

Converting Units with Ratio Reasoning

Grade 6 math · Lesson · Standards: 6.RP.A.3d

Quick answer: To convert units, use the ratio between them, such as 12 inches per 1 foot or 1,000 meters per 1 kilometer. Multiply when changing to a smaller unit and divide when changing to a larger one. For multi-step conversions, chain the equivalences one unit at a time.

Standards: 6.RP.A.3d · **Level:** Grade 6

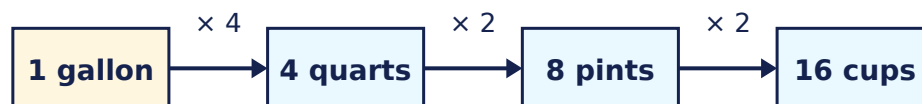
What is a unit conversion?

Conversion factor

A **unit conversion** writes the same amount in a different unit. A **conversion factor** is a ratio of equal measures, such as 3 feet per 1 yard, so multiplying by it never changes the size of the amount.

Which equivalents should you know?

Customary	Metric
12 in = 1 ft; 3 ft = 1 yd	1 km = 1,000 m
5,280 ft = 1 mi	1 m = 100 cm; 1 cm = 10 mm
16 oz = 1 lb	1 kg = 1,000 g
2 cups = 1 pt; 2 pt = 1 qt; 4 qt = 1 gal	1 L = 1,000 mL



Going to a smaller unit multiplies.

How do you convert with a ratio table?

Direction rule

Going from a larger unit to a smaller unit gives more of the smaller unit, so **multiply**. Going from a smaller unit to a larger unit, **divide**.

Method

1. Write the equivalence as the first column: 12 inches = 1 foot.
2. Find what turns the first row into your amount.
3. Apply the same number to the other row.
4. Attach the unit and ask whether the size makes sense.

Worked example

Convert 54 inches to feet.

Inches are smaller than feet, so divide: $54 \div 12 = 4.5$.

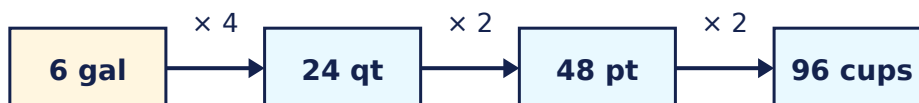
Answer: **4.5 feet**.

Inches	12	24	54
Feet	1	2	4.5

$$54 \div 12 = 4.5 \text{ feet.}$$

How do you do a multi-step conversion?

Chain the equivalences so that each step uses one familiar fact. To change 6 gallons to cups, go from gallons to quarts, then to pints, then to cups.



Multiply by 4, then 2, then 2.

Write each step so that a reader can follow it. The calculation is $6 \times 4 = 24$, then $24 \times 2 = 48$, then $48 \times 2 = 96$, so 6 gallons is **96 cups**.

Common mistake

Multiplying when you should divide. Since a foot is bigger than an inch, a length in feet must be a smaller number than the same length in inches.

Mathbot's tip

Before you finish, do a size check: if you convert to a smaller unit, your number should grow. If it shrinks, you probably divided by mistake.

Key points to remember

- A conversion factor is a ratio of equal measures, like 3 feet per 1 yard.
- Larger unit to smaller unit: multiply. Smaller unit to larger unit: divide.
- Know 12 in = 1 ft, 3 ft = 1 yd, 5,280 ft = 1 mi, 16 oz = 1 lb, 4 qt = 1 gal.
- Metric conversions use powers of ten, such as 1 km = 1,000 m.
- Ratio tables and double number lines organize each conversion.

Converting Units with Ratio Reasoning: frequently asked questions

What is a conversion factor?

A conversion factor is a ratio that equals 1 because both parts are the same amount, such as 3 feet per 1 yard. Multiplying by it changes the unit but not the size.

When do you multiply and when do you divide?

Multiply when going to a smaller unit, because you need more of them. Divide when going to a larger unit, because you need fewer.

How many cups are in a gallon?

A gallon has 4 quarts, each quart has 2 pints, and each pint has 2 cups. So $4 \times 2 \times 2 = 16$ cups.

How do you convert metric units?

Use the powers of ten: 1 km = 1,000 m, 1 m = 100 cm, 1 kg = 1,000 g and 1 L = 1,000 mL. Multiply or divide by that number.

How do you compare two measurements in different units?

Convert both to the same unit and compare the numbers. For example, 2.4 m is 240 cm, which is longer than 235 cm.