



# Chapter 8

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## The Metric System



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# WHAT YOU WILL LEARN

- The advantages of using the metric system
- The basic units used in the metric system
- Conversions within the metric system
- Determining length, area, volume, mass, and temperature in the metric system
- Dimensional analysis and converting to and from the metric system



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# Section 1

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## Basic Terms and Conversions within the Metric System



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## SI System and U.S. Customary System

- Most countries of the world use the *Système international d'unités* or *SI system*.
- The SI system is referred to as the metric system in the United States.
- Two systems of weights and measures exist side by side in the United States today, *U.S customary system* and the metric system.



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## Advantages to Using the Metric System

- The metric system is the worldwide accepted standard measurement system.
- There is only one unit of measurement for each physical quantity.
- The SI system is based on the number 10, allowing less need for fractions.



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## Basic Terms

Metric Term	Abbrev	Common Use	Comparison to Customary
meter	m	length	a little more than a yard
kilogram	kg	mass	about 2.2 pounds
liter	L	volume	a little more than a quart



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## Metric Prefixes

Prefix	Symbol	Meaning
kilo	k	$1000 \times$ base unit
hecto	h	$100 \times$ base unit
deka	da	$10 \times$ base unit
		base unit
deci	d	$1/10$ of base unit
centi	c	$1/100$ of base unit
milli	m	$1/1000$ of base unit



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## Changing Units within the Metric System

- To change from a smaller unit to a larger unit move the decimal point in the original quantity one place to the left for each larger unit of measure until you obtain the desired unit of measure.
- To change from a larger unit to a smaller unit, move the decimal point in the original quantity one place to the right for each smaller unit of measure until you obtain the desired unit of measure.



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## Changing Units within the Metric System

Measure of length	kilometer	hectometer	dekameter
Symbol	km	hm	dam
Number of meters	1000 m	100 m	10 m

Measure of length	meter	decimeter	centimeter	millimeter
Symbol	m	dm	cm	mm
Number of meters	1 m	0.1 m	0.01 m	0.001 m



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## Example: Changing Units

- Convert 54.6 m to km.
- Convert 15 L to mL.
- Convert 0.89 kg to cg.

Solutions:

- Meters is a smaller unit than km. Move the decimal 3 places to the left, 0.0546 km.
- Liter is a larger unit than milliliter. Move the decimal point 3 places to the right, 15,000 mL.
- Kilogram is a larger unit than centigram. Move the decimal point 5 places to the right 0.89 kg = 89,000 cg



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## Example: Application

A case of fruit juice contains twenty-four 0.75 liter bottles. How many 250 milliliter glasses can you fill using one case of juice?

Solution: The case of juice contains

$$24(0.75) = 18 \text{ L.}$$

Converting 18 L = 18,000 mL. If each glass hold 250 mL,

$$\text{then } \frac{18,000}{250} = 72 \text{ glasses can be filled.}$$



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