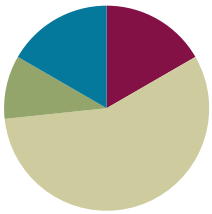
Lesson 9

Objective: Relate manipulative representations to the addition algorithm.

Suggested Lesson Structure



Application Problem	(6 minutes)
Fluency Practice	(10 minutes)
Concept Development	(34 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**

Application Problem (6 minutes)

The table to the right represents the halftime score at a basketball game.

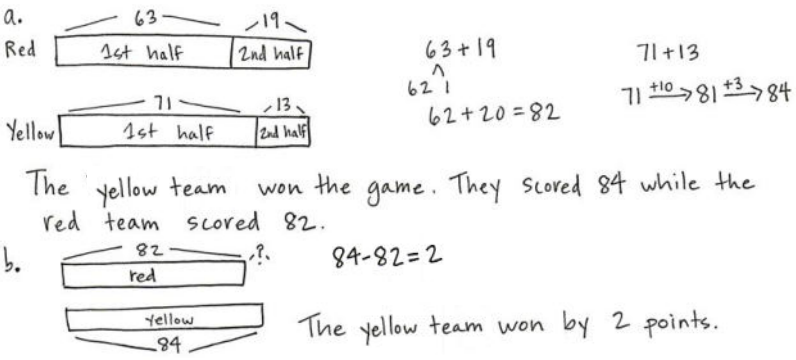
The red team scored 19 points in the second half.

The yellow team scored 13 points in the second half.

a. Who won the game?

b. By how much did that team win?

Team	Score
red team	63 points
yellow team	71 points



Note: This comparison problem requires multiple steps. The numbers chosen encourage students to practice simplifying and place value strategies. Invite students to reason about how they could have known who won without adding.

Fluency Practice (10 minutes)

- Making the Next Ten to Add **2.OA.2, 2.NBT.5** (2 minutes)
- Add Common Units **2.NBT.1, 2.NBT.7** (2 minutes)
- More Tens and Ones **2.NBT.5, 2.NBT.7** (6 minutes)

Making the Next Ten to Add (2 minutes)

Post on board:
9 + 4 = _____
/\
1 3

9 + 1 = 10
10 + 3 = ____

Note: This fluency activity reviews 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.

Continue with the following possible sequence: 19 + 4, 9 + 6, 19 + 6, 8 + 3, 18 + 3, 8 + 5, 18 + 5, 7 + 6, 27 + 6, 7 + 4, 17 + 4, 9 + 7, 19 + 7, 8 + 6, and 18 + 6.

Add Common Units (2 minutes)

Materials: (S) Personal white board

Note: Reviewing this mental math fluency activity prepares students for understanding the importance of the algorithm.

T: (Project 545.) Say the number in unit form.
S: 5 hundreds 4 tens 5 ones.
T: (Write 545 + 232 =____.) Say the addition sentence, and answer in unit form.
S: 5 hundreds 4 tens 5 ones + 2 hundreds 3 tens 2 ones = 7 hundreds 7 tens 7 ones.
T: Write the addition sentence on your personal white board.
S: (Write 545 + 232 = 777.)

Repeat the process, and continue with the following possible sequence: 440 + 225, 603 + 303, 211 + 644, 670 + 330, and 671 + 321.

More Tens and Ones (6 minutes)

Note: Students review adding tens and ones to prepare for today's lesson.

T: What is 3 tens more than 6 tens?
S: 9 tens.
T: Give the number sentence in unit form.
S: 6 tens + 3 tens = 9 tens.
T: Give the number sentence in standard form.
S: 60 + 30 = 90.

T: What is 4 tens more than 6 tens? Give the answer in tens.
S: 10 tens.
T: Give the answer in hundreds.
S: 1 hundred.
T: Give the number sentence in standard form.
S: 60 + 40 = 100.

Continue with the following possible sequence: 4 tens more than 6 tens 3 ones, 5 tens more than 5 tens, 5 tens more than 6 tens, 5 tens more than 6 tens 4 ones, 2 tens more than 8 tens, and 3 tens more than 8 tens.

Concept Development (34 minutes)

Materials: (T) Place value disks (9 hundreds, 18 tens, 18 ones), personal white board (S) Place value disks (9 hundreds, 18 tens, 18 ones), unlabeled hundreds place value chart (Lesson 1 Template 2), personal white board

Note: This lesson is designed to provide students with practice relating manipulative representations to vertical form. As students show proficiency, allow them to move on to the Problem Set. The first problem is intended for guided practice; the second problem is still guided but with less teacher support. Adjust delivery of instruction to best fit student needs.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

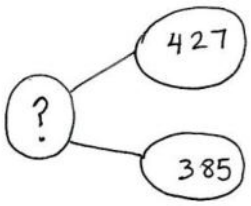
For students working above grade level, incorporate error analysis into the lesson. Distribute a premade, half-page extension with an incorrect problem (e.g., 679 + 284 = 863). Tell students that this is the *Math ER*! They must put on their doctor's jackets and diagnose the sick problem. On each slip of paper, ask the following two questions:

- What makes this problem *sick*?
- What steps should the doctor take to cure the problem?

Problem 1: 427 + 385

Distribute place value disks. Students can use their desks as place value charts to model the problems below, perhaps by dividing their desks into three columns with masking tape.

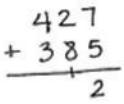
T: (Write 427 + 385 in vertical form on the board. Next to the problem, draw a number bond showing two parts: 427 and 385.)



T: Let's solve this mentally. Where do we begin?
S: Add the hundreds (400 + 300 = 700), then add the tens (20 + 80 = 100), and then add the ones (7 + 5 = 12). Then, add them together. 700 + 100 + 12 = 812. → Break the second part into hundreds, tens, and ones. 427 + 300 = 727, 727 + 80 = 807, and then 807 + 5 = 812.
T: That might not be the easiest way for all of us. Is there another way we can solve?
S: Use place value disks. → Make a math drawing. → Solve with vertical form.
T: Use place value language to tell your partner how to show this problem using place value disks.

S: Show 4 hundred disks, 2 ten disks, and 7 one disks; then, show 3 hundred disks, 8 tens, and 5 ones. → Show both parts so you can add them together. → Make sure you put the place value disks in the right part of your chart. For example, 7 ones and 5 ones go in the ones column to match the vertical form.

T: Let's all show the problem. (Model counting out place value disks as students do the same.)



T: What should we do first to solve?

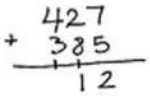
S: Add the ones.

T: 7 ones + 5 ones?

S: 12 ones!

T: What do we do when we have 10 of a unit, like 10 ones?

S: Change 10 ones for 1 ten. → Take off the 10 ones disks and put 1 ten disk. → Rename the 10 ones as a new unit of ten.



T: Yes! Let's do that together. (Model changing 10 ones for 1 ten.) Don't forget to show your action in vertical form. (Circulate as students show the change on the vertical form using new groups below. Because students are writing the number 12, they will write the tens digit first.)

S: (Write the tens digit.)

MP.8 T: What do we do next?

S: Add the tens. → Add 2 tens + 8 tens + 1 ten. → Add the tens, but don't forget the new ten that we wrote on the line.

T: Let's add 2 tens, 8 tens, and 1 ten. How many tens altogether?

S: 11 tens.

T: What's next?

S: Bundle to make a new unit, a hundred! → Change 10 tens for 1 hundred. → Take away the 10 tens disks and put a hundred disk.

T: Yes, let's compose a new hundred! Remember to show the change on the vertical form. (Change 10 tens for 1 hundred, and show the change using new groups below as students do the same.)

T: Are we ready to add the hundreds?

S: Yes!

T: What is 4 hundreds + 3 hundreds + 1 hundred?

S: 8 hundreds!

T: Let's record that. (Write 8 in the hundreds place as students do the same.) If 427 and 385 are the parts, what is the whole?

S: 812.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

As students move toward independent practice, highlight critical vocabulary so they can ask themselves questions as they solve:

- Do I have enough *ones* or *tens* to *bundle*? (More abstractly, we can ask, "Can I *compose* a new *unit*?")
- Where do I record the new *ten* or *hundred*?
- How do we show this change using vertical form?

These questions will prepare students to work independently through the Problem Set and to meaningfully contribute during the Debrief.

Problem 2: 672 + 249

T: Write 672 + 249 vertically, and whisper-count as you show it with place value disks on your place value chart. (Circulate as students count out place value disks and write the problem vertically.)

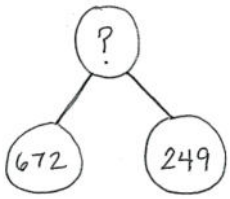
T: Are we finding a part or the whole?

S: The whole.

T: What are the parts?

S: 672 and 249.

T: (Draw a number bond on the board to show the two parts and the missing whole.) Can we solve this mentally?



S: 600 + 200 + 70 + 40 + 2 + 9 equals 800 + 110 + 11, which equals 921. → 672 plus 200 is 872, plus 40 is 912, plus 9 more is 921.

T: That might not be the easiest way for all of us. Let's try that with place value disks, a place value chart, and the vertical form.

T: What is the first step?

S: Add the ones. → Add 2 ones + 9 ones, which is 11 ones.

T: What do you do next? Discuss with your partner.

S: Make a ten! → Change 10 ones for 1 ten, and record it in new groups below. → Compose a ten, and then you'll have 1 one leftover.

T: Okay, show me with your place value disks, and record it on the vertical form. (Circulate as students work, and check for understanding.)

T: Turn and talk: What is our next step?

S: Move on to the tens. → Add the tens, and don't forget the new one! → Add 7 tens + 4 tens + 1 ten.

T: You've got it! Show me and record it! (Circulate and check for understanding.)

T: What is our next step?

S: Add the hundreds. → Add 6 hundreds + 2 hundreds + 1 hundred.

T: One last time, show me and record it! (Circulate and check for understanding.)

T: So, what is 672 + 249?

S: 921.

If students show proficiency after the two problems above, allow them to move on to the Problem Set. Otherwise, continue with the following suggested sequence: 671 + 149, 348 + 464, and 563 + 247.

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)

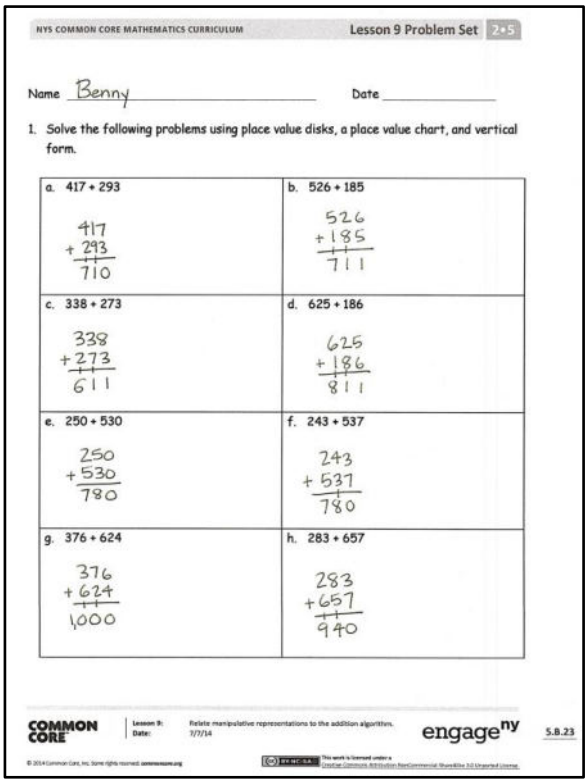
Lesson Objective: Relate manipulative representations to the addition algorithm.

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 Student 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.

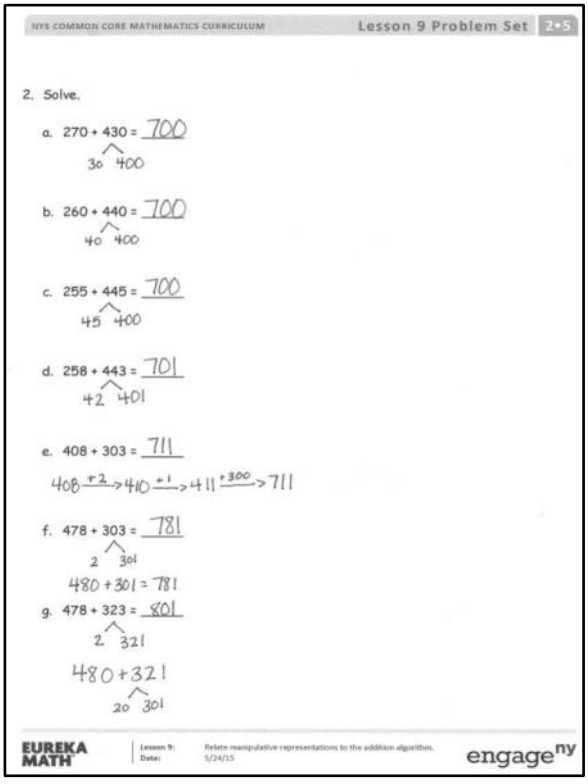
- Did you solve any problems on the first page mentally or with a simplifying strategy? Which ones? Explain your thinking.
- Explain to your partner how you used manipulatives to set up Problem 1(a). How did you change your place value disks to show Problem 1(b)? What actions did you take to solve?
- For Problem 1(c), 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 1(e). Did you need to compose a ten or hundred for Problem 1(f)? Why not? Why was the total the same for both problems?
- In Problem 2, which problems were you able to solve mentally? Did you use manipulatives to solve any of these problems? Why or why not?
- Use place value language and explain to your partner how you solved Problem 2(a–d) mentally. Or explain how your place value disks and vertical form changed as you worked through the problems.


NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 9 Problem Set 2•5

Name Benny Date

1. Solve the following problems using place value disks, a place value chart, and vertical form.

a. 417 + 293 = 710
b. 526 + 185 = 711
c. 338 + 273 = 611
d. 625 + 186 = 811
e. 250 + 530 = 780
f. 243 + 537 = 780
g. 376 + 624 = 1,000
h. 283 + 657 = 940


NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 9 Problem Set 2•5

2. Solve.

a. 270 + 430 = 700 (30, 400)
b. 260 + 440 = 700 (40, 400)
c. 255 + 445 = 700 (45, 400)
d. 258 + 443 = 701 (42, 401)
e. 408 + 303 = 711 (408 +2→ 410 +1→ 411 +300→ 711)
f. 478 + 303 = 781 (2, 301; 480 + 301 = 781)
g. 478 + 323 = 801 (2, 321; 480 + 321; 20, 301)

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.

Name _____ Date _____

1. Solve the following problems using place value disks, a place value chart, and vertical form.

a. 417 + 293	b. 526 + 185
c. 338 + 273	d. 625 + 186
e. 250 + 530	f. 243 + 537
g. 376 + 624	h. 283 + 657

2. Solve.

a. 270 + 430 = _____

b. 260 + 440 = _____

c. 255 + 445 = _____

d. 258 + 443 = _____

e. 408 + 303 = _____

f. 478 + 303 = _____

g. 478 + 323 = _____

Name _____ Date _____

Solve the following problems using your place value chart, place value disks, and vertical form. Bundle a ten or hundred, when necessary.

1. 375 + 197

2. 184 + 338

Name _____ Date _____

1. Solve the following problems using a place value chart, place value disks, and vertical form. Bundle a ten or hundred, when necessary.

a. 205 + 345	b. 365 + 406
c. 446 + 334	d. 466 + 226
e. 537 + 243	f. 358 + 443
g. 753 + 157	h. 663 + 258

2. Solve.

a. 180 + 420 = _____

b. 190 + 430 = _____

c. 364 + 236 = _____

d. 275 + 435 = _____

e. 404 + 206 = _____

f. 440 + 260 = _____

g. 444 + 266 = _____