

What Is SI?

To make sharing information easier, most of the world uses the SI of measurement. **SI**, which stands for *Système Internationale d'Unités*, is a standard for measuring mass, length, volume, and other quantities. It is used by all scientists to avoid the confusion of comparing data that is based on different measuring systems. Three common SI units are in the chart at right. Obviously, these three units are not suitable for all measuring needs. But most quantities can be measured using one of these units with one of the prefixes in the chart below.

Quantity	Unit	Symbol
length	meter	m
volume	liter	L
mass	gram	g

Prefix	Powers of 10	Symbol	Example
kilo-	1000 (10 ³)	k	kilogram (kg)
hecto-	100 (10 ²)	h	hectoliter (hL)
deca-	10 (10 ¹)	da	decameter (dam)
—	1	—	meter (m), gram (g), liter (L)
deci-	0.1 (10 ⁻¹)	d	decigram (dg)
centi-	0.01 (10 ⁻²)	c	centimeter (cm)
milli-	0.001 (10 ⁻³)	m	milliliter (mL)

PROCEDURE: To convert between SI units, first find the prefixes of your numbers in the chart above. If you are converting from a smaller prefix to a larger prefix (moving *up* the chart), *divide* your number by a power of 10. If you are converting from a larger prefix to a smaller prefix (moving *down* the chart), *multiply* your number by a power of 10.

SAMPLE PROBLEM A: Convert 500 decimeters (dm) to kilometers (km).

Step 1: Find the prefixes of the numbers.

decimeters to kilometers

Step 2: Notice that you will move up the chart four places when converting from deci- to kilo-. Therefore, you will *divide* your number by $10 \times 10 \times 10 \times 10$, or 10,000.

$$500 \div 10,000 = \overset{\circ}{\underset{\circ}{\underset{\circ}{\underset{\circ}{500}}} \rightarrow 0.05$$

$$500 \text{ decimeters (dm)} = 0.05 \text{ kilometers (km)}$$

SAMPLE PROBLEM B: 2.5 centiliters (cL) is how many milliliters (mL)?

Step 1: Find the prefixes.

centiliters to milliliters

Step 2: Because you move down the chart one place when converting from centi- to milli-, multiply your number by 10.

$$2.5 \times 10 = \overset{\circ}{\underset{\circ}{2.5}} \rightarrow 25$$

$$2.5 \text{ centiliters (cL)} = 25 \text{ milliliters (mL)}$$

What Is SI? continued

Work with the System!

1. Write True or False next to each statement.

- a. 12 hg = 1.2 kg _____
- b. 54 cm = 5.4 mm _____
- c. 0.5 dL = 0.005 cL _____
- d. 4.5 g = 0.45 dag _____
- e. 111 cm = 1.11 m _____
- f. 7 cL = 70,000 kL _____

2. Fill in the missing numbers and units in the equations below.

- a. 25 mm = _____ cm
- b. 27 kg = 270,000 _____
- c. 50 cm = 0.005 _____
- d. 1.2 dL = _____ L
- e. 0.9 L = _____ mL
- f. 41 hm = 4,100,000 _____

3. 1 m = _____ dm = _____ cm = _____ mm

4. 5 kg = _____ hg = _____ dg = _____ cg

5. Special balances can weigh to the 0.00000001 g. How many kilograms is this?

6. A chemistry experiment calls for 5 g of baking soda. Your measuring spoon holds 5000 mg of powder. How many scoops will you need for the experiment?

Challenge Yourself!

Some SI prefixes are almost never used because they are so small or large. A micrometer (μm) is 10^{-6} m, while a nanometer is 10^{-9} m. A gigameter is 10^9 m.

7. a. How many nanometers are in 1 gigameter?

b. How many gigameters are in 1,000,000,000,000 micrometers?
