

18.5 Customary Units for Capacity



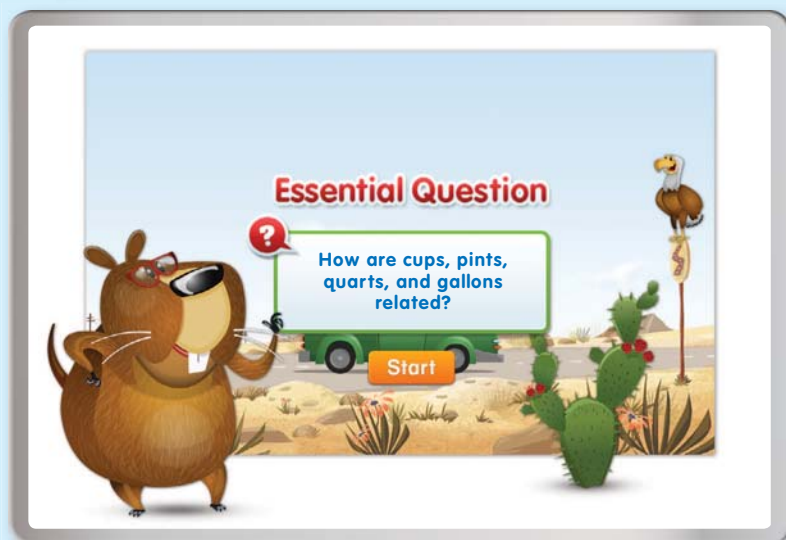
Essential Question

How are cups, pints, quarts, and gallons related?



the 5 Es

ENGAGE



Lesson Opener

Making Connections

Invite students to tell you what they know about cooking.

Have you ever cooked anything? Describe the recipe. Would you rather cook your own food or have someone make it for you?

Using the Digital Lesson

You may want to help the students compare cups and pints by showing them a measuring cup next to a pint bottle.

Learning Task

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

- How many cups of prickly pear cactus syrup does the cook need? (2 cups)
- What unit are the bottles of syrup sold in? (Pints)
- What does the cook need to know? (How many pints of syrup to buy.)

Literacy and Mathematics

Choose one or more of the following activities.

- Write the words *customary* and *capacity* on the board and discuss their meaning in relation to the problem.
- Ask the students to predict the reason that the cook wants these ingredients and who will eat the salad.



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?* 18.5 in the *Assessment Guide* to assess students' understanding of the prerequisite skills for this lesson.

Vocabulary

capacity, **cup (c)**, **pint (pt)**, **quart (qt)**, **gallon (gal)**



Multimedia eGlossary at thinkcentral.com

Materials

cup, pint, quart, and gallon containers;
water



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

Investigate



Ask students to think about things they buy in cup, pint, quart, and gallon containers. They should suggest items such as milk, juice, water, and ice cream. Ask them to order the units from smallest to largest by the amount they hold. Tell them that this is capacity.

Have students consider the vocabulary words and the pictures associated with them.

- **When have you used these words?** Possible answers: when baking, when buying something to drink
- **Where have you seen containers like the ones shown?** Possible answers: in my kitchen at home; at the grocery store

You may choose to do this activity using rice, sand, or other materials instead of water.

- **Consider steps B–D. Do you predict that the number of cups in the table will increase or decrease for quarts and gallons? Explain.** increase; Possible explanation: the containers increase in size, so it will take more cups to fill up the next container.

After students have completed the activity, ask:

- **What surprised you about the results?** Answers may vary. Possible answers: that it took so many cups to fill a gallon; that the number of cups in a gallon is not double the number of cups in a quart.

Have students extend their thinking by making conjectures about measurement.

- **Predict the number of pints in a quart. Explain.** Predictions may vary. Possible explanation: Since you can double the number of cups in a pint to get the number of cups in a quart, I predict that there are 2 pints in a quart.
- **Ask similar questions so students predict how many pints will fill a gallon, and how many quarts will fill a gallon.**

ELL English Language Learners

| Leveled Activities | ELPS |
|----------------------------------|---------------------|
| Beginning: Activity 39 | 4.C.3, 4.F.3, 4.G.3 |
| Intermediate: Activity 53 | 1.A.2, 2.D.1, 3.F.1 |
| Advanced: Activity 41 | 4.F.3, 4.F.8 |
| Advanced High: Activity 6 | 2.I.5, 3.G.2, 4.G.2 |



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

Name _____

18.5 Customary Units for Capacity

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



Essential Question

How are cups, pints, quarts, and gallons related?

Investigate



Capacity is the amount a container will hold. Customary units used to measure capacity are **cup (c)**, **pint (pt)**, **quart (qt)**, and **gallon (gal)**.



Materials ■ cup, pint, quart, and gallon containers; water

| | Number of Cups | | |
|----------|--------------------------|---------------------------|----------------------------|
| | Number of Cups in a Pint | Number of Cups in a Quart | Number of Cups in a Gallon |
| Estimate | | | |
| Capacity | 2 cups | 4 cups | 16 cups |

Estimates will vary.

Math Idea

The smallest of these customary units of capacity is a cup.

- Estimate the number of cups it will take to fill the pint container. Record your estimate.
- Fill a cup and pour it into the pint container. Repeat until the pint container is full.
- Record the number of cups it took to fill the pint container.
- Repeat Steps A to C for the quart and gallon containers.

- How many cups are in a pint? **2 cups** in a quart? **4 cups** in a gallon? **16 cups**



Differentiated Instruction

ELL Language Support



Kinesthetic
Small Group

ELPS 3.D.1, 4.E, 4.F.9

Strategy: Restate

Materials: containers having different capacities

- Restate unfamiliar language and vocabulary to help students work on the lesson.
- Show an open container, such as the classroom trashcan, a pencil holder, or a cup. **This is a container.** Move your hand or finger inside the container to model as you say:

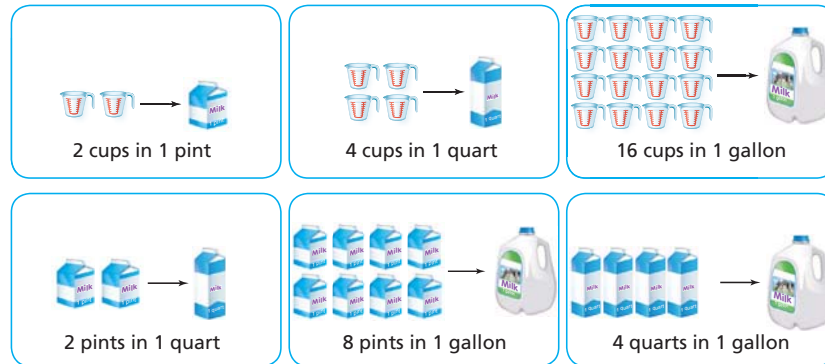


Capacity is the amount that fits in a container. **Capacity** is the amount that a container can hold.

- Provide the sentence frame *Capacity is the amount that _____*. Have students use the sentence frame and a container to define capacity.

Make Connections

These drawings show how cups, pints, quarts, and gallons are related.



Share and Show



Choose the unit you would most likely use to measure the capacity. Write *cup*, *pint*, *quart*, or *gallon*.



Circle the groups that equal the unit named. Then, rename the capacity using the unit shown.



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3 the 5 Es EXPLAIN

Make Connections

- How would you describe the relationship between cups in a pint and cups in a quart? Explain. Possible answer: there are 2 cups in a pint and 4 cups in a quart. It is double, just like the relationship between cups and pints.
- How would you describe the relationship between cups in a quart and cups in a gallon? Explain. Possible answer: there are 4 cups in a quart and 16 cups in a gallon. It is 4 times as much, just like the relationship between quarts and gallons.

Share and Show

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



IF

a student misses the checked exercises

THEN

Differentiate Instruction with
RtI Tier 1 Lesson 89

In Exercises 5 and 6, students will be changing units by finding different units that name the same amount. Have students use the drawings in Making Connections to help them solve these problems.

Enrich



Logical / Mathematical
Partners

Materials: index cards

- Students can practice identifying equivalent capacities by playing a matching game.
- Give each pair of students 12 index cards. Have partners work together to make pairs of cards that show equivalent capacities, such as 2 pints and 1 quart or 16 cups and 1 gallon. Students should make a total of six pairs.
- Have students mix the cards and place them facedown in an array. Students take turns turning over two cards at a time. If the cards show equivalent capacities, the player takes the cards and gets another turn. If the capacities are not equivalent, the player replaces the cards facedown to their original position and the other player takes a turn.

Check students' work.



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



COMMON ERRORS

Error Students may confuse which units are larger and which units are smaller.

Example I can fit 2 pints in 1 cup.

Springboard to Learning Have students label containers for cups, pints, quarts, and gallons. Have students practice arranging containers in order from smallest to largest. Students should say to themselves, Two cups make a pint. Two pints make a quart. Four quarts make a gallon.

Problem Solving

H.O.T. Problems

In Problem 9, students use multiple steps to rename two different capacities in two different units in the same unit, so they can be added.

Problem 11 requires students to use reasoning and proof. Students can think about the number of quarts in 2 gallons and then determine if that amount is more or less than 7 quarts. They draw pictures to prove their answer.



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



7. **Multi-Step** Janet is serving lemonade. Each glass contains 1 pint. If Janet serves 16 glasses, how many gallons will she serve?

2 gallons

8. **Write Math** **What's the Error?** Conner says that it takes 8 cups to fill a 2-gallon container. Is he correct? **Explain.**

No; Possible explanation: 32 cups fill 2 gallons, 4 cups fill 1 quart,

and 4 quarts fill a gallon, so $4 \times 4 = 16$ cups fill 1 gallon, and 32 cups fill 2 gallons.

9. **H.O.T.** **Multi-Step** Mr. Velez has 8 pints of orange juice and 1 gallon of grape juice. How many quarts of juice does he have? **Explain.**

8 quarts; **Possible explanation: 2 pints = 1 quart, so**

8 pints = 4 quarts. Add the 4 quarts in a gallon. $4 + 4 = 8$

10. **Reasoning** What unit of capacity would you use to measure the amount of water in a bathtub?

Gallon; a bathtub holds a lot of water and a gallon is the largest unit.

11. **H.O.T.** Which is the greater capacity, 2 gallons or 7 quarts? **Justify** by drawing a picture.

2 gallons

12. **What's the Question?** Angela used the drawing below to help answer a question. The answer is 1 quart.



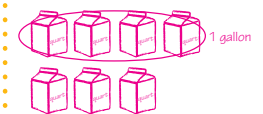
Possible answer: How can you rename 4 cups using quarts?



Write Math

Show Your Work

Possible drawing for 11:



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Differentiated Instruction

RtI RtI Tier I Lesson 89

Name _____

LESSON 89 **Customary Units for Capacity**
OBJECTIVE: Relate customary units for capacity and use them to measure capacity.

Capacity is the amount a container will hold.

| Units of Capacity | |
|-------------------|------------|
| cup (c) | pint (pt) |
| quart (qt) | gallon (g) |

Choose the unit you would most likely use to measure the capacity of this mug. Write **cup, pint, quart, or gallon**.

Step 1 Think about how a mug compares to the containers shown.
A mug holds about a cup.

Step 2 Choose a unit of capacity.
A cup is a good unit for measuring the capacity of a mug.

Choose the unit you would most likely use to measure the capacity. Write **cup, pint, quart, or gallon**.

1. 2. 3. 4.

cup or pint **cup, pint, or quart** **cup or pint** **quart or gallon**

Circle the groups that equal quarts. Then, rename the capacity using quarts.

5. 4 pints in 2 quarts

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Enrich 86

Name _____

Fill 'Er Up

Choose the better estimate of the capacity for each item. Write the letters of your answers in the blanks at the bottom of the page. Solve the riddle.

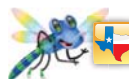
| | | |
|---|--|--|
| 1. a car's gas tank S 10 gallons T 10 cups | 2. a sink O 4 pints E 4 gallons | 3. a sand pail E 3 gallons Y 3 quarts |
| 4. an ice cube tray M 1 cup N 1 quart | 5. a dog's bowl K 1 gallon P 1 pint | 6. a milk jug C 16 cups T 16 gallons |
| 7. a shampoo bottle I 1 gallon E 1 pint | 8. a bathtub J 40 cups T 40 gallons | 9. a drinking glass A 1 cup B 1 gallon |
| 10. a large soda bottle E 10 quarts U 10 cups | 11. a goldfish bowl A 2 quarts R 1 cup | 12. a baby's bottle R 1 cup H 1 quart |
| 13. a cooking pot O 1 cup I 1 gallon | 14. a water bottle D 2 gallons C 2 pints | 15. a washing machine A 20 gallons E 20 cups |

What can a cup do, besides hold a drink?

M E A S U R E C A P A C I T Y

4 2 15 1 10 12 7 14 9 5 11 6 13 8 3

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Daily Assessment Task

Fill in the bubble for the correct answer choice.

13. Tiger asks Shakira for 1 quart of milk for his tea. How many pints of milk does Shakira need to give Tiger?
- ☐ 2 pints
☒ 4 pints
☐ 3 pints
☐ 8 pints
14. Steve buys a 2-quart container of orange juice. How many cups of orange juice does he buy?
- ☐ 3 cups ☐ 4 cups
☒ 8 cups ☐ 2 cups
15. **Multi-Step** Mr. Armstrong is serving 8 quarts of cranberry juice and 3 gallons of apple juice at a party. Each glass contains 2 cups. How many glasses will Mr. Armstrong serve?
- ☐ 80 glasses ☐ 16 glasses
☒ 40 glasses ☐ 24 glasses



TEXAS Test Prep

16. Emily enjoys drinking cocoa before she goes to bed at night. Choose the amount that her mug could hold?
- ☐ 4 quarts
☐ 2 gallons
☒ 2 cups
☐ 4 pints

Daily Assessment Task



RtI

Do students understand how cups, pints, quarts, and gallons are related?

IF

NO

YES

THEN

• **Soar to Success Math**
Warm-Up 43.07, 43.11

• **Enrich** 86
• **Homework and Practice**
Lesson 18.5



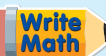
TEXAS Test Prep Coach

In the Test Prep exercise, if students selected:

- A They do not understand the capacity of a quart
- B They do not understand the amount of liquid in a gallon.
- D They do not understand the capacity of a pint.



Essential Question



How are cups, pints, quarts, and gallons related?

Possible answer: two cups make a pint; 2 pints make a quart; and 4 quarts make a gallon. Each smaller unit can be used to make the larger unit.



Ready-Made Independent Activities

Differentiated Centers Kit



Literature

How Heavy? How Much?

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



Activities

Fix It

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

Homework and Practice

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

Name _____

18.5 Customary Units for Capacity

Choose the unit you would use to measure the capacity.
Write *cup*, *pint*, *quart*, or *gallon*.

1.



gallon

2.



quart

3.



cup

Circle the groups that equal the unit named.
Then, rename the capacity using the unit shown.

4.



8 quarts in 2 gallons

5.



4 pints in 2 quarts

6.



6 cups in 3 pints

Problem Solving



7. Jacey's fish tank holds 12 quarts of water. How many gallons of water should Jacey use to fill his fish tank?

3 gallons

8. Selena has a cooking pot that holds 3 quarts of water. How many cups of water does she need to fill the pot?

12 cups

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Lesson Check



Fill in the bubble completely to show your answer.

9. Zuri wants to fill a 1-gallon jug with pints of juice. How many pints of juice does Zuri need to fill the jug?
☐ A 8 pints
☐ B 4 pints
☐ C 2 pints
☐ D 6 pints
10. Tanner buys a 1-gallon jug of milk. How many cups of milk can Tanner pour from the gallon?
☐ A 10 cups
☐ B 8 cups
☒ C 16 cups
☐ D 12 cups
11. Henley needs $2\frac{1}{2}$ quarts of water to make a batch of chicken soup. How many pints of soup will Henley make?
☐ A 4 pints
☐ B 3 pints
☒ C 5 pints
☐ D 6 pints
12. Chen places a large pot on the stove to cook spaghetti. Choose the amount that Chen's pot could hold if it were full.
☐ A 8 gallons
☒ B 3 quarts
☐ C 2 cups
☐ D 1 pint
13. **Multi-Step** Mr. Tome uses 5 quarts of pineapple juice and 2 gallons of orange juice to make punch. How many 1-cup servings of punch will Mr. Tome make?
☐ A 20 cups
☐ B 16 cups
☐ C 40 cups
☒ D 52 cups
14. **Multi-Step** Garcia has a 5-gallon fish tank and a 3-gallon fish tank. How many more pints of water are in the 5-gallon tank than in the 3-gallon tank?
☒ A 16 pints
☐ B 40 pints
☐ C 24 pints
☐ D 30 pints

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Homework and Practice

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