OA1-14  Addition and Order

Pages 65–66

STANDARDS
1.OA.B.3, 1.OA.C.6

VOCABULARY
addition sentence
left
order
right
sum

Goals
Students will see that changing the order in which you add numbers does not change the total.

PRIOR KNOWLEDGE REQUIRED
Recognizes the plus sign (+) and equal sign (=)
Can count
Can add numbers using vertical notation

MATERIALS
paper dominoes and real dominoes
BLM Snowman (p. D-69)
BLM 2 cm Grid Paper (p. H-3)
connecting cubes
two-color counters
Domino Addition by Lynette Long
dice (3 for each pair of students, see Extension 2)

Order does not affect the total. Review the words right and left with students. Hold three pencils in your left hand and four pencils in your right hand. Ask students how many you have in each hand. Then ask how many you have in total. Write on the board:

\[ \square + \square = \square \]

Have a volunteer fill in the correct numbers. Then, without changing the pencils in your hands, reverse the positions of your hands (so that your left hand appears on the right to the class, and vice versa) and repeat.

ASK: What is the same about the two addition sentences? (the two numbers being added and the total) What is different? (the order of the two numbers being added) Repeat with several examples, including examples with your hands vertically one above the other to model vertical notation.

Then write on the board:

\[ 4 + 6 = 10 \]

ASK: How could I show this addition sentence using 10 pencils and both hands? What if I wanted to show \( 6 + 4 = 10 \)? How could I show that? (Demonstrate switching the groups of pencils in your hands and ask if doing this changes the total.)

Turning dominoes around to change the order. Tape a blank paper domino to the board.
Ask a student to put dots on the domino to show \(3 + 6\). Then ask how you could use the same domino to show \(6 + 3\). ASK: What could I do to this domino to make it show \(6 + 3\) instead of \(3 + 6\)? Demonstrate turning it around. ASK: Does turning the domino around change the total number of dots on it? (no) How does turning the domino around change the addition sentence? (it becomes \(6 + 3 = 9\)) What stays the same and what changes? (the numbers being added and the total stay the same, but the order of the numbers being added changes) How do those numbers change? (the order of the numbers is reversed or switched) Distribute dominoes and have students turn them around to write two addition sentences. Provide students with the same dominoes that appear on AP Book 1.1 pp. 65–66, so that they can physically turn the dominoes around as they answer the questions.

Provide students with BLM Snowman, which allows students to add three different sets of buttons in six ways. (the total is always 10 buttons) As a bonus, ask students why the total is the same for each question. (the parts with the buttons are the same, but they are added in different orders)

Although we use the word “sum” in these descriptions, you do not need to use it in discussions with students. You could use the word “total” instead. If you do want to introduce the word “sum,” be careful that students do not confuse it with the word “some.”

### ACTIVITIES 1–3

1. Two students sit across from each other and place a domino between them. Each student makes a sum by reading the number of dots from left to right. (Example: If the domino has two dots and three dots, then one student will say “two plus three equals five” and the other will say “three plus two equals five.”) Repeat with other dominoes. NOTE: You could do this activity with a pair of volunteers (with the rest of the class watching) at the beginning of the lesson. Ask the class to say which student is reading the domino correctly. The class should see that both students are reading the domino correctly since both addition sentences give the same number of dots.

2. Give each student a copy of BLM 2 cm Grid Paper. Write on the board:

\[
2 + 4
\]

Ask students to color two squares beside each other in red and four squares beside those in yellow. Ask students to write the sum “2 + 4” above their picture. Then ask them to draw a picture of the same sum with the four yellow squares on the left and the two red squares last. Ask students to write a sum for their new picture. (4 + 2) Repeat with different sums. NOTE: To help students draw the pictures, show them a connecting cube model of the sum 2 + 4, with two red and four yellow cubes.
3. If you have two-color counters, toss eight of them up in the air and write an addition sentence for the colors that face up when they land. ASK: Does anyone see another addition sentence that we could make for the colors? What if we counted the counters that showed red first and then yellow? What number sentence would we get? What if we counted the counters that showed yellow first and then red—then what number sentence would we get? Give students two-color counters to toss up and record two number sentences for each result.

Literature Connection: *Domino Addition* by Lynette Long. Provide students with suggestions for games using dominoes that reinforce addition skills for numbers 1 to 12.

**Extensions**

1. Count letters in sentences that have the same words in different orders. Examples:
   
   a) Ed sees Tom.  
   b) The blue hat is big.  
   Tom sees Ed.  
   Is the big hat blue?

   **Bonus:** Write an addition sentence to show that the number of letters in each sentence is the same.

   **Answers:** a) 9; b) 15; Bonus: the number of letters in part a) is $2 + 4 + 3 = 9 = 3 + 4 + 2$, and the number of letters in part b) is $3 + 4 + 2 + 3 = 15 = 2 + 3 + 3 + 3 + 4$.

2. Students play in pairs. Each pair rolls three dice. Each student independently adds the numbers and writes a number sentence. Students make sure that they get the same sum as their partner.

3. Students work in pairs. One student makes up an addition problem and the other writes the related number sentence. For example, one student might say, “There are three cats in a basket. Two more cats jump in. How many cats are in the basket?” The other student writes “$3 + 2 = 5$.”

4. a) Add $8 + 6$ by drawing circles. Find a fast way to count the circles.
   
   b) In pairs, explain how you answered part a) and why your way was fast.

   **Answers:** a) 14; b) sample explanation: I drew 8 circles and 6 circles. I knew I had 8 circles in the first group, so I could start counting on from 8 to find the total number of circles:
Goals

Students will add using cubes and then a chart.

PRIOR KNOWLEDGE REQUIRED

Can add
Can read the first few rows of a hundreds chart
Can count using a chart

MATERIALS

1 cm connecting cubes in two colors or BLM Base Ten Materials (p. H-6)
paper ones and tens blocks (in two colors) to use on a large hundreds chart
BLM Hundreds Chart to 10 (p. H-4)
BLM Hundreds Chart to 30 (p. H-7)
BLM Adding a Number to 10 (p. D-70, see Extension 1)
BLM Addition and Order (p. D-71, see Extension 2)

Add using blocks. Give each student several red and blue 1 cm connecting cubes. (If you do not have connecting cubes, use base ten blocks or cut out paper squares from BLM Base Ten Materials.) Ask students to find three red blocks and four blue blocks. ASK: How many blocks is that altogether? (7) Write on the board:

\[ 3 + 4 = 7 \]

Repeat with various numbers and have volunteers write the addition sentences on the board.

Add using a chart and blocks. Draw the first two rows of a hundreds chart on the board (or use a large hundreds chart if available). Demonstrate how to find 3 + 4 by placing three red paper ones blocks and then four blue paper ones blocks on the chart in order, so that the last block is on square 7. Count as a class the number of ones blocks that are placed on the chart. Do several examples like this, then ASK: Is there a way to determine the total number of blocks without adding or counting? (look at the last block covered) As a class, check the prediction on several examples. Ask students how putting the pieces on, in order, makes it easier to tell how many there are. Demonstrate putting three red and then four blue blocks on the chart randomly, and then count them. Then put them on in order and count again. Emphasize that when the blocks go on in order, the chart does the counting for you—the answer is under the last block.

Give students a copy of BLM Hundreds Chart to 10. Have students determine 4 + 5 by placing four red and five blue connecting cubes or squares over the first nine squares of the first row of a hundreds chart.
More advanced students can add larger pairs of numbers by placing blocks on BLM Hundreds Chart to 30.

**Use coloring and circling instead of blocks.** Draw the first row of a hundreds chart on the board. Tell students that you want to add $3 + 5$. Have a volunteer do so using the red and blue paper ones blocks. Then tell students that, instead of using the three red paper blocks, you are just going to shade the first three squares. Remove the paper blocks and shade the squares. Instead of using the blue paper blocks, you are just going to circle the next five numbers. Remove the paper blocks one at a time and circle the next five squares as you do so. Now we see that $3 + 5 = 8$ since 8 is the last square circled.

**NOTE:** If students are not familiar with the meaning of "first" and "second," you might explain these while students are standing in a line, drawing attention to their position in the line. You could use other examples that pertain to the order or steps for doing something, such as getting ready for school.

**Practice using coloring and circling instead of blocks.** Draw the first two rows of a hundreds chart on the board. Add several pairs of one-digit numbers whose sum is greater than 10. Invite volunteers to come to the board and shade the first number of squares and circle the second number of squares, then have students do problems individually using BLM Hundreds Chart to 10 and BLM Hundreds Chart to 30. Some students may need to do the two steps (shade the first number of squares and then circle the second number of squares) separately.

**Exercises:** Shade the first number of squares and circle the next number of squares to add.

a) $5 + 3$  b) $4 + 4$  c) $7 + 2$  d) $6 + 3$

e) $7 + 5$  f) $8 + 4$  g) $13 + 4$

**Bonus**

h) $2 + 7 + 6$  i) $4 + 4 + 4$

**Answers:** a) 8, b) 8, c) 9, d) 9, e) 12, f) 12, g) 17, Bonus: h) 15, i) 12

**Compare the two methods.** Ask how the coloring and circling method of adding on a hundreds chart is different from the method of placing blocks on the hundreds chart. How is it the same? (similarities: you are still adding in order and you only have to count out the 3 and the 5, not the 8 at the end; differences: the first method requires blocks or squares, and the second method you can do on a sheet of paper)

**Shade only the square showing the first number.** Draw the first row of a hundreds chart on the board. Tell students that you want to add $4 + 3$, but instead of shading the first four squares you are just going to shade the fourth one. Count to the fourth square and ASK: What number is in it? (4) How can I find the fourth square without counting? (it has a 4 in it)

Emphasize that once you have shaded the fourth square, you know
where to start circling. Have volunteers shade the square showing the first number and then circle the second number of squares to add $4 + 5$, $7 + 2$, and $2 + 6$.

Add a second row to the hundreds chart on the board and have volunteers add $3 + 8$ and $5 + 9$. Then distribute another copy of BLM Hundreds Chart to 30. In the exercises below, some students may need to practice doing each step separately.

**Exercises:** Add.

a) $7 + 6$   b) $8 + 4$   c) $9 + 5$

**Bonus**

d) $8 + 14$   e) $5 + 8 + 12$   f) $7 + 14 + 6$

**Answers:** a) 13, b) 12, c) 14, Bonus: d) 22, e) 25, f) 27

**Extensions**

1. Have students complete BLM Adding a Number to 10.

   **Answers:** 2. 17, 3. 13, 4. 16, 5. 15, 6. 19, 7. 12, 8. 18, 9. 17

2. BLM Addition and Order uses the same questions as on AP Book 1.1 p. 70, but on the BLM students shade the square showing the last number and then circle the other number of squares to add. Students can then check their answers to the BLM against their answers for Questions 16–20 on AP Book 1.1 p. 70.

   Whole-class follow-up: Have students discuss the following in pairs: What is the same about the questions on the BLM and in your AP Book? (the same two numbers are being added, the answers are the same) What is different about the questions? (on the BLM, we counted on from the second number instead of the first number—it’s like we counted the second number first) Do you think counting the second number first will always give the same answer? (yes)

   Draw a group of five circles and a group of two circles. SAY: If Jenny starts counting from here (point to the group of 5) and Eddy starts counting from here (point to the group of 2), will they get the same total number of circles? (yes) Why is that? (you can count objects in any order) Is there something special about the 5 and 2, or is it true for any numbers? (it’s true for any numbers)

   **NOTE:** Students will need their answers to Extension 3 to do Extension 4.

3. Use a hundreds chart to add.

a) $5 + 1$   b) $7 + 1$   c) $16 + 1$   d) $12 + 1$

   **Answers:** a) 6, b) 8, c) 17, d) 13
Whole-class follow-up: In pairs, have students explain to a partner how they found the numbers on the chart. PROMPTS: How did you know where to look for the number 7? For part c), did you use any number in the top row to help you find 16?

4. Look at your answers to Extension 3. Look for a fast way to add 1 without using a chart. Explain your idea to a partner.

**Answer:** I can just say the next number. For example, to add $5 + 1$, I can just say the next number after 5. That's because when I used the chart, I shaded 5 and circled only the next number. It was always only the next number that I circled, no matter which number I shaded.
**OA1-16 Counting On to Add 1 or 2**

**Goals**

Students will add 1 or 2 by counting on.

**PRIOR KNOWLEDGE REQUIRED**

- Can count to 20, orally and in writing
- Can order numbers to 20
- Can add
- Knows that “next” means “right after”

**MATERIALS**

- BLM The Next Square (p. D-72)
- Counters or playing cards
- Calendar
- *Two Too Many* by Jo Ellen Bogart
- *One Monkey Too Many* by Jackie French Koller

**NOTE:** In Lesson OA1-5, students learned to determine how many more objects are in a group by counting on. In Lesson NBT1-2, they learned to identify the next number on a chart. In this lesson, students begin making the connection between counting on and adding. Students who need to review or practice counting what comes next in a linear model can complete BLM The Next Square.

**Adding 1 by finding the next number.** Draw three circles on the board. Count the circles one at a time and write the numbers above the circles as you count, as shown below:

```
1  2  3
○  ○  ○
```

Then draw one more circle and ASK: Now how many circles are there? (4) Erase the numbers above the circles and count again, rewriting 1, 2, and 3 and adding 4 above the last circle. Repeat for several examples. Then do another example, but instead of erasing the original counting, explain that you might as well leave it there and just write the next number above the new circle.

Draw five circles on the board and count them, writing the numbers above the circles as you go, as shown below:

```
1  2  3  4  5
○  ○  ○  ○  ○
```
Then draw another circle and ASK: What is the next number after 5? Have a volunteer write it over the last circle:

\[
\begin{array}{cccccc}
1 & 2 & 3 & 4 & 5 & \circ \\
\end{array}
\]

Write the corresponding addition sentence on the board: \(5 + 1 = 6\).

Repeat with several examples where students add 1 to a number. Emphasize that the answer is just the next number you say when counting.

Write the numbers from 0 to 10 on the board. Emphasize that the numbers are written in order and have students add 1 to more one-digit numbers by referring to the numbers only (without drawing pictures).

**Exercises:** Add.

\[
\begin{array}{cccccc}
\text{a)} & 4 + 1 & \text{b)} & 8 + 1 & \text{c)} & 5 + 1 & \text{d)} & 6 + 1 & \text{e)} & 0 + 1 \\
\text{f)} & 2 + 1 & \text{g)} & 3 + 1 & \text{h)} & 1 + 1 & \text{i)} & 9 + 1 & \text{j)} & 7 + 1 \\
\end{array}
\]

**Bonus**

\[
\begin{array}{cccccc}
\text{k)} & 13 + 1 & \text{l)} & 17 + 1 & \text{m)} & 16 + 1 \\
\end{array}
\]

**Answers:** a) 5, b) 9, c) 6, d) 7, e) 1, f) 3, g) 4, h) 2, i) 10, j) 8, Bonus: k) 14, l) 18, m) 17

Together as a class, count the number of boys. Tell students to pretend that there will be a new boy in the class. ASK: How many boys will there be in the class? Repeat for girls. (Begin with the gender having the fewest students.)

**Adding 2 by finding the next two numbers.** Draw the following picture on the board:

\[
\begin{array}{cccccc}
1 & 2 & 3 & \circ & \circ & \circ \\
\end{array}
\]

Repeat the lesson for adding 1 with adding 2, to guide students to discover that we can add 2 by finding the next two numbers. ASK: What are the next two numbers after 3? (4 and 5) What is 3 + 2? (5) Repeat with different examples until all students are comfortable saying the next two numbers to add 2. Then write the numbers from 0 to 10 on the board and have students find the following sums.

**Exercises:** Add.

\[
\begin{array}{cccccc}
\text{a)} & 4 + 2 & \text{b)} & 8 + 2 & \text{c)} & 5 + 2 & \text{d)} & 6 + 2 \\
\text{e)} & 0 + 2 & \text{f)} & 2 + 2 \\
\text{g)} & 13 + 2 & \text{h)} & 16 + 2 & \text{i)} & 11 + 2 & \text{j)} & 18 + 2 \\
\end{array}
\]

**Answers:** a) 6, b) 10, c) 7, d) 8, e) 2, f) 4, Bonus: g) 15, h) 18, i) 13, j) 20
Counting on by 2s. Draw two circles on the board and ASK: How many circles did I draw? (2) Write “2” under the right-hand circle. Then draw a vertical line and add two more circles to your diagram. ASK: How many circles have I drawn now? (4) Write “4” under the right-hand circle then draw a vertical line and add two more circles. Continue this process until you have drawn 10 circles and your diagram looks like this:

```
  2  4  6  8  10
```

SAY: When you start at 2 and keep adding two, you get the numbers 2, 4, 6, 8, 10, and so on. When you say these numbers you are counting on by 2s. The numbers you say when you count on by 2s are also called the even numbers.

NOTE: The concept of an even number is normally taught in Grade 2, but to avoid having to say, “the numbers you say when counting on by two,” we recommend you teach your students the term “even.” You can define the even numbers as “the numbers you say when counting on by 2s,” or you could teach your students a more advanced definition. For example, a number is even if that number of counters can be arranged in groups of two with no counters left over or arranged in two equal groups. Demonstrate the first method with various numbers of counters and the second method with playing cards by dealing cards to two players. Emphasize that if students lose track of which player they started dealing cards to first, they can stop and count out the cards to make sure the piles have the same number of cards.

Have the class practice saying the even numbers 2, 4, 6, 8, 10 until they can recite them automatically. Then write the first line below on the board. Ask a student to fill in the sum. Then, write the second line below on the board and have a student complete the sum. Continue having students add 2 in this way. Then, draw their attention to the answers: they are the numbers you say when counting on by 2s (or the even numbers).

```
0 + 2 = 2
2 + 2 = 4
4 + 2 = ___
6 + 2 = ___
8 + 2 = ___
```

Repeat the previous part of the lesson (Counting on by 2s) starting at 10, so students learn the sequence of even numbers in the teens (10, 12, 14, …). We recommend that you practice counting on by 2s to 20 with your class regularly, as students who know the sequence of even numbers can use this knowledge to do mental math. For example, if a student wishes to add 2 to a number in the sequence, they simply have to say the next number...
in the sequence. Example: I want to add 8 + 2. I say the number 8 when counting on by 2s. The number 8 is an even number. So to add 2 to 8, I just say the next number in the sequence (or the next even number), which is 10. 

\[8 + 2 = 10\]

Give students regular practice with sums like 6 + 2, 14 + 2, and 18 + 2 until they know these automatically.

The numbers that you don’t say when you are counting on by 2 are called the odd numbers (1, 3, 5, 7, 9, 11, 13, …). If you teach your students to count on by the odd numbers, then they can mentally add 2 to an odd number by just saying the next odd number.

**ACTIVITY**

On a calendar, shade the squares up to today’s date. **ASK:** How many squares are shaded today? How many will be shaded tomorrow? How many will be shaded two days from today?

**Literature Connection:** *Two Too Many* by Jo Ellen Bogart. After reading each page, **ASK:** How many [wheels does a tricycle have]? **SAY:** We have two too many. How many should that be? Check the answer in the picture. Some of the objects pictured may be unfamiliar, so have additional reference pictures on hand. For example, if students do not know how many antlers a moose has, show pictures of moose.

**Literature Connection:** *One Monkey Too Many* by Jackie French Koller. Adding by 1, from 1 to 7. Students can predict what one more is each time and then count the monkeys in the picture to verify their answers.

**Extensions**

1. **Add.**

   a) \[4 + 1 + 1\]  
   b) \[7 + 1 + 1\]  
   c) \[15 + 1 + 1\]  
   d) \[3 + 2 + 1\]  
   e) \[6 + 2 + 1\]  
   f) \[12 + 2 + 1\]  
   g) \[4 + 2 + 2\]  

   **Bonus:** \[3 + 2 + 1 + 1\]

2. Jane has pet cats, dogs, and hamsters. She has 3 cats, 4 dogs, and 5 hamsters. How many pets does Jane have? Use different colors of counters for each kind of pet. Say what color you used for each kind of pet. Write your answer as a full sentence.

   **Sample solution:** I took 3 white counters, 4 black counters, and 5 brown counters. I counted 12 counters. Jane has 12 pets.

   **NOTE:** Students who use a faster way to count, such as by starting from 5 and counting on for the cats and dogs, are looking for and making use of structure (MP.7).

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**Operations and Algebraic Thinking 1-16**

D-21
Goals
Students will add by counting on.

Prior Knowledge Required
Can count to 20, orally and in writing
Can order numbers to 20
Can add

Materials
ball or paper object for the game Catch
BLM Adding to Make a Picture (p. D-73)
pencil case and pencils
BLM Apples (p. D-74)

Adding by saying the next numbers. Start by adding 5. Draw on the board:

1 2 3

Tell students that the first three circles are already counted and ask a volunteer to say the next five numbers to add 3 + 5. Emphasize that five is a lot of numbers to keep track of, and ensure that the problem is posed as a challenge. Students need to count on from 3 aloud while simultaneously keeping track of how many numbers they say. Check the volunteer’s answer by writing the next five numbers above each of the white circles. If the answer is incorrect, ask another volunteer to add 5 to a number using this method, and repeat until someone is successful. When a volunteer is correct, have another volunteer add 4 + 7 using the same method.

SAY: Seven is a lot of numbers to keep track of. Who thinks they can keep track of 4 + 7? Repeat with other volunteers, all adding 7 to a number. Discuss any strategies you observe volunteers using. (Students might, for example, write a mark for each number they say, use their fingers to keep track, or add the numbers one at a time: 4 + 1 is 5, 4 + 2 is 6, and so on until 4 + 7 is 11.)

Review counting on your fingers. Have students count from 0 to 10 on their fingers, starting with the thumb of their left hand. Then ask students to tell you how many fingers you are holding up. Hold up several fingers as though you counted this way and ask students what number you counted to.

NOTE: If students have difficulty recognizing how many fingers they are holding up, provide opportunities for them to practice counting on one hand first and then both hands.
Using your fingers to keep track. Tell students that you would like to add $9 + 8$, but eight numbers is a lot to keep track of, so you will use your fingers to help you. Explain that you will count on from 9 and hold up one finger for every number you say until you are holding up eight fingers.

ASK: What is the first number that comes after 9? (Put up your thumb when they say 10.) And the next number? (Put up your forefinger when they say 11.) Continue in this way. After they say 13, ASK: How many numbers have I said after 9 so far? (4) How do you know? (you are holding up four fingers) Have students tell you when you have said eight numbers after 9. ASK: How do you know we said eight numbers? (you are holding up eight fingers—one for each number you said after 9) What was the last number I said? (17) Write on the board:

$$9 + 8 = 17$$

Draw nine colored circles and eight uncolored circles in a row. Write “9” above the last colored circle and then write the next eight numbers above each of the uncolored circles. Count to verify that there are eight numbers after the 9.

Teach your students to add by counting on from the bigger number, using Steps 1–3 below. Write on the board:

$$7 + 3$$

**Step 1:** Say the greater number (7) with your fist closed.

**Step 2:** Count on by 1s raising first your thumb, then one finger at a time until you have the same number of fingers up as the lower number.

**Step 3:** The number you say when you have the second number of fingers up is the answer (in this case you say 10 when you have three fingers up, so 10 is the sum of 7 and 3).

![Finger positions](image)

**NOTE:** Students will learn to count to 120 in AP Book 1.2. However, we recommend that you practice counting to 100 with your class even before then. Students who can count beyond 20 can be given sums with higher numbers, for instance, $25 + 3$, $32 + 2$, $51 + 5$, and so on.

Sometimes, when students try to add $7 + 3$, they will make the mistake of putting their thumbs up when they say the number 7. To help them avoid this mistake, you might try the following warm-up exercise: Tell your students that you are going to throw the bigger number in a sum to them. Throw the number “7” and ask them to catch it from the air by closing their fists (with their thumbs tucked under their fingers) while saying the number out loud. Raise the bar by throwing students bigger and bigger numbers to catch. Young students will get more and more excited as you increase the
size of the numbers. After your students have practiced saying the bigger number in a sum with their fists closed, let them add pairs of numbers, increasing the size of one of the numbers and letting your students know how impressed you are that they can handle such big numbers.

If students have trouble adding by counting on, use sums where one of the addends is 1 (for instance, \(6 + 1\), \(8 + 1\), \(10 + 1\), and so on).

**Exercises:** Add.

a) \(4 + 3\)  
b) \(5 + 2\)  
c) \(6 + 3\)  
d) \(7 + 2\)  
e) \(12 + 4\)  
f) \(17 + 3\)  
g) \(12 + 6\)

**Answers:** a) 7, b) 7, c) 9, d) 9, e) 16, f) 20, g) 18

**ACTIVITY**

**Catch.** You will need a ball or paper object that students can catch. Explain that students are to add 1 to the number you throw them and say the answer as they throw the ball back to you. Throw the ball to a student while saying a number. The student catches the ball and repeats the number. The student then throws the ball back to you and says the next number, i.e., after adding 1. Allow all students to have a turn. For other rounds, you could ask students to add 2, and then 3. Keeping the numbers small allows students to add using their fingers, if necessary.

For students who are comfortable counting past 20, “throw” them larger numbers, but continue to have the class add small numbers so that students can add using their fingers if necessary. Examples: \(21 + 3\), \(14 + 2\), \(21 + 4\).

**Correcting mistakes.** Model incorrect ways of counting on, such as counting more quickly or more slowly than you hold up your fingers (e.g., hold up two fingers while adding 3 or vice versa), skipping or repeating numbers, and saying some numbers in the wrong order. Challenge students to tell you what you are doing wrong each time. Then ask volunteers to add by counting on: \(7 + 3\), \(6 + 5\), \(8 + 3\), \(9 + 6\), \(7 + 7\), \(10 + 5\).

For extra practice, use **BLM Adding to Make a Picture.** (the picture shows a maple leaf)

**Counting objects when some are hidden.** Have a pencil case ready with five pencils in it. Tell students that you have five pencils in your pencil case (hold it up). Then show students four pencils outside the pencil case. How many pencils do you have altogether? Count on as a class to add: Hold up the pencil case and say 5; then hold up each pencil outside the case and say, one at a time, 6, 7, 8, 9. Write on the board:

\[5 + 4 = 9\]
Verify this by removing the five pencils from the case and counting all the pencils together. Repeat with various examples. Emphasize that as long as we know how many pencils are in the pencil case, we don’t have to count them; we can add by counting on.

**Adding by counting on is similar to adding with a hundreds chart.** Point out that to add \(5 + 3\), coloring square 5 only is similar to saying five with your fist closed; and circling the next three numbers is similar to saying 6, 7, 8 while raising three fingers, one at a time.

Students who finish the questions in the AP Book early can complete **BLM Apples.** (2. 17, 3. 14, 4. 16, 5. 18, 6. 20)

**Extensions**

1. **Add by counting on.**
   - a) \(2 + 3 + 1\)
   - b) \(4 + 3 + 1\)
   - c) \(5 + 4 + 1\)
   - d) \(6 + 3 + 2\)
   - e) \(14 + 3 + 1\)

   **Answers:** a) 6, b) 8, c) 10, d) 11, e) 18

   (MP.4)

2. **Use counters to act out the story. Pretend the counters are people.**
   - a) At a summer camp, there are 6 people in line to play chess and 3 more people in line to play checkers than chess. How many people are in line to play checkers?
   - b) At recess, there are 8 children playing baseball and 2 fewer children playing soccer than baseball. How many children are playing soccer?

   **Answers:** a) 9 people are in line to play checkers, b) 6 children are playing soccer
Goals
Students will discover that adding by counting on is easier when you start from the bigger number because you need to count on fewer numbers.

PRIOR KNOWLEDGE REQUIRED
Can add by counting on
Knows that numbers can be added in any order \(3 + 5 = 5 + 3\)

MATERIALS
10 circles drawn on a long sheet of paper (see details below)
paper domino (see details below)
2 lidless cardboard boxes (one foot long)
two-color connecting cubes

Comparing \(8 + 2\) and \(2 + 8\). Have a volunteer solve \(8 + 2\), and then challenge another volunteer to solve \(2 + 8\). What do students notice about the answers? (The answers are the same) Why did that happen? (we added the same numbers in two ways) Draw the following on a long sheet of thick paper and stick it to the board:

\[
\begin{array}{ccccccccc}
\bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc \\
\end{array}
\]

Write “\(2 + 8\)” below the sheet and verify together that there are two shaded circles and eight white circles. Solve the problem by counting the white circles, starting at 3:

\[
\begin{array}{cccccccc}
3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc \\
\end{array}
\]

Then write the answer:

\[
2 + 8 = 10
\]

Turn the sheet around:

\[
\begin{array}{ccccccccc}
\bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc \\
\end{array}
\]

Write “\(8 + 2\)” and point out that there are still eight white circles and two shaded circles. Solve the problem by counting the shaded circles continuing on from 8. ASK: How do I know to start counting at 9? (9 comes right after 8) How many numbers do I count after 8? (2) How do you know? (because there are two shaded circles) Have a volunteer show the counting on the board. ASK: How does \(8 + 2\) compare to \(2 + 8\)? (the answers are the same) Why did that happen? PROMPT: Did we change the total number of circles by turning the sheet around? (no) What did we change? (we changed the number we counted first—the 2 or the 8)
Order doesn’t matter in addition (another model). Repeat the above with a paper domino:

```
2 + 7 = 9
7 + 2 = 9
```

Demonstrate counting on from each number and emphasize what changes and what stays the same.

**Review counting on to count a collection of objects.** Place one lidless box on a table with the open part facing the students. Count five cubes into the box so that students can see you counting. Place four cubes on the table beside the box. SAY: There are five cubes in the box. Invite a volunteer to count all of the cubes and say the total. Repeat this exercise with different volunteers, keeping the five cubes in the box and changing the number of cubes outside the box. If students don’t count on from 5, PROMPT: Do we need to count the cubes in the box each time? What number can we count on from to find the total? (5)

**Counting on from the larger number is faster.** Tell students that you are going to play a game to see how quickly they can count some cubes. Put 14 red connecting cubes in one box and 2 blue connecting cubes in the other box. As you place the cubes, let the students see that you are counting, but don’t let them see how many you counted. Turn the boxes toward the class so everyone can see the cubes. SAY: I need a volunteer to find out how many cubes there are altogether. I’ll give you a head start. I can tell you how many cubes are in either of the boxes. You can choose one of the boxes, and I will tell you how many cubes are in it, so you can count on from there. Which box do you choose?

- If the student chooses the box with 14 cubes, congratulate the student for finding the total so quickly.
- If the student chooses the box with 2 cubes, congratulate the student for counting so many numbers. Ask students to count again from the other number, and then ASK: Which is faster? (counting on two numbers from 14)

Repeat the game, always placing *more* cubes in one box and *fewer* cubes in the other. After you have played the game several times, ASK: Can you find the total faster by counting on from the larger number or the smaller number? (the larger number) To make the game more exciting you might give students five-second time limits, which you can measure on a stop watch.

Make a chain with 15 red cubes and 3 blue cubes. SAY: I want a volunteer to add the number of red and blue cubes by counting on. I will tell you how many of one color there are. As with the separated blocks, students should see that it is easier to add the cubes in the chain by counting on from the greater number.
Choosing which number to count on from. Write on the board:

\[ 2 + 9 = \quad 9 + 2 = \]

ASK: Will these problems have the same answer? (yes) How do you know? (they are adding the same numbers) Which problem is easier to solve? PROMPT: How would I solve 2 + 9? How many numbers would I count? What number would I start at? (count nine numbers starting at 3) Demonstrate doing so. How would I solve 9 + 2? (count two numbers starting at 10) Demonstrate doing so. ASK: what is easier—to count nine numbers or to count two numbers? (counting two numbers) Which would be faster? (counting two numbers) Emphasize that when mathematicians see two problems that they know have the same answer, they can be smart and pick the easier one to do.

Write many addition problems on the board. (Examples: \( 3 + 7, 8 + 4, 2 + 10, 1 + 9, 7 + 2, 5 + 1, 9 + 2, 8 + 3 \)) Point to the first number in each problem and ASK: Is this number the bigger number? Is it less work to add (for example) \( 3 + 7 \) or \( 7 + 3 \)? Verify each student’s prediction by trying both ways.

Challenge volunteers to add more numbers both ways and to decide which they find easier. Example: \( 6 + 3 \) or \( 3 + 6 \)? At first, give volunteers the numbers to count from and the number of blanks:

\[
6 \quad \_ \quad \_ \\
3 \quad \_ \quad \_ \quad \_ \quad \_ \quad \_
\]

Then have volunteers do this themselves, and discuss how they know how many blanks to draw. (start at the first number and draw the second number of blanks or vice versa) Have students do similar questions individually in their notebooks. Examples: Which is easier, \( 3 + 8 \) or \( 8 + 3 \)?, \( 9 + 1 \) or \( 1 + 9 \)?, \( 14 + 2 \) or \( 2 + 14 \)?

**Bonus:** Which addition is easier, \( 23 + 4 \) or \( 4 + 23 \)?

**Answer:** \( 23 + 4 \)

ASK: Which is easier—to count on starting from the bigger number or the smaller number? (the bigger number) Why do you think that is? (there are fewer numbers to count when adding the smaller number)

### Extensions

1. Write the following letters and the point value for each one on the board:

   A 1 point
   B 3 points
   C 2 points
   D 2 points
   E 1 point
   H 3 points
   P 3 points
   T 1 point
Ask students to write words and score their words by adding the number of points they get for each letter. As a warm up, you might show students how to make words with higher scores. For instance you could make the word “BET” and ask students which letter they might change to get a better score. (change the T to a D)

If this exercise is too complex, give simpler challenges. For example, SAY: How many words can you make that end in “AT” using the letters on the board?

(MP5) 2. a) Add 8 + 5 using a picture, counters, counting on, or a chart.
    b) Explain to a partner what tool you used and how you used it.
    c) Explain to a partner why you picked the tool you did.

Answers: a) 13, b) sample explanations:
    • I used a chart and counters. I placed 8 counters on the first 8 squares and then 5 more of a different color. The last number covered was 13.
    • I used a chart. I shaded the first 8 numbers and then circled the next 5. The last number circled was 13.
    • I used a chart. I shaded the 8th square. I found it easily because it has an 8 in it. Then I circled the next 5 squares. The last number circled was 13.
    c) sample explanations:
    • I drew a picture because it helped me see the 8 and 5 objects.
    • I used a chart because it does the counting for me.
    • I started at 8 and counted 5 more on my fingers, because that way I didn’t have to use other materials.

NOTE: In parts b) and c), encourage partners to ask questions to understand and challenge each other’s choice of tools and strategies (MP5)—see p. A-43 for sample sentence and question stems.

Whole-class follow-up: Compare counting on to using a chart by shading only the 8th square. Present both solutions and ASK: How are these two strategies the same? (shading the 8th square is like saying “8,” and circling the next 5 numbers is like saying the next 5 numbers) Which way seems easiest to you? (answers may vary)
Snowman

How many buttons in all?

Find the total in 6 different ways.

How many buttons in all?

Find the total in 6 different ways.
Adding a Number to 10

☐ Use the chart to add.

1. Use the chart to add.
   
   10 + 4 = __14__

2. Use the chart to add.
   
   10 + 7 = ___

3. Use the chart to add.
   
   10 + 3 = ___

4. Use the chart to add.
   
   10 + 6 = ___

☐ Add without the chart.

5. 10 + 5

6. 10 + 9

7. 10 + 2

8. 10 + 8

9. 10 + 7
Addition and Order

☐ Shade the square showing the last number.
☐ Circle the other number of squares.
☐ Add.

1. 5 + 2 = __7__

2. 6 + 3 = __3__

3. 8 + 5 = ___

4. 4 + 7 = ___

5. 9 + 5 = ___
The Next Square

☐ Move the circle to the next square.

☐ Move the circle 2 squares.

☐ Move the circle 3 squares.

☐ Move the circle 4 squares.
Adding to Make a Picture

☐ Color each part the correct color.

- Red parts add to 5.
- Orange parts add to 6.
- Green parts add to 7.
- Yellow parts add to 8.

What picture do you see? ______________________________
Apples

There are 12 apples in the bag.

☐ Add by counting on.

1. $12 + 3 = \underline{15}$

2. $12 + 5 = \underline{\hspace{1cm}}$

3. $12 + 2 = \underline{\hspace{1cm}}$

4. $12 + 4 = \underline{\hspace{1cm}}$

5. $12 + 6 = \underline{\hspace{1cm}}$

6. $12 + 8 = \underline{\hspace{1cm}}$
Base Ten Materials
Hundreds Chart to 10
Hundreds Chart to 30

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