

# 4. The Metric System

**Meter, liter, and gram**—these are the basic units of length, capacity (volume), and mass (weight) used in the **metric system**, the measurement language based on 10. It is a **decimal system** using many standard prefixes, as shown on the chart below. Each prefix has 10 times the value of its neighbor to the right.

Metric Prefixes

Prefix	kilo-	hecto-	deka-	(unit)	deci-	centi-	milli-
Symbol	k	h	da	(m, l, or g)	d	c	m
Decimal Meaning	1,000	100	10	1	1	.01	.001

## THE METRIC UNITS AT A GLANCE

### LENGTH

10 millimeters (mm) = 1 centimeter  
 10 centimeters (cm) = 1 decimeter  
 100 centimeters = 1 meter (m)  
 10 decimeters (dm) = 1 meter  
 1000 meters (m) = 1 kilometer (km)

### CAPACITY (Volume)

1000 milliliters (ml) = 1 liter (l)  
 1000 liters = 1 kiloliter (kl)  
 1 cubic centimeter (cm<sup>3</sup>) = 1 milliliter  
 1 cubic decimeter (dm<sup>3</sup>) = 1 liter

### MASS (Weight)

1000 milligrams (mg) = 1 gram  
 1000 grams = 1 kilogram (kg)  
 1000 kilograms = 1 metric ton (t)  
 1 metric ton = 1 megagram (mg)

### AREA

100 square millimeters (mm<sup>2</sup>) = 1 square centimeter (cm<sup>2</sup>)  
 100 square centimeters = 1 square decimeter (dm<sup>2</sup>)  
 100 square decimeters = 1 square meter (m<sup>2</sup>)

### TEMPERATURE

0°C = (zero degrees Celsius)  
 the freezing point of water  
 37°C = the normal body temperature  
 100°C = the boiling point of water

## ENGLISH AND METRIC COMPARED

### APPROXIMATE EQUIVALENTS

#### LENGTH

1 mm = .039 in.                      1 in. = 25.4 mm  
 1 cm = .39 in.                      1 in. = 2.54 cm  
 1 m = 1.09 yd.                      1 ft. = .3 m  
 1 m = 3.28 ft.                      1 yd. = .91 m  
 1 km = .62 mi.                      1 mi. = 1.6 km

#### MASS (Weight)

1 g = .035 oz.                      1 oz. = 28 g  
 1 kg = 2.2 lb.                      1 lb. = .45 kg

#### CAPACITY (Liquid Measurement)

1 ml = .03 fl. oz.                      1 fl. oz. = 29.57 ml  
 1 l = 2.11 pt.                      1 pt. = .47 l  
 1 l = 1.06 qt.                      1 qt. = .95 l

#### TEMPERATURE

0° Celsius = 32° Fahrenheit  
 0° Fahrenheit = -17.8° Celsius

## Use what you've learned.

Use the information on the prefix chart on page 83 to complete this table.

Name of Unit	Symbol	Change to	Operation	Example
millimeter	<i>mm</i>	cm	$\div 10$	40 mm = ..... <sup>4</sup> .....cm
	cm	mm	$\times 10$	2 cm = .....mm
meter	m		$\times 100$	3 m = .....cm
meter	m	km	$\div 1000$	5000 m = .....m
kilometer		m		60 km = .....m
kilogram		g	$\times 1000$	5 kg = .....g
gram			$\div 1000$	2000 g = .....kg
	mg	g	$\div 1000$	4000 mg = .....g
	g	mg		3 g = .....mg
liter		kl	$\div 1000$	1200 l = .....kl
	ml		$\div 1000$	4500 ml = .....l
kiloliter		l		3 kl = .....l

Due to space limitations, the answers to these questions do not appear in the answer key.

Using the units above, answer the following questions.

- Which unit is often used to measure fabric? \_\_\_\_\_
- Which unit is used to measure distances between cities? \_\_\_\_\_
- Gasoline might be measured in \_\_\_\_\_.
- The measurement of a large plot of land might be expressed in square \_\_\_\_\_.
- A dime is about one \_\_\_\_\_ thick.
- To find out how heavy a bag is, which unit would you use? \_\_\_\_\_
- A dose of liquid medicine might be expressed in \_\_\_\_\_.
- The net weight of a box of cereal might be expressed in \_\_\_\_\_.
- Oven heat is expressed in \_\_\_\_\_.
- The size of a tile is often expressed in \_\_\_\_\_.

Apply the comparisons to the following questions.

- Which is thicker? 3 in. or 5 cm? \_\_\_\_\_
- Is a 4 lb. package heavier than 2 kg? \_\_\_\_\_
- Which is the larger container?  
2 qt. or 2 l? \_\_\_\_\_
- Is 65 km per hour within the  
55 mph speed limit? \_\_\_\_\_
- What is the metric height of  
a person who is 5 ft. tall? \_\_\_\_\_
- Which is lighter? 9 oz. or 230 g? \_\_\_\_\_
- Which cherries cost less? 10 lb.  
for \$15 or 9 kg for \$20? \_\_\_\_\_
- Which temperature is warmer?  
20° Celsius or 32° Fahrenheit? \_\_\_\_\_
- Is a 62 in. bag larger or smaller  
than 145 cm? \_\_\_\_\_
- You used to weigh 100 lb. Now you  
weigh 49 kg. Did you lose or  
gain weight? \_\_\_\_\_

# Answer Key

12. No
13. 2 liters
14. Yes
15. 1.5 meters
16. 230 g
17. 9 kg for \$20
18. 20 Celsius
19. Larger
20. Gain

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1. meter
2. kilometer
3. liter
4. meters
5. millimeter
6. kilogram
7. milligrams
8. grams
9. degrees Celsius
10. square centimeters
11. 3 in.