## Lesson 9
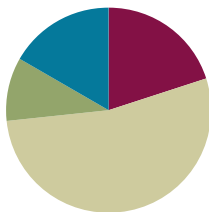
Objective:  Use math drawings to represent the composition when adding a two-digit to a three-digit addend.

### Suggested Lesson Structure

- ■ Application Problem  (6 minutes)
- ■ Fluency Practice  (12 minutes)
- ■ Concept Development  (32 minutes)
- ■ Student Debrief  (10 minutes)

   **Total Time**  **(60 minutes)**

### 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.  Five 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 comparison tape diagram to represent this problem.  First, solve to find the number that spilled on the floor.  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.

Desk [ 20 ]
Floor [      5 ]  } ?
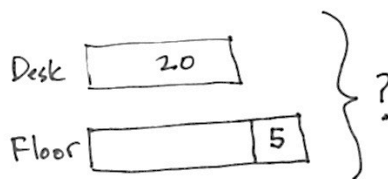
$20 + 5 = 25$
$25 \xrightarrow{+20} 45$

Maria 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 activity reviews place value concepts from Module 3 to prepare students for today's lesson.

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

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T:   Say the number in expanded form.

S:   300 + 50 + 2.

T:   The 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 journal or paper

> **NOTES ON MULTIPLE MEANS OF ENGAGEMENT:**
>
> Provide graph paper for students who need support drawing rows, columns, and dots, and encourage them to place one dot into each grid square.

Note:  As students learn to make math drawings to represent the vertical form, it is important to teach precision:  aligning digits in their proper place, drawing place value disks in clear 5-groups, and 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 and marker.

**MP.6**

### Problem 1:  34 + 18

T:   Write 34 + 18 in vertical form 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.  We call this a chip model, and the dots are the chips.  This model is 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 vertical form.
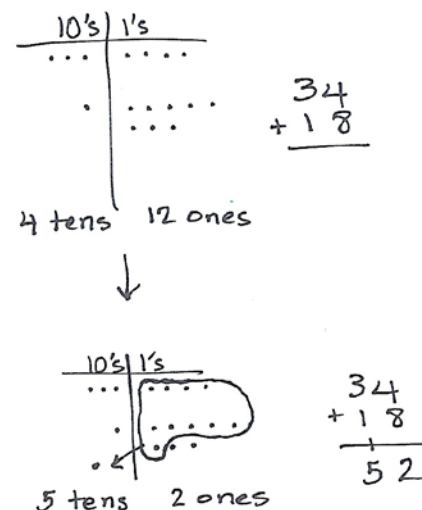
S:   3 dots in the tens place is 30 and 4 dots in the ones place is 4, so my picture is the same as 34.
      → 1 ten 8 ones is 18, and that's what I drew on my model.

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T:    What is 4 ones + 8 ones?

S:    12 ones!

T:    The Say Ten way?

S:    Ten 2.

T:    Tell your partner what to do on your model and with the numbers.

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 with numbers.

S:    (Circle 10 ones.  Draw an arrow to the tens place, and draw a dot to represent another ten.  Write 1 on the line below the tens place and a 2 below the ones place.  Add the tens digits.  See image on previous page.)

T:    Partners, check each other's work to be sure it matches my model and numbers.

T:    On the problem, you have written a 1 on the line.  On your chart, 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 the new ten that 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.

T:    What we just did is a way to solve problems using steps, an **algorithm**.  These steps, or the algorithm, help us work more quickly.

**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?  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.

### NOTES ON MULTIPLE MEANS OF REPRESENTATION:

For students performing below grade level, use manipulatives such as straws to model bundling with three-digit addends.  Once the students understand the concept of creating a new unit, move to the disks and chip model and connecting them to the vertical form.
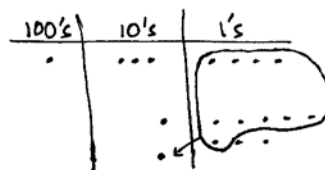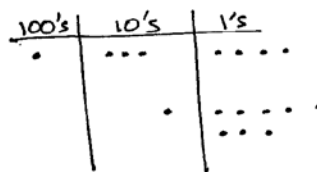
### NOTES ON VERTICAL FORM AND ALGORITHM:

*Vertical form* is used to describe the written numbers whereas *algorithm* is used to describe the cyclical process of making a larger or smaller unit.

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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.

T:  Again, use place value language to explain to your partner how your model matches the vertical form.  (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 pointing to the tens place.  Draw a dot for the new ten.  See image on previous page.)

T:  How do we show the new ten and 2 ones in vertical form?

S:  Write a 1 on the line below the tens place, and write 2 under the line below the ones place.

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T:  Correct!  Let's show that.  (Model the change on the problem.)

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:  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 of the algorithm, 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 vertical form.

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 should solve these problems using the RDW approach used for Application Problems.

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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 Problem 1, Parts (a) and (b).  What significant differences do you notice about the place value charts for these two problems?

- For Problem 1, Part (c), use place value language to explain to your partner how you solved using the **algorithm** and how you showed the steps on your model.

- One student's answer for Problem 1, Part (d), 57 + 138, was 285.  What mistake did he make in using 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 problems 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.



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**4.B.40**

**A**
Add.

# Correct _____

| | | | | | |
|---|---|---|---|---|---|
| 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**
Add.

Improvement _____     # Correct _____

| | | | | | |
|---|---|---|---|---|---|
| 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.

| hundreds | tens | ones |
|---|---|---|
| | | |

a.  123 + 16 = _____

| hundreds | tens | ones |
|---|---|---|
| | | |

b.  111 + 79 = _____

| hundreds | tens | ones |
|---|---|---|
| | | |

c.  109 + 33 = _____

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| hundreds | tens | ones |
| --- | --- | --- |
|  |  |  |

d.  57 + 138 = _____

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 |
| --- | --- | --- |
|  |  |  |

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Name _____    Date _____

1.  Solve using the algorithm.  Write a number sentence for the problem modeled on the place value chart.

hundreds | tens | ones

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

136 + 39 = _____

hundreds | tens | ones

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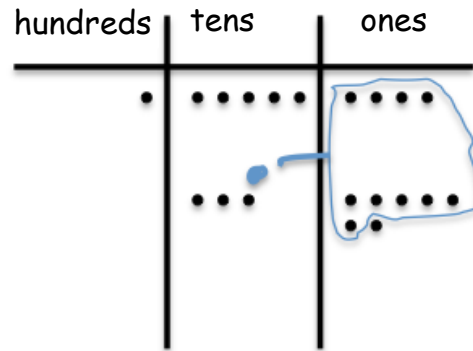
Name _____     Date _____

1.  Solve using the algorithm.  Draw and bundle chips on the place value chart.
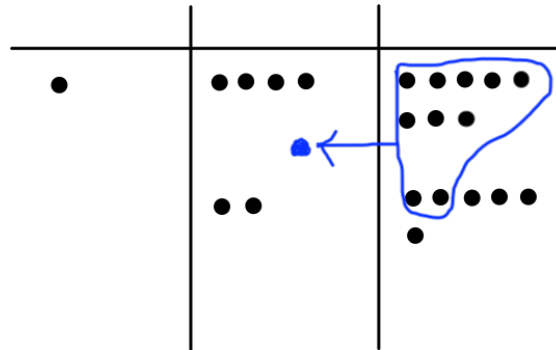
    a.  127 + 14 = _____

| hundreds | tens | ones |
|---|---|---|
|  |  |  |

    b.  135 + 46 = _____

| hundreds | tens | ones |
|---|---|---|
|  |  |  |

    c.  108 + 37 = _____

| hundreds | tens | ones |
|---|---|---|
|  |  |  |

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2. Solve using the algorithm.  Write a number sentence for the problem modeled on the place value chart.



3. Jane made 48 lemon bars and 23 cookies.

a. How many lemon bars and cookies did Jane make?

| hundreds | tens | ones |
|---|---|---|
|  |  |  |

b. Jane made 19 more lemon bars.  How many lemon bars does she have?

| hundreds | tens | ones |
|---|---|---|
|  |  |  |

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