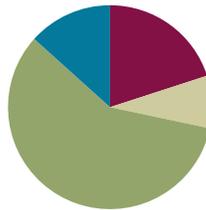


Lesson 13

Objective: Use place value understanding to decompose to smaller units once using the standard subtraction algorithm and apply the algorithm to solve word problems using tape diagrams.

Suggested Lesson Structure

■ Fluency Practice	(12 minutes)
■ Application Problems	(5 minutes)
■ Concept Development	(35 minutes)
■ Student Debrief	(8 minutes)
Total Time	(60 minutes)



Fluency Practice (12 minutes)

- Find the Sum **4.NBT.4** (6 minutes)
- Subtract Common Units **4.NBT.3** (6 minutes)

Find the Sum (6 minutes)

Materials: (S) Personal white boards

Note: Reviewing this mental math fluency will prepare students for understanding the importance of the addition algorithm.

T: (Write $316 + 473 = \underline{\quad}$.) Write an addition sentence horizontally or vertically.

S: (Students write $316 + 473 = 789$.)

Repeat process and sequence for $6,065 + 3,731$; $13,806 + 4,393$; $5,928 + 124$; and $629 + 296 + 962$.

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 707.) Say the number in unit form.

S: 7 hundreds 7 ones.

T: (Write $707 - 202 = \underline{\quad}$.) Say the subtraction sentence and answer in unit form.

S: 7 hundreds 7 ones – 2 hundreds 2 ones = 5 hundreds 5 ones.

T: Write the subtraction sentence on your personal white boards.

S: (Students write $707 - 202 = 505$.)

Repeat process and sequence for $909 - 404$; $9,009 - 5,005$; $11,011 - 4,004$; and $13,013 - 8,008$.

Application Problems (5 minutes)

Jennifer texted 5,849 times in January. In February, she texted 1,263 more times than she did in January. What was the total number of texts that Jennifer sent in the two months combined? Explain how you would check the reasonableness of your answer.

January $\overbrace{\hspace{2cm}}^{5,849}$

February $\underbrace{\hspace{2cm}}_{1,263}$ } A

$$\begin{array}{r} 5,849 \\ + 1,263 \\ \hline 7,112 \end{array} \quad \begin{array}{r} 7,112 \\ + 5,849 \\ \hline 12,961 \end{array}$$

January $\approx 6,000$

February $\approx 7,000$ } 13,000

My answer is reasonable because if I round January and February, I get 13,000. 12,961 rounded is 13,000, so my answer is reasonable.

Jennifer sent 12,961 texts in January and February.

Note: This Application Problem reviews content from the previous lesson of a multi-step addition problem.

Concept Development (35 minutes)

Materials: (T) Place value chart, disks (S) Personal white board, place value charts, disks

Problem 1

Use a place value chart and disks to model subtracting alongside the algorithm, regrouping 1 hundred into 10 tens.

T: Write $4,259 - 2,171$ vertically on the board.

T: Say this problem with me.

T: Watch as I draw a tape diagram to represent this problem. What is the whole?

S: 4,259.

T: We record that above the bar as the whole, and record the known part of 2,171 under the bar. Your turn to draw a tape diagram. Mark the unknown part of the diagram as A.

T: Model the whole, 4,259, using number disks on your place value chart.

T: Do we model the part we are subtracting?

S: No, just the total.

MP.6

T: First let's determine if we are ready to subtract. We look across the top number, from right to left, to see if there are enough units in each column. Is the number of units in the top number of the ones column greater than or equal to that of the bottom number? (Point to the 9 and the 1 in the equation.)

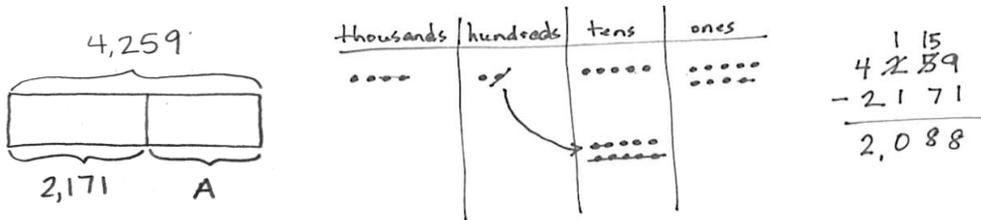
S: Yes, 9 is greater than 1.

T: That means we are ready to subtract in the ones column. Is the number of units in the top number of the tens column greater than or equal to that of the bottom number?

S: No, 5 is less than 7.

T: (Show regrouping on the place value chart.) We ungroup or unbundle 1 unit from the hundreds to make 10 tens. I now have 1 hundred and 15 tens. Let's represent the change in writing. (Cross out the hundreds and tens to rename them in the equation.)

T: Show the change with your disks. (Students cross off 1 hundred and change it for 10 tens as shown below.)



T: Is the number of units in the top number of the hundreds column greater than or equal to that of the bottom number?

S: Yes, 1 is equal to 1.

T: Is the number of units in the top number of the thousands column greater than or equal to that of the bottom number?

S: Yes, 4 is greater than 2.

T: Are we ready to subtract?

S: Yes, we are ready to subtract!

T: (Point to the algorithm.) 9 ones minus 1 one?

S: 8 ones. (Remove 1 disk; write an 8 in the algorithm.)

T: 15 tens minus 7 tens?

S: 8 tens. (Remove 7 disks; write an 8 in the algorithm.)

Continue subtracting through the hundreds and thousands.

T: Say the complete number sentence. (Read $4,259 - 2,171 = 2,088$ together.)

T: The value of the A in our tape diagram is 2,088. We write $A = 2,088$ below the tape diagram. What can be added to 2,171 to result in the sum of 4,259?

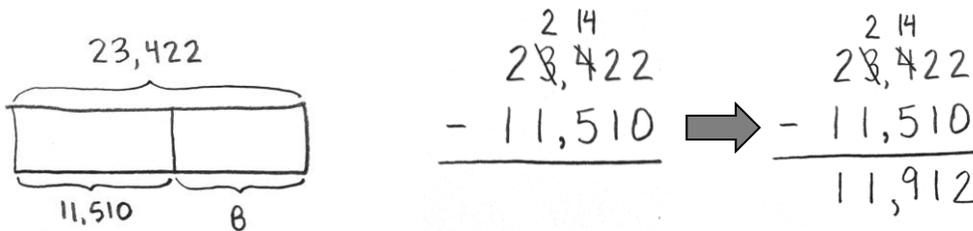
S: 2,088.

Repeat the process for $6,314 - 3,133$.

Problem 2

Regroup 1 thousand into 10 hundreds using the subtraction algorithm.

- T: (Write $23,422 - 11,510$ vertically on the board.)
- T: With your partner, read this problem and draw a tape diagram. Label the whole, the known part, and use B for the missing part.
- T: Record the problem on your board.
- T: Look across the numbers. Are we ready to subtract?
- S: No!
- T: Is the number of units in the top number of the ones column greater than or equal to that of the bottom number? (Point to the 2 and the 0.)
- S: Yes, 2 is greater than 0.
- T: Is the number of units in the top number of the tens column greater than or equal to that of the bottom number?
- S: Yes, 2 is greater than 1.
- T: Is the number of units in the top number of the hundreds column greater than or equal to that of the bottom number?
- S: No, 4 is less than 5.
- T: Tell your partner how to make enough hundreds to subtract.
- S: I unbundle 1 unit from the thousands to make 10 hundreds. I now have 2 thousands and 14 hundreds. → I change 1 thousand for 10 hundreds. → I rename 34 hundreds as 20 hundreds and 14 hundreds.
- T: Watch as I record that. Now your turn.



Repeat questioning for the thousands and ten thousands column.

- T: Are we ready to subtract?
- S: Yes, we're ready to subtract!
- T: 2 ones minus 0 ones?
- S: 2 ones. (Record 2 in the ones column.)

Continue subtracting across the number from right to left always naming the units.

- T: Tell your partner what must be added to 11,510 to result in the sum of 23,422?
- T: How do we check a subtraction problem?
- S: We can add the difference to the part we knew at first to see if the sum we get equals the whole.

- T: Please add 11,912 and 11,510. What sum do you get?
 S: 23,422, so our answer to the subtraction problem is correct.
 T: Label your tape diagram as $B = 11,912$.

Repeat for $29,014 - 7,503$.

Problem 3

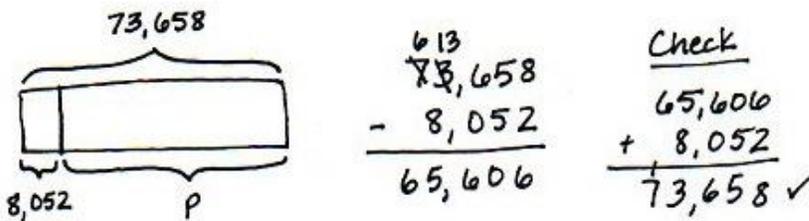
Solve a subtraction application problem, regrouping 1 ten thousand into 10 thousands.

The paper mill produced 73,658 boxes of paper. 8,052 boxes have been sold. How many boxes remain?

- T: Draw a tape diagram to represent the boxes of paper produced and sold. I'll use the letter P to represent the paper. Record the subtraction problem. Check to see you lined up all units.
 T: Am I ready to subtract?
 S: No!
 T: Work with your partner, asking if the top unit is greater than or equal to the bottom unit. Regroup when needed. Then ask, "Am I ready to subtract?" before you begin subtracting. (Students work.)
 S: $73,658 - 8,052 = 65,606$.
 T: The value of P is 65,606. Tell your partner how many boxes remain in a complete sentence. (65,606 boxes remain.)
 T: To check and see if your answer is correct, add the two values of the bar, 8,052 and your answer of 65,606 to see if the sum is the value of the bar, 73,658.
 S: (Students add to find their sum matches the value of the bar.)

 **NOTES ON MULTIPLE MEANS OF ENGAGEMENT:**

Ask students to look at the numbers in the subtraction problem and to think about how the numbers are related. Ask them how they might use their discovery to check to see if their answer is correct. Use the tape diagram to show if 8,052 was subtracted from 73,658 to find the unknown part of the tape diagram, the value of the unknown, 65,606, can be added to the known part of the tape diagram, 8,052. If the sum is the value of the whole tape diagram, the answer is correct.



Repeat with: The library has 50,819 books. 4,506 are checked out. How many books remain in the library?

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 (8 minutes)

Lesson Objective: Use place value understanding to decompose to smaller units once using the standard subtraction algorithm, and apply the algorithm to solve word problems using tape diagrams.

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.

- Compare your answers for Problem 1(a) and 1(b). How is your answer the same, when the problem was different?
- Why do the days and months matter when solving Problem 3?
- Compare Problems 1(a) and 1(f). Does having a larger whole in 1(a) give an answer greater to or less than 1(f)?
- In Problem 4, you used subtraction. But I can say, "I can add 52,411 to 15,614 to result in the sum of 68,025." How can we add and subtract using the same problem?
- Why do we ask, "Are we ready to subtract?"

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 13 Worksheet 4•1

Name Tuck Date _____

1. Use the standard algorithm to solve the following subtraction problems.

a.
$$\begin{array}{r} 7,525 \\ -3,502 \\ \hline 4,023 \end{array}$$

b.
$$\begin{array}{r} 17,525 \\ -13,502 \\ \hline 4,023 \end{array}$$

c.
$$\begin{array}{r} 6,625 \\ -4,417 \\ \hline 2,208 \end{array}$$

d.
$$\begin{array}{r} 4,625 \\ -435 \\ \hline 4,190 \end{array}$$

e.
$$\begin{array}{r} 6,800 \\ -470 \\ \hline 6,030 \end{array}$$

f.
$$\begin{array}{r} 5,025 \\ -3,502 \\ \hline 2,523 \end{array}$$

g.
$$\begin{array}{r} 2,640 \\ -1,430 \\ \hline 9,010 \end{array}$$

h.
$$\begin{array}{r} 4,815 \\ -2,481 \\ \hline 2,271 \end{array}$$

i.
$$\begin{array}{r} 2,925 \\ -1,270 \\ \hline 9,220 \end{array}$$

Directions: Draw a tape diagram to represent each problem. Use numbers to solve and write your answer as a statement. Check your answers.

2. Michelle's class collected 13,875 pennies for the victims of Hurricane Sandy. Martin's class also collected some pennies. In all, they collected 25,884 pennies. How many pennies did Martin's class collect?

$$\begin{array}{r} 25,884 \\ -13,875 \\ \hline 12,009 \end{array}$$
 Martin's class collected 12,009 pennies.

COMMON CORE Lesson 13: Use place value understanding to decompose to smaller units once using the standard subtraction algorithm, and apply the algorithm to solve word problems using tape diagrams. Date: 4/20/13 engage^{ny} 1.E.7

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 13 Worksheet 4•1

3. Artist Michelangelo was born on March 6, 1475. Author Mem Fox was born on March 6, 1946. How many years after Michelangelo was born was Mem born?

$$\begin{array}{r} 1946 \\ -1475 \\ \hline 471 \end{array}$$
 Mem was born 471 years after Michelangelo.

4. During the month of March, 68,025 pounds of king crab were caught. If 15,614 pounds were caught in the first week of March, how many pounds were caught in the rest of the month?

$$\begin{array}{r} 68,025 \\ -15,614 \\ \hline 52,411 \end{array}$$
 52,411 pounds of king crab were caught in the rest of the month.

5. James bought a used car. After driving exactly 9,050 miles, the odometer read 118,064 miles. What was the odometer reading when James bought the car?

$$\begin{array}{r} 118,064 \\ -9,050 \\ \hline 109,014 \end{array}$$
 The odometer read 109,014 when James bought the car.

COMMON CORE Lesson 13: Use place value understanding to decompose to smaller units once using the standard subtraction algorithm, and apply the algorithm to solve word problems using tape diagrams. Date: 4/20/13 engage^{ny} 1.E.8

- When we get our top number ready to subtract do we have to then subtract in order from right to left?
- When do we need to unbundle to subtract?
- What are the benefits to modeling subtraction using number disks?
- Why must the units line up when subtracting? How might our answer change if the numbers were not aligned?
- What happens when there is a zero in the top number of a subtraction problem?
- What happens when there is a zero in the bottom number of a subtraction problem?
- When you are completing word problems, how can you tell that you need to subtract?

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 the standard algorithm to solve the following subtraction problems.

a.
$$\begin{array}{r} 7,525 \\ -3,502 \\ \hline \end{array}$$

b.
$$\begin{array}{r} 17,525 \\ -13,502 \\ \hline \end{array}$$

c.
$$\begin{array}{r} 6,625 \\ -4,417 \\ \hline \end{array}$$

d.
$$\begin{array}{r} 4,625 \\ -435 \\ \hline \end{array}$$

e.
$$\begin{array}{r} 6,500 \\ -470 \\ \hline \end{array}$$

f.
$$\begin{array}{r} 6,025 \\ -3,502 \\ \hline \end{array}$$

g.
$$\begin{array}{r} 23,640 \\ -14,630 \\ \hline \end{array}$$

h.
$$\begin{array}{r} 431,925 \\ -204,815 \\ \hline \end{array}$$

i.
$$\begin{array}{r} 219,925 \\ -121,705 \\ \hline \end{array}$$

Directions: Draw a tape diagram to represent each problem. Use numbers to solve and write your answer as a statement. Check your answers.

2. What number must be added to 13,875 to result in a sum of 25,884?

Name _____

Date _____

1. a.
$$\begin{array}{r} 8,512 \\ -2,501 \\ \hline \end{array}$$

b.
$$\begin{array}{r} 18,042 \\ -4,122 \\ \hline \end{array}$$

c.
$$\begin{array}{r} 8,052 \\ -1,561 \\ \hline \end{array}$$

2. Draw a tape diagram to represent the following problem. Use numbers to solve and write your answer as a statement.

- a. What number must be added to 1,575 to result in a sum of 8,625?

Name _____

Date _____

1. Use the standard algorithm to solve the following subtraction problems.

$$\begin{array}{r} a. \quad 2,431 \\ - 341 \\ \hline \end{array}$$

$$\begin{array}{r} b. \quad 422,431 \\ - 14,321 \\ \hline \end{array}$$

$$\begin{array}{r} c. \quad 422,431 \\ - 92,420 \\ \hline \end{array}$$

$$\begin{array}{r} d. \quad 422,431 \\ - 392,420 \\ \hline \end{array}$$

$$\begin{array}{r} e. \quad 982,430 \\ - 92,300 \\ \hline \end{array}$$

$$\begin{array}{r} f. \quad 243,089 \\ - 137,079 \\ \hline \end{array}$$

$$g. \quad 2,431 - 920 =$$

$$h. \quad 892,431 - 520,800 =$$

2. What number must be added to 14,056 to result in a sum of 32,713?

