Length, Liquid Volume, and Mass

Name: _____

Prerequisite: Convert Measurements

Study the example problem showing how to convert from a larger to a smaller unit of length. Then solve problems 1–7.

Example

Tess needs 75 inches of ribbon for a project. She has 6 feet of ribbon. Does she have enough ribbon? How much extra ribbon does she have or how much more ribbon does she need?

Use a table to convert from the larger unit, feet, to the smaller unit, inches.

1 foot = 12 inches

Feet (ft)	1	2	3	4	5	6
Inches (in)	12	24	36	48	60	72

The table shows that 6 feet = 72 inches.
Since 72 < 75, Tess does not have enough ribbon.

75 − 72 = 3, so Tess needs 3 more inches of ribbon.

1 A concrete walkway is 6 meters long. How many centimeters long is the walkway?

1 meter = 100 centimeters

Fill in the missing numbers in the table. Circle the numbers that show how many centimeters are equal to 6 meters.

Meters (m)	1	2				
Centimeters (cm)	100					

The walkway is _____ centimeters long.

2 Explain how to use multiplication to solve problem 1.

_____

_____

_____

_____

Vocabulary

convert to change from one unit to another unit.

1 foot = 12 inches
   ↑   ↑
 unit   unit

Solve.

3 The cooler at a softball game holds 5 quarts of sports drink. How many cups of sports drink does the cooler hold?

| 1 quart = 4 cups |

Show your work.

Solution: _____

4 Mark brought 2 1-liter bottles of water to basketball practice. He drank 1,500 milliliters of water during practice. How many milliliters of water does he have left?

| 1 liter = 1,000 milliliters |

Show your work.

Solution: _____

5 Write an expression to convert kilograms to grams. Let *K* stand for kilograms.

| 1 kilogram = 1,000 grams |

Expression: _____

6 Write an expression to convert pounds to ounces.

Let *p* stand for pounds.

| 1 pound = 16 ounces |

Expression: _____

7 Look at problems 5 and 6 to answer the questions below.

a. How many grams are in 4 kilograms?

_____

b. How many ounces are in 7 pounds?

_____

Solve Length Problems

**Study the example problem showing how to solve a multi-step problem about length. Then solve problems 1–5.**

Example

Wendy has a fence that is 10 feet long. Vines cover a section of fence that is $\frac{5}{6}$ foot long. Wendy and 4 friends will each paint an equal length of the rest of the fence. How long is the section of fence that each friend will paint?

Length of fence

↑ Length with vines   ↑ Each length to paint

1 foot = 12 inches

Length of fence: 10 feet = 120 inches

Length covered with vines: $\frac{5}{6} \times 12$ inches = 10 inches

Length to paint: 120 − 10 = 110 inches

Length of each section: 110 ÷ 5 = 22 inches

The section of fence each friend will paint is 22 inches.

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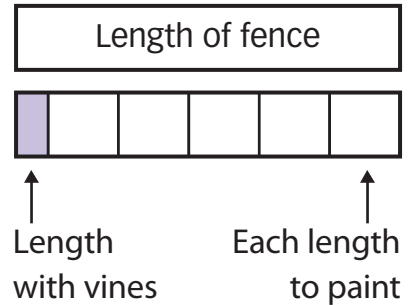
1. Nestor needs 750 centimeters of rope. Rope comes in lengths of $4\frac{1}{2}$ meters and 9 meters at the hardware store. Which length of rope should Nestor buy?

1 meter = 100 centimeters

   $4\frac{1}{2}$ meters = _____ centimeters

   9 meters = _____ centimeters

   a. Which length is greater than 750 centimeters? _____ centimeters

   b. Nestor should buy rope with a length of _____ .

2. Which length is greater, $\frac{1}{2}$ meter or 240 centimeters? Explain.

   _____

   _____

   _____

Solve.

3 Jorge is playing football. He carries the ball forward $5\frac{2}{3}$ yards and then moves backward 1 foot. How far forward is the ball, in feet, from where Jorge started carrying the ball?

$$\boxed{1 \text{ yard} = 3 \text{ feet}}$$

Show your work.

Solution: _____

4 Last summer, Marion was $3\frac{1}{2}$ feet tall. She was 4 inches taller than her brother Elijah. She was $1\frac{1}{4}$ feet shorter than her sister Lorie. How tall were Elijah and Lorie last summer?

$$\boxed{1 \text{ foot} = 12 \text{ inches}}$$

Show your work.

Solution: Elijah: _____ Lorie: _____

5 Paula has $4\frac{2}{3}$ yards of ribbon. She cuts 4 inches off each end of the ribbon to remove the frayed ends. She divides the remaining ribbon into 16 equal pieces to make bows. What is the length of ribbon, in inches, used to make each bow?

Show your work.

Solution: _____

Name: _____

Solve Liquid Volume Problems

Study the example showing how to solve a liquid volume problem. Then solve problems 1–5.

Example

Naomi has a container of water. She uses 4 liters to water her vegetable garden. She uses $3\frac{1}{2}$ liters to water flowers. She uses the remaining 500 milliliters in the container to fill up a bird bath. How many milliliters of water did Naomi have in the container?

1 liter (L) = 1,000 milliliters (mL)

Write an equation to find the total amount of water.

$W = 4\,L + 3\frac{1}{2}\,L + 500\,mL$

Convert liters to milliliters.

$4 \times 1,000\,mL = 4,000\,mL$
$3 \times 1,000\,mL = 3,000\,mL$ and $\frac{1}{2} \times 1,000\,mL = 500\,mL$

Write the equation using milliliters and solve.

$W = 4,000\,mL + 3,500\,mL + 500\,mL$
$W = 8,000\,mL$

Naomi had 8,000 milliliters of water in the container.

Benny has two small fish tanks with one fish in each tank. One tank has $3\frac{1}{2}$ quarts of water. The other tank has 12 cups of water. Benny combines the water into one large fish tank with both fish in the large tank.

1 quart = 4 cups

1 How many cups of water are in the large tank?

$3\frac{1}{2}$ quarts: 3×4 cups = _____ cups and $\frac{1}{2} \times 4$ cups = _____ cups

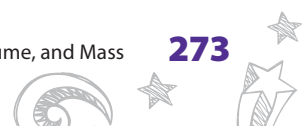$3\frac{1}{2}$ quarts = _____ cups; _____ cups + _____ cups = _____ cups

There are _____ of water in the large tank.

2 At least 5 cups of water are needed for each fish in a tank. How many more fish would Benny be able to put in the large tank? Explain.

_____

_____

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Solve.

3 Tamara prepared fruit punch for a party. She used $\frac{3}{4}$ gallon of pineapple juice, 2 quarts of lemonade, and $1\frac{1}{4}$ gallons of orange juice. How many quarts of punch did Tamara prepare?

Show your work.

$$\boxed{1 \text{ gallon} = 4 \text{ quarts}}$$

Solution: _____

4 Sharon and her cousin are making milkshakes at a family reunion. Sharon brought $2\frac{1}{2}$ gallons of milk. Her cousin brought 2 quarts of milk. The girls used 8 quarts of milk for the milkshakes. How much milk is left? There may be more than one correct answer. Circle the letter for all that apply.

A 4 quarts

B 6 quarts

C $\frac{1}{2}$ gallon

D 1 gallon

E $1\frac{1}{2}$ gallons

5 Rob has 6 quarts of apple cider for the fall fair. He pours the cider into glasses to set on picnic tables. He pours 6 ounces of cider into each glass. How many glasses of cider does Rob set on the tables?

Show your work.

$$\boxed{\begin{array}{l} 1 \text{ quart} = 4 \text{ cups} \\ 1 \text{ cup} = 8 \text{ ounces} \end{array}}$$

Solution: _____

Name: _____

Solve Mass and Weight Problems

Study the example problem showing how to solve a mass and weight problem. Then solve problems 1–5.

Example

The softball coach has a box filled with softballs. The weight of the empty box is 3 pounds. When it is filled with softballs, the box weighs 12 pounds. Each softball has a weight of 6 ounces. How many softballs are in the box?

1 pound = 16 ounces

Find the weight of the softballs in ounces.
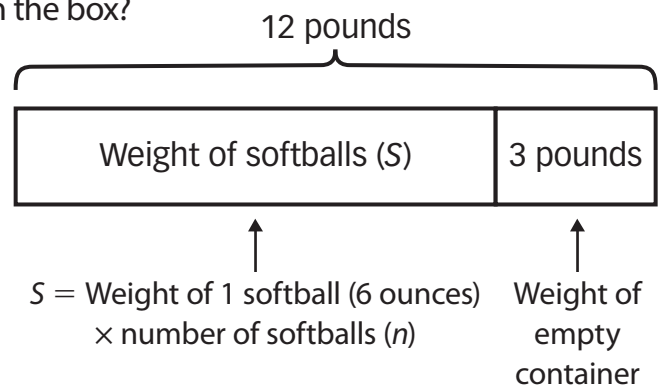$S = 12$ pounds $- 3$ pounds $= 9$ pounds
$S = 9 \times 16$ ounces $= 144$ ounces

Find the number of softballs.
$S = 6 \times n$
$144 = 6 \times n$
$24 = n$

There are 24 softballs in the box.

12 pounds

Weight of softballs (S)	3 pounds

$S = $ Weight of 1 softball (6 ounces) $\times$ number of softballs (n)

Weight of empty container

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1 Look at the example above. Explain why you need to find the weight of the softballs in the box in ounces.

_____

_____

_____

2 Tyson's baby brother weighed 7 pounds, 3 ounces when he was born. The baby lost 9 ounces after a few days, and then gained 1 pound, 6 ounces by the end of the week. How much did the baby weigh at the end of the week?

Show your work.

Solution: _____

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Solve.

3 A large truck that moves cars can carry a maximum load of 15,720 pounds. The table below shows the weight of each kind of car that could be loaded onto the truck.

1 ton = 2,000 pounds

Kind of Car	Compact	Mid-size	Full-size
Weight (in tons)	$1\frac{1}{2}$	$2\frac{1}{4}$	3

Choose *Yes* or *No* to tell whether the truck is able to carry each load of cars below.

a. 2 full-size cars, 1 compact car ☐ Yes ☐ No

b. 2 compact cars, 2 full-size cars ☐ Yes ☐ No

c. 2 mid-size cars, 2 compact cars ☐ Yes ☐ No

d. 4 mid-size cars ☐ Yes ☐ No

4 Melinda donated fudge for the school bake sale. She wrapped 80 pieces of fudge. Each piece of fudge weighed 1 ounce. How many pounds of fudge did Melinda wrap?

1 pound = 16 ounces

Show your work.

Solution: _____

5 A paper clip has a mass of 1 gram. A box of paper clips has 100 paper clips. Which equation below can be used to find the number of boxes of paper clips that will have a mass of 1 kilogram? Let *n* be the number of boxes. Circle the letter for all that apply.

1 kilogram = 1,000 grams

A $100 = 1,000 \div n$

B $n = 1,000 \times 100$

C $n = 1,000 \div 100$

D $1,000 = n \times 100$

Name: _____

Length, Liquid Volume, and Mass

Solve the problems.

1 Miguel and his brother put two 8-foot tables end to end for a graduation party. The tablecloth they plan to use is 5 yards in length. Is the tablecloth long enough to cover both tables?

A Yes, because 8 feet $<$ 10 yards.

B Yes, because the tables are 8 feet long and the tablecloth is 15 feet long.

C No, because the tables are 16 feet long and the tablecloth is 15 feet long.

D No, because 8 feet $>$ 5 yards.

> *1 yard = 3 feet. What units should you use to compare the length of the tables and the length of the tablecloth?*

2 Patel bought a 2-pound bag of trail mix. He poured $\frac{1}{2}$ pound of the mix into a bowl and divided the remaining amount into bags. Each bag had 2 ounces of trail mix. How many bags did Patel use?

A 20 bags

B 16 bags

C 12 bags

D 8 bags

Jen chose **A** as the correct answer. How did she get that answer?
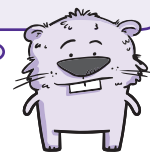
_____

_____

_____

_____

> *1 pound = 16 ounces. How many ounces of trail mix is he dividing into bags?*

Solve.

3 Marcus poured an equal amount of milk into 4 bottles. He started with 1 quart of milk. After pouring, he had $\frac{1}{4}$ of a quart of milk left. How many ounces of milk did Marcus pour into each bottle?

1 quart = 4 cups.
1 cup = 8 ounces.
There are two steps in this problem.

Show your work.

Solution: _____

4 Maya cut a length of wood into strips to make 5 small picture frames. She used 14 inches of wood for each frame. For another project, she cut another length of wood into 3 strips of 1 foot each and 4 strips of $\frac{1}{6}$ foot each. How much wood, in inches, did Maya use in all?

1 foot = 12 inches.
You can use multiplication and addition to solve this problem.

Show your work.

Solution: _____