

Convert Units of Measure

Show What You Know

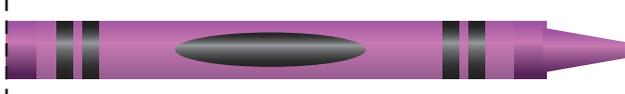


Check your understanding of important skills.

Name _____

► **Measure Length to the Nearest Inch**

Use an inch ruler. Measure the length to the nearest inch.

1.  about _____ inches
2.  about _____ inches

► **Multiply and Divide by 10, 100, and 1,000** Use mental math.

$$3. \begin{aligned} 1 \times 5.98 &= 5.98 \\ 10 \times 5.98 &= 59.8 \end{aligned}$$

$$4. \begin{aligned} 235 \div 1 &= 235 \\ 235 \div 10 &= 23.5 \end{aligned}$$

$$100 \times 5.98 = \underline{\hspace{2cm}}$$

$$235 \div 100 = \underline{\hspace{2cm}}$$

$$1,000 \times 5.98 = \underline{\hspace{2cm}}$$

$$235 \div 1,000 = \underline{\hspace{2cm}}$$

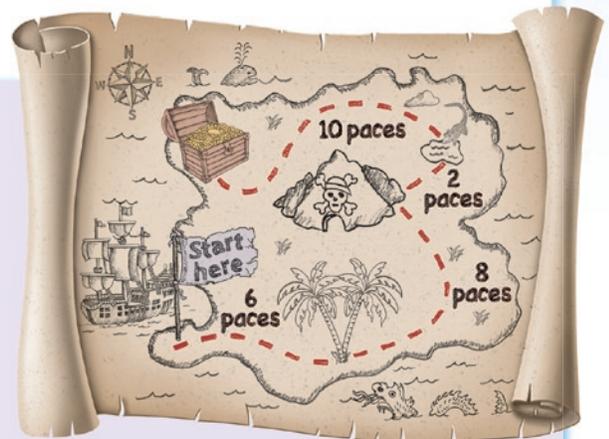
► **Choose Customary Units** Write the appropriate unit to measure each.
Write *inch*, *foot*, *yard*, or *mile*.

5. length of a pencil _____

6. length of a football field _____



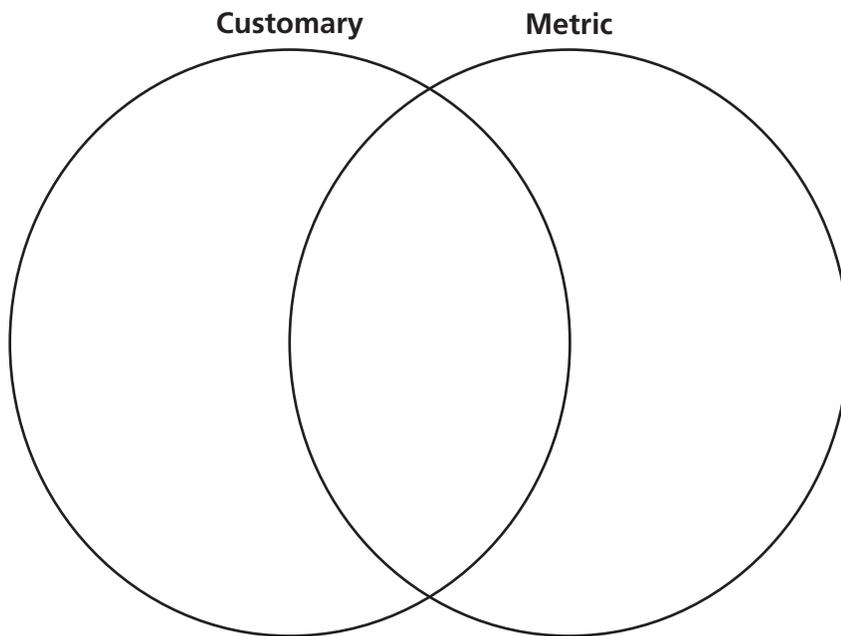
You can step out distances of 5 feet by using an estimate. Two steps or 2 paces is about 5 feet. Be a Math Detective and act out the directions on the map to find a treasure. About how many feet from start to finish is the path to the treasure?



Vocabulary Builder

► Visualize It

Sort the review and preview words into the Venn diagram.



Review Words

decimeter
gallon
gram
length
liter
mass
meter
mile
milligram
milliliter
millimeter
pound
ton
weight

Preview Words

capacity
dekameter

► Understand Vocabulary

Complete the sentences.

1. A metric unit of length that is equal to one tenth of a meter is a _____.
2. A metric unit of length that is equal to one thousandth of a meter is a _____.
3. A metric unit of capacity that is equal to one thousandth of a liter is a _____.
4. A metric unit of length that is equal to 10 meters is a _____.
5. A metric unit of mass that is equal to one thousandth of a gram is a _____.

Name _____

Customary Length

Essential Question How can you compare and convert customary units of length?

UNLOCK the Problem REAL WORLD

To build a new swing, Mr. Mattson needs 9 feet of rope for each side of the swing and 6 more feet for the monkey bar. The hardware store sells rope by the yard.

- How many feet of rope does Mr. Mattson need for the swing? _____
- How many feet does Mr. Mattson need for the swing and the monkey bar combined? _____

Mr. Mattson needs to find how many yards of rope he needs to buy. He will need to convert 24 feet to yards. How many groups of 3 feet are in 24 feet?



A 12-inch ruler is 1 foot.

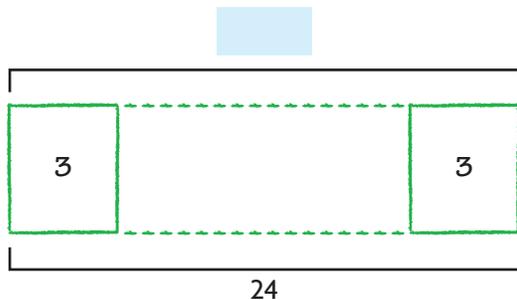
A yardstick is 1 yard.

_____ feet = 1 yard



Use a bar model to write an equation.

MODEL



RECORD

total feet	feet in 1 yard	total yards
↓	↓	↓
24	÷ _____	= _____

So, Mr. Mattson needs to buy _____ yards of rope.

Math Talk

MATHEMATICAL PRACTICES

What operation did you use when you found groups of 3 feet in 24 feet? Do you multiply or divide when you convert a smaller unit to a larger unit? **Explain.**



Example 1 Use the table to find the relationship between miles and feet.

Customary Units of Length

1 foot (ft) = 12 inches (in.)

1 yard (yd) = 3 ft

1 mile (mi) = 5,280 ft

1 mile = 1,760 yd

The distance between the new high school and the football field is 2 miles. How does this distance compare to 10,000 feet?

When you convert larger units to smaller units, you need to multiply.

STEP 1 Convert 2 miles to feet.

Think: 1 mile is equal to 5,280 feet.

I need to _____ the total number of miles by _____.

total miles		feet in 1 mile		total feet
↓		↓		↓
2	×	_____	=	_____
2 miles = _____ feet				

STEP 2 Compare. Write <, >, or =.

_____ feet ○ 10,000 feet

Since _____ is _____ than 10,000, the distance between the new high school and the football field is _____ than 10,000 feet.



Example 2 Convert to mixed measures.

Mixed measures use more than one unit of measurement. You can convert a single unit of measurement to mixed measures.

Convert 62 inches into feet and inches.

STEP 1 Use the table.

Think: 12 inches is equal to 1 foot

I am changing from a smaller unit to a larger unit, so I _____.

STEP 2 Convert.

total inches		inches in 1 foot		feet		inches
↓		↓		↓		↓
62	÷	_____	is	_____	r	_____

So, 62 inches is equal to _____ feet _____ inches.

- **Explain** how to convert the mixed measures, 12 yards 2 feet, to a single unit of measurement in feet. How many feet is it?

Name _____

Share and Show



Convert.

1. 2 mi = _____ yd

✓ 2. 6 yd = _____ ft

✓ 3. 90 in. = _____ ft _____ in.

Math Talk

MATHEMATICAL PRACTICES

Explain how you know when to multiply to convert a measurement.

On Your Own

Convert.

4. 57 ft = _____ yd

5. 13 ft = _____ in.

6. 240 in. = _____ ft

7. 6 mi = _____ ft

8. 96 ft = _____ yd

9. 75 in. = _____ ft _____ in.

Practice: Copy and Solve Convert.

10. 60 in. = ■ ft

11. ■ ft = 7 yd 1 ft

12. 4 mi = ■ yd

13. 125 in. = ■ ft ■ in.

14. 46 ft = ■ yd ■ ft

15. 42 yd 2 ft = ■ ft

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

16. 8 ft ○ 3 yd

17. 2 mi ○ 10,500 ft

18. 3 yd 2 ft ○ 132 in.

Problem Solving **REAL WORLD**

19. **H.O.T.** Javon is helping his dad build a tree house. He has a piece of trim that is 13 feet long. How many pieces can Javon cut that are 1 yard long? How much of a yard will he have left over?

20. **Test Prep** Katy's driveway is 120 feet long. How many yards long is Katy's driveway?

- (A) 60 yards
- (B) 40 yards
- (C) 20 yards
- (D) 10 yards



Connect to Reading

Compare and Contrast

When you compare and contrast, you tell how two or more things are alike and different. You can compare and contrast information in a table.

Complete the table below. Use the table to answer the questions.

Linear Units				
Yards	1	2	3	4
Feet	3	6	9	
Inches	36	72		

21. How are the items in the table alike? How are they different?

22. What do you notice about the relationship between the number of larger units and the number of smaller units as the length increases?

Name _____

Customary Capacity

Essential Question How can you compare and convert customary units of capacity?

UNLOCK the Problem REAL WORLD

Mara has a can of paint with 3 cups of purple paint in it. She also has a bucket with a capacity of 26 fluid ounces. Will the bucket hold all of the paint Mara has?

The **capacity** of a container is the amount the container can hold.



1 cup (c) = _____ fluid ounces (fl oz)

- What capacity does Mara need to convert?

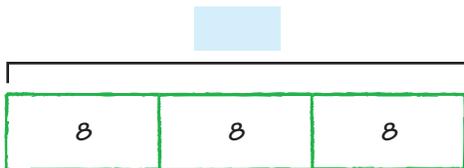
- After Mara converts the units, what does she need to do next?



Use a bar model to write an equation.

STEP 1 Convert 3 cups to fluid ounces.

MODEL



RECORD

total cups	fl oz in 1 cup	total fl oz
↓	↓	↓
3	×	_____ = _____



STEP 2 Compare. Write <, >, or =.

_____ fl oz ○ 26 fl oz

Since _____ fluid ounces is _____ than 26 fluid ounces,

Mara's bucket _____ hold all of the paint.

- **What if** Mara has 7 cups of green paint and a container filled with 64 fluid ounces of yellow paint? Which color paint does Mara have more of? **Explain** your reasoning.

Name _____

On Your Own

Convert.

5. $38 \text{ c} = \underline{\hspace{2cm}} \text{ pt}$

6. $36 \text{ qt} = \underline{\hspace{2cm}} \text{ gal}$

7. $104 \text{ fl oz} = \underline{\hspace{2cm}} \text{ c}$

8. $4 \text{ qt} = \underline{\hspace{2cm}} \text{ c}$

9. $7 \text{ gal} = \underline{\hspace{2cm}} \text{ pt}$

10. $96 \text{ fl oz} = \underline{\hspace{2cm}} \text{ pt}$

Practice: Copy and Solve Convert.

11. $200 \text{ c} = \blacksquare \text{ qt}$

12. $22 \text{ pt} = \blacksquare \text{ fl oz}$

13. $8 \text{ gal} = \blacksquare \text{ qt}$

14. $72 \text{ fl oz} = \blacksquare \text{ c}$

15. $2 \text{ gal} = \blacksquare \text{ pt}$

16. $48 \text{ pt} = \blacksquare \text{ gal}$

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

17. $28 \text{ c} \bigcirc 14 \text{ pt}$

18. $25 \text{ pt} \bigcirc 13 \text{ qt}$

19. $20 \text{ qt} \bigcirc 80 \text{ c}$

20. $12 \text{ gal} \bigcirc 50 \text{ qt}$

21. $320 \text{ fl oz} \bigcirc 18 \text{ pt}$

22. $15 \text{ qt} \bigcirc 63 \text{ c}$

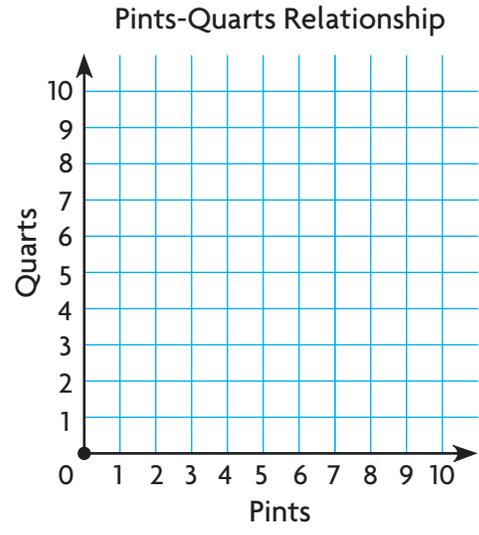
23.  **Write Math** Which of exercises 17–22 could you solve mentally?
Explain your answer for one exercise.

Problem Solving **REAL WORLD**

Show your work. For 24–26, use the table.

24. **H.O.T.** Complete the table, and make a graph showing the relationship between pints and quarts. Draw a line through the points to make the graph.

Pints	Quarts
0	0
2	
4	
6	
8	



25. **Describe** any pattern you notice in the pairs of numbers you graphed. Write a rule to describe the pattern.

26. **H.O.T.** **Explain** how you can use your graph to find the number of quarts equal to 5 pints.

27. **Test Prep** Shelby made 5 quarts of juice for a picnic. How many cups of juice did Shelby make?

- (A) 1 cup (C) 10 cups
 (B) 5 cups (D) 20 cups

Name _____

Weight

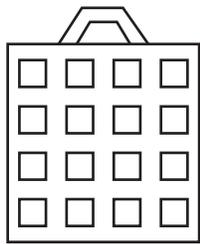
Essential Question How can you compare and convert customary units of weight?

UNLOCK the Problem REAL WORLD

Hector's school is having a model rocket competition. To qualify, each rocket must weigh 4 pounds or less. Hector's unpainted rocket weighs 62 ounces. What is the weight of the most paint he can use for his model rocket to qualify for entry?

- What weight does Hector need to convert?

- After Hector converts the weight, what does he need to do next?



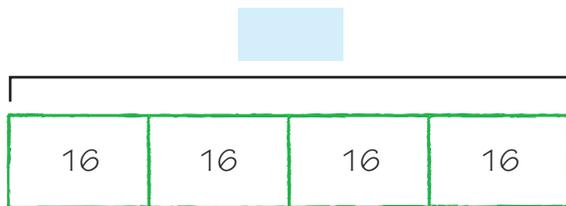
1 pound = _____ ounces



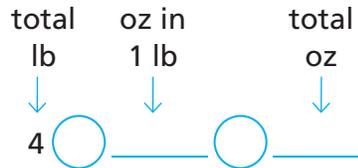
Use a bar model to write an equation.

STEP 1 Convert 4 pounds to ounces.

MODEL



RECORD



STEP 2 Subtract the rocket's weight from the total ounces a rocket can weigh to qualify.

_____ - 62 = _____

So, the weight of the paint can be at most _____ ounces for Hector's model rocket to qualify for entry.



Math Talk

MATHEMATICAL PRACTICES

How did you choose which operation to use to change from pounds to ounces? **Explain.**

Example

The rocket boosters for a U.S. space shuttle weigh 1,292,000 pounds each when the shuttle is launched. How many tons does each rocket booster weigh?

Use mental math to convert pounds to tons.

STEP 1 Decide which operation to use.

Since pounds are smaller than tons,
I need to _____ the number
of pounds by _____.

Units of Weight

1 pound (lb) = 16 ounces (oz)

1 ton (T) = 2,000 lb

STEP 2 Break 2,000 into two factors that are easy to divide by mentally.

$2,000 = \underline{\hspace{2cm}} \times 2$

STEP 3 Divide 1,292,000 by the first factor. Then divide the quotient by the second factor.

$1,292,000 \div \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

$\underline{\hspace{2cm}} \div 2 = \underline{\hspace{2cm}}$

So, each rocket booster weighs _____ tons when launched.

Share and Show



1. Use the picture to complete each equation.

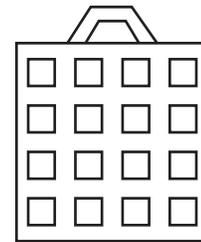
a. 1 pound = _____ ounces

b. 2 pounds = _____ ounces

c. 3 pounds = _____ ounces

d. 4 pounds = _____ ounces

e. 5 pounds = _____ ounces



Convert.

2. 15 lb = _____ oz

 3. 3 T = _____ lb

 4. 320 oz = _____ lb

Math Talk

MATHEMATICAL PRACTICES

Explain how you can compare 11 pounds to 175 ounces mentally.

Name _____

On Your Own

Convert.

5. $5 \text{ T} = \underline{\hspace{2cm}} \text{ lb}$

6. $19 \text{ T} = \underline{\hspace{2cm}} \text{ lb}$

7. $16,000 \text{ lb} = \underline{\hspace{2cm}} \text{ T}$

8. $192 \text{ oz} = \underline{\hspace{2cm}} \text{ lb}$

9. $416 \text{ oz} = \underline{\hspace{2cm}} \text{ lb}$

10. $24 \text{ lb} = \underline{\hspace{2cm}} \text{ oz}$

Practice: Copy and Solve Convert.

11. $23 \text{ lb} = \blacksquare \text{ oz}$

12. $6 \text{ T} = \blacksquare \text{ lb}$

13. $144 \text{ oz} = \blacksquare \text{ lb}$

14. $15 \text{ T} = \blacksquare \text{ lb}$

15. $352 \text{ oz} = \blacksquare \text{ lb}$

16. $18 \text{ lb} = \blacksquare \text{ oz}$

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

17. $130 \text{ oz} \bigcirc 8 \text{ lb}$

18. $34 \text{ lb} \bigcirc 544 \text{ oz}$

19. $14 \text{ lb} \bigcirc 229 \text{ oz}$

20. $16 \text{ T} \bigcirc 32,000 \text{ lb}$

21. $5 \text{ lb} \bigcirc 79 \text{ oz}$

22. $85,000 \text{ lb} \bigcirc 40 \text{ T}$

Problem Solving REAL WORLD

23.  **Write Math** Explain how you can use mental math to compare 7 pounds to 120 ounces.

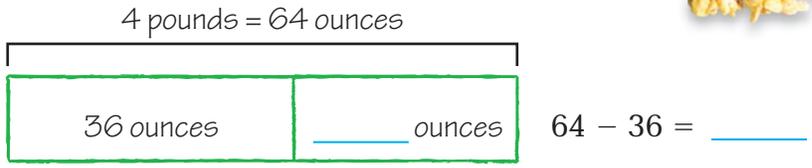
24. **Test Prep** Carlos used 32 ounces of walnuts in a muffin recipe. How many pounds of walnuts did Carlos use?

- (A) 8 pounds
- (B) 4 pounds
- (C) 2 pounds
- (D) 1 pound

Problem Solving REAL WORLD

H.O.T. Pose a Problem

25. Kia wants to have 4 pounds of munchies for her party. She has 36 ounces of popcorn and wants the rest to be pretzel sticks. How many ounces of pretzel sticks does she need to buy?



So, Kia needs to buy _____ ounces of pretzel sticks.

Write a new problem using different amounts of snacks. Some weights should be in pounds and others in ounces. Make sure the amount of snacks given is less than the total amount of snacks needed.

Pose a Problem

Draw a bar model for your problem. Then solve.

- Write an expression you could use to solve your problem. **Explain** how the expression represents the problem.

Name _____

Multistep Measurement Problems**Essential Question** How can you solve multistep problems that include measurement conversions?

A leaky faucet in Jarod's house drips 2 cups of water each day. After 2 weeks of dripping, the faucet is fixed. If it dripped the same amount each day, how many quarts of water dripped from Jarod's leaky faucet in 2 weeks?



Use the steps to solve the multistep problem.

STEP 1

Record the information you are given.

The faucet drips _____ cups of water each day.

The faucet drips for _____ weeks.

STEP 2

Find the total amount of water dripped in 2 weeks.

Since you are given the amount of water dripped each day, you must convert 2 weeks into days and multiply.

cups each day	days in 2 weeks	total cups
↓	↓	↓

$$2 \quad \times \quad \underline{\hspace{2cm}} \quad = \quad \underline{\hspace{2cm}}$$

The faucet drips _____ cups in 2 weeks.

Think: There are 7 days in 1 week.**STEP 3**

Convert from cups to quarts.

Think: There are 2 cups in 1 pint.

There are 2 pints in 1 quart.

_____ cups = _____ pints

_____ pints = _____ quarts

So, Jarod's leaky faucet drips _____ quarts of water in 2 weeks.

- **What if** the faucet dripped for 4 weeks before it was fixed? How many quarts of water would have leaked?

Example

A carton of large, Grade A eggs weighs about 1.5 pounds. If a carton holds a dozen eggs, how many ounces does each egg weigh?

STEP 1

In ounces, find the weight of a carton of eggs.

Think: 1 pound = _____ ounces



Weight of a carton (in ounces):

$$\begin{array}{ccc} \text{total lb} & \text{oz in 1 lb} & \text{total oz} \\ \downarrow & \downarrow & \downarrow \\ 1.5 & \times \quad \underline{\hspace{1cm}} & = \quad \underline{\hspace{1cm}} \end{array}$$

The carton of eggs weighs about _____ ounces.

STEP 2

In ounces, find the weight of each egg in a carton.

Think: 1 carton (dozen eggs) = _____ eggs

Weight of each egg (in ounces):

$$\begin{array}{ccc} \text{total oz} & \text{eggs in 1 carton} & \text{oz of 1 egg} \\ \downarrow & \downarrow & \downarrow \\ 24 & \div \quad \underline{\hspace{1cm}} & = \quad \underline{\hspace{1cm}} \end{array}$$

So, each egg weighs about _____ ounces.

Share and Show

Solve.

1. After each soccer practice, Scott runs 4 sprints of 20 yards each. If he continues his routine, how many practices will it take for Scott to have sprinted a total of 2 miles combined?

Scott sprints _____ yards each practice.

Since there are _____ yards in 2 miles, he will need to continue his routine for

_____ practices.

-  3. Cory brings five 1-gallon jugs of juice to serve during parent night at his school. If the paper cups he is using for drinks can hold 8 fluid ounces, how many drinks can Cory serve for parent night?

-  2. A worker at a mill is loading 5-lb bags of flour into boxes to deliver to a local warehouse. Each box holds 12 bags of flour. If the warehouse orders 3 Tons of flour, how many boxes are needed to fulfill the order?

Math Talk

MATHEMATICAL PRACTICES

Explain the steps you took to solve Exercise 2.

Name _____

On Your Own

Solve.

4. A science teacher needs to collect lake water for a lab she is teaching. The lab requires each student to use 4 fluid ounces of lake water. If 68 students are participating, how many pints of lake water will the teacher need to collect?
5. A string of decorative lights is 28 feet long. The first light on the string is 16 inches from the plug. If the lights on the string are spaced 4 inches apart, how many lights are there on the string?

6. When Jamie's car moves forward such that each tire makes one full rotation, the car has traveled 72 inches. How many full rotations will the tires need to make for Jamie's car to travel 10 yards?
7. A male African elephant weighs 7 Tons. If a male African lion at the local zoo weighs $\frac{1}{40}$ of the weight of the male African elephant, how many pounds does the lion weigh?

8. An office supply company is shipping a case of wooden pencils to a store. There are 64 boxes of pencils in the case. If each box of pencils weighs 2.5 ounces, what is the weight, in pounds, of the case of wooden pencils?
9.  A gallon of unleaded gasoline weighs about 6 pounds. About how many ounces does 1 quart of unleaded gasoline weigh? HINT: 1 quart = $\frac{1}{4}$ of a gallon

UNLOCK the Problem REAL WORLD

10. At a local animal shelter there are 12 small-size dogs and 5 medium-size dogs. Every day, the small-size dogs are each given 12.5 ounces of dry food and the medium-size dogs are each given 18 ounces of the same dry food. How many pounds of dry food does the shelter serve in one day?



a. What are you asked to find? _____

b. What information will you use? _____

c. What conversion will you need to do to solve the problem?

d. Show the steps you use to solve the problem.

e. Complete the sentences. The small-size dogs eat a total of _____ ounces of dry food each day.

The medium-size dogs eat a total of _____ ounces of dry food each day.

The shelter serves _____ ounces, or _____ pounds, of dry food each day.

11. **Test Prep** For a class assignment, students are asked to record the total amount of water they drink in one day. Melinda records that she drank four 8-fluid ounce glasses of water and two 1-pint bottles. How many quarts of water did Melinda drink during the day?

- (A) 2 quarts (C) 6 quarts
- (B) 4 quarts (D) 8 quarts

Name _____



Mid-Chapter Checkpoint

► Vocabulary

Choose the best term from the box.

1. The _____ of an object is how heavy the object is. (p. 413)
2. The _____ of a container is the amount the container can hold. (p. 409)

Vocabulary
capacity
length
weight

► Concepts and Skills

Convert.

3. 5 mi = _____ yd

4. 48 qt = _____ gal

5. 9 T = _____ lb

6. 336 oz = _____ lb

7. 14 ft = _____ yd _____ ft

8. 11 pt = _____ fl oz

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

9. 96 fl oz 13 c

10. 25 lb 384 oz

11. 8 yd 288 in.

Solve.

12. A standard coffee mug has a capacity of 16 fluid ounces. If Annie needs to fill 26 mugs with coffee, how many total quarts of coffee does she need?
- _____

Fill in the bubble completely to show your answer.

13. The length of a classroom is 34 feet. What is this measurement in yards and feet?
- (A) 17 yards 0 feet
 - (B) 11 yards 1 foot
 - (C) 8 yards 2 feet
 - (D) 5 yards 4 feet
14. Charlie's puppy, Max, weighs 8 pounds. How many ounces does Max weigh?
- (A) 24 ounces
 - (B) 88 ounces
 - (C) 124 ounces
 - (D) 128 ounces
15. Milton purchases a 5-gallon aquarium for his bedroom. To fill the aquarium with water, he uses a container with a capacity of 1 quart. How many times will Milton fill and empty the container before the aquarium is full?
- (A) 10
 - (B) 15
 - (C) 20
 - (D) 25
16. Sarah uses a recipe to make 2 gallons of her favorite mixed-berry juice. The containers she plans to use to store the juice have a capacity of 1 pint. How many containers will Sarah need?
- (A) 4
 - (B) 8
 - (C) 10
 - (D) 16
17. The average length of a female white-beaked dolphin is about 111 inches. What is this length in feet and inches?
- (A) 9 feet 2 inches
 - (B) 9 feet 3 inches
 - (C) 10 feet 0 inches
 - (D) 10 feet 3 inches

Name _____

Metric Measures**Essential Question** How can you compare and convert metric units?

UNLOCK the Problem

REAL WORLD

Using a map, Alex estimates the distance between his house and his grandparent's house to be about 15,000 meters. About how many kilometers away from his grandparent's house does Alex live?

- Underline the sentence that tells you what you are trying to find.
- Circle the measurement you need to convert.

The metric system is based on place value. Each unit is related to the next largest or next smallest unit by a power of 10.

One Way Convert 15,000 meters to kilometers.

kilo- (k)	hecto- (h)	deka- (da)	meter (m) liter (L) gram (g)	deci- (d)	centi- (c)	milli- (m)
Power of 10		Power of 10	Power of 10			

STEP 1 Find the relationship between the units.

Meters are _____ powers of 10 smaller than kilometers.

There are _____ meters in 1 kilometer.

STEP 2 Determine the operation to be used.

I am converting from a _____ unit to a _____ unit, so I will _____.

STEP 3 Convert.

number of meters		meters in 1 kilometer		number of kilometers
↓		↓		↓
15,000	○	_____	=	_____

So, Alex's house is _____ kilometers from his grandparent's house.

Math Talk**MATHEMATICAL PRACTICES**

Chose two units in the chart. **Explain** how you use powers of 10 to describe how the two units are related.

Another Way Use a diagram.

Jamie made a bracelet 1.8 decimeters long.
How many millimeters long is Jamie's bracelet?



Convert 1.8 decimeters to millimeters.

				1	8	
kilo-	hecto-	deka-	meter liter gram	deci-	centi-	milli-

STEP 1 Show 1.8 decimeters.

Since the unit is decimeters, place the decimal point so that decimeters are the whole number unit.

STEP 2 Convert.

Cross out the decimal and rewrite it so that millimeters will be the whole number unit. Write zeros to the left of the decimal point as needed to complete the whole number.

STEP 3 Record the value with the new units.

1.8 dm = _____ mm

So, Jamie's bracelet is _____ millimeters long.

Try This! Complete the equation to show the conversion.

A Convert 247 milligrams to centigrams, decigrams, and grams.

Are the units being converted to a larger unit or a smaller unit? _____

Should you multiply or divide by powers of 10 to convert? _____

247 mg 10 = _____ cg

247 mg 100 = _____ dg

247 mg 1,000 = _____ g

B Convert 3.9 hectoliters to dekaliters, liters, and deciliters.

Are the units being converted to a larger unit or a smaller unit? _____

Should you multiply or divide by powers of 10 to convert? _____

3.9 hL 10 = _____ daL

3.9 hL 100 = _____ L

3.9 hL 1,000 = _____ dL

Name _____

Share and Show

Complete the equation to show the conversion.

1. $8.47 \text{ L} \bigcirc 10 = \underline{\hspace{2cm}} \text{ dL}$

$8.47 \text{ L} \bigcirc 100 = \underline{\hspace{2cm}} \text{ cL}$

$8.47 \text{ L} \bigcirc 1,000 = \underline{\hspace{2cm}} \text{ mL}$

Think: Are the units being converted to a larger unit or a smaller unit?

2. $9,824 \text{ dg} \bigcirc 10 = \underline{\hspace{2cm}} \text{ g}$

$9,824 \text{ dg} \bigcirc 100 = \underline{\hspace{2cm}} \text{ dag}$

$9,824 \text{ dg} \bigcirc 1,000 = \underline{\hspace{2cm}} \text{ hg}$

Convert.

3. $4,250 \text{ cm} = \underline{\hspace{2cm}} \text{ m}$

 4. $6,000 \text{ mL} = \underline{\hspace{2cm}} \text{ L}$

 5. $4 \text{ dg} = \underline{\hspace{2cm}} \text{ cg}$

Math Talk

MATHEMATICAL PRACTICES

Explain how you can compare the lengths 4.25 dm and 4.25 cm without converting.

On Your Own

Convert.

6. $8 \text{ kg} = \underline{\hspace{2cm}} \text{ g}$

7. $5 \text{ km} = \underline{\hspace{2cm}} \text{ m}$

8. $40 \text{ mm} = \underline{\hspace{2cm}} \text{ cm}$

9. $7 \text{ g} = \underline{\hspace{2cm}} \text{ mg}$

10. $6,000 \text{ g} = \underline{\hspace{2cm}} \text{ kg}$

11. $1,521 \text{ mL} = \underline{\hspace{2cm}} \text{ dL}$

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

12. $32 \text{ hg} \bigcirc 3.2 \text{ kg}$

13. $6 \text{ km} \bigcirc 660 \text{ m}$

14. $525 \text{ mL} \bigcirc 525 \text{ cL}$

Problem Solving **REAL WORLD**

For 15–16, use the table.

15. Kelly made one batch of peanut and pretzel snack mix. How many grams does she need to add to the snack mix to make 2 kilograms?

16. **H.O.T.** Kelly plans to take juice on her camping trip. Which will hold more juice, 8 cans or 2 bottles? How much more?

17. Erin’s water bottle holds 600 milliliters of water. Dylan’s water bottle holds 1 liter of water. Whose water bottle has the greater capacity? How much greater?

18. Liz and Alana each participated in the high jump at the track meet. Liz’s high jump was 1 meter. Alana’s high jump was 132 centimeters. Who jumped higher? How much higher?

19. **H.O.T.** Are there less than 1 million, exactly 1 million, or greater than 1 million milligrams in 1 kilogram? **Explain** how you know.

20. **Test Prep** Monica has 426 millimeters of fabric. How many centimeters of fabric does Monica have?

- (A) 4,260 centimeters (C) 4.26 centimeters
- (B) 42.6 centimeters (D) 0.426 centimeters

Food for Camping	
Item	Amount
1 can of juice	150 mL
1 bottle of juice	2 L
1 batch of pancakes	200 g
peanut & pretzel snack mix	1,425 g

SHOW YOUR WORK

Name _____

Problem Solving
Customary and Metric Conversions

Essential Question How can you use the strategy *make a table* to help you solve problems about customary and metric conversions?



Aaron is making fruit punch for a family reunion. He needs to make 120 cups of punch. If he wants to store the fruit punch in gallon containers, how many gallon containers will Aaron need?

Use the graphic organizer below to help you solve the problem.

Conversion Table				
	gal	qt	pt	c
1 gal	1	4	8	16
1 qt	$\frac{1}{4}$	1	2	4
1 pt	$\frac{1}{8}$	$\frac{1}{2}$	1	2
1 c	$\frac{1}{16}$	$\frac{1}{4}$	$\frac{1}{2}$	1

Read the Problem

What do I need to find?

I need to find _____

What information do I need to use?

I need to use _____

How will I use the information?

I will make a table to show the relationship between the number of _____ and the number of _____.

Solve the Problem

There are _____ cups in 1 gallon. So, each cup is _____ of a gallon. Complete the table below.

c	1	2	3	4	120
gal	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	

Multiply by _____.

So, Aaron needs _____ gallon containers to store the punch.

- Will all of the gallon containers Aaron uses be filled to capacity? **Explain.** _____



Try Another Problem

Sharon is working on a project for art class. She needs to cut strips of wood that are each 1 decimeter long to complete the project. If Sharon has 7 strips of wood that are each 1 meter long, how many 1-decimeter strips can she cut?

Conversion Table				
	m	dm	cm	mm
1 m	1	10	100	1,000
1 dm	$\frac{1}{10}$	1	10	100
1 cm	$\frac{1}{100}$	$\frac{1}{10}$	1	10
1 mm	$\frac{1}{1,000}$	$\frac{1}{100}$	$\frac{1}{10}$	1

Read the Problem

What do I need to find?

What information do I need to use?

How will I use the information?

Solve the Problem

So, Sharon can cut _____ 1-decimeter lengths to complete her project.

- What relationship did the table you made show? _____

Math Talk

MATHEMATICAL PRACTICES

Explain how you could use another strategy to solve this problem.

Name _____

Share and Show



1. Edgardo has a drink cooler that holds 10 gallons of water. He is filling the cooler with a 1-quart container. How many times will he have to fill the quart container to fill the cooler?

First, make a table to show the relationship between gallons and quarts. You can use a conversion table to find how many quarts are in a gallon.

gal	1	2	3	4	10
qt	4				

Then, look for a rule to help you complete your table.

number of gallons \times _____ = number of quarts

Finally, use the table to solve the problem.

Edgardo will need to fill the quart container _____ times.

2.  **What if** Edgardo only uses 32 quarts of water to fill the cooler. How can you use your table to find how many gallons that is?

3. If Edgardo uses a 1-cup container to fill the cooler, how will that affect the number of times he has to fill a container to fill the cooler? **Explain**.



SHOW YOUR WORK 

On Your Own

Choose a STRATEGY

- Act It Out
- Draw a Diagram
- Make a Table
- Solve a Simpler Problem
- Work Backward
- Guess, Check, and Revise

4. Jeremy made a belt that was 6.4 decimeters long. How many centimeters long is the belt Jeremy made?

5. Dan owns 9 DVDs. His brother Mark has 3 more DVDs than Dan has. Their sister, Marsha, has more DVDs than either of her brothers. Together, the three have 35 DVDs. How many DVDs does Marsha have?

6.  Kevin is making a picture frame. He has a piece of trim that is 4 feet long. How many 14-inch-long pieces can Kevin cut from the trim? How much of a foot will he have left over?

7.  **Write Math** **Explain** how you could find the number of cups in five gallons of water.

8. Carla uses $2\frac{3}{4}$ cups of flour and $1\frac{3}{8}$ cups of sugar in her cookie recipe. How many cups does she use in all?

9. Tony needs 16-inch-long pieces of gold chain to make each of 3 necklaces. He has a piece of chain that is $4\frac{1}{2}$ feet long. How much chain will he have left after making the necklaces?

- (A) 6 inches (C) 18 inches
- (B) 12 inches (D) 24 inches



SHOW YOUR WORK

Name _____

Elapsed Time

Essential Question How can you solve elapsed time problems by converting units of time?

UNLOCK the Problem REAL WORLD

A computer company claims its laptop has a battery that lasts 4 hours. The laptop actually ran for 200 minutes before the battery ran out. Did the battery last 4 hours?



1 hour = _____ minutes

Think: The minute hand moves from one number to the next in 5 minutes.



Convert 200 minutes to hours and minutes.

STEP 1 Convert minutes into hours and minutes.

200 min = _____ hr _____ min

total min	min in 1 hr	hr	min
↓	↓	↓	↓
_____	○	_____	r _____

STEP 2 Compare. Write <, >, or =.

_____ hr _____ min ○ 4 hr

Since _____ hours _____ minutes is _____ 4 hours, the battery _____ last as long as the computer company claims.

Try This! Convert to mixed measures.

Jill spent much of her summer away from home. She spent 10 days with her grandparents, 9 days with her cousins, and 22 days at camp. How many weeks and days was she away from home?

STEP 1 Find the total number of days away.

10 days + 9 days + 22 days = _____ days

STEP 2 Convert the days into weeks and days.

_____ ÷ 7 is _____ r _____

So, Jill was away from home _____ weeks and _____ days.

Units of Time

60 seconds (s) = 1 minute (min)

60 minutes = 1 hour (hr)

24 hours = 1 day (d)

7 days = 1 week (wk)

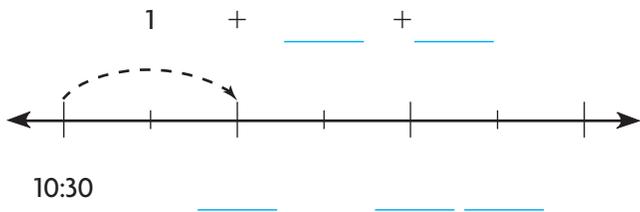
52 weeks = 1 year (yr)

12 months (mo) = 1 year

365 days = 1 year

One Way Use a number line to find elapsed time.

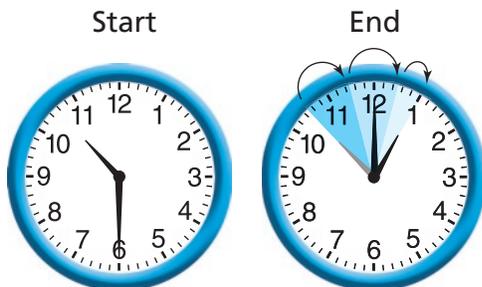
Monica spent $2\frac{1}{2}$ hours working on her computer. If she started working at 10:30 A.M., what time did Monica stop working?



Think: $\frac{1}{2}$ hour = 30 minutes



Another Way Use a clock to find elapsed time.



So, Monica stopped working at _____.

Try This! Find a start time.

Robert's soccer team needs to be off the soccer field by 12:15 P.M. Each game is at most $1\frac{3}{4}$ hours long. What time should the game begin to be sure that the team finishes on time?

$\frac{1}{4}$ hour = 15 minutes, so $\frac{3}{4}$ hour = _____ minutes

STEP 1 Subtract the minutes first.



45 minutes earlier is _____.

So, the game should begin at _____.

STEP 2 Then subtract the hour.



1 hour and 45 minutes earlier is _____.

Math Talk **MATHEMATICAL PRACTICES** Explain how you could convert 3 hours 45 minutes to minutes.

Name _____

Share and Show

Convert.

1. $540 \text{ min} = \underline{\hspace{2cm}} \text{ hr}$

2. $8 \text{ d} = \underline{\hspace{2cm}} \text{ hr}$

 3. $110 \text{ hr} = \underline{\hspace{1cm}} \text{ d } \underline{\hspace{1cm}} \text{ hr}$

Find the end time.

 4. Start time: 9:17 A.M. Elapsed time: 5 hr 18 min



End time: _____

Math Talk

MATHEMATICAL PRACTICES

Explain how to find how long a movie lasts if it starts at 1:35 P.M. and ends at 3:40 P.M.

On Your Own

Convert.

5. $3 \text{ min} = \underline{\hspace{2cm}} \text{ sec}$

6. $240 \text{ min} = \underline{\hspace{2cm}} \text{ hr}$

7. $1 \text{ hr} = \underline{\hspace{2cm}} \text{ sec}$

8. $3 \text{ yr} = \underline{\hspace{2cm}} \text{ d}$

9. $208 \text{ wk} = \underline{\hspace{2cm}} \text{ yr}$

10. $350 \text{ min} = \underline{\hspace{1cm}} \text{ hr } \underline{\hspace{1cm}} \text{ min}$

Find the start, elapsed, or end time.

11. Start time: 11:38 A.M.

Elapsed time: 3 hr 10 min

End time: _____

12. Start time: _____

Elapsed time: 2 hr 37 min

End time: 1:15 P.M.

13. Start time: _____

Elapsed time: $2\frac{1}{4}$ hr

End time: 5:30 P.M.

14. Start time: 7:41 P.M.

Elapsed time: _____

End time: 8:50 P.M.

Name _____



Chapter Review/Test

► Vocabulary

Choose the best term from the box.

1. A metric unit of mass that is equal to $\frac{1}{1,000}$ of a gram is called a _____. (p. 423)
2. A metric unit for measuring length that is equal to 10 meters is called a _____. (p. 423)

Vocabulary
dekameter
milligram
millimeter

► Concepts and Skills

Convert.

3. 96 oz = _____ lb
4. 5 kg = _____ g
5. 500 min = _____ hr _____ min
6. 65 yd 2 feet = _____ ft

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

7. 7 wk ○ 52 d
8. 4 L ○ 3,000 mL
9. 72 in. ○ 2 yd

Solve.

10. A girl walks 5,000 meters in one hour. If the girl walks at the same speed for 4 hours, how many kilometers will she have walked?

Fill in the bubble completely to show your answer.

11. Howard cuts 54 centimeters off a 1-meter board. How much of the board does Howard have left?
- (A) 53 centimeters
 - (B) 53 meters
 - (C) 46 meters
 - (D) 46 centimeters
12. Joe's dog has a mass of 28,000 grams. What is the mass of Joe's dog in kilograms?
- (A) 2,800 kilograms
 - (B) 280 kilograms
 - (C) 28 kilograms
 - (D) 2.8 kilograms
13. Cathy drank 600 milliliters of water at school and another 400 milliliters at home. How many liters of water did Cathy drink?
- (A) 1,000 liters
 - (B) 100 liters
 - (C) 10 liters
 - (D) 1 liter
14. Mr. Banks left work at 5:15 P.M. It took him $1\frac{1}{4}$ hours to drive home. At what time did Mr. Banks arrive home?
- (A) 6:15 P.M.
 - (B) 6:30 P.M.
 - (C) 6:45 P.M.
 - (D) 7:30 P.M.

Name _____

Fill in the bubble completely to show your answer.

15. A turtle walks 12 feet in one hour. How many inches does the turtle walk in one hour?
- (A) 12 inches
 - (B) 24 inches
 - (C) 124 inches
 - (D) 144 inches
16. Jason and Doug competed in the long jump at a track meet. Jason's long jump was 98 inches. Doug's long jump was 3 yards. How much longer was Doug's jump than Jason's jump?
- (A) 1 inch
 - (B) 10 inches
 - (C) 12 inches
 - (D) 20 inches
17. Sarita used 54 ounces of apples to make an apple pie. How many pounds and ounces of apples did Sarita use?
- (A) 2 pounds 6 ounces
 - (B) 3 pounds 6 ounces
 - (C) 4 pounds 6 ounces
 - (D) 8 pounds 6 ounces
18. Morgan measures the capacity of a juice glass to be 12 fluid ounces. If she uses the glass to drink 4 glasses of water throughout the day, how many pints of water does Morgan drink?
- (A) 3 pints
 - (B) 6 pints
 - (C) 24 pints
 - (D) 48 pints

► Constructed Response

19. Louisa needs 3 liters of lemonade and punch for a picnic. She has 1,800 milliliters of lemonade. How much punch does she need? **Explain** how you found your answer.

20. Maddie bought 10 quarts of ice cream. How many gallons and quarts of ice cream did Maddie buy? **Explain** how you found your answer.

► Performance Task

21. The Drama Club is showing a video of their recent play. The first showing began at 2:30 P.M. The second showing was scheduled to start at 5:25 P.M. with a $\frac{1}{2}$ -hour break between the showings.

A How long is the video in hours and minutes? _____

B **Explain** how you can use a number line to find the answer.

C The second showing started 20 minutes late. Will the second showing be over by 7:45 P.M.? **Explain** why your answer is reasonable.
