

Converting Between Measurement Systems

Name: _____

Date: _____

Score: _____ / 17

Travelling, cooking, or doing a science lab often means hopping between **customary** units (inches, pounds, gallons) and **metric** units (centimeters, kilograms, liters)—and the trick is a **conversion factor**, a fraction equal to 1 that bridges the two systems (for example, $\frac{2.54 \text{ cm}}{1 \text{ in}}$). Multiply by the conversion factor so the old unit cancels and the new unit stays—this technique is also called *dimensional analysis*. You can also set up a **proportion** just like any other equivalent-ratio problem. Get comfortable with the most common length, mass, and capacity conversions now and science labs, recipes, and real-world measurement tasks will feel like a breeze!

Key Concepts & Quick Review

Common Conversion Factors (approximate):

Length

$$1 \text{ inch} \approx 2.54 \text{ cm}$$

$$1 \text{ foot} \approx 0.3048 \text{ m}$$

$$1 \text{ mi} \approx 1.609 \text{ km}$$

Mass / Weight

$$1 \text{ pound} \approx 0.454 \text{ kg}$$

$$1 \text{ kilogram} \approx 2.205 \text{ lb}$$

$$1 \text{ ounce} \approx 28.35 \text{ g}$$

Capacity

$$1 \text{ gal} \approx 3.785 \text{ L}$$

$$1 \text{ liter} \approx 0.264 \text{ gal}$$

$$1 \text{ quart} \approx 0.946 \text{ L}$$

Temperature

$$F = \frac{9}{5} C + 32$$

$$C = \frac{5}{9} (F - 32)$$

Conversion Method: Multiply by a conversion factor written as a fraction equal to 1. For example, $\frac{2.54 \text{ cm}}{1 \text{ in}} = 1$. Arrange so the unwanted unit cancels.

Examples

① Convert 15 inches to centimeters.

Think It Through: Multiply by the conversion factor: $15 \text{ in} \times \frac{2.54 \text{ cm}}{1 \text{ in}} = 15 \times 2.54 = 38.1 \text{ cm}$.

Answer: 38.1 cm

② Convert 5 kilometers to miles (round to the nearest hundredth).

Think It Through: $5 \text{ km} \times \frac{1 \text{ mi}}{1.609 \text{ km}} = \frac{5}{1.609} \approx 3.11 \text{ mi}$.

Answer: $\approx 3.11 \text{ mi}$



 **Practice Problems**

Convert each measurement. Round to the nearest hundredth when necessary.

- | | | |
|--|-------|---------------------------------------|
| 1. Convert 8 inches to centimeters. | _____ | _____ |
| 2. Convert 3 feet to meters. | _____ | 11. Convert 2 quarts to liters. |
| 3. Convert 10 <i>mi</i> to kilometers. | _____ | _____ |
| 4. Convert 20 centimeters to inches. | _____ | 12. Convert 15 kilometers to miles. |
| 5. Convert 50 kilograms to pounds. | _____ | _____ |
| 6. Convert 12 pounds to kilograms. | _____ | 13. Convert 25 centimeters to inches. |
| 7. Convert 4 <i>gal</i> to liters. | _____ | _____ |
| 8. Convert 7 liters to gallons. | _____ | 14. Convert 9 pounds to kilograms. |
| 9. Convert 100 <i>m</i> to feet. | _____ | _____ |
| 10. Convert 6 ounces to grams. | _____ | 15. Convert 36 inches to centimeters. |
| | | _____ |

Study Tips

-  Always write the conversion factor as a fraction so the **unwanted unit cancels**. If you start with inches, put inches in the denominator.
-  Memorise the “big three”: $1\text{ in} \approx 2.54\text{ cm}$, $1\text{ kg} \approx 2.2\text{ lb}$, $1\text{ mi} \approx 1.6\text{ km}$. Most problems can be solved from these.
-  Check your answer: converting to a **larger unit** should give a **smaller number**, and vice versa.

 **Word Problems**

16. A recipe from France calls for 250 *g* of flour. Your kitchen scale only shows ounces. How many ounces of flour do you need? Round to the nearest tenth. _____
17. A track meet lists the 1,500-metre race. About how many miles is that? Round to the nearest hundredth. _____



Answer Keys

- | | |
|---------------------|---|
| 1) 20.32 <i>cm</i> | 10) 170.1 <i>g</i> |
| 2) 0.91 <i>m</i> | 11) 1.89 <i>L</i> |
| 3) 16.09 <i>km</i> | 12) 9.32 <i>mi</i> |
| 4) 7.87 <i>in</i> | 13) 9.84 <i>in</i> |
| 5) 110.25 <i>lb</i> | 14) 4.08 <i>kg</i> |
| 6) 5.44 <i>kg</i> | 15) 91.44 <i>cm</i> |
| 7) 15.14 <i>L</i> | 16) about 8.8 ounces |
| 8) 1.85 <i>gal</i> | 17) 1,500 <i>m</i> = 1.5 <i>km</i> ; $\frac{1.5}{1.609} \approx 0.93$ <i>mi</i> . |
| 9) 328.1 <i>ft</i> | |

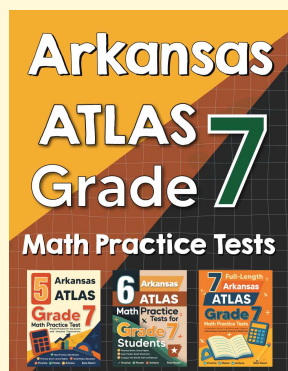
Step-by-Step Explanations

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