

Name _____

Customary Units of Liquid Volume

Essential Question How can you use models to compare customary units of liquid volume?



Measurement and Data—4.MD.A.1
Also 4.MD.A.2

MATHEMATICAL PRACTICES
MP3, MP7, MP8

Unlock the Problem

Liquid volume is the measure of the space a liquid occupies. Some basic units for measuring liquid volume are **gallons**, **half gallons**, **quarts**, **pints**, and **cups**.

The bars below model the relationships among some units of liquid volume. The largest units are gallons. The smallest units are **fluid ounces**.

1 cup = 8 fluid ounces
 1 pint = 2 cups
 1 quart = 4 cups

1 gallon

1 gallon															
1 half gallon								1 half gallon							
1 quart				1 quart				1 quart				1 quart			
1 pint		1 pint		1 pint		1 pint		1 pint		1 pint		1 pint		1 pint	
1 cup	1 cup	1 cup	1 cup	1 cup	1 cup	1 cup	1 cup	1 cup	1 cup	1 cup	1 cup	1 cup	1 cup	1 cup	1 cup
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
fluid	fluid	fluid	fluid	fluid	fluid	fluid	fluid	fluid	fluid	fluid	fluid	fluid	fluid	fluid	fluid
ounces	ounces	ounces	ounces	ounces	ounces	ounces	ounces	ounces	ounces	ounces	ounces	ounces	ounces	ounces	ounces

Example How does the size of a gallon compare to the size of a quart?



MATHEMATICAL PRACTICES 7

Look for a Pattern
Describe the pattern in the units of liquid volume.

STEP 1 Draw two bars that represent this relationship. One bar should show gallons and the other bar should show quarts.

STEP 2 Shade 1 gallon on one bar and shade 1 quart on the other bar.

STEP 3 Compare the size of 1 gallon to the size of 1 quart.

So, 1 gallon is _____ times as much as 1 quart.

Example Compare measures.



Serena needs to make 3 gallons of lemonade for the lemonade sale. She has a powder mix that makes 350 fluid ounces of lemonade. How can she decide if she has enough powder mix?

STEP 1 Use the model on page 659. Find the relationship between gallons and fluid ounces.

1 gallon = _____ cups

1 cup = _____ fluid ounces

1 gallon = _____ cups \times _____ fluid ounces

1 gallon = _____ fluid ounces

STEP 2 Make a table that relates gallons and fluid ounces.

Gallons	Fluid Ounces
1	128
2	
3	

Think:

1 gallon = 128 fluid ounces

2 gallons \times 128 = _____ fluid ounces

3 gallons \times 128 = _____ fluid ounces

STEP 3 Compare 350 fluid ounces and 3 gallons.

350 fluid ounces

3 gallons



Think: Write each measure in fluid ounces and compare using $<$, $>$, or $=$.



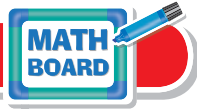
Serena has enough mix to make 350 fluid ounces. She needs to make 3 gallons of lemonade.

350 fluid ounces is _____ than 3 gallons.

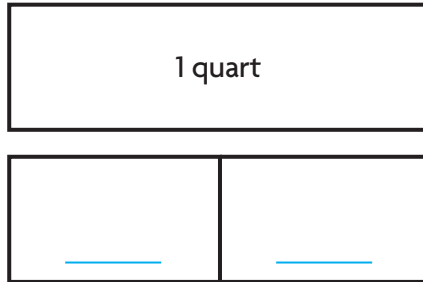
So, Serena _____ enough mix to make 3 gallons of lemonade.

Name _____

Share and Show



1. Compare the size of a quart to the size of a pint.
Use a model to help.



Customary Units of Liquid Volume

1 cup (c) = 8 fluid ounces (fl oz)
 1 pint (pt) = 2 cups
 1 quart (qt) = 2 pints
 1 quart (qt) = 4 cups
 1 gallon (gal) = 4 quarts
 1 gallon (gal) = 8 pints
 1 gallon (gal) = 16 cups

1 quart is _____ times as much as _____ pint.

Complete.

2. 2 pints = _____ cups 3. 3 gallons = _____ quarts 4. 6 quarts = _____ cups



MATHEMATICAL PRACTICES 6

Make Connections Explain how the conversion chart above relates to the bar model in Exercise 1.

On Your Own

Use a model or *iTools* to complete.

5. 4 gallons = _____ pints 6. 5 cups = _____ fluid ounces

MATHEMATICAL PRACTICE 4 Use Symbols Algebra Compare using $>$, $<$, or $=$.

7. 2 gallons 32 cups 8. 4 pints 6 cups 9. 5 quarts 11 pints

Problem Solving • Applications



10. **THINK SMARTER** A soccer team has 25 players. The team's thermos holds 4 gallons of water. If the thermos is full, is there enough water for each player to have 2 cups? Explain. Make a table to help.



Gallons	Cups
1	
2	
3	
4	

11. **MATHEMATICAL PRACTICE 3** **Verify the Reasoning of Others** Whose statement makes sense? Whose statement is nonsense? Explain your reasoning.

1 pint is $\frac{1}{4}$ of a gallon.



Zach's Statement

1 pint is $\frac{1}{8}$ of a gallon.



Angela's Statement

12. **GO DEEPER** Peter's glasses each hold 8 fluid ounces. How many glasses of juice can Peter pour from a bottle that holds 2 quarts?

13. **THINK SMARTER** A pitcher contains 5 quarts of water. Josy says the pitcher contains 10 cups of water. Explain Josy's error. Then find the correct number of cups the pitcher contains.

Name _____

Customary Units of Liquid Volume



Common Core Standard—4.MD.A.1
Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

Complete.

1. 6 gallons = 24 quarts

Think: 1 gallon = 4 quarts,
so 6 gallons = 6×4 quarts, or 24 quarts

2. 12 quarts = _____ pints

3. 6 cups = _____ fluid ounces

4. 9 pints = _____ cups

5. 10 quarts = _____ cups

6. 5 gallons = _____ pints

7. 3 gallons = _____ cups

Compare using $<$, $>$, or $=$.

8. 6 pints 60 fluid ounces

9. 3 gallons 30 quarts

10. 5 quarts 20 cups

11. 6 cups 12 pints

Problem Solving



12. A chef makes $1\frac{1}{2}$ gallons of soup in a large pot. How many 1-cup servings can the chef get from this large pot of soup?

13. Kendra's water bottle contains 2 quarts of water. She wants to add drink mix to it, but the directions for the drink mix give the amount of water in fluid ounces. How many fluid ounces are in her bottle?

14. **WRITE** *Math* Write a problem that can be solved by comparing quarts and cups using a model. Include a solution. Explain why you are changing from a larger unit to a smaller unit.

Lesson Check (4.MD.A.1)

1. Joshua drinks 8 cups of water a day. The recommended daily amount is given in fluid ounces. How many fluid ounces of water does he drink each day?


2. A cafeteria used 5 gallons of milk in preparing lunch. How many 1-quart containers of milk did the cafeteria use?

Spiral Review (4.NF.B.4a, 4.NF.C.6, 4.MD.A.1, 4.G.A.1)

3. Roy uses $\frac{1}{4}$ cup of batter for each muffin. Make a list to show the amounts of batter he will use depending on the number of muffins he makes.

4. Beth has $\frac{7}{100}$ of a dollar. What is the amount of money Beth has?

5. Name the figure that Enrico drew below.



6. A hippopotamus weighs 4 tons. Feeding instructions are given for weights in pounds. How many pounds does the hippopotamus weigh?
