

Lesson 23

Convert Measurements

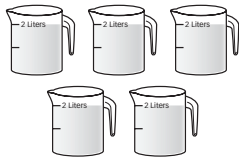
Name: _____

Prerequisite: Multiply with Measurements

Study the example showing how to use multiplication to solve a measurement problem. Then solve problems 1–5.

Example

Kian filled 5 pitchers with water. Each pitcher holds 2 liters. How many liters of water did Kian use to fill the pitchers?

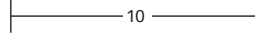


1 pitcher

2

5 pitchers

2	2	2	2	2
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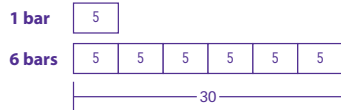
The picture shows that $2 + 2 + 2 + 2 + 2 = 10$.

The bar model shows multiplication as a comparison, $5 \times 2 = 10$.

Kian used 10 liters of water.

- B 1** Yvonne's house has 4 bedrooms. It takes 1 gallon of paint to paint each bedroom. How many gallons of paint are needed to paint all 4 bedrooms? Show how to add or multiply to find the answer.
 $1 + 1 + 1 + 1 = 4$, or $4 \times 1 = 4$. **4 gallons of paint are needed.**

- M 2** One granola bar has 5 grams of protein. A package has 6 granola bars. How many grams of protein are in a package? Draw a bar model to show how to find the answer.



Solution: **30 grams of protein are in a package.**

Solve.

- M 3** Miranda's family brought 3 large coolers full of lemonade to the family picnic. Each cooler contains 8 liters of lemonade. How much lemonade did the family bring to the picnic?

Show your work. Students might draw a picture or a bar model to solve the problem.
Possible work: $3 \times 8 = 24$

Solution: The family brought **24 liters** of lemonade.

- M 4** The table below shows the number of grams of sugar in a 1-cup serving of each kind of fruit.

Fruit	Strawberries	Apples	Bananas
Grams of sugar in a 1-cup serving	7 g	13 g	18 g

- a. How many grams of sugar are in 3 cups of strawberries?
 $3 \times 7 = 21$ grams
- b. How many grams of sugar are in 2 cups of apples?
 $2 \times 13 = 26$ grams
- c. Are there more grams of sugar in 3 cups of strawberries or 2 cups of apples? Explain.
There are more grams of sugar in 2 cups of apples.
 $3 \times 7 = 21$ and $2 \times 13 = 26$. $26 > 21$.

- C 5** Look at the table in problem 4. Madeleine made a strawberry-banana smoothie to share with her friends. She put 4 cups of strawberries and 2 cups of bananas in a blender. How many total grams of sugar are in the smoothie?

Show your work.
Strawberries: $4 \times 7 = 28$
Bananas: $2 \times 18 = 36$
 $28 + 36 = 64$

Solution: **64 grams of sugar**

Key

- B** Basic **M** Medium **C** Challenge



Lesson 23

Name: _____

Convert Units of Weight and Mass

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

Example

Eleanor bought a 3-pound watermelon and 32 ounces of strawberries. How much more does the watermelon weigh than the strawberries?

$$1 \text{ pound (lb)} = 16 \text{ ounces (oz)}$$

Write an expression to convert pounds to ounces.
Let p stand for the number of pounds.

$$p \times 16$$

Find the weight of the watermelon in ounces.
The watermelon weighs 48 ounces.

$$\begin{aligned} \text{Substitute 3 for } p. \\ 3 \times 16 = 48 \end{aligned}$$

$$48 - 32 = 16$$

The watermelon weighs 16 ounces more than the strawberries.

- B** 1 John has a watermelon with a mass of 3 kilograms. Complete the bar model. Then write the mass of the watermelon in grams.

3 kilograms (kg)		
1 kg	1 kg	1 kg
1,000 g	1,000 g	1,000 g
3,000 grams (g)		

- M** 2 Write an expression that shows how to convert kilograms to grams. Use K to stand for the number of kilograms.

$$K \times 1,000$$

- M** 3 Convert the units of mass.

$$2 \text{ kg} = \underline{2,000} \text{ g} \quad 4 \text{ kg} = \underline{4,000} \text{ g}$$

Vocabulary

convert to change from one unit to another unit.

1 kilogram = 1,000 grams

↑ unit ↑ unit

Solve.

- M** 4 Complete the table to convert from a larger unit to a smaller unit of weight.

Pounds (lb)	1	2	3	4	5	6	7
Ounces (oz)	16	32	48	64	80	96	112

- M** 5 Neil brought 2 pounds of grapes for fruit salad at the class picnic. There are 8 ounces of grapes left. How many ounces of grapes were used? Look at the table in problem 4 to help you answer the question.

Show your work.

Possible work:
2 pounds = 32 ounces
32 – 8 = 24

Solution: 24 ounces

- M** 6 Choose Yes or No to tell whether the given weight is equal to 6 pounds.

- a. 22 ounces Yes No
b. 96 ounces Yes No
c. 4 pounds, 32 ounces Yes No
d. 5 pounds, 16 ounces Yes No

- C** 7 An adult bottlenose dolphin has a mass of 200 kilograms. What is the mass of an adult bottlenose dolphin in grams?

$$1 \text{ kilogram} = 1,000 \text{ grams}$$

Show your work.

Possible work:
200 × 1,000 = 200,000

Solution: 200,000 grams



Lesson 23

Name: _____

Convert Units of Liquid Volume

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

Example

Josie made 4 quarts of iced tea for a family picnic. Her sister made 14 cups of punch for the picnic. Who made a greater amount of beverages?

Use a table to convert quarts to cups.

Quarts	1	2	3	4	5
Cups	4	8	12	16	20

1 quart = 4 cups

Josie made 4 quarts, or 16 cups of iced tea.
 $16 > 14$

Josie made a greater amount of beverages.

- B** 1 The soccer coach has a container that holds 5 liters of water. How many milliliters of water does the container hold?

Fill in the table to answer the question.

Liters (L)	1	2	3	4	5
Milliliters (mL)	1,000	2,000	3,000	4,000	5,000

The container holds 5,000 milliliters of water.

- B** 2 Write an expression that shows how to convert liters to milliliters. Use L to stand for the number of liters.

$L \times 1,000$

- M** 3 Convert the units of liquid volume.

$6 \text{ L} = \underline{6,000} \text{ mL}$ $\frac{1}{2} \text{ L} = \underline{500} \text{ mL}$

Vocabulary

convert to change from one unit to another unit.

1 liter = 1,000 milliliters

↑ ↑

unit unit

Solve.

- M** 4 Carla had 2 liters of juice to share. She and her 3 friends each drank an equal amount of the juice. How many milliliters of juice did each friend have?

1 liter = 1,000 milliliters

Show your work.

$2 \times 1,000 = 2,000$

Possible work shown.

$2,000 \div 4 = 500$

Solution: 500 milliliters

- M** 5 Theo filled up a 3-liter watering can to water the garden. He has 750 milliliters of water left in the watering can. How many milliliters of water did Theo use?

Show your work.

$3 \times 1,000 = 3,000$

Possible work shown.

$3,000 - 750 = 2,250$

Solution: 2,250 milliliters

- M** 6 A small bottle contains 2 cups of juice. Do 5 small bottles of juice have a greater amount of juice than a 1-quart bottle of juice? Explain.

1 quart = 4 cups

Possible explanation: 2 cups in each small bottle \times 5 bottles = 10 cups.

So, 5 small bottles = 10 cups of juice. 1 quart = 4 cups of juice. $10 > 4$,

so 5 small bottles of juice have a greater amount of juice than a 1-quart bottle.

- C** 7 Rachel has a 4-liter jug of water. She fills 3 small vases each with 900 mL of water. How much water did she use? How much water is left in the jug?

Show your work.

$4 \text{ L} = 4,000 \text{ mL}$

Possible work shown.

$3 \times 900 = 2,700 \text{ mL used}$

$4,000 - 2,700 = 1,300 \text{ mL left in the jug}$

Solution: 2,700 mL used and 1,300 mL left



Lesson 23

Name: _____


Convert Measurements

Solve the problems.

B 1 How many weeks are in 2 years?

A 26 weeks C 54 weeks
B 52 weeks **D** 104 weeks

There are 52 weeks in a year.




M 2 How many cups of milk are in 8 quarts?

A 2 cups
B 12 cups
C 16 cups
D 32 cups

1 quart = 4 cups

Which is the larger unit, quarts or cups?

Jeff chose **A** as the correct answer. How did he get that answer?
Possible answer: He divided 8 by 4 instead of multiplying 8 by 4.




M 3 Stacia buys 6 yards of ribbon to make a costume. She has 2 feet of ribbon left over. How many feet of ribbon did Stacia use to make the costume?

Show your work. 1 yard = 3 feet

Possible work:
yard \times 3 = feet
 $6 \times 3 = 18$
 $18 - 2 = 16$

You can write an equation to show the relationship between yards and feet.

Solution: Stacia used 16 feet of ribbon.




Solve.

M 4 Which of the following is equal to 2 days, 12 hours? Circle the letter for all that apply.

A 48 hours
B 60 hours
C 1 day, 36 hours
D 1 day, 24 hours

1 day = 24 hours




M 5 Jason is 5 foot 11 inches tall. Amy is 63 inches tall. Who is taller and by how much?

1 foot = 12 inches

Show your work.
Possible work:
5 feet = 60 inches
 $60 + 11 = 71$ inches for Jason's height
 $71 - 63 = 8$ inches

Do you compare the heights in inches or feet?

Solution: Jason is taller than Amy by 8 inches.



C 6 How many 250 mL glasses can be filled with 2 L of water?

1 liter = 1,000 milliliters

Show your work. **Students might draw a picture or a table, or write and solve an equation to solve this problem.**

Glasses	1	2	3	4	5	6	7	8
mL per glass	250	500	750	1,000	1,250	1,500	1,750	2,000

A picture or a table can help you understand and solve this problem.

Solution: 8 glasses

