Lesson 5
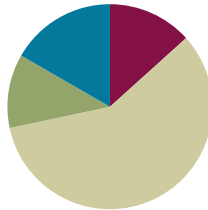
Objective: Develop estimation strategies by applying prior knowledge of length and using mental benchmarks.

Suggested Lesson Structure

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

Fluency Practice (8 minutes)

- Break Apart by Tens and Ones **2.NBT.1** (4 minutes)
- Take Out a Part **2.OA.2** (4 minutes)

Note: This fluency reviews place value understanding from Module 1 and helps develop skills needed for module 3.

Break Apart by Tens and Ones (4 minutes)

Materials: (S) Personal white boards

- T: If I say 64, you write 6 tens 4 ones.
- T: If I say 7 tens 2 ones, you write 72.
- T: Turn your board over when you've written your answer. When I say, "Show me," hold it up.
- T: 5 tens 2 ones. (Pause.) Show me.
- S: (Hold up boards showing 52.)
- T: 84. (Pause.) Show me.
- S: (Show 8 tens 4 ones.)

Continue with possible sequence: 7 tens 3 ones, 79, 8 tens 9 ones, 9 tens 9 ones, 10 tens 2 ones, 10 tens 4 ones, 104, 10 tens 8 ones, 11 tens, 11 tens 5 ones.

- T: Partner B, quiz Partner A for 1 minute.

Take Out a Part (4 minutes)

T: Let's take out 2 tens from each number.

T: I say 5 tens. You say, 2 tens + 3 tens = 5 tens.

T: 5 tens. Get ready. (Signal.)

S: 2 tens + 3 tens = 5 tens.

T: 7 tens. Get ready. (Signal.)

S: 2 tens + 5 tens = 7 tens.

T: Let's take out 20 from each number.

T: I say 50. You say, 20 + 30 = 50.

T: 50. Get ready. (Signal.)

S: 20 + 30 = 50.

T: 70. Get ready. (Signal.)

S: 20 + 50 = 70.

Continue with possible sequence: 83, 52, 97, 100, 105, 110, and 120.
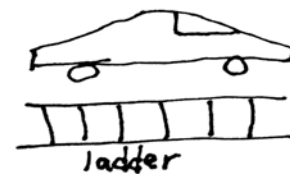
T: Now let's take out 40. If I say 60, you say 40 + 20 = 60.

T: 50. Wait for the signal (pause and signal).

S: 40 + 10 = 50.

Continue with possible sequence: 70, 75, 81, 87, etc.

Application Problem (7 minutes)

Jenna and Bobby are building a rope ladder for their treehouse. They would like the ladder to be about the length of a sports car. They want to use rope for the sides of the ladder and wooden rungs for the steps. Which measurement tools would you suggest that Jenna and Bobby use to measure the length of the rope and the length of the rungs for their ladder? Draw a picture and use words to explain your thinking.

Note: Today's problem asks students to choose the appropriate measurement tool by applying prior knowledge of length and making comparisons. Students work independently using personal boards and then compare their responses with a partner. The teacher listens in on conversations and invites a few students to share their responses with the whole class. The teacher may wish to return to this problem during the debrief segment to estimate the amount of rope needed to build the ladder.

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Concept Development (35 minutes)

Materials: (T) Meter stick displayed horizontally for student reference (S) 1 unsharpened brand new pencil and 1 centimeter cube per student, student-created ruler from Lesson 3, meter tape one per student

T: Put your pinky on your centimeter cube. Would you say it's about the same length as the centimeter cube?

S: Yes.

T: How could you use your pinky to estimate length?

S: I can tell how many times my pinky would fit into the space. → I can put my pinky down as many times as I can and then count.

T: Let's try that. Use your pinky to estimate, about how long do you think the eraser is? Turn to your neighbor and share your estimate.

S: About 6 centimeters.

T: Let's measure to see if your estimates are correct.

S: (Use student-created rulers to check estimates.)

T: The distance from the floor to the doorknob is about one meter (verify by modeling). How does this help you estimate the length of your desk?

S: My desk is about half the length from the floor to the doorknob. So it's about 50 centimeters long. → My desk is twice the length from the floor to the doorknob so I think it's about 2 meters long.

T: Let's measure to see which estimate is closer to the real measurement.

S: (Use meter tapes to measure their desks.)

T: Measure your pencil. How long is it?

S: About 20 centimeters.

T: Can that help you estimate the length of your math book? Estimate the length of your math book and then measure it with your centimeter ruler to see how close you got.

S: My math book is longer than the pencil, but not by much. → They are almost the same. → I think it's about 23 centimeters. → I think it's 30 centimeters.

T: Picture the meter stick in your mind. Estimate how many meters long the whiteboard is.

MP.2

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

During this lesson students will be learning multiple benchmark measurements. To help all students remember the benchmarks the teacher may use these techniques:

- Partner language with visuals by posting pictures of the benchmarks.
- Instruct students to create a reference chart to keep track of the benchmarks as they learn them. They can refer to this chart later as well.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Use a chant to help students understand the conversion from meters to centimeters. The teacher adds gestures to accompany the chant.

- T: When I say meter, you say 100 centimeters. (Open arms wide, about the length of a meter.)
- T: Meter! (Open arms wide.)
- S: 100 centimeters ! (Open arms wide.)

This conversion is meant to support students' estimations of the length of their desks.

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S: It looks like the board is a few meters long. → I can fit more than one meter stick along the length of the whiteboard. → I would say it is 2 meters long. → To me it's longer than 2 meters but shorter than 3 meters.

T: Let's check our estimates. (Call on a volunteer to measure the whiteboard for the class.)

T: Now look at this three-ring binder. What known measurement can we use to estimate the length?

S: It looks about the same as my ruler, so 30 centimeters.

MP.2

T: So let's check and see if it is 30 centimeters. (Student volunteer measures the three-ring binder.)

T: It is. Now that we know this is 30 centimeters what other lengths can we estimate with this information?

S: The length of my science book. → The length of the paper that goes inside the binder.

T: All these measurements we use to estimate length are called mental **benchmarks**. The pencil is 20 centimeters. Your pinky is 1 centimeter. The three-ring binder is 30 centimeters. And the length from the doorknob to the floor is 1 meter. You can use these benchmarks at any time by picturing them in your head to estimate the length of an object. Now use your mental benchmarks to estimate length on your worksheet. Check your estimates by measuring.

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 (10 minutes)

Lesson Objective: Develop estimation strategies by applying prior knowledge of length and using mental benchmarks.

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.

- Turn to your partner and compare your answers to Problems 1–5 in your Problem Set. Why is it possible to have different estimates? How can we check to see if our estimates are accurate?

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- How many mental **benchmarks** can you name? (Draw students' attention to Problem 6 in their Problem Set.   Chart student responses for future reference.)
- How do mental benchmarks help us? When is a good time to use them?
- (Return to today's application problem.) Look at Problem 6(c) on your worksheet. We said that the length of a car is about 4 meters. How can we use this information to estimate the amount of rope Jenna and Bobby will need to build their ladder? 1

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.

4. _____

a) Estimate: _10_ cm
b) Actual length: _8_ cm

5. _____

a) Estimate: _5_ cm
b) Actual length: _5_ cm

6. Circle the correct unit of measurement for each estimation.

a) The height of a door is about 2 (centimeters/meters) tall.
What benchmark did you use to estimate? meter stick

b) The length of a pen is about 10 (centimeters/meters) long.
What benchmark did you use to estimate? pencil

c) The length of a car is about 4 (centimeters/meters) long.
What benchmark did you use to estimate? meter stick

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Provide sufficient wait time to allow students to process the connection between mental benchmarks and length of objects.

- Teacher points to or holds visuals while speaking.

Ask students to explain how and why they chose a specific mental benchmark when estimating length.

COMMON CORE

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Name _____   Date _____

First estimate the length of each line in centimeters using mental benchmarks.
Then measure each line with a cm ruler to find the actual length.

1. _____

   a. Estimate: _____ cm
   b. Actual length: _____ cm

2. _____

   a. Estimate: _____ cm
   b. Actual length: _____ cm

3. _____

   a. Estimate: _____ cm
   b. Actual length: _____ cm

4. _____

   a. Estimate: _____ cm
   b. Actual length: _____ cm

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5.　　　　　_____

    a.　Estimate: _____ cm

    b.　Actual length: _____ cm

6. Circle the correct unit of measurement for each length estimation.

    a.　The height of a door is about 2 (centimeters/meters) tall.
       What benchmark did you use to estimate? _____

    b.　The length of a pen is about 10 (centimeters/meters) long.
       What benchmark did you use to estimate? _____

    c.　The length of a car is about 4 (centimeters/meters) long.
       What benchmark did you use to estimate? _____

    d.　The length of a bed is about 2 (centimeters/meters) long.
       What benchmark did you use to estimate? _____

    e.　The length of a dinner plate is about 20 (centimeters/meters) long.
       What benchmark did you use to estimate? _____

7.　Use an unsharpened pencil to estimate the length of 3 things in your desk.

    a.　_____ is about _____ cm long.

    b.　_____ is about _____ cm long.

    c.　_____ is about _____ cm long.

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Name _____   Date _____

1. Circle the most reasonable estimate for each object.
   a. Length of a push pin   1 cm or 1 m
   b. Length of classroom door   100 cm or 2 m
   c. Length of a pair of students scissors   17 cm or 42 cm

2. Estimate the length of your desk. (Remember that your pinky is about 1 cm.)

   My desk is about _____ cm long.

3. How does knowing that an unsharpened pencil is about 20 cm long help you estimate the length of your arm from your elbow to your wrist?

   _____

   _____

Name _____   Date _____

1. Name 5 things in your home that you would measure in meters.
   Estimate their length.

   *Remember the length from a doorknob to the floor is about 1 meter.

Item	Estimated Length
a.	
b.	
c.	
d.	
e.	

2. Choose the best length estimate for each object.

a. Whiteboard   3 m   or   45 cm

b. Banana   12 cm   or   20 cm

c. DVD   25 cm   or   17 cm

d. Pen   18 cm   or   1 m

e. Swimming pool   50m   or   150 cm

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3. The width of your pinky finger is about 1 cm.
   Measure the length of the lines using your pinky finger. Write your estimation.

a. Line A _____

   Line A is about _____cm long.

b. Line B _____

   Line B is about _____cm long.

c. Line C _____

   Line C is about _____cm long.

d. Line D _____

   Line D is about _____cm long.

e. Line E _____

   Line E is about _____cm long.