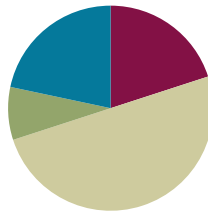


Lesson 19

Objective: Create and solve multi-step word problems from given tape diagrams and equations.

Suggested Lesson Structure

■ Fluency Practice	(12 minutes)
■ Application Problem	(5 minutes)
■ Concept Development	(30 minutes)
■ Student Debrief	(13 minutes)
Total Time	(60 minutes)



Fluency Practice (12 minutes)

- Rename Units to Subtract **4.NBT.4** (5 minutes)
- Add Up to the Next Unit **4.NBT.4** (3 minutes)
- Convert Units **4.MD.1** (4 minutes)

Rename Units to Subtract (5 minutes)

Note: This fluency activity supports further practice of decomposing a larger unit to make smaller units in order to subtract.

T: (Write: 1 ten – 6 ones.) Am I ready to subtract?

S: No.

T: Rename 1 ten as 10 ones. Say the entire number sentence.

S: 10 ones minus 6 ones is 4 ones.

Repeat with 2 tens – 6 ones, 2 tens – 1 ten 6 ones, 1 hundred – 6 tens, 2 hundreds – 4 tens, 3 hundreds – 1 hundred 4 tens, 5 thousands – 3 hundreds, 5 thousands – 3 thousands 3 hundreds, 2 ten thousands – 3 hundreds.

Add Up to the Next Unit (3 minutes)

Note: This fluency activity strengthens students' ability to make the next unit, a skill used when using the arrow way to add or subtract. This activity also anticipates students' use of the arrow way to solve mixed measurement unit addition and subtraction in Module 2.

T: (Write 8.) How many more to make 10?

S: 2.

T: (Write 80.) How many more to make 100?

S: 20.

T: (Write 84.) How many more to make 100?

S: 16.

Repeat with the following numbers to make 1000: 200, 250, 450, 475, 600, 680, 700, 720, 800, 805, 855, and 945.

Convert Units (4 minutes)

Note: Reviewing unit conversions that were learned in third grade helps prepare the students to solve problems with centimeters and meters in Topic A of Module 2.

Materials: (S) Personal white board

T: (Write 1 m = ____ cm.) How many centimeters are in a meter?

S: 1 m = 100 cm.

Repeat process for 2 m, 3 m, 8 m, 8 m 50 cm, 7 m 50 cm, and 4 m 25 cm.

T: (Write 100 cm = ____ m.) Say the answer.

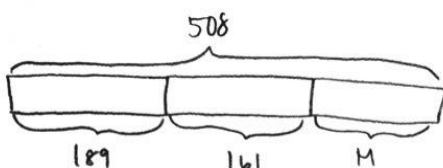
S: 100 cm = 1 m.

T: (Write 150 cm = ____ m ____ cm.) Say the answer.

S: 150 cm = 1 m 50 cm. Repeat process for 250 cm, 350 cm, 950 cm, and 725 cm.

Application Problem (5 minutes)

For Jordan to get to his grandparents' house, he has to travel through Albany and Plattsburgh. From Jordan's house to Albany is 189 miles. From Albany to Plattsburgh is 161 miles. If the total distance of the trip is 508 miles, how far from Plattsburgh do Jordan's grandparents live?



$$\begin{array}{r} 189 \\ + 161 \\ \hline 350 \end{array}$$

$$\begin{array}{r} 508 \\ - 350 \\ \hline 158 \end{array}$$

Jordan's grandparents live 158 miles from Plattsburgh.

Note: This problem reviews two-step problems from the previous lessons.

Concept Development (30 minutes)

Materials: (S) Problem Set

Suggested Delivery of Instruction for Lesson 19's Word Problems.

1. Draw the labeled tape diagram on the board, and give the students the context. Have them write a story problem based on the tape diagram.

Have two pairs of students, who you think can be successful with writing a problem, work at the board while the others work independently or in pairs at their seats. Review the following questions before beginning the first problem.

- What story makes sense with the diagram?
- What question will I ask in my word problem?

As students work, circulate. Reiterate the questions above.

After 2 minutes, have the two pairs of students share their stories.

For about 1 minute, have the demonstrating students receive and respond to feedback and questions from their peers.

2. Calculate to solve and write a statement.

Give everyone 2 minutes to exchange stories, calculate, and make a statement of the answer.

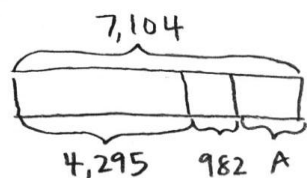
3. Assess the solution for reasonableness.

Give students 1–2 minutes to assess and explain the reasonableness of their solutions.

Note: In Lessons 17–19, the Problem Set will be comprised of the word problems from the lesson and is, therefore, to be used during the lesson itself.

Problem 1: Create and solve a simple two-step word problem from the tape diagram below.

Suggested context: People at a football game.

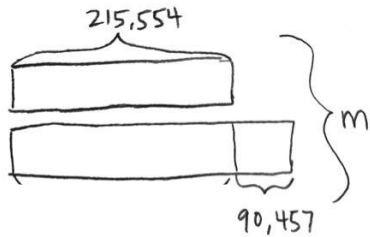


**NOTES ON
MULTIPLE MEANS
OF REPRESENTATION:**

Students who are English language learners may find it difficult to create their own problem. Work together with a small group of students to explain what the tape diagram is showing. Work with the students to write information into the tape diagram. Discuss what is known and unknown. Together, build a question based on the discussion.

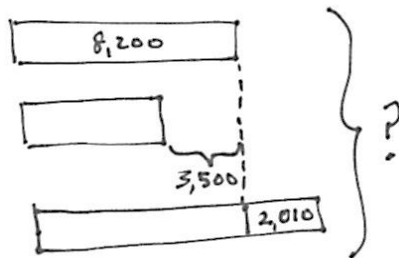
Problem 2: Create and solve a two-step addition word problem from the tape diagram below.

Suggested context: Cost of two houses.



Problem 3: Create and solve a three-step word problem involving addition and subtraction from the tape diagram below.

Suggested context: Weight in kilograms of three different whales.



**NOTES ON
MULTIPLE MEANS
OF ACTION
AND REPRESENTATION:**

Students working below grade level may struggle with the task of creating their own problems. These students may benefit from working together in a partnership with another student. First, encourage them to design a tape diagram showing the known parts, the unknown part, and the whole. Second, encourage them to create a word problem based on the diagram.

Problem 4: Students use equations to model and solve multi-step word problems.

Display the equation $5,233 + 3,094 + k = 12,946$.

- T: Draw a tape diagram that models this equation.
- T: Compare with your partner. Then create a word problem that uses the numbers from the equation. Remember to first create a context. Then write a statement about the total and a question about the unknown. Finally, tell the rest of the information.

Students work independently. Students can share problems in partners to solve or select word problems to solve as a class.

Problem Set

Please note that the Problem Set in Topic F is comprised of the lesson's problems as stated at the introduction of the lesson.

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 (13 minutes)

Lesson Objective: Create and solve multi-step word problems from given tape diagrams and equations.

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.

- How does a tape diagram help when solving a problem?
- What is the hardest part about creating a context for a word problem?
- To write a word problem, what must you know?
- There are many different contexts for Problem 2, but everyone found the same answer. How is that possible?
- What have you learned about yourself as a mathematician over the past module?
- How can you use this new understanding of addition, subtraction, and solving word problems in the future?

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 19: Problem Set 4•1

Name Jack Date _____

Directions: Using the diagrams below, create your own word problem. Solve for the value of the variable.

1.

There were 7,104 people who attended a football game. 4,295 were men, 982 were children, and the rest were women. How many women attended the football game?

$7,104 - 4,295 - 982 = A$
 $7,104 - 5,277 = 1,827$
 $A = 1,827$
 1,827 women attended the game.

2.

House A costs \$215,554. House B costs \$90,457 more than House A. How much do both houses cost together?

$\$215,554 + \$90,457 = \$306,011$
 $\$306,011 + \$215,554 = \$521,565$
 $M = \$521,565$
 Both houses cost \$521,565.

COMMON CORE Lesson 19: Create and solve multi-step word problems from given tape diagrams and equations. Date: 5/7/13 11:03 AM engage^{ny} 1.F.7

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 19: Problem Set 4•1

3.

Whale A weighs 8,200 kilograms. Whale B weighs 3,500 ~~more~~ less kilograms than Whale A. Whale C weighs 2,010 more kilograms than Whale A. How many kilograms do all 3 whales weigh together?

$8,200 + 3,500 + 2,010 = ?$
 $8,200 + 5,510 = 13,710$
 $13,710 + 2,010 = 15,720$
 All 3 whales weigh 15,720 kilograms.

4.

A survey of 24,854 people showed 17,729 prefer orange juice, 3,731 prefer grape juice, and the rest prefer apple juice in the morning. How many people prefer apple juice?

$24,854 - 17,729 - 3,731 = A$
 $24,854 - 21,460 = 3,394$
 $A = 3,394$
 3,394 people prefer apple juice in the morning.

COMMON CORE Lesson 19: Create and solve multi-step word problems from given tape diagrams and equations. Date: 5/7/13 11:03 AM engage^{ny} 1.F.8

Exit Ticket (3 minutes)

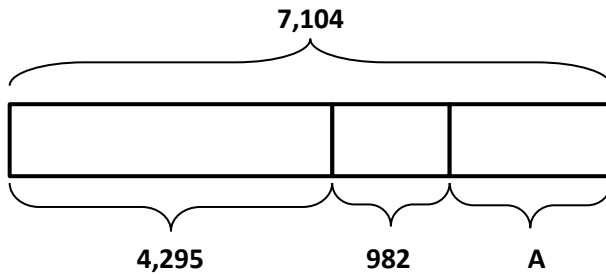
After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name _____

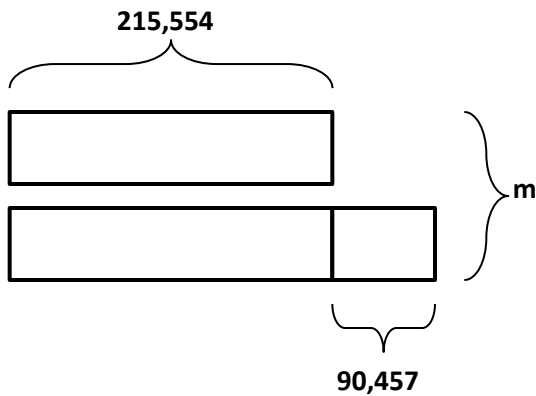
Date _____

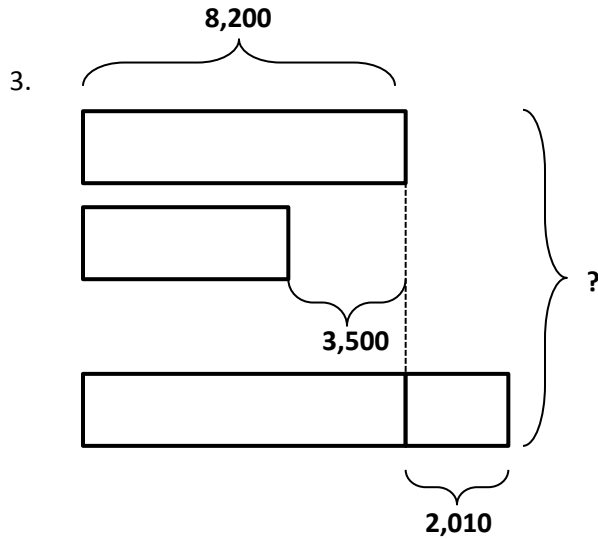
Using the diagrams below, create your own word problem. Solve for the value of the variable.

1.



2.





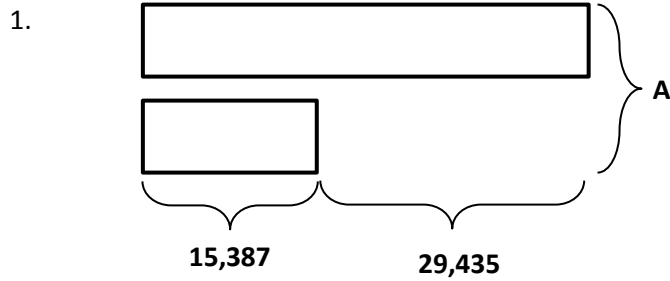
4. Draw a tape diagram to model the following equation. Create a word problem. Solve for the value of the variable.

$$26,854 = 17,729 + 3,731 + A$$

Name _____

Date _____

Using the diagram below, create your own word problem. Solve for the value of the variable.



2. Using the equation below, draw a tape diagram and create your own word problem. Solve for the value of the variable.

$$248,798 = 113,205 + A + 99,937$$

Name _____

Date _____

Using the diagrams below, create your own word problem. Solve for the value of the variable.

1. At the local botanical gardens, there are _____

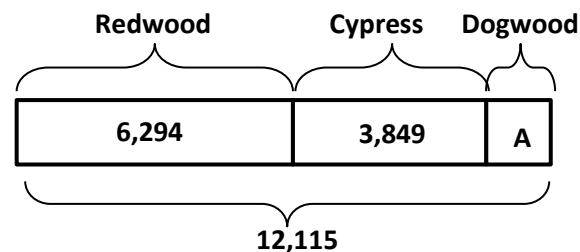
Redwoods and _____ Cypress trees.

There are a total of _____ Redwood,

Cypress, and Dogwood trees.

How many _____

_____?



2. There are 65,302 _____

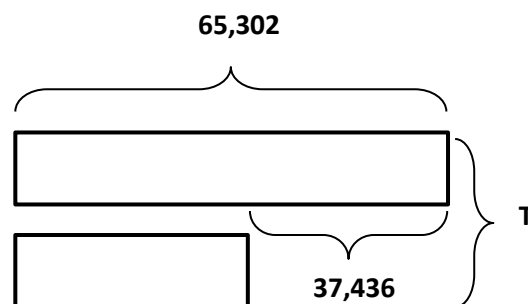
_____.

There are 37,436 fewer _____

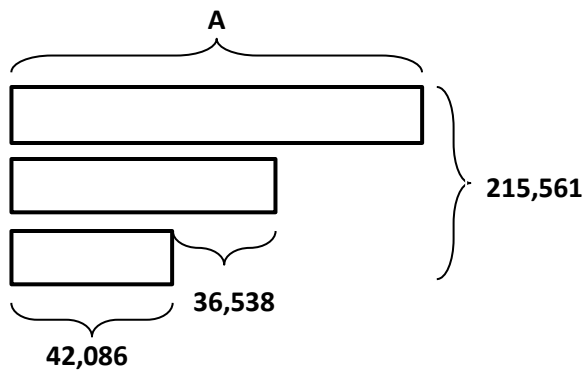
_____.

How many _____

_____?



3. Use the following tape diagram to create a word problem. Solve for the value of the variable.



4. Draw a tape diagram to model the following equation. Create a word problem. Solve for the value of the variable.

$$27,894 + A + 6,892 = 40,392$$