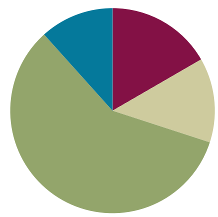
Lesson 17

Objective: Solve additive compare word problems modeled with tape diagrams.

Related Topics: More Lesson Plans for the Common Core Math

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Application Problems	(8 minutes)
Concept Development	(35 minutes)
Student Debrief	(7 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

- Change Place Value **4.NBT.2** (5 minutes)
- Convert Units **4.MD.1** (5 minutes)

Change Place Value (5 minutes)

Materials: (S) Personal white board, place value chart to the millions

Note: Reviewing this fluency will help students work towards mastery of using place value skills to add and subtract different units.

T: (Project place value chart to the millions place. Write 4 hundred thousands, 6 ten thousands, 3 thousands, 2 hundreds, 6 tens, 5 ones.) On your personal white boards, write the number.

S: (Students do so.)

T: Show 100 more.

S: (Students write 463,365.)

Possible further sequence: 10,000 less, 100,000 more, 1 less, 10 more.

T: (Write 400 + 90 + 3 =____). On your place value chart, write the number.

Possible further sequence: 7,000 + 300 + 80 + 5; 20,000 + 700,000 + 5 + 80; 30,000 + 600,000 + 3 + 20.

Convert Units (5 minutes)

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

T: (Write 1 km = ___ m.) How many meters are in a kilometer?

S: 1 km = 1,000 m.

Repeat process for 2 km, 3 km, 8 km, 8 km 500 m, 7 km 500 m, and 4 km 250 m.

T: (Write 1,000 m = ___ km.) Say the answer.

S: 1,000 m = 1 km.

T: (Write 1,500 m = ___ km ___ m.) Say the answer.

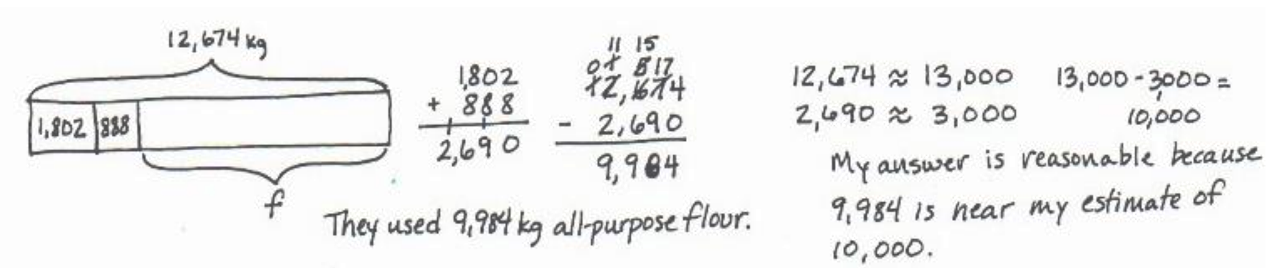
S: 1,500 m = 1 km 500 m.

Repeat process for 2,500 m, 3,500 m, 9,500 m, and 7,250 m.

Application Problem (8 minutes)

A bakery used 12,674 kg of flour. Of that, 1,802 kg was whole wheat and 888 kg was rice flour. The rest was all-purpose flour. How much all-purpose flour did they use? Solve and check the reasonableness of your answer.

Note: This problem leads well into today's lesson and bridges as it goes back into the work from Lesson 16.



Concept Development (35 minutes)

Materials: (S) Problem Set

Suggested Delivery of Instruction for Solving Topic F's Word Problems

1. Model the problem.

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

- Can you draw something?
- What can you draw?
- What conclusions can you make from your drawing?

As students work, circulate. Reiterate the questions above.

After 2 minutes, have the two pairs of students share *only* their labeled diagrams.

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 finish work on that question, sharing their work, and thinking with a peer. All should then write their equations and statements of the answer.

3. Assess the solution for reasonableness.

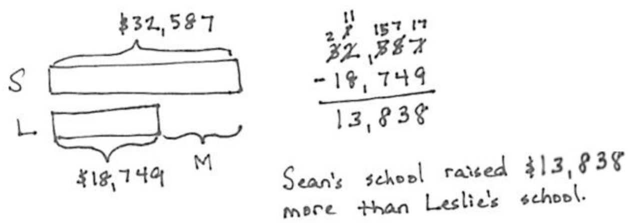
Give students 1–2 minutes to assess and explain the reasonableness of their solution.

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

Problem 1

Solve a single-step word problems using how much more.

Sean's school raised $32,587. Leslie's school raised $18,749. How much more money did Sean's school raise?



NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

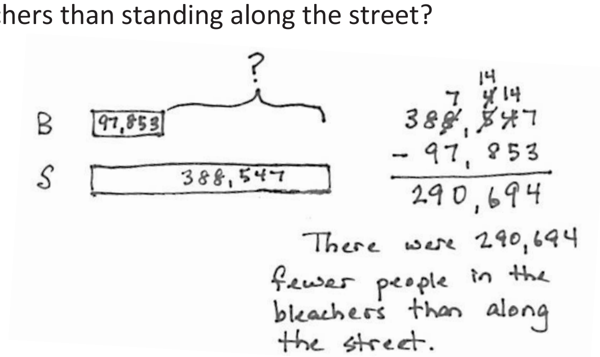
Students working below grade level may continue to need additional support in adding numbers together using place value charts or disks.

Support them in realizing that though the question is asking, "How much more?" we can see from the tape diagram that the unknown is a missing part, therefore we subtract to find the answer.

Problem 2

Solve a single-step word problem using how many fewer.

At a parade, 97,853 people sat in bleachers. 388,547 people stood along the street. How many fewer people were in the bleachers than standing along the street?



NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Challenge students to think about how reasonableness can be associated with rounding. If the actual answer does not round to the estimate, does it mean that the answer is not reasonable?

Ask students to explain their thinking. (For example, 376 – 134 = 242. Rounding to the nearest hundred would result with an estimate of 400 – 100 = 300. The actual answer of 242 rounds to 200, not 300.)

Circulate and support students to realize that the unknown is a missing part. Encourage them to write a statement using the word *fewer* when talking about separate things. For example, I have *fewer* apples than you do but *less* juice.

Problem 3

Solve a two-step problem using how much more.

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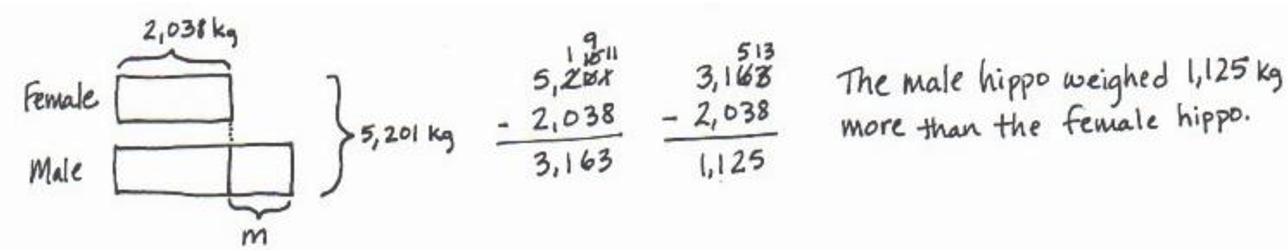
A pair of hippos weighed 5,201 kg together. The female weighed 2,038 kg. How much more did the male weigh than the female?

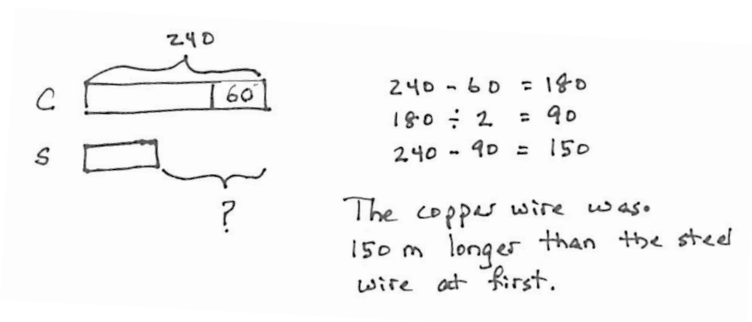


Many students will want to draw this as a single bar showing the combined weight to start. That works. However, the second step will most likely require a new double bar to compare the weights of the male and female. If no one comes up with the model pictured, you can show it quickly. Students generally do not choose to draw a bracket with the known total to the side until they are very familiar with two-step comparison models. However, be aware that students will have modeled this problem type since Grade 2.

Problem 4

Solve a three-step problem using how much longer.

A copper wire was 240 m long. After 60 m was cut off, it was double the length of a steel wire. How much longer was the copper wire than the steel wire at first?



T: Read the problem, draw a model, write equations both to estimate and calculate precisely and write a statement. I'll give you 5 minutes.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

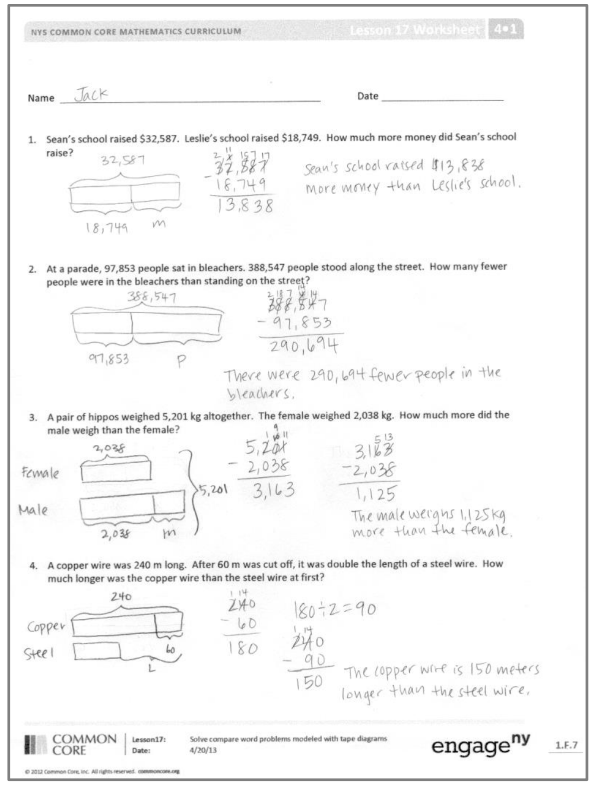
For students who may find Problem 4 challenging, remind them of the work done earlier in this module with multiples of 10. For example, 180 is ten times as much as 18. If 18 divided by 2 is 9, then 180 divided by 2 is 90.

Circulate, using the bulleted questions to guide students. Encourage the students when they get stuck to focus on what they can learn from their drawing:

- Show me the copper wire at first.
- Show me in your model what happened to the copper wire.
- Show me in your model what you know about the steel wire.

- What are you comparing? Where is that difference in your model?

Notice the number size is quite small here. The calculations are not the issue but rather the relationships. Students will eventually solve similar problems with larger numbers but begin here at a simple level numerically.



Problem Set

Please note that the Problem Sets in Topic F are 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 (7 minutes)

Lesson Objective: Solve additive compare word problems modeled with 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.

- How are your tape diagrams for Problem 1 and Problem 2 similar?
- How did your tape diagrams vary across all problems?
- How did drawing a double tape diagram instead of a single tape diagram in Problem 3 help to better visualize the problem?
- What was most challenging about drawing the tape diagram from Problem 4? What helped you to find the best diagram to solve the problem?
- What different ways are there to draw a tape diagram to solve comparative problems?
- What does the word compare mean?
- What phrases do you notice repeated through many of today's problems that help you to see the problem as a comparative problem?

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 ______________________

Directions: Model each problem using a tape diagram. Solve using numbers and words.

1. Sean's school raised $32,587. Leslie's school raised $18,749. How much more money did Sean's school raise?

2. At a parade, 97,853 people sat in bleachers and 388,547 people stood along the street. How many fewer people were in the bleachers than standing on the street?

3. A pair of hippos weighed 5,201 kg together. The female weighed 2,038 kg. How much more did the male weigh than the female?

4. A copper wire was 240 m long. After 60 m was cut off, it was double the length of a steel wire. How much longer was the copper wire than the steel wire at first?

Name ____ Date ____________________

Directions: Estimate, then solve the following problem modeling with a tape diagram.

1. A mixture of 2 chemicals measures 1,034 ml. It contains some of Chemical A and 755 ml of Chemical B. How much less of Chemical A than Chemical B was in the mixture?

Name ____ Date ______________________

1. Gavin has 1,094 toy building blocks. Avery has only 816 toy building blocks. How many more building blocks does Gavin have?

2. Container A and B hold 11,875 L of water altogether. Container B holds 2,391 L more than container A holds. How much water does Container A hold?

3. A piece of yellow yarn was 230 inches long. After 90 inches had been cut from it, the piece of yellow yarn was twice as long as a piece of blue yarn. How much longer than the blue yarn was the yellow yarn at first?