Rulers are usually separated into eighths of an inch.

$\frac{1}{8}$ inch    $\frac{1}{4}$ inch    $\frac{1}{2}$ inch

0        1        2        3
in.
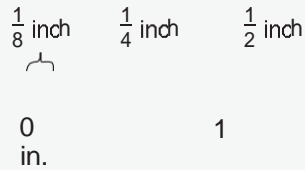
The smallest mark represents $\frac{1}{8}$ inch. The next larger mark represents $\frac{1}{4}$ inch, and the next larger mark represents $\frac{1}{2}$ inch. The longest mark on a ruler represents an inch.

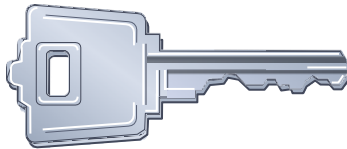**EXAMPLE**   Draw a Line Segment

**1** Draw a line segment measuring $2\frac{3}{8}$ inches.

Draw a line segment from 0 to $2\frac{3}{8}$.

0        1        2        3
in.

**Real-World EXAMPLE**   Measure Length

**2** Measure the key's length to the nearest half, fourth, or eighth inch.

0        1        2
in.

The length of the key is between $1\frac{3}{4}$ inches and $1\frac{7}{8}$ inches. It is closer to $1\frac{3}{4}$ inches.

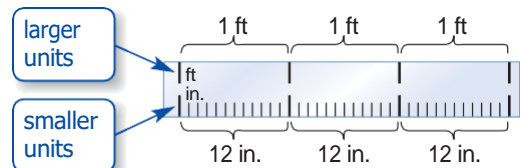The length of the key is about $1\frac{3}{4}$ inches.

**EXAMPLE**   Change Larger Units to Smaller Units

**3** 3 ft =    in.

Since 1 foot = 12 inches, multiply 3 by 12.

3 × 12 = 36

So, 3 feet = 36 inches.

larger units

smaller units

1 ft      1 ft      1 ft
ft
in.
12 in.   12 in.   12 in.

To change from larger units to smaller units you multiply. Similarly, to change from smaller units to larger units you divide.
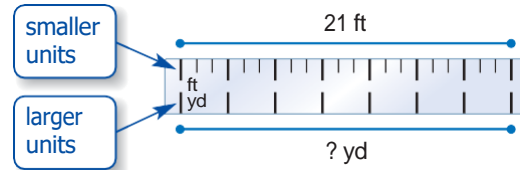
**EXAMPLE**     Change Smaller Units to Larger Units

**4** 21 ft =     yd

Since 3 feet = 1 yard, divide 21 by 3.

$21 \div 3 = 7$

So, 21 feet = 7 yards.

smaller units

larger units

21 ft

ft
yd

? yd

**Real-World EXAMPLE**

**5** A bookcase is 60 inches tall. The distance between the top of the bookcase and the ceiling is 4 feet. What is the distance in feet between the floor and the ceiling?

First, find the height of the bookcase in feet.

$60 \div 12 = 5$   Since 12 inches = 1 foot, divide 60 by 12.

Since the bookcase is 5 feet tall and the distance between the top of the bookcase and the ceiling is 4 feet, then the distance between the floor and the ceiling is 5 feet + 4 feet or 9 feet.

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# CHECK What You Know

Draw a line segment of each length.  See Example 1 (p. 633)

**1.** $1\frac{1}{4}$ in.

**2.** $\frac{5}{8}$ in.

Measure the length of each line segment or object to the nearest half, fourth, or eighth inch. See Example 2 (p. 633)

**3.** •————————•

**4.**

Complete.  See Examples 3, 4 (pp. 633–634)

**5.** 4 yd =    ft

**6.** 4 mi =    yd

**7.** 72 in. =    yd

**8.** 5,280 ft =    mi

**9.** Brianna's brother is about 25 inches shorter than she is. If Brianna is 5 feet tall, about how tall is her brother in feet? See Example 5 (p. 634)

**10.** Talk About It Describe how you would change 12 feet to yards.

Draw a line segment of each length. See Example 1 (p. 633)

**11.** $2\frac{1}{2}$ in.

**12.** $3\frac{1}{4}$ in.

**13.** $\frac{3}{4}$ in.

**14.** $1\frac{3}{8}$ in.

Measure the length of each line segment or object to the nearest
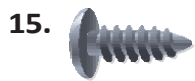half, fourth, or eighth inch. See Example 2 (p. 633)

**15.**

**16.** ⇧ Shift

**17.** •————————•

**18.** •——•

**19.** 37 USA 2002

**20.**

Complete. See Examples 3, 4 (pp. 633–634)

**21.** 5 yd =     in.

**22.** 6 yd =     ft

**23.** $6\frac{1}{2}$ ft =     in.

**24.** 3.5 mi =   ft

**25.** 48 in. =     ft

**26.** 10 ft =   yd

**27.** 6,160 yd =     mi

**28.** 510 in. =     ft

**29.** The largest telescope in the world is powerful enough to identify a
penny that is 5 miles away. How many yards is this?

**30.** Top Thrill Dragster at Cedar Point in Sandusky, Ohio, is the tallest
roller coaster in the United States. It has a height of 420 feet. What
is this height in yards?

**H.O.T. Problems**

**31.** **OPEN ENDED** Draw a segment that measures between $1\frac{1}{2}$ inches
and $2\frac{1}{4}$ inches long. State the measure of the segment to the nearest
fourth inch. Then state the measure to the nearest eighth inch.

**32.** **CHALLENGE** How many sixteenths of an inch are in a foot? How
many half inches are in a yard?

**REASONING** Determine whether you would measure each length or
distance in inches, feet, yards, or miles. Explain your reasoning.

**33.** length of a computer monitor

**34.** distance from your home to school

**35.** **WRITING IN MATH** Suppose your friend says that 24 feet is
equal to 2 inches. Is this reasonable? Explain.

# Capacity and Weight in the Customary System

## MAIN IDEA

I will change units of capacity and weight in the customary system.

**Preparation for Standard 6AF2.1**
Convert one unit of measurement to another (e.g., from feet to miles, from centimeters to inches).

## New Vocabulary

capacity
fluid ounce
cup
pint
quart
gallon
ounce
pound
ton

### GET READY to Learn

**Hands-On Mini Lab**

Several different milk containers are shown at the right.

gallon          quart          pint

**Step 1** Fill the pint container with water. Then pour the water into the quart container. Repeat until the quart container is full. Record the number of pints needed to fill the quart.

**Step 2** Fill the quart container with water. Then pour the water into the gallon container. Repeat until the gallon container is full. Record the number of quarts needed to fill the gallon.

Complete.

**1.** 1 quart =     pints          **2.** 2 quarts =     pints

**3.** 1 gallon =     quarts          **4.** 1 gallon =     pints

**5.** What fractional part of 1 gallon would fit in 1 pint?

**6.** How many gallons are equal to 12 quarts? Explain.

**Capacity** refers to the amount that can be held in a container. The most commonly used customary units of capacity are shown.

| Unit | Model |
|------|-------|
| 1 **fluid ounce** (fl oz) | 2 tablespoons of water |
| 1 **cup** (c) = 8 fl oz | coffee cup |
| 1 **pint** (pt) = 2 c | small ice cream container |
| 1 **quart** (qt) = 2 pt | large liquid measuring cup |
| 1 **gallon** (gal) = 4 qt | large plastic jug of milk |

As with units of length, to change from larger units to smaller units, multiply. To change from smaller units to larger units, divide.

Complete.

**1** 3 qt = ⬚ pt

You know that there are 2 pints in 1 quart.



2 pints          1 quart

Since you are changing a larger unit to a smaller unit, multiply 3 by 2.

$3 \times 2 = 6$

So, 3 quarts = 6 pints.

**2** 64 fl oz = ⬚ pt

First, find the number of cups in 64 fluid ounces.

Since 8 fluid ounces = 1 cup, divide 64 by 8.

$64 \div 8 = 8$

So, 64 fluid ounces = 8 cups. Next, find the number of pints in 8 cups.

Since 2 cups = 1 pint, divide 8 by 2.

$8 \div 2 = 4$

So, 64 fluid ounces = 4 pints.

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The most commonly used customary units of weight are shown.

| Unit | Model |
|---|---|
| 1 **ounce** (oz) | pencil |
| 1 **pound** (lb) = 16 oz | package of notebook paper |
| 1 **ton** (T) = 2,000 lb | small passenger car |

### Vocabulary Link

**Capacity**

Everyday Use the maximum amount that can be contained, as in a theater filled to capacity

Math Use amount that can be held in a container

**Remember**

For Example 2, since 8 fluid ounces = 1 cup and 2 cups = 1 pint, you need to divide twice. $64 \div 8 = 8$ and $8 \div 2 = 4$ So, 64 fluid ounces = 4 pints.