

Convert Measurement Units



Dear Family,

This week your child is learning to convert from one measurement unit to another.

Your child is learning to make measurement conversions, such as:

- from one unit of length to another, using kilometers, meters, and centimeters.
- from one unit of weight to another, using pounds and ounces.
- from one unit of capacity to another, using gallons, quarts, and cups.

You can describe the same measurement using different units. For example, 1 kilometer describes the same distance as 1,000 meters. The length is the same. The units used to measure the length are different, so the number of units in the measurement is different, too.

Kilometers are a larger unit of measurement than meters. Since there are 1,000 meters in each kilometer, you can multiply the length, or distance, in kilometers by 1,000 to convert the measurement to meters.

$$\begin{aligned}4.5 \text{ kilometers} &= ? \text{ meters} \\4.5 \times 1,000 &= 4,500 \\4.5 \text{ kilometers} &= 4,500 \text{ meters}\end{aligned}$$

Meters are a smaller unit of measurement than kilometers. Since 1 kilometer is equivalent to 1,000 meters, you can divide the length, or distance, in meters by 1,000 to convert the measurement to kilometers.

$$\begin{aligned}6,700 \text{ meters} &= ? \text{ kilometers} \\6,700 \div 1,000 &= 6.7 \\6,700 \text{ meters} &= 6.7 \text{ kilometers}\end{aligned}$$

Your child is becoming familiar with the relative sizes of units by identifying which units are larger and which units are smaller. Also, as your child practices converting units, they are applying multiplication and division skills.

Invite your child to share what they know about converting measurement units by doing the following activity together.

ACTIVITY CONVERTING MEASUREMENT UNITS

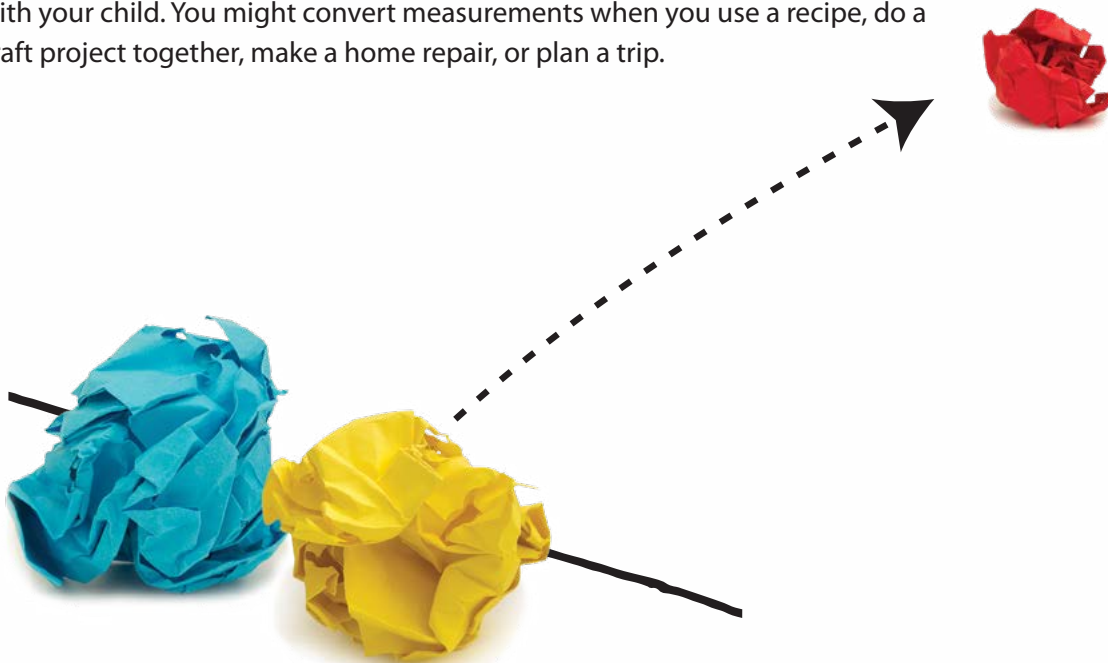
Do this activity with your child to convert measurement units.

Materials ruler or measuring tape, sheet of paper

Play a game with your child to convert measurements in real-life situations.

- Choose a place to mark a starting line. It can be inside your home or outside. Make sure there is enough open space if you choose to play inside.
- Make a paper ball by crumpling a sheet of paper.
- Have your child stand at the starting line and toss the paper ball.
- Together, measure the length of the toss to the nearest foot. Then convert the length of the toss from feet to inches. [1 foot = 12 inches] So, multiply the number of feet by 12 to find the number of inches.
- Take turns tossing the ball, measuring, and converting measurements.

Look out for other real-life opportunities to practice converting measurements with your child. You might convert measurements when you use a recipe, do a craft project together, make a home repair, or plan a trip.



Explore Converting Measurement Units

You have worked with measurement units in earlier grades. Now you will convert between different units in the same measurement system. Use what you know to try to solve the problem below.

Robyn's foster dad buys a futon sofa that is 4 feet wide. Robyn wants to place the futon sofa in the family room. She measures the space in inches. How many inches wide is the futon sofa? (1 foot = 12 inches)



TRY IT



Math Toolkit

- ruler
- yardstick
- number lines
- grid paper
- math reference sheet



DISCUSS IT

Ask your partner: Why did you choose that strategy?

Tell your partner:
I knew ... So I ...



Learning Targets

- Convert from larger measurement units to smaller measurement units.
- Convert from smaller measurement units to larger measurement units.

CONNECT IT

1 LOOK BACK

Look at the problem on the previous page. Is the number of inches in 4 feet greater than or less than the number of feet? Explain.

2 LOOK AHEAD

You solved a problem using the relationship between units to find the equivalent measure. You can use what you know about unit sizes and operations to convert other measurement units.

The table shows equivalent measurements of weight.

a. Is an ounce a smaller unit or larger unit than a pound?

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A melon weighs about 2 pounds. How many ounces is 2 pounds?

b. Suppose a basket of melons weighs 64 ounces.
Is the weight in pounds greater than or less than 64 pounds? How do you know?

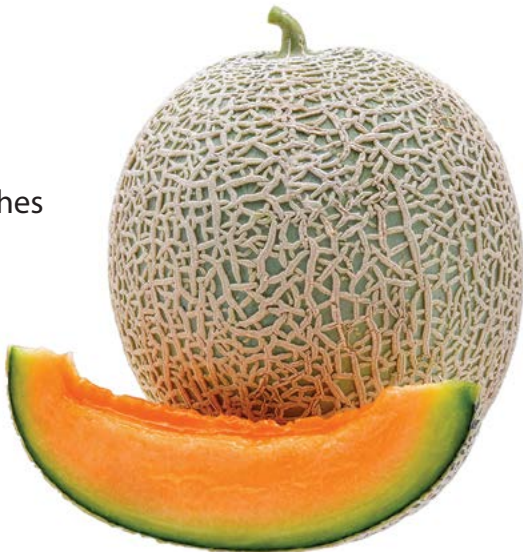
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Complete the table to convert from ounces to pounds.

Ounces	16	32		64
Pounds	1		3	

64 ounces = pounds

Units of Weight
1 pound = 16 ounces
1 ton = 2,000 pounds



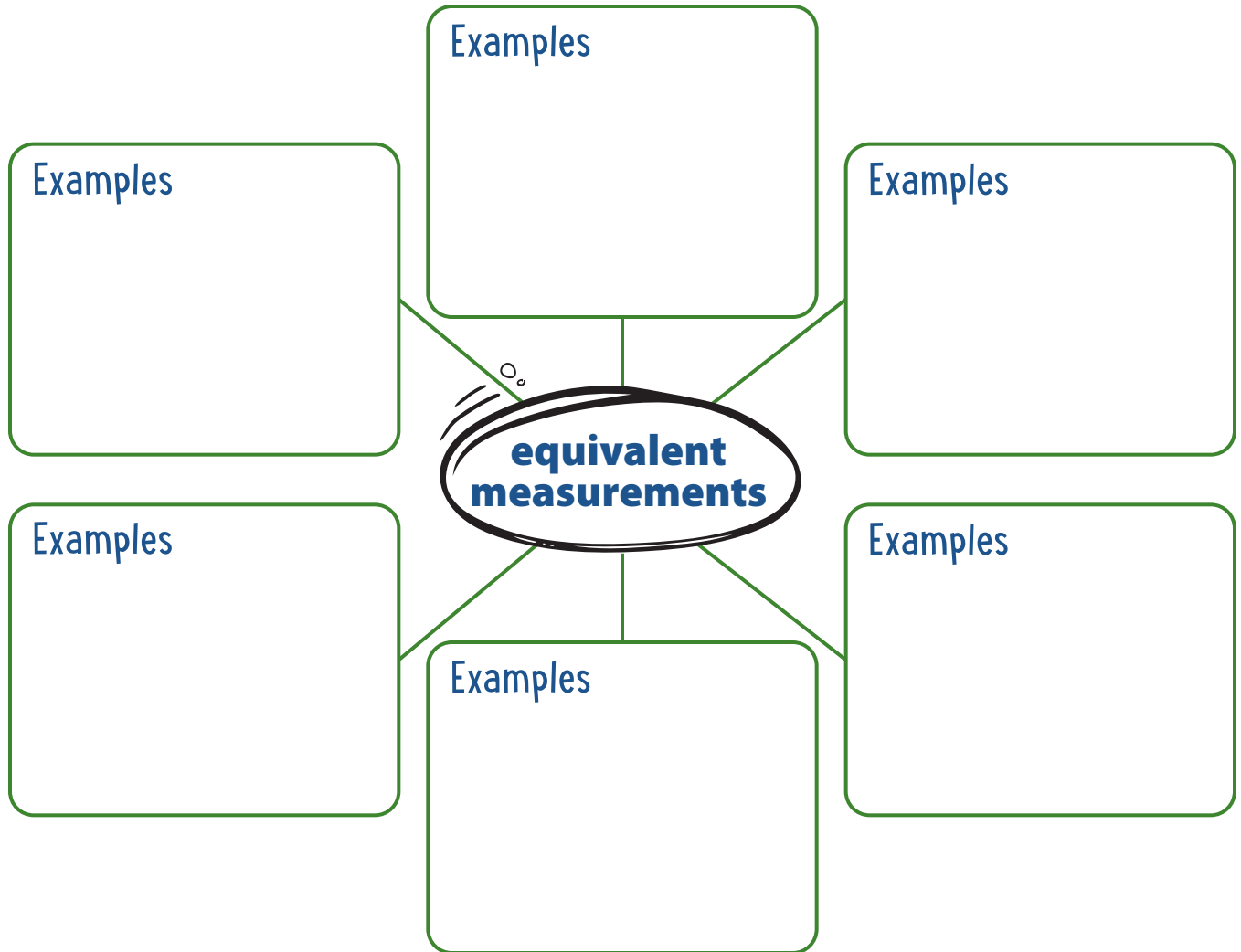
3 REFLECT

Describe a real-world object that you can measure using two different units and tell which two units you could use. Which unit would you need more of to measure the object?

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Prepare for Converting Measurement Units

- 1 Think about what you know about equivalent measurements. Fill in each box. Use words, numbers, and pictures. Show as many ideas as you can.



- 2 The picture shows a container with 1 gallon of liquid. The measurements written on the container tell how much liquid there is in cups and in quarts.

Use the picture to write the equivalent measurement units.

2 quarts = cups 12 cups = quarts

1 gallon = cups 8 quarts = gallons



- 3 Solve the problem. Show your work.

A Sacramento Valley tomato farmer makes 5 gallons of tomato sauce. The farmer fills 1-cup containers with the sauce. How many 1-cup containers can the farmer fill? (1 gallon = 16 cups)



Solution

- 4 Check your answer. Show your work.

Develop Converting Larger Units to Smaller Units

Read and try to solve the problem below.

In many parts of the world, travel distances on road signs and maps are given in kilometers. How many meters are there in 3.5 kilometers?
(1 kilometer = 1,000 meters)



PARIS 3.5 km

TRY IT



Math Toolkit

- base-ten blocks
- number lines
- grid paper
- thousandths decimal place-value charts
- math reference sheet



DISCUSS IT

Ask your partner: Can you explain that again?

Tell your partner: I started by ...

Explore one way to understand converting larger measurement units to smaller measurement units.



In many parts of the world, travel distances on road signs and maps are given in kilometers. How many meters are there in 3.5 kilometers?
 (1 kilometer = 1,000 meters)

MODEL IT

You can use a table to help understand the problem.

The table below shows the relationship between meters and kilometers.

kilometers	1	2	3	4	5	6
meters	1,000	2,000	3,000	4,000	5,000	6,000

SOLVE IT

Use the information from the table to understand how to solve the problem.

The pattern in the table shows that the number of meters is always 1,000 times the number of kilometers.



kilometers	1	2	3	3.5	4	5	6
meters	1,000	2,000	3,000		4,000	5,000	6,000

To find the number of meters in 3.5 kilometers, multiply 3.5 by 1,000.
 Write the answer in the table.

CONNECT IT

Now you will use the problem from the previous page to help you understand how to convert larger measurement units to smaller measurement units.

- 1 Which is the smaller unit, *meters* or *kilometers*?
How do you know?
- 2 What operation do you use to convert from a larger measurement unit to a smaller measurement unit?
- 3 3.5 kilometers = meters
- 4 Use what you learned about the relationship between meters and kilometers to complete the table below.

kilometers	0.8	1	1.85	2	2.03	3
meters		1,000		2,000		3,000

- 5 How many meters are in *k* kilometers?
- 6 There are 3 feet in 1 yard. Do you multiply or divide by 3 when you need to convert yards to feet? Explain.

7 REFLECT

Look back at your **Try It**, strategies by classmates, and **Model It** and **Solve It**. Which models or strategies do you like best for converting larger units to smaller units? Explain.

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APPLY IT

Use what you just learned to solve these problems.

- 8 How many ounces are there in $4\frac{1}{2}$ pounds? Show your work.
(1 pound = 16 ounces)

Solution

- 9 How many millimeters are in 9.25 centimeters? Show your work.
(1 centimeter = 10 millimeters)

Solution

- 10 Issay's fish tank can hold 65 liters of water. How many milliliters of water can the fish tank hold? (1 liter = 1,000 milliliters)
- Ⓐ 0.065 milliliters
- Ⓑ 6.5 milliliters
- Ⓒ 6,500 milliliters
- Ⓓ 65,000 milliliters



Practice Converting Larger Units to Smaller Units

Study the Example showing how to convert between meters and millimeters. Then solve problems 1–10.

EXAMPLE

How many millimeters are in 2.52 meters?

The table below shows the relationship between meters and millimeters.

meters (m)	1	2	3	4	5
millimeters (mm)	1,000	2,000	3,000	4,000	5,000

To find the number of millimeters in 2.52 meters, multiply 2.52 by 1,000.

$$2.52 \times 1,000 = 2,520$$

There are 2,520 millimeters in 2.52 meters.

- 1 Which is the larger unit, meters or millimeters?
- 2 How can you find how many millimeters are in 4.06 meters?
- 3 How many millimeters are in 4.06 meters?
- 4 Fill in the missing information in the table.

meters (m)	0.34	1	1.5	2	2.09	3	3.77	4
millimeters (mm)		1,000		2,000		3,000		4,000

- 5 What operation do you use to convert from a larger measurement unit to a smaller measurement unit? Explain why.

- 6 The pattern in the table shows that the number of centimeters is always 100 times the number of meters. Fill in the missing numbers of centimeters.

meters (m)	1	1.5	2	2.07	3	3.26	4
centimeters (cm)	100	150	200				

- 7 A football player runs for $13\frac{1}{2}$ yards. How many feet do they run? Show your work. (1 yard = 3 feet)

Solution

- 8 When you want to convert days to hours, should you multiply or divide by 24? Explain. (1 day = 24 hours)

- 9 Look at problem 8. How many hours are in $2\frac{1}{2}$ days? Show your work.

Solution

- 10 Suppose a lion cub born in South Africa's Kruger National Park weighs $2\frac{1}{2}$ pounds. How many ounces does the lion cub weigh? Show your work. (1 pound = 16 ounces)



Solution

Develop Converting Smaller Units to Larger Units

Read and try to solve the problem below.

How many quarts are equivalent to 6 cups?
(1 quart = 4 cups)

1 quart



1 cup



TRY IT



Math Toolkit

- fraction tiles
- fraction circles
- number lines
- grid paper
- math reference sheet



DISCUSS IT

Ask your partner: How did you get started?

Tell your partner: A model I used was . . . It helped me . . .

Explore one way to convert smaller measurement units to larger measurement units.

How many quarts are equivalent to 6 cups? (1 quart = 4 cups)

MODEL IT

You can use a table to help understand the problem.

The table below shows the relationship between cups and quarts.

quarts	1	2	3	4	5	6
cups	4	8	12	16	20	24

SOLVE IT

Use the information from the table to understand how to solve the problem.

The pattern in the table shows that there are 4 cups in every quart.



quarts	1		2	3	4	5	6
cups	4	6	8	12	16	20	24

To find the number of quarts equivalent to 6 cups, divide by 4.



CONNECT IT

Now you will use the problem from the previous page to help you understand how to convert smaller measurement units to larger measurement units.

1 Which is a smaller unit, quarts or cups?
How do you know?

2 What operation do you use to convert from a smaller measurement unit to a larger measurement unit?

3 6 cups = quarts
Write your answer in the table on the previous page. Explain your reasoning.

4 Use what you learned about the relationship between cups and quarts to complete the table below.

quarts		1		2		3		4
cups	2	4	5	8	9	12	15	16

5 One gallon is equivalent to 8 pints. Describe how to convert from pints to gallons. Explain your reasoning.

6 REFLECT

Look back at your **Try It**, strategies by classmates, and **Model It** and **Solve It**. Which models or strategies do you like best for converting smaller units to larger units? Explain.

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APPLY IT

Use what you just learned to solve these problems. Use the Math Reference Sheet as necessary.

- 7 How many kilometers are equivalent to 800 meters? Show your work.

Solution

- 8 A doctor has a patient walk 25 feet to check how quickly they are able to move. How many yards are equivalent to 25 feet? Show your work.



Solution

- 9 Which of the following measures is equivalent to 3,300 grams?
- Ⓐ 330 kilograms
 - Ⓑ 33 kilograms
 - Ⓒ 3.3 kilograms
 - Ⓓ 0.33 kilograms

Practice Converting Smaller Units to Larger Units

**Study the Example showing how to convert between ounces and pounds.
Then solve problems 1–8.**

EXAMPLE

How many pounds are equivalent to 56 ounces?

The table below shows the relationship between pounds and ounces.

pounds (lb)	1	2	3	4
ounces (oz)	16	32	48	64

To find the number of pounds equivalent to 56 ounces, divide by 16.

$$56 \div 16 = 3\frac{1}{2}$$

$3\frac{1}{2}$ pounds is equivalent to 56 ounces.

- 1 Which is the smaller unit, pounds or ounces?
- 2 What operation do you use to convert from a smaller measurement unit to a larger measurement unit?
- 3 Look at the Example. Explain how you can use multiplication to check the answer.
- 4 Use the relationship between pounds and ounces to complete the table.

pounds (lb)		1		2	
ounces (oz)	8	16	20	32	40

- 5 How many yards are equivalent to 38 feet? Show your work.
(1 yard = 3 feet)

Solution

- 6 How many meters are equivalent to 247 centimeters? Show your work.
(1 meter = 100 centimeters)

Solution

- 7 When converting between two measurement units, how can you tell which operation to use?

- 8 How many gallons are equivalent to 24 cups? Show your work.
(1 gallon = 4 quarts and 1 quart = 4 cups)

Solution

Refine Converting Measurement Units

Complete the Example below. Then solve problems 1–9 using the Math Reference Sheet as necessary.

EXAMPLE

How many liters are equivalent to 100 milliliters?

1 liter = 1,000 milliliters

Divide the number of milliliters by 1,000 or 10^3 .

$$100 \div 1,000 = 0.1$$

Dividing by 10^3 changes the placement of the decimal point. The digit 1 from the hundreds place has a value of 0.1 in the quotient because it has moved three places to the right.

Solution

Use division, because milliliters are smaller than liters.



PAIR/SHARE

How can you check your answer?

APPLY IT

- 1 Carmelita uses water and watermelon to make a drink called agua de sandia. She makes $10\frac{1}{2}$ gallons of agua de sandia to sell in 1-quart bottles. How many quarts of agua de sandia does she make? Show your work.

Solution

How many quarts are in $\frac{1}{2}$ gallon?



PAIR/SHARE

Draw a picture or make a table to support your answer.

- 2 How many kilograms are equivalent to 450 grams? Show your work.

Will the number of kilograms be greater or less than 450?



Solution

- 3 One of the world's tallest Ferris wheels is in Dubai. This Ferris wheel is 250 meters tall. How many millimeters are in 250 meters?

- Ⓐ 0.25 millimeter
- Ⓑ 2.50 millimeters
- Ⓒ 250,000 millimeters
- Ⓓ 2,500,000 millimeters

Trinidad chose Ⓐ as the correct answer. How did she get that answer?

PAIR/SHARE

Did you and your partner solve the problem the same way?

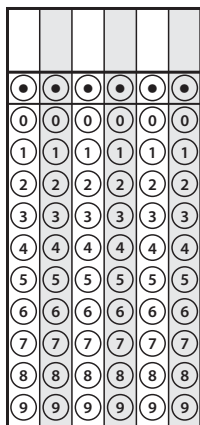
Which is a larger unit, millimeters or meters?



PAIR/SHARE

Does Trinidad's answer make sense?

- 4 Broad beans are healthy to eat and also for the soil they are grown in. A seed company sells 75 kilograms of broad bean seeds. Each seed has a mass of 1 gram. How many grams are equivalent to 75 kilograms?



- 5 Five measurements are shown below. Write one of the measurements on each of the lines to make two true equations.

300 millimeters 30 meters 3,000 meters 3 kilometers 3,000 centimeters

..... =

..... =

- 6 Complete the equations. Show your work to convert.

a. 3 feet + 7 inches = inches

b. 2 gallons – 5 quarts = quarts

c. 5 pounds – 38 ounces = ounces

d. 60 centimeters + 4 meters = centimeters

e. 2,000 meters + 5,000 meters = kilometers

f. 1 liter – 150 milliliters = milliliters

7 Lake freight ships are used on the Great Lakes to carry materials from mines and fields to industrial areas. One lake freight ship has a length of 1,000 feet. How many yards are equivalent to 1,000 feet?



- A 333 ¹/₃ yards
- B 333 ¹/₁₂ yards
- C 83 ⁴/₁₂ yards
- D 3,000 yards

8 Write each measurement below in the table under an equivalent measure, if possible. Some of the measurements may not have an equivalent measure.

¹/₂ quart 4 pints 16 cups ¹/₄ gallon 8 pints

1 gallon	1 quart	1 pint

9 MATH JOURNAL

Rafael uses a ruler to measure his desk. It is 85 centimeters wide. Then he measures the width of his desk in meters. Is the number of meters less than or greater than 85? What is the measure in meters? Explain how you know.

SELF CHECK Go back to the Unit 4 Opener and see what you can check off.