35 apples on the table.

17 of the apples were rotten and were thrown out.

9 apples were eaten.

How many apples are still on the table?

COMMON CORE Lesson 31: Solve two-step word problems within 100. Date: 7/4/13

engage<sup>ny</sup> 4.F.28

Name \_\_\_\_\_

Date \_\_\_\_\_

Solve the following word problems by drawing a tape diagram. Then use any strategy that you've learned to solve.

1. Mr. Roberts graded 57 tests on Friday and 43 tests on Saturday. How many tests did Mr. Roberts grade?

2. There are 54 women and 17 fewer men than women on a boat.

a. How many men were on the boat?

b. How many people were on the boat?





Name \_\_\_\_\_

Date \_\_\_\_\_

1. Melissa had 56 pens and 37 more pencils than pens.
  - a. How many pencils did Melissa have?
  
  
  
  
  
  
  
  
  
  
  - b. How many pens and pencils did Melissa have?
  
  
  
  
  
  
  
  
  
  
2. Antonio gave 27 tomatoes to his neighbor and 15 to his brother. He had 72 tomatoes before giving some away. How many tomatoes does Antonio have left?

3. The bakery made 92 muffins. 17 were blueberry, 23 were cranberry, and the rest were chocolate chip. How many chocolate chip muffins did the bakery make?
4. After spending \$43 on groceries and \$19 on a book, Mrs. Groom had \$16 left. How much money did Mrs. Groom have to begin with?

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve. Show mental strategy.

<p>a.</p> $35 + 25 = \underline{\hspace{2cm}}$	<p>b.</p> $\underline{\hspace{2cm}} = 27 + 46$	<p>c.</p> $\underline{\hspace{2cm}} - 19 = 73$
<p>d.</p> $89 - 52 = \underline{\hspace{2cm}}$	<p>e.</p> $61 - \underline{\hspace{2cm}} = 32$	<p>f.</p> $75 - \underline{\hspace{2cm}} = 29$
<p>g.</p> $32 \xrightarrow{+1} \underline{\hspace{2cm}} \xrightarrow{+\underline{\hspace{1cm}}} 43$	<p>h.</p> $60 \xrightarrow{-\underline{\hspace{1cm}}} \underline{\hspace{2cm}} \xrightarrow{-\underline{\hspace{1cm}}} 49$	<p>i.</p> $\underline{\hspace{2cm}} \xrightarrow{+10} \underline{\hspace{2cm}} \xrightarrow{+1} 73$

2. Solve and show your work with a model.

<p>a.</p> $116 + 74 = \underline{\hspace{2cm}}$ <p>Model:</p>	<p>b.</p> $147 + 28 = \underline{\hspace{2cm}}$ <p>Model:</p>
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4. Sarah solved the word problem below.

There are 47 cats in Cuddle's Pet Shop. There are 29 more dogs than cats. How many dogs are in Cuddle's Pet Shop?

$$47 + 29$$

$$47 + 30 - 1 = 76$$

- a. Explain why Sarah's addition strategy worked.

- b. There are 18 fewer cats than birds. How many birds are in Cuddle's Pet Shop? Use another place value strategy to find the answer. Show your work.

Mid-Module Assessment Task  
Standards Addressed

Topics A–C

**Represent and solve problems involving addition and subtraction.**

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

**Use place value understanding and properties of operations to add and subtract.**

- 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 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
- 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.)

## Evaluating Student Learning Outcomes

A Progression Toward Mastery is provided to describe steps that illuminate the gradually increasing understandings that students develop *on their way to proficiency*. In this chart, this progress is presented from left (Step 1) to right (Step 4). The learning goal for each student is to achieve Step 4 mastery. These steps are meant to help teachers and students identify and celebrate what the student CAN do now and what they need to work on next.

A Progression Toward Mastery

<p><b>Assessment Task Item and Standards Assessed</b></p>	<p><b>STEP 1</b>                      Little evidence of reasoning without a correct answer.   <b>(1 Point)</b></p>	<p><b>STEP 2</b>                      Evidence of some reasoning without a correct answer.   <b>(2 Points)</b></p>	<p><b>STEP 3</b>                      Evidence of some reasoning with a correct answer or evidence of solid reasoning with an incorrect answer.   <b>(3 Points)</b></p>	<p><b>STEP 4</b>                      Evidence of solid reasoning with a correct answer.   <b>(4 Points)</b></p>
<p><b>1</b></p> <p><b>2.NBT.5</b> <b>2.NBT.8</b></p>	<p>The student solves one to two of the six problems correctly and models mental strategies fewer than three times.</p>	<p>The student solves three to five of the nine problems correctly and models mental strategies at least three times.</p>	<p>The student solves six to eight of the nine problems correctly and models mental strategies at least six times.</p>	<p>The student correctly solves to find:</p> <ul style="list-style-type: none"> <li>a) 60</li> <li>b) 73</li> <li>c) 92</li> <li>d) 37</li> <li>e) 29</li> <li>f) 46</li> <li>g) 33, +10</li> <li>h) -10, 50, -1 or -1, 59, -10</li> <li>i) 62, 72</li> </ul> <ul style="list-style-type: none"> <li>▪ Uses and models mental strategy such as arrow notation, adding the same amount to the subtrahend as to the minuend to make a multiple of ten, add or subtract a multiple of 10 and adjust the solution as necessary, or other strategies as noted in the Module Overview.</li> </ul>

A Progression Toward Mastery

<p><b>2</b></p> <p><b>2.NBT.7</b> <b>2.NBT.8</b></p>	<p>The student solves one of the four problems correctly and shows one correct model, or solves two of the problems correctly and shows no models.</p>	<p>The student answers three to five of eight parts (one part being the equation and one part being the model) correctly.</p>	<p>The student answers six to seven of eight parts correctly.</p>	<p>Student shows accurate models and finds:</p> <ul style="list-style-type: none"> <li>a) 190</li> <li>b) 175</li> <li>c) 25</li> <li>d) 17</li> </ul>
<p><b>3</b></p> <p><b>2.NBT.5</b></p>	<p>The student answers one of four problems correctly and models mental strategies fewer than two times.</p>	<p>The student answers two of four problems correctly and models mental strategies at least twice.</p>	<p>The student answers three of four problems correctly and models mental strategies at least three times.</p>	<p>The student correctly:</p> <ul style="list-style-type: none"> <li>▪ Answers                             <ul style="list-style-type: none"> <li>a) False</li> <li>b) True</li> <li>c) False</li> <li>d) False</li> </ul> </li> <li>▪ Uses and models mental strategy such as arrow notation, adding the same amount to the subtrahend as to the minuend to make a multiple of ten, add or subtract a multiple of 10 and adjust the solution as necessary, or other strategies as noted in the module overview.</li> </ul>
<p><b>4</b></p> <p><b>2.OA.1</b> <b>2.NBT.5</b> <b>2.NBT.9</b></p>	<p>The student answers neither of the parts correctly.</p>	<p>Student answers one of the parts correctly.</p>	<p>Student answers Parts (a) and (b) correctly but does not show work in Part (b), or answers one part incorrectly but shows correct work in Part (b).</p>	<p>The student correctly:</p> <ul style="list-style-type: none"> <li>▪ Demonstrates an understanding of the role of place value and the arithmetic properties in Sarah’s strategy.</li> <li>▪ Uses an alternate place value strategy to solve Part (b), e.g., <math>47 + 18 = 45 + 20 = 65</math></li> </ul>

Name Daniel

Date \_\_\_\_\_

1. Solve. Show mental strategy.

<p>a.</p> $35 + 25 = 60$ $35 \xrightarrow{+20} 55 \xrightarrow{+5} 60$	<p>b.</p> $73 = 27 + 46$ $46 \xrightarrow{+20} 66 \xrightarrow{+4} 70 \xrightarrow{+3} 73$	<p>c.</p> $92 - 19 = 73$ $73 + 20 - 1 = 92$
<p>d.</p> $89 - 52 = 37$ $89 - 50 - 2 = 37$	<p>e.</p> $61 - 29 = 32$ $61 - 30 - 2 = 29$	<p>f.</p> $75 - 46 = 29$ $75 - 30 + 1 = 46$
<p>g.</p> $32 \xrightarrow{+1} 33 \xrightarrow{+10} 43$	<p>h.</p> $60 \xrightarrow{-10} 50 \xrightarrow{-1} 49$	<p>i.</p> $62 \xrightarrow{+10} 72 \xrightarrow{+1} 73$

\*Other strategies based in place value are acceptable

2. Solve and show your work with a model.

<p>a.</p> $116 + 74 = 190$ <p>Model:</p>	<p>b.</p> $147 + 28 = 175$ <p>Model:</p>
--	--

<p>c.</p> <p><math>84 - 59 = \underline{25}</math></p> <p>Model:</p> <p style="text-align: center;">2    5</p>	<p>d.</p> <p><math>62 - 45 = \underline{17}</math></p> <p>Model:</p> <p style="text-align: center;">1    7</p>
--	--

3. Label each as true or false. Show mental strategy.

a.  $23 - 14 = 14 + 23$     false

$23 \xrightarrow{-10} 13 \xrightarrow{-4} 9 = 37$

b.  $45 - 19 = 22 + 4$     true

$45 - 20 + 1 = 26 = 26$

c.  $93 - 56 = 84 - 37$     false

$93 \xrightarrow{-50} 43 \xrightarrow{-6} 37 = 84 \xrightarrow{-30} 54 \xrightarrow{-7} 47$

d. 8 ones + 5 tens = 85    false

$58 = 85$

4. Sarah solved the word problem below.

There are 47 cats in Cuddle's Pet Shop. There are 29 more dogs than cats. How many dogs are in Cuddle's Pet Shop?

$$47 + 29$$

$$47 + 30 - 1 = 76$$

- a. Explain why Sarah's addition strategy worked.

Sarah added 30 because it is easier to do in your head but she had to take away 1 because she should only add 29.

- b. There are 18 fewer cats than birds. How many birds are in Cuddle's Pet Shop? Use another place value strategy to find the answer. Show your work.

$$47 \xrightarrow{+10} 57 \xrightarrow{+3} 60 \xrightarrow{+5} (65)$$

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve mentally:

a. $72 + 10 = \underline{\hspace{2cm}}$	b. $\underline{\hspace{2cm}} = 73 - 10$	c. $\underline{\hspace{2cm}} + 10 = 174$
d. $83 + 100 = \underline{\hspace{2cm}}$	e. $\underline{\hspace{2cm}} = 182 - 100$	f. $\underline{\hspace{2cm}} - 100 = 81$
g. $65 + 40 = \underline{\hspace{2cm}}$	h. $\underline{\hspace{2cm}} = 166 - 40$	i. $127 + \underline{\hspace{2cm}} = 167$
j. $85 + 42 = \underline{\hspace{2cm}}$	k. $\underline{\hspace{2cm}} = 186 - 41$	l. $189 - 47 = \underline{\hspace{2cm}}$

2. Solve:

a. Find the solution and model how you found your answer.

$87 + 56 =$	Model:
$38 + 68 + 71 + 12 =$	Model:

b. Solve and explain your answer using place value.

$91 - 24 =$	$154 + 27 =$
$105 - 42 =$	$86 + 45 =$

c. Susan and James solved  $125 + 32$  in different ways. Explain why both ways are correct.

<p>Susan's Way:</p> $125 + 32$ $125 \xrightarrow{+10} 135 \xrightarrow{+10} 145 \xrightarrow{+10} 155 \xrightarrow{+1} 156 \xrightarrow{+1} 157$	<p>James' Way:</p> $125 + 32 =$ $125 + 30 + 2 = 157$
<p>Explanation:</p>	<p>Explanation:</p>

3. Find the missing numbers to make each statement true. Show your mental math strategy.

a.  $98 \xrightarrow{+10} \underline{\hspace{1cm}} \xrightarrow{+ \underline{\hspace{1cm}}} 109$

b.  $6 \text{ tens} + 4 \text{ ones} = 70 - \underline{\hspace{2cm}}$

c.  $25 + 75 = \underline{\hspace{2cm}} + 30$

d.  $39 + \underline{\hspace{2cm}} = 82$

e.  $100 - \underline{\hspace{2cm}} = 45 + 15 + 32$

4. Sally went shopping. She spent \$86 on groceries and \$39 on clothing.

a. How much more did Sally spend on groceries than on clothing? Show your work.

b. After Sally's shopping trip she had \$12 left. How much money did she have to begin with? Show your work.

- c. If Sally hadn't purchased the clothing would she have been able to afford a \$55 necklace? Explain your answer.
- d. How much money would Sally need to buy the groceries, clothing, and the necklace? Show your work with a model.

End-of-Module Assessment Task  
Standards Addressed

Topics A–F

**Represent and solve problems involving addition and subtraction.**

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

**Use place value understanding and properties of operations to add and subtract.**

- 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 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
- 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.)

**Evaluating Student Learning Outcomes**

A Progression Toward Mastery is provided to describe steps that illuminate the gradually increasing understandings that students develop *on their way to proficiency*. In this chart, this progress is presented from left (Step 1) to right (Step 4). The learning goal for each student is to achieve Step 4 mastery. These steps are meant to help teachers and students identify and celebrate what the student CAN do now and what they need to work on next.

**A Progression Toward Mastery**

<b>Assessment Task Item and Standards Assessed</b>	<b>STEP 1 Little evidence of reasoning without a correct answer.  (1 Point)</b>	<b>STEP 2 Evidence of some reasoning without a correct answer.  (2 Points)</b>	<b>STEP 3 Evidence of some reasoning with a correct answer or evidence of solid reasoning with an incorrect answer. (3 Points)</b>	<b>STEP 4 Evidence of solid reasoning with a correct answer.  (4 Points)</b>
<p><b>1</b></p> <p><b>2.NBT.8</b> <b>2.NBT.7</b></p>	<p>The student solves one to three of twelve parts correctly.</p>	<p>The student solves four to seven of twelve parts correctly.</p>	<p>The student solves eight to eleven of the twelve parts correctly.</p>	<p>The student correctly solves to find:</p> <ul style="list-style-type: none"> <li>a) 82</li> <li>b) 63</li> <li>c) 164</li> <li>d) 183</li> <li>e) 82</li> <li>f) 181</li> <li>g) 105</li> <li>h) 126</li> <li>i) 40</li> <li>j) 127</li> <li>k) 145</li> <li>l) 142</li> </ul>
<p><b>2</b></p> <p><b>2.NBT.6</b> <b>2.NBT.7</b> <b>2.NBT.9</b></p>	<p>The student solves one to four of fourteen parts correctly.</p>	<p>The student solves five to nine of fourteen parts correctly.</p>	<p>The student solves ten to thirteen of the fourteen parts correctly.</p>	<p>For Part (a) the student correctly:</p> <ul style="list-style-type: none"> <li>▪ Solves to find 143.</li> <li>▪ Shows an accurate model for <math>87 + 56</math>.</li> <li>▪ Solves to find 189.</li> <li>▪ Shows an accurate model for <math>38 + 68 + 71 + 12</math>.</li> <li>▪ Uses and models mental strategy such as arrow notation, adding the same amount to the subtrahend as to the minuend to make a multiple of ten, adding or</li> </ul>

A Progression Toward Mastery

				<p>subtracting a multiple of 10 and adjusting the solution as necessary, or other strategies as noted in the module overview.</p> <p>For Part (b) the student correctly:</p> <ul style="list-style-type: none"> <li>▪ Solves to find 67, 181, 63, and 131.</li> <li>▪ Shows an accurate explanation for each number sentence.</li> </ul> <p>For Part (c) the student correctly:</p> <ul style="list-style-type: none"> <li>▪ Explains why both Susan and James' strategies are correct.</li> </ul>
<p><b>3</b></p> <p><b>2.NBT.5</b></p> <p><b>2.NBT.6</b></p> <p><b>2.NBT.8</b></p>	<p>The student solves one of six problems correctly and models fewer than two mental strategies.</p>	<p>The student solves two to three of six problems correctly and models at least two mental strategies.</p>	<p>The student solves four to five of the six problems correctly and models at least four mental strategies.</p>	<p>The student correctly:</p> <ul style="list-style-type: none"> <li>▪ Solves to find                     <ul style="list-style-type: none"> <li>a) 108, + 1</li> <li>b) 6</li> <li>c) 70</li> <li>d) 27</li> <li>e) 8</li> </ul> </li> <li>▪ Uses and models mental strategy such as arrow notation, adding the same amount to the subtrahend as to the minuend to make a multiple of ten, adding or subtracting a multiple of 10 and adjusting the solution as necessary, or other</li> </ul>

A Progression Toward Mastery				
				strategies as noted in the module overview.
<p><b>4</b></p> <p><b>2.OA.1</b></p> <p><b>2.NBT.5</b></p> <p><b>2.NBT.6</b></p> <p><b>2.NBT.7</b></p>	The student solves one of the six parts correctly.	The student solves two to three of the six parts correctly.	The student solves four to five of the six parts correctly.	<p>The student correctly answers:</p> <p>a) \$47.00</p> <p>b) \$137.00</p> <p>c) “No,” and provides an accurate explanation.</p> <p>d) \$180.00 with an accurate model</p>

Name Daniel Date \_\_\_\_\_

1. Solve mentally:

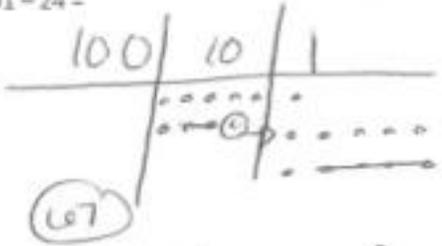
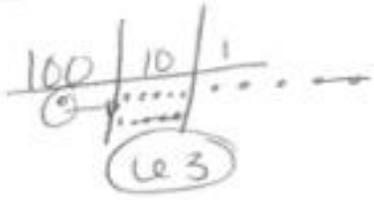
a. $72 + 10 = \underline{82}$	b. $\underline{63} = 73 - 10$	c. $\underline{164} + 10 = 174$
d. $83 + 100 = \underline{183}$	e. $\underline{82} = 182 - 100$	f. $\underline{181} - 100 = 81$
g. $65 + 40 = \underline{105}$	h. $\underline{126} = 166 - 40$	i. $127 + \underline{40} = 167$
j. $85 + 42 = \underline{127}$	k. $\underline{145} = 186 - 41$	l. $189 - 47 = \underline{42}$

2. Solve:

a. Find the solution and model how you found your answer.

$87 + 56 = \underline{143}$	Model: $87 \xrightarrow{+20} 107 \xrightarrow{+30} 137 \xrightarrow{+3} 140 \xrightarrow{+3} 143$
$38 + 68 + 71 + 12 = \underline{189}$	Model: $38 + 70 - 2 = 106$ $70 + 12 + 1 = 83$ $106 \xrightarrow{+80} 186 \xrightarrow{+3} 189$

b. Solve and explain your answer using place value.

<p>91 - 24 =</p>  <p>(67)</p> <p>I had to take from the tens to subtract.</p>	<p>154 + 27 =</p> <p>154 + 30 - 3 = (181)</p> <p>27 is close to 30 so I added 30 then had to subtract 3 because I should have only added 27.</p>
<p>105 - 42 =</p>  <p>(63)</p> <p>There were no tens to subtract so I used the 100.</p>	<p>86 + 45 =</p> <p>86 + 40 + 5 = 126 + 5 = (131)</p> <p>I know that 80 and 40 is 120 so I did that first. Then I added 5 and 6 which is 11, 126 plus 5 is 131</p>

\*Other strategies based in place value are acceptable

c. Susan and James solved  $125 + 32$  in different ways. Explain why both ways are correct.

<p>Susan's Way:</p> $125 + 32$ $125 \xrightarrow{+10} 135 \xrightarrow{+10} 145 \xrightarrow{+10} 155 \xrightarrow{+2} 157$	<p>James' Way:</p> $125 + 32 =$ $125 + 30 + 2 = 157$
<p>Explanation:</p> <p>Susan is right because she added all the ones and tens on their own to get 157.</p>	<p>Explanation:</p> <p>James is also right. He added the tens together and then added all the ones. He also got 157.</p>

3. Find the missing numbers to make each statement true. Show your mental math strategy.

a.  $98 \xrightarrow{+10} 108 \xrightarrow{+1} 109$

b.  $6 \text{ tens} + 4 \text{ ones} = 70 - \underline{6}$   
 $64 \xrightarrow{+6} 70$

c.  $25 + 75 = \underline{70} + 30$

$$100 - 30 = 70$$

d.  $39 + \underline{43} = 82$

$$82 - 40 + 1 = 43$$

e.  $100 - \underline{8} = 45 + 15 + 32$

$$92 + 8 = 100 \quad 60 + 30 + 2 = 92$$

4. Sally went shopping. She spent \$86 on groceries and \$39 on clothing.

a. How much more did Sally spend on groceries than on clothing? Show your work.

$$86 - 39$$

$$86 - 40 + 1 = \textcircled{\$47}$$

b. After Sally's shopping trip she had \$12 left. How much money did she have to begin with? Show your work.

$$86 + 39 + 12$$

$$86 + 40 - 1 = 126 - 1 = 125$$

$$125 + 12 = \textcircled{\$137}$$

- c. If Sally hadn't purchased the clothing would she have been able to afford a \$55 necklace? Explain your answer.

$$12 + 39 = .$$

$$12 + 40 - 1 = \$ 51$$

NO, she is \$4 short.

- d. How much money would Sally need to buy the groceries, clothing, and the necklace? Show your work with a model.

$$86 + 39 = 126$$

$$126 + 55 =$$

$$126 \xrightarrow{+50} 176 \xrightarrow{+5} \textcircled{\$181}$$