

**Purpose** In this session, students solve a problem that requires them to measure pieces of yarn with lengths of 11 centimeters and 4 inches. The purpose of this problem is to have students develop strategies for measuring length in inches and centimeters.

**Start**

**Connect to Prior Knowledge**

**Materials** For each student: 10 1-inch tiles or tiles cut from Activity Sheet *1-Inch Grid Paper*, inch ruler, 6-inch piece of yarn, 9-inch piece of ribbon

**Why** Support students' knowledge of inches as a standard unit of measure.

**How** Have students measure the length of pieces of yarn and ribbon with inch tiles.

Use the inch tiles to measure.

The piece of yarn is \_\_\_\_\_ inches long.

The piece of ribbon is \_\_\_\_\_ inches long.

**Solutions**

The piece of yarn is 6 inches long; The piece of ribbon is 9 inches long.

**Develop Language**

**Why** Clarify the meaning of the term *long*.

**How** Explain that when used in mathematical contexts, the term *long* refers to length, the longest side of an object. Have students measure a variety of objects and then use the sentence frames below to talk about how long each object is.

The \_\_\_\_\_ is \_\_\_\_\_ inches long.

The \_\_\_\_\_ is \_\_\_\_\_ centimeters long.

**TRY IT**

**Make Sense of the Problem**

To support students in making sense of the problem, have them identify that there are two pieces of yarn shown and that their lengths are different.

**Ask** *What do you know? What do you need to find?*

**Develop** Measuring in Inches and Centimeters

Read and try to solve the problem below.

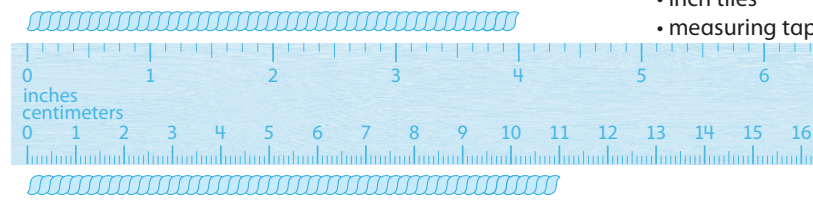
**Which piece of yarn is 11 centimeters long?  
Which piece of yarn is 4 inches long?**



**TRY IT**

**Possible student work:**

**Sample A**



The yellow piece of yarn is 11 centimeters long.

The blue piece of yarn is 4 inches long.

**Sample B**



I used the inch tile 4 times. The blue piece of yarn is 4 inches long.



I used a measuring tape.

The yellow piece of yarn is 11 centimeters long.

**Math Toolkit**

- inch ruler
- centimeter ruler
- inch tiles
- measuring tape

**DISCUSS IT**

**Ask your partner:** Do you agree with me? Why or why not?

**Tell your partner:** I agree with you about ... because ...

**DISCUSS IT**

**Support Partner Discussion**

Encourage students to use the terms *inches* and *centimeters* as they discuss their solutions.

Support as needed with questions such as:

- *What steps did you take to solve the problem?*
- *How was your strategy like your partner's? How was it different?*

**Common Misconception** Look for students who find the correct number of units when measuring but confuse inches and centimeters when recording the lengths.

**Select and Sequence Student Solutions**

One possible order for whole class discussion:

- using inch tiles and centimeter tiles to measure both pieces of yarn
- using a ruler labeled in both inches and centimeters to measure both pieces of yarn
- using an inch ruler to measure both pieces of yarn
- using a centimeter ruler to measure both pieces of yarn



### Support Whole Class Discussion

**Compare and connect** the number of units in each length with the measuring tools used to find each length.

**Ask** *Do the lengths have more centimeters or more inches? Why?*

**Listen for** The lengths have fewer inches than centimeters. Centimeters are smaller than inches, so it takes more of them to show the same length.

### MODEL ITS

**If no student presented these models,** connect them to the student models by pointing out the ways they each represent:

- the longer length of yarn as 11 centimeters
- the shorter length of yarn as 4 inches

**Ask** *Why is the left side of the pieces of yarn above the 0 mark on each of the rulers?*

**Listen for** The left side of the pieces of yarn are above the 0 marks so that the length starts at 0 inches or 0 centimeters. I can see what number the right side of the yarn lines up with on the ruler to know how many inches or centimeters long each piece of yarn is.

**For measuring the lengths with an inch ruler,** prompt students to connect the length of each piece of yarn with the measurement shown on the inch ruler.

- *How many inches long is the blue piece of yarn?*
- *How many inches long is the yellow piece of yarn?*
- *How do you decide which piece of yarn is 4 inches long?*

**For measuring the lengths with a centimeter ruler,** prompt students to connect the length of each piece of yarn with the measurement shown on the centimeter ruler.

- *How many centimeters long is the blue piece of yarn?*
- *How many centimeters long is the yellow piece of yarn?*
- *How do you decide which piece of yarn is 11 centimeters long?*

Explore different ways to understand measuring in inches and centimeters.

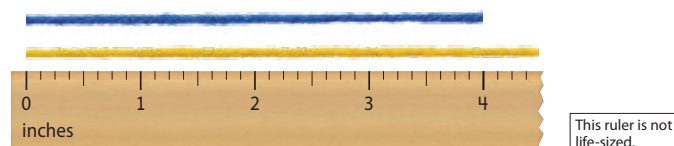
**Which piece of yarn is 11 centimeters long?  
Which piece of yarn is 4 inches long?**



### MODEL IT

**You can measure the lengths with an inch ruler.**

Line up the left end of the yarn with the 0 mark on the ruler.

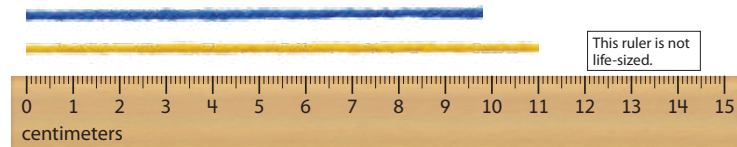


Look at the number on the ruler under the other end of the yarn.

### MODEL IT

**You can measure the lengths with a centimeter ruler.**

Line up the left end of the yarn with the 0 mark on the ruler.



Look at the number on the ruler under the other end of the yarn.

502

### Deepen Understanding

#### Measuring Length with an Inch or Centimeter Ruler

**SMP 5** Use appropriate tools strategically.

When discussing measuring the lengths of the pieces of yarn, prompt students to consider how each ruler is used to measure the lengths.

**Ask** *How do you know if a ruler is marked in inches or centimeters? How are the pieces of yarn lined up on each ruler? How do you use the numbers on the ruler to find the length of each piece of yarn in inches or centimeters?*

**Listen for** The rulers have the labels *inches* or *centimeters*. The ruler with bigger spaces between numbers is the inch ruler. For both rulers, one end of the piece of yarn is lined up with the 0 mark. To find the length, I read the number on the ruler that lines up with the other end.

**Ask** *If the right end of the piece of yarn is not exactly lined up above one of the numbers on the ruler, how can you tell how long the piece of yarn is?*

**Listen for** If the right end of the piece of yarn does not line up exactly with a number on the ruler, then its length is less than or more than the number of inches or centimeters shown below the nearest mark.

**CONNECT IT**

- Remind students that one thing that is alike about all the representations is that they find lengths of 4 inches and 11 centimeters using standardized measurement tools.
- Explain that on this page, students will use the problem from the previous page to measure in inches and centimeters.

**Monitor and Confirm**

**1** – **3** Check for understanding that:

- rulers are typically labeled to show the units they measure
- an inch has a greater length than a centimeter
- the blue yarn is 4 inches long
- the yellow yarn is 11 centimeters long

**Support Whole Class Discussion**

**4** Be sure students understand that this problem is asking them to explain the process of measuring with a ruler.

**Ask** *How do you place the ruler to measure the length of the piece of yarn?*

**Listen for** I line up one end of the yarn with the 0 mark on the ruler.

**Ask** *How do you find the length on the ruler?*

**Listen for** I look at the number that the other end of the piece of yarn lines up with to read the number of centimeters or inches.

**5 REFLECT** Have all students focus on the strategies used to solve this problem. If time allows, have students share their preferences with a partner.

**CONNECT IT**

Now you will use the problem from the previous page to help you understand how to measure using rulers.

**1** How do you know what units a ruler shows?

*The word “inches” or “centimeters” is usually shown on a ruler to tell you the units. Also, your little finger is about a centimeter across, and a quarter is about an inch across.*

**2** Which color yarn is 4 inches long? blue

**3** Which color yarn is 11 centimeters long? yellow

**4** How do you use a ruler to measure the length of the yarn in inches or centimeters?

*Possible answer: I line up the 0 mark on the ruler with the left end of the yarn. Then I look at the number on the ruler that is under the right end of the yarn. That number is the length in inches or centimeters.*

**5 REFLECT**

Look back at your **Try It**, strategies by classmates, and **Model Its**. Which models or strategies do you like best for measuring in inches and centimeters? Explain.

*Possible answer: I like to measure using a ruler best because it*

*is easy to line up a ruler with the object and then read the*

*number that is its length.*

**Hands-On Activity**

**Model rulers with grid paper.**

**If . . .** students are unsure about measuring the lengths of objects in inches or centimeters,

**Then . . .** use this activity to have them measure the lengths of objects by using models of rulers on grid paper.

**Materials** For each student: Activity Sheet *1-Inch Grid Paper*, Activity Sheet *1-Centimeter Grid Paper*, crayons (including red), scissors, and classroom objects to measure (if possible, with whole-inch and whole-centimeter lengths)

- Tell students to position the 1-inch grid paper horizontally, color the first square in one row red, and then use a different color to shade 7 more squares.
- Have students cut out and use this ruler to measure several objects with whole-inch lengths. Tell them to make sure that the red square lines up with the left end of the object they are measuring, and then count all of the squares to reach the right end in order to determine the length of the object.
- Repeat the activity using 20 squares on 1-centimeter grid paper and a different set of objects with whole-centimeter lengths.

## APPLY IT

For all problems, encourage students to explain the strategies they used to solve the problem.

6 Lynn made her ruler correctly. Possible explanation: I can tell she made her ruler correctly because all of the units (or spaces between the numbers) are the same size.

7 The paintbrush is 5 inches long.

### Close: Exit Ticket

8 Possible explanation: Tony lines up the crayon with the 1 on the ruler instead of with the 0. If you count on from 1 to 8, you get 7. The crayon is 7 centimeters long.

Students' solutions should indicate understanding that:

- the left end of an object should be lined up with the 0 mark on the ruler
- the length of the object can be determined by counting the number of units between the left and right ends of the object

**Error Alert** If students are unable to explain what Tony did wrong, **then** model the correct way to measure the crayon and compare the length with the result of counting the number of centimeters from 1 to 8.

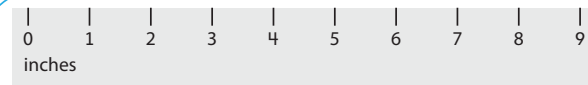
## APPLY IT

Use what you just learned to solve these problems.

6 Ty made the top ruler. Lynn made the bottom ruler. Circle the ruler that is made correctly. Explain how you know.



These rulers are not life-sized.



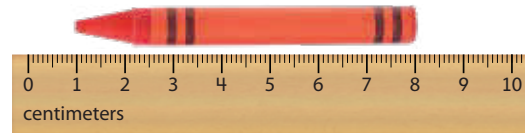
Lynn made her ruler correctly. I can tell she made her ruler correctly because all of the units (or spaces between the numbers) are the same size.

7 Use a ruler. How long is the paintbrush in inches?



**Solution** The paintbrush is 5 inches long.

8 Tony says the crayon is 8 centimeters long. Explain what Tony did wrong. Then find the correct length of the crayon.



**Possible explanation:** Tony lined up the crayon with the 1 on the ruler instead of with the 0. If you count up from 1 to 8, you get 7. The crayon is 7 centimeters.



**Solutions**

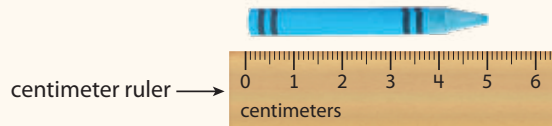
- 1 the number of whole centimeters  
**Basic**
- 2 on the zero mark  
**Basic**
- 3 7 centimeters  
**Medium**

**Practice Measuring in Inches and Centimeters**

**Study the Example showing how to measure with a ruler. Then solve problems 1–7.**

**EXAMPLE**

What is the length of the crayon?



The length of the crayon is 5 centimeters.

- 1 What do the numbers on a centimeter ruler represent?  
**the number of whole centimeters**
- 2 When measuring with a ruler, where do you line up the left end of the object?  
**on the 0-mark**
- 3 Use a ruler to measure the length of a piece of string in centimeters.



What is the length of the string?

**7 centimeters**

**Fluency & Skills Practice** **Teacher Toolbox**

**Assign Measuring in Inches and Centimeters**

Students will need an inch ruler and a centimeter ruler to complete this activity. Through this exercise, students will gain experience using a ruler to measure length in inches and centimeters. This is a skill students will use in many real-world situations, including craft, household, and science projects.

**Fluency and Skills Practice**  
**Measuring in Inches and Centimeters** Name: \_\_\_\_\_

- 1 Use a ruler to measure the length of the piece of tape in inches.  
  
What is the length of the tape? \_\_\_\_\_ inches
- 2 Use a ruler to measure the length of the pencil in inches.  
  
What is the length of the pencil? \_\_\_\_\_ inches
- 3 Use a ruler to measure the length of the shoe in centimeters.  
  
What is the length of the shoe? \_\_\_\_\_ centimeters
- 4 Use a ruler to measure the length of the fish in centimeters.  
  
What is the length of the fish? \_\_\_\_\_ centimeters

©Curriculum Associates, LLC. Copying is permitted for classroom use.

- 4 Sample explanation: Al could use an inch ruler or measuring tape to measure the correct length of string.

**Basic**

- 5 2 inches

**Medium**

- 6 4 inches

**Medium**

- 7 5 inches

**Medium**

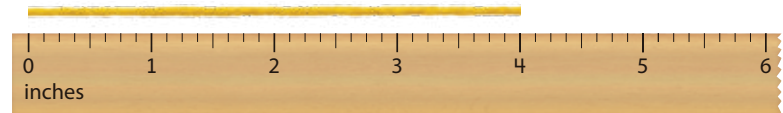
- 4 Al needs 8 inches of string for a project. How could he find the correct length of string?

**Possible answer:** Al could use an inch ruler or measuring tape to measure the correct length of string.

- 5 On an inch ruler, what is the length of the space between the line marked 1 and the line

marked 3? 2 inches

- 6 Emma uses an inch ruler to measure the length of a piece of yarn.



What is the length of the yarn? 4 inches

- 7 Use a ruler to measure the length of the pencil below in inches.



What is the length of the pencil? 5 inches



506

**ELL**

**English Language Learners:  
Differentiated Instruction**

**Prepare for Session 3**  
Use with *Apply It*.

### Levels 1–3

**Listening/Speaking** Have students chorally read *Apply It* problem 3.

Have students work in pairs to answer the following questions: *What part of the leaf should you measure? Show me how the leaf will line up with the ruler. What is the length of the leaf? Is Tani's answer correct?*

Encourage students to state the length of the leaf in a complete sentence:

*The leaf is 8 centimeters long.*

*Tani's answer is correct.*

### Levels 2–4

**Reading/Writing** Have students chorally read *Apply It* problem 3. Instruct them to write sentences using the sequence terms *first*, *next*, and *then* to explain how Tani got her answer. When complete, encourage students to read and follow the steps they wrote to measure the leaf. Then ask them to discuss with their partners:

*How do you know that the starting point Tani used to measure the leaf is correct? How do you know that the ending point Tani used to measure the leaf is correct?*

### Levels 3–5

**Reading/Writing** Have students read *Apply It* problem 3 with their partners. Encourage them to discuss their ideas in writing. Instruct students to take turns writing out the steps Tani took to get her answer. Have them use the terms *first*, *next*, *then*, *centimeters*, *starting point*, and *ending point*.

When complete, encourage students to write a reflection to answer this question:

*How do you know the starting and ending points Tani used to measure the leaf are correct?*

Have students read their reflections aloud to their partners.