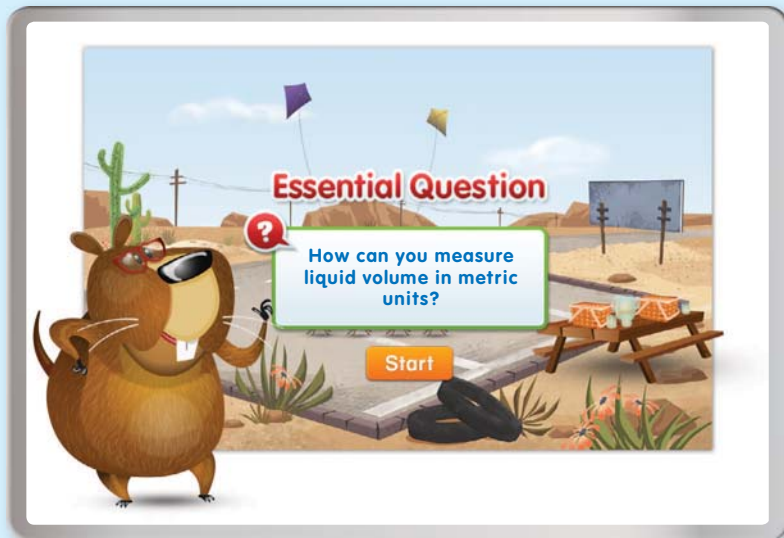


18.6 Metric Units for Liquid Volume

Essential Question How can you measure liquid volume in metric units?

the 5 Es ENGAGE



GO DIGITAL Lesson Opener

Making Connections

Invite students to tell you what they know about nature paths and parks.

Is there a park or nature path that you like to go to? What is it like? Why do we have parks and nature paths?

Using the Digital Lesson

You can provide containers in different shapes and sizes to help students visualize the units.

Learning Task

What is the problem the students are trying to solve? Connect the story to the problem.

- What does Doc want to know? (What size juice container the leader has.)
- How many people need to share the juice? (3 people)
- About how much juice do you think you would you drink? (Example: 2 glasses)

Literacy and Mathematics

Choose one or more of the following activities.

- Have the students work in pairs to come up with a list of things they might see on a nature path.
- Ask the students to summarize what happened in the problem and clarify the question that needs to be answered.



Texas Essential Knowledge and Skills

TEKS Geometry and Measurement—3.7.D

Determine when it is appropriate to use measurements of liquid volume (capacity) or weight

3.7.E Determine liquid volume (capacity) or weight using appropriate units and tools

MATHEMATICAL PROCESSES

3.1.C Select tools, technology, and techniques

3.1.F Analyze mathematical relationships

Are You Ready?

Access Prior Knowledge

Use the *Are You Ready?* 18.6 in the *Assessment Guide* to assess students' understanding of the prerequisite skills for this lesson.

Vocabulary

liquid volume, liter (L), milliliter (mL)



Multimedia eGlossary at thinkcentral.com

Materials

1-L beaker, a bottle cap, milliliter eyedropper, various containers, water, tape



Resources

For the student



Interactive Student Edition provides students with an interactive learning environment!



Math on the Spot Video Tutor



iTools Virtual Manipulatives



Soar to Success Math Online Intervention

For the teacher



Digital Management Center organizes program resources by TEKS!



eTeacher Edition



Online Assessment System

Unlock the Problem



Have students describe their experiences with measuring liquids.

- What are some objects that hold liquid? Possible answer: cups, pots, bowls
- What are some examples of liquid measurements in recipes? Possible answer: 1 cup of milk, $\frac{1}{2}$ cup of water

Have a student read aloud the definition of *liquid volume*.

- When might you need to measure liquid volume? Possible answers: for science experiments; when measuring needs to be more exact

Keep in mind that the term *capacity* is also associated with measurement. However, the capacity of a container refers to the amount the container can hold. Students will observe that 1 liter of liquid volume does not change, but the level of water may change depending on the container.

Activity

Tell students that they will measure an amount of liquid that is the metric unit called a liter (L) or a milliliter (mL).

- To measure 1 liter of liquid, line up the top of the liquid with the 1-liter mark on the beaker.

Students should pour 1 liter of water into each of the different containers and use tape to mark the level of the water in each container.

- Did the amount of water, or liquid volume, change? How can you check? No; possible answer: you can pour the water back into the 1-liter beaker.

Math Talk Mathematical Processes

Use Math Talk to focus on students' understanding of how much 1 liter actually is and how it looks in each container even though the volume is the same.

ELL English Language Learners

Leveled Activities	ELPS
Beginning: Activity 39	4.C.3, 4.F.3, 4.G.3
Intermediate: Activity 40	4.F.6, 4.G.2, 4.G.4
Advanced: Activity 57	2.C.4, 3.D.2, 3.E
Advanced High: Activity 43	4.F.8, 4.G.2, 4.G.4

Go to thinkcentral.com for the **ELL Activity Guide** containing these leveled activities.

Name _____

18.6 Metric Units for Liquid Volume

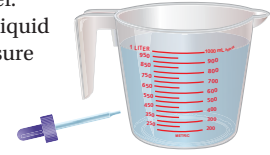
TEKS Geometry and Measurement—3.7.D, 3.7.E
MATHEMATICAL PROCESSES 3.1.C, 3.1.F

Essential Question

How can you measure liquid volume in metric units?

Unlock the Problem

Liquid volume is the amount of liquid in a container. The **liter (L)** is the basic metric unit for measuring liquid volume. A **milliliter (mL)** is the metric unit to measure liquid in very small containers.



Activity

Materials ■ 1-L beaker ■ a bottle cap ■ 1-mL dropper ■ 2 containers ■ water ■ tape

STEP 1 Fill a 1-liter beaker with water to the 1-liter mark.

STEP 2 Pour 1 liter of water to fill a container. Mark the level of the water with a piece of tape. Draw the container below and name the container. Write if the container holds less than a liter, a liter, or more than a liter.

Possible answer: the liquid volume remains the same when it is poured into different-size containers.

STEP 3 Repeat Steps 1 and 2 with a different-sized container.

Possible containers and drawings are shown.

Container 1



cooking pot; more than a liter

Container 2



vase; less than a liter

Math Talk
Mathematical Processes
What can you say about the amount of liquid volume in each container?

STEP 4 Use the 1-mL dropper filled with water to fill the bottle cap.

How many times did you fill the dropper? Answers will vary.

Explain if the bottle cap is less than a milliliter, a milliliter, or more than a milliliter? Answers will vary.

- Name a container that will hold a liter of water. Answers will vary.

Will the container hold 50 bottle caps of water? **Justify.**

Yes; Possible answer: The container holds at least a liter of water, a bottle cap holds a few milliliters of water which is a very small part of a liter. So, the container will hold 50 bottle caps of water.



Differentiated Instruction

ELL Language Support



Visual / Spatial
Small Group

ELPS 1.D, 2.C.4, 2.I.5

Strategy: Draw

- Students can practice their comprehension by drawing a picture showing the definition of new vocabulary terms.
- Discuss the new terms in this lesson: *Liquid volume* is the amount of liquid in a container. A *liter* and a *milliliter* are metric units for measuring liquid volume. A *liter* is abbreviated with the letter *L* and *milliliter* with the letters *mL*.
- Have students draw pictures to show their understanding of the meaning for these terms.

Liquid volume of 1 liter





A dropper holds about 1 mL.



A full glass holds about 250 mL.



A sports bottle holds about 1,000 mL or 1 L.

- Suppose you drank a glass of orange juice. Did you drink about 4 mL or 300 mL of orange juice? **Explain.**

300 mL; Possible explanation: 4 mL would only be a few droppers full of juice.

A glass would contain much more liquid, so 300 mL is a better estimate.

Share and Show



Choose the unit you would use to measure each container's capacity. Write *milliliter* or *liter*.

1.



Think: I will use a small unit to measure small amounts.

milliliter

2.



liter

3.



liter

4.



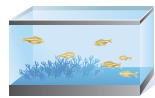
liter

5.



milliliter

6.



liter

Ginger pours punch into three 1-L bottles. Choose the metric unit to measure the liquid volume in each bottle. Write *milliliter* or *liter*.

7.



milliliter

8.



liter

9.



milliliter

596

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Metric Units

Give students the opportunity to discuss the containers in the photos. Point out that these containers can be used with metric measurements of capacity.

- About how many milliliters does the glass in the photo hold? **about 250 milliliters**
- How can you figure out the number of milliliters that equal 1 liter? **Possible answer: The photo of the full glass shows 250 mL. If I fill the beaker with a full glass of water that holds 250 mL, I can see how many times I need to pour the glass to reach the liter mark on the beaker. I can add $250 + 250 + 250 + 250$ to find that 1,000 mL equals 1 liter.**

The question helps students to understand the amount of liquid in a milliliter. Milliliter and a liter are used as benchmarks for metric units of liquid volume.

Share and Show

Exercises 1–6 connect to the learning model.

Use the checked exercises for **Quick Check**. Students should show their answers for the Quick Check on the MathBoard.

RtI Quick Check

IF

a student misses the checked exercises

THEN

Differentiate Instruction with
RtI Tier 1 Lesson 92

Enrich



Logical / Mathematical
Individual / Partners

- Have students create a new unit of measure for liquid volume. Have them name their unit, such as a *sindler*.
- Students should describe how much liquid is in their unit of liquid volume. They may compare their unit with other units they know for liquid amounts.
- Have students draw a picture of their new unit.
- Then have students tell whether common containers, such as a baby bottle, small lunch milk carton, and bathroom sink will hold more than, less than, or about the same amount as their unit of liquid volume.



a sindler

A sindler is an amount of liquid that is about the amount in a juice box.



Go to thinkcentral.com for additional enrichment activities in the **Enrich Activity Guide**.

Problem Solving

H.O.T. Problems

Problems 10–13 require students to apply logical reasoning to compare liquid volumes using illustrations of containers. Encourage students to focus on the sizes of the containers as they compare and solve the problems



COMMON ERRORS

Error Students may only look at how tall the container is or how wide, even though it may hold the same amount.

Springboard to Learning Have students pour liquid from a 1-liter bottle into containers that hold the same amount of liquid volume, but are different shapes.



Math on the Spot Video Tutor

Through the *Math on the Spot Video Tutor*, students will be guided through an interactive solving of this type of H.O.T. problem. Use this video to also help students solve the H.O.T. problem in the Interactive Student Edition. With these videos and the H.O.T. problems, students will build skills needed in the TEXAS assessment.



Math on the Spot videos are in the Interactive Student Edition and at thinkcentral.com.

Name _____

Problem Solving

Use the containers for 10–13. Container A is full when 1 liter of water is poured into it.

10. **Write Math** **What if** you poured 1 liter of water into Container B? Describe the way the water fills the container. **Explain** how you know.

Possible answer: it will be mostly full. **Possible explanation:**

Container A holds 1 liter. Since Container B is shorter and wider, it will most likely hold the same amount of water.

11. **H.O.T. Reasoning** Bryson filled 2 containers full with water. One container held 2 liters and the other container held 250 milliliters. Which two containers did he fill?

Container C would hold 2 liters of water. Container E would hold 250 milliliters of water. I compared C and E to A.

12. **H.O.T. Evaluate** Name two containers that will be filled with about the same number of liters of water. **Explain.**

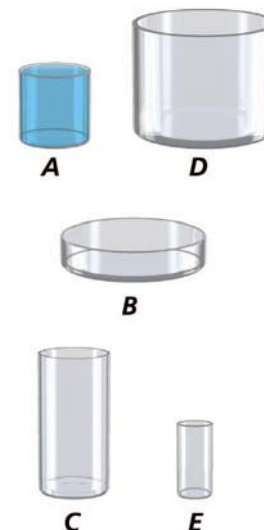
Possible answers: Containers A and B; **Explanations**

may vary. Possible explanation: Container A is taller than Container B, but not as wide.

13. **H.O.T. What's the Error?** Samuel says that you can pour more liters of water into Container B than into Container D. Is he correct? **Explain.**

No; possible explanation: Container B is smaller than

Container D. Container D is much taller, it can hold more liters of water when filled.



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Differentiated Instruction

RtI RtI Tier I Lesson 92

Name _____

LESSON 92 **Metric Units for Liquid Volume**

OBJECTIVE: Measure liquid volume in milliliters and liters.

Liquid volume is the amount of liquid in a container. You can measure liquid volume using metric units such as **milliliter (mL)** and **liter (L)**. A dropper holds about 1 milliliter. A water bottle holds about 1 liter.

Choose the unit you would use to measure how much liquid volume there will be when the container is filled. Write **milliliter** or **liter**.

A plastic cup holds about 200 milliliters.

Think: A plastic cup is smaller than a water bottle.

A water bottle holds about 1 liter.

A fish bowl holds more than 1 liter.

Think: A fish bowl is larger than a water bottle.

1. A wading pool is filled with water. Is the amount measured using **milliliters** or **liters**?

liters

Choose the unit you would use to measure how much liquid volume there will be when the container is filled. Write **milliliter** or **liter**.

2. vase

liter

3. mug

milliliter

4. bathtub

liter

183

Enrich 87

Name _____

Estimate Liquid Volumes

Choose a container that you estimate will have the liquid volume given when the container is filled. Draw and label the container you chose.

Possible containers are given.

Liquid Volume	Container
1. less than 1 liter	Check students' drawings. a small juice glass
2. about 1 liter	bottled water
3. more than 1 liter	fish tank

4. **Write Math** How did you decide what container to choose for each liquid volume? **Explain.**

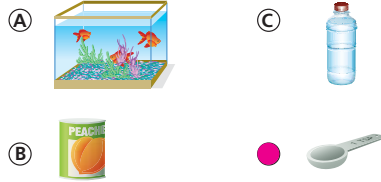
Possible answer: I used 1 liter as a benchmark to help estimate the liquid volume each container would have when filled.

E87

Daily Assessment Task

Fill in the bubble for the correct answer choice.

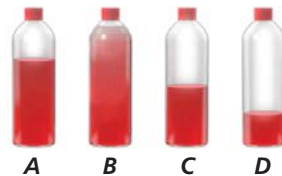
14. **Representations** For which container would you use milliliters to measure the amount of liquid?



15. Which container has the greatest liquid volume when filled?



16. **Multi-Step** If the liquid in two of the bottles are poured into another container, which two will have the least combined liquid volume?



★ TEXAS Test Prep

17. The bottles of tea are all liter bottles. Which bottle has a liter of tea?



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Grab-and-Go!™ Ready-Made Independent Activities

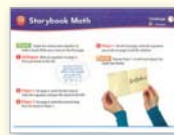
Differentiated Centers Kit



Literature

How Heavy? How Much?

Students read about customary units of measures used to buy groceries.



Activities

Fix It

Students complete purple Activity Card 10 by identifying the correct measure for length, distance, mass, and capacity.

5 the 5 Es EVALUATE

Daily Assessment Task RtI

Can students measure liquid volume in metric units?

IF

NO

YES

THEN

• Soar to Success Math
Warm-Up 43.09, 43.10

• Enrich 87
• Homework and Practice
Lesson 18.6

★ TEXAS Test Prep Coach

Test Prep Coach helps teachers to identify common errors that students can make.

In the Test Prep exercise, if students selected:

A or C They do not understand the term *liter*.

B They chose the bottle with the least amount of tea.

? Essential Question Write Math

How can you measure liquid volume in metric units?

Possible answer: I can use the metric unit of a liter or a milliliter to visualize and estimate the amount of liquid volume a container can hold when full. I can measure the actual liquid volume by pouring the liquid into a beaker and reading the liquid volume as all or part of a liter. If the liquid volume in a container is a very small amount, I could use a milliliter eyedropper to measure how many milliliters are in the container.







Homework and Practice

TEKS Geometry and Measurement—3.7.D, 3.7.E
MATHEMATICAL PROCESSES 3.1.C, 3.1.F

Name _____

18.6 Metric Units for Liquid Volume

Choose the unit you would use to measure the capacity. Write *milliliter* or *liter*.

- | | | |
|---|---|---|
| 1. 
<u>milliliter</u> | 2. 
<u>liter</u> | 3. 
<u>liter</u> |
| 4. 
<u>liter</u> | 5. 
<u>milliliter</u> | 6. 
<u>milliliter</u> |

Problem Solving 

Use the containers for 7–9. Container A is full when 1 liter of water is poured into it.

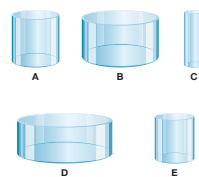
7. What if you poured 1 liter of water into container C? Describe the way the water fills the container.
The water would flow over the sides since container C is about the same height but thinner than container A.

8. Which container would hold about half of the water as in container D? **Explain.**

Container E; possible explanation: container E is about half as wide, but the same height as container D.

9. For which containers would you use milliliters to measure the liquid volume? **Explain. Containers C and E;**









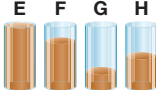
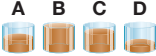
possible explanation: C and E are smaller or thinner than A which holds 1 liter, so measure their liquid volume in milliliters.



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Lesson Check

Fill in the bubble completely to show your answer.

10. Which container has the least liquid volume when filled?
 (A) water glass (C) soup bowl
 (B) tablespoon (D) fish bowl
11. Which container would you use a liter to measure the amount of liquid?
 (A)  (C) 
 (B)  (D) 
12. The bottles of liquid are all liter bottles. Which amount of liquid would fill a juice glass?
 (A)  (B)  (C)  (D) 
13. **Multi-Step** If the liquid in two of the containers is poured into another container, which two will have the greatest combined liquid volume?
 (A) E and H 
 (B) F and H
 (C) E and F
 (D) G and H
14. **Multi-Step** Each of the containers has a capacity of 1 liter. If the liquid in two of the containers is poured into another container, which two will have a combined volume of 1 liter?
 (A) C and D 
 (B) B and C
 (C) A and D
 (D) B and D

600

Homework and Practice

Use the Homework and Practice pages to provide students with more practice on the concepts and skills of this lesson.