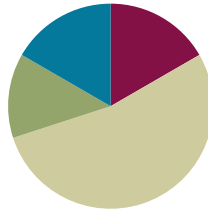# Lesson 7

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)
  Total Time   **(60 minutes)**

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

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 the tens place?
S: Five tens.
T: How many tens are in 157?
S: Fifteen tens.
T: What digit is in the ones place?
S: 7.

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Lesson 7:   Relate addition using manipulatives to a written vertical method.

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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 today's 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 the process with the following possible sequence: 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 today's lesson.

T: (Write 43 ones = ____ tens ____ ones.) Say the number sentence.

S: 43 ones = 4 tens 3 ones.

Repeat the process with the following possible sequence: 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 with the following possible sequence: 50 + 37, 21 + 31, 42 + 21, 71 + 12, and 83 + 15.

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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, unlabeled tens place value chart (Lesson 1 Template) (S) Per pair: personal white board, unlabeled tens place value chart (Lesson 1 Template), place value disks (9 tens, 18 ones), place value disks (Lesson 6 Template)

MP.4

Note: In the following modeled activity, it is important to emphasize how each action on the place value chart relates to each step of the algorithm. When students write the numbers vertically to record the steps of the algorithm, we refer to it as the vertical form. The term *algorithm* is introduced in Lesson 9.

Project or draw an unlabeled 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 the numbers vertically, with 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 place value disks. I can place my disks straight up and down, like filling a ten-frame, or from left to right, like making 5-groups (pictured on the next page). Count with me as I model the addends.

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 numbers written in vertical form?

S: Yes!

T: (Point to the ones in the vertical form, and 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.

> **NOTES ON MULTIPLE MEANS OF REPRESENTATION:**
>
> Show the same process on a Rekenrek or on an interactive whiteboard abacus. Have students working below grade level 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: Did we compose a ten?

S: No!

T: So we show 9 ones in the vertical form like this. We write the 9 below the line in the ones place. (Write 9.)

T: (Point to the tens in the vertical form; 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 and to the right.)

T: What is 6 ones + 5 ones? (Point to the ones in the vertical form and on the model.)

S: 11 ones!

MP.4

T: (Move the 4 ones disks to join the 6 ones to form the unit ten. See the 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 the third image.) We show this step in vertical form 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 to the right.) This is called **new groups below.**

T: And we write the 1 one below the line in the ones place.

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 chart matches each step that I recorded in the vertical form.

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.
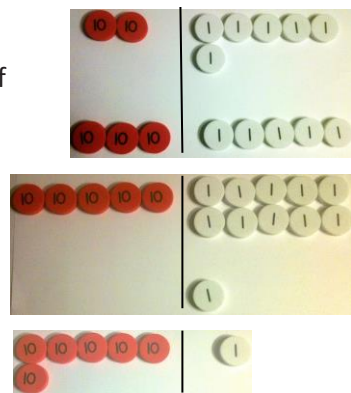
NOTES ON MULTIPLE MEANS OF REPRESENTATION:

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:

$$18 \rightarrow 10 + 8$$
$$+\ 25 \rightarrow 20 + 5$$
$$43 = 30 + 13$$

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

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

Lesson 7:   Relate addition using manipulatives to a written vertical method.

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90

Pass out place value disks and the place value chart template, to be inserted in personal white boards.
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 place value 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 vertical form. 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 place value disks to show what we should do here. (Circulate to check for understanding.)

MP.4

S: (Remove 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 activity!

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: (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 vertical form.

> **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 a coherent system. Be aware that choices made at this juncture 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 vertical form, allow them to work independently in the Problem Set.

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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.

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. Any combination of the questions below may be used 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, Part (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, Part (d): 27 + 68. How did this problem help you to solve the second one?
- For Problem 2, how did your work with the place value disks match the vertical form? How did you show **new groups below**?
- Explain to your partner how you solved Problem 3 using manipulatives and the vertical form. How could you solve this problem differently using a simplifying strategy?

Lesson 7: Relate addition using manipulatives to a written vertical method.

92

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

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93

Name _____   Date _____

1. Solve the following problems using the vertical form, your place value chart, and place value 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
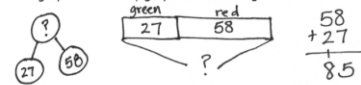
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Extra Practice for Early Finishers: Solve the following problems using your place value chart and place value disks. Bundle a ten, when necessary.
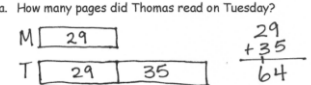
2. Samantha brought grapes to school for a snack. She had 27 green grapes and 58 red grapes. How many grapes did she bring to school?
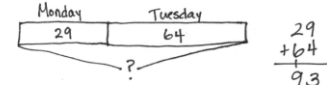
3. Thomas read 29 pages of his new book on Monday. On Tuesday, he read 35 more pages than he did on Monday.

    a. How many pages did Thomas read on Tuesday?

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

Lesson 7:   Relate addition using manipulatives to a written vertical method.

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Name _____   Date _____

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

   a. 47 + 34

   b. 54 + 27

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

Name _____   Date _____

1. Solve the following problems using the vertical form, your place value chart, and place value disks. Bundle a ten, if needed. Think about which ones you can solve mentally, too!
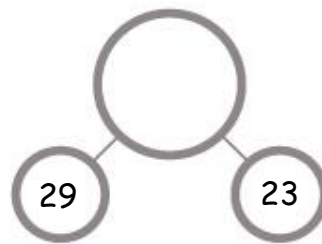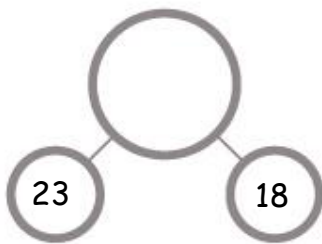
   a. 31 + 9   32 + 8

   b. 42 + 18   43 + 17

   c. 26 + 67   28 + 65

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

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97

3. Jahsir counted 63 flowers by the door and 28 flowers on the windowsill. How many flowers were by the door and on the windowsill?

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 centimeters shorter than the length of his desk. How long is Antonio's desk?

Lesson 7:   Relate addition using manipulatives to a written vertical method.

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