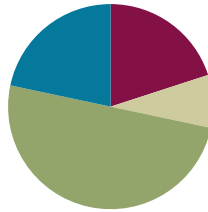# Lesson 19

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

Related Topics: <u>More Lesson Plans for the Common Core Math</u>

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)

- Convert Meters to Kilometers and Meters **4.MD.1**   (8 minutes)
- Convert Units **4.MD.1**   (4 minutes)

Sprint: Convert Meters to Kilometers and Meters (8 minutes)

Materials: (S) Convert Meters to Kilometers and Meters Sprint

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

Convert Units (4 minutes)

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

Materials: (S) Personal white boards

    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 m = 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.

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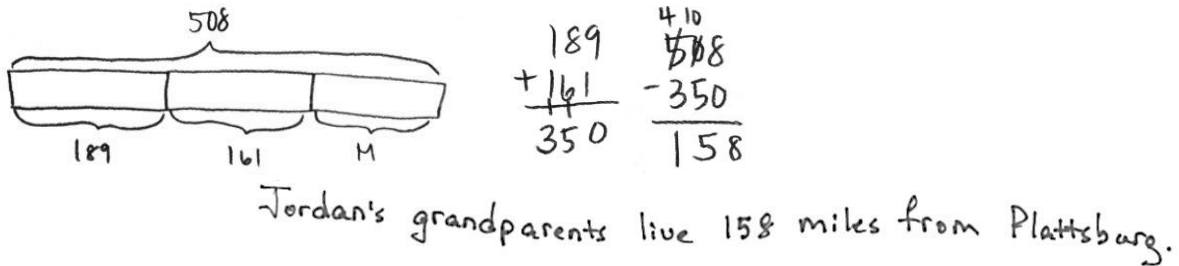
Note: This problem reviews two-step problems from the previous lessons.

Concept Development (30 minutes)

Materials: (S) Problem Set

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

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 solution.

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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

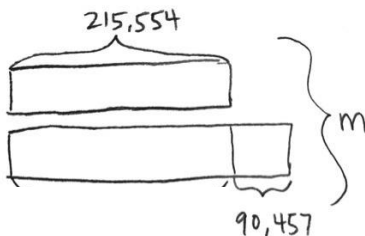Create and solve a simple two-step word problem from the tape diagram below.

Suggested context: People at a football game.

7,104

4,295   982   A
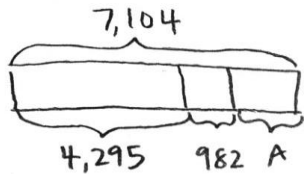
Problem 2

Create and solve a two-step addition word problem from the tape diagram below.
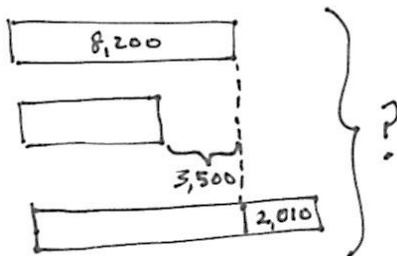
Suggested context: Cost of two houses.

215,554

m

90,457

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.

8,200

3,500

2,010

?

MP.2

> **NOTES ON MULTIPLE MEANS OF REPRESENTATION:**
>
> Students who are ELLs 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.

> **NOTES ON MULTIPLE MEANS OF ACTION AND REPRESENTATION:**
>
> Students 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, write a statement about the total and a question about the unknown. Then you can 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 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 to solve 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?

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.

A

Write in kilometers and meters.   # Correct _____

1	2,000 m =	km	m	23	3,800 m =	km	m
2	3,000 m =	km	m	24	4,770 m =	km	m
3	4,000 m =	km	m	25	4,807 m =	km	m
4	9,000 m =	km	m	26	5,065 m =	km	m
5	6,000 m =	km	m	27	5,040 m =	km	m
6	1,000 m =	km	m	28	6,007 m =	km	m
7	8,000 m =	km	m	29	2,003 m =	km	m
8	5,000 m =	km	m	30	1,090 m =	km	m
9	7,000 m =	km	m	31	1,055 m =	km	m
10	6,100 m =	km	m	32	9,404 m =	km	m
11	6,110 m =	km	m	33	9,330 m =	km	m
12	6,101 m =	km	m	34	3,400 m =	km	m
13	6,010 m =	km	m	35	4,000 m + 2,000 m =	km	m
14	6,011 m =	km	m	36	5,000 m + 3,000 m =	km	m
15	6,001 m =	km	m	37	4,000 m + 4,000 m =	km	m
16	8,002 m =	km	m	38	8 x 7,000 m =	km	m
17	8,020 m =	km	m	39	49,000 m ÷ 7 =	km	m
18	8,200 m =	km	m	40	16,000 m x 5 =	km	m
19	8,022 m =	km	m	41	63,000 m ÷ 7 =	km	m
20	8,220 m =	km	m	42	17 x 4,000 m =	km	m
21	8,222 m =	km	m	43	13,000 m x 5 =	km	m
22	7,256 m =	km	m	44	84,000 m ÷ 7 =	km	m

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Lesson 19:   Create and solve multi-step word problems from given tape
diagrams and equations.
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B

Improvement _____   # Correct _____

Write in kilometers and meters.

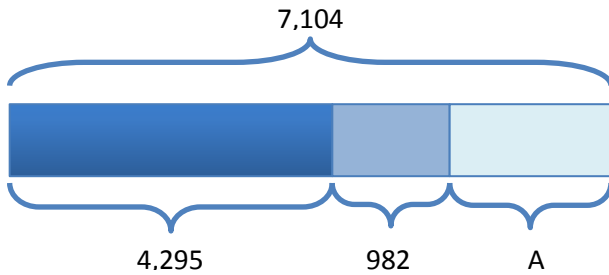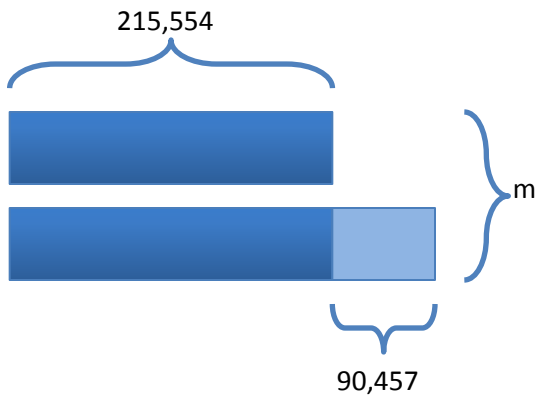| #		km	m	#		km	m
1	1,000 m =	km	m	23	2,700 m =	km	m
2	2,000 m =	km	m	24	3,660 m =	km	m
3	3,000 m =	km	m	25	3,706 m =	km	m
4	8,000 m =	km	m	26	4,095 m =	km	m
5	6,000 m =	km	m	27	4,030 m =	km	m
6	9,000 m =	km	m	28	5,006 m =	km	m
7	4,000 m =	km	m	29	3,004 m =	km	m
8	7,000 m =	km	m	30	2,010 m =	km	m
9	5,000 m =	km	m	31	2,075 m =	km	m
10	5,100 m =	km	m	32	1,504 m =	km	m
11	5,110 m =	km	m	33	1,440 m =	km	m
12	5,101 m =	km	m	34	4,500 m =	km	m
13	5,010 m =	km	m	35	3,000 m + 2,000 m =	km	m
14	5,011 m =	km	m	36	4,000 m + 3,000 m =	km	m
15	5,001 m =	km	m	37	5,000 m + 4,000 m =	km	m
16	7,002 m =	km	m	38	9 x 8,000 m =	km	m
17	7,020 m =	km	m	39	64,000 m ÷ 8 =	km	m
18	7,200 m =	km	m	40	17,000 m x 5 =	km	m
19	7,022 m =	km	m	41	54,000 m ÷ 6 =	km	m
20	7,220 m =	km	m	42	18,000 m x 4 =	km	m
21	7,222 m =	km	m	43	14 x 5,000 m =	km	m
22	4,378 m =	km	m	44	96,000 m ÷ 8 =	km	m

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Lesson 19: Create and solve multi-step word problems from given tape diagrams and equations.

Date: 3/25/14

COMMON CORE

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Name _____ Date _____

Directions: Using the diagrams below, create your own word problem and solve for the missing variable.

1.

7,104

4,295   982   A

2.

215,554

m

90,457

COMMON CORE

Lesson 19: Create and solve multi-step word problems from given tape diagrams and equations.

Date: 3/25/14

engage^{ny}

1.F.28

3.

8,200

3,500

?

2,010
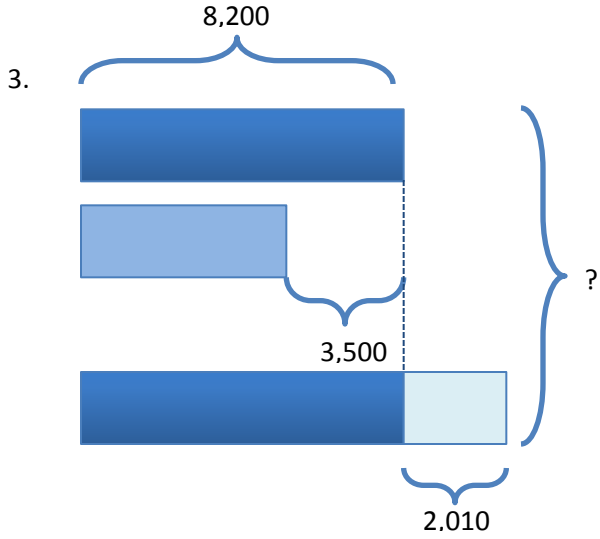
Draw a tape diagram to model the following equation. Write a word problem and solve for the unknown.

4.   26,854 = 17,729 + 3,731 + A

COMMON CORE

Lesson 19:   Create and solve multi-step word problems from given tape
diagrams and equations.

Date: 3/25/14
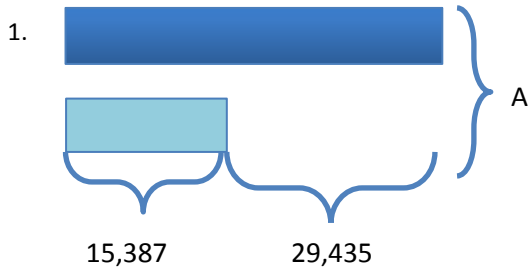
engage^{ny}

1.F.29

Name _____   Date _____

Directions: Using the diagram below, create your own word problem and solve for the missing variable.

1.

A

15,387   29,435

Directions: Using the equation below, draw a tape diagram and create your own word problem.
Solve for the missing variable.

2.   248,798 = 113,205 + A + 99,937

COMMON CORE

Lesson 19:   Create and solve multi-step word problems from given tape
Date: diagrams and equations.
               3/25/14

engage^{ny}

1.F.30

Name _____   Date _____

Directions: Using the diagrams below, create your own word problem to solve for the missing variable.

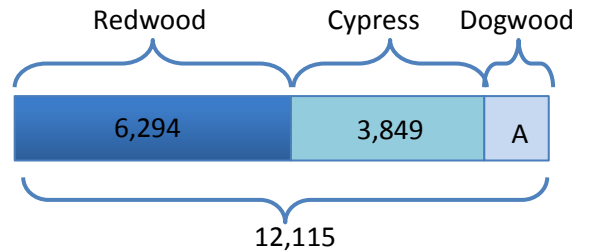1.   At the local botanical gardens, there are _____

       Redwoods and _____ Cypress trees.

       There are a total of _____ Redwood,

       Cypress, and Dogwood trees.
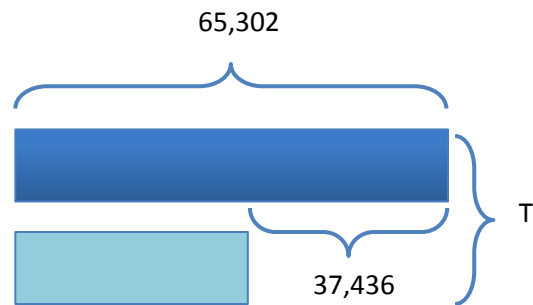
       How many _____

       _____

       _____?

	Redwood	Cypress	Dogwood

Redwood: 6,294   Cypress: 3,849   Dogwood: A

Total: 12,115

2.   There are 65,302 _____

       _____.

       There are 37,436 fewer _____
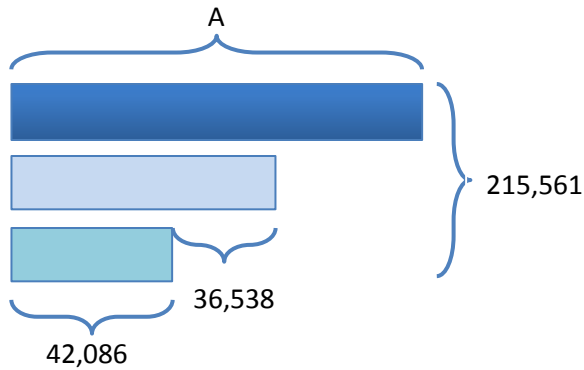
       _____.

       How many _____

       _____?

65,302

37,436   T

3. Use the following tape diagram to create a word problem to solve for the missing variable.

4. Use the equation 27,894 + A + 6,892 = 40,392 to model a tape diagram, create a word problem, and solve.