

# METRICS AND MEASUREMENT

Name \_\_\_\_\_

Scientists use the metric system of measurement, based on the number 10. It is important to be able to convert from one unit to another.

kilo	hecto	deca	<b>Basic Unit</b>	deci	centi	milli
(k)	(h)	(da)	gram (g)	(d)	(c)	(m)
1000	100	10	liter (L)	.1	.01	.001
$10^3$	$10^2$	$10^1$	meter (m)	$10^{-1}$	$10^{-2}$	$10^{-3}$

Using the above chart, we can determine how many places to move the decimal point and in what direction by counting the places from one unit to the other.

**Example:** Convert 5 mL to L.  
**Answer:** To go from milli (m) to the basic unit, liters, count on the above chart three places to the left. Move the decimal point three places to the left and 5 mL becomes 0.005 L.

Convert the following.

- 35 mL = \_\_\_\_\_ dL
- 950 g = \_\_\_\_\_ kg
- 275 mm = \_\_\_\_\_ cm
- 1,000 L = \_\_\_\_\_ kL
- 1,000 mL = \_\_\_\_\_ L
- 4,500 mg = \_\_\_\_\_ g
- 25 cm = \_\_\_\_\_ mm
- 0.005 kg = \_\_\_\_\_ dag
- 0.075 m = \_\_\_\_\_ cm
- 15 g = \_\_\_\_\_ mg

# UNIT CONVERSIONS AND FACTOR-LABEL METHOD

Name \_\_\_\_\_

Another method of going from one unit to another involves multiplying by a conversion factor. A conversion factor is a fraction that is equal to the number 1. For example, 60 seconds = 1 hour. Therefore, 60 sec/1 hr or 1 hr/60 sec = 1. When you multiply by the number 1, the value of the number is not changed, although the units may be different.

**Example:** How many milligrams in 20 kilograms?

**Solution:** Use the following relationships:

$$1000 \text{ mg} = 1 \text{ g}$$

$$1000 \text{ g} = 1 \text{ kg}$$

1. Start with the original number and unit.
2. Multiply by a unit factor with the unit to be discarded on the bottom and the desired unit on top.
3. Cancel units.
4. Perform numerical calculations.

$$20 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1000 \text{ mg}}{1 \text{ g}} = 20,000,000 \text{ or } 2 \times 10^7 \text{ mg}$$

Perform the following conversions using unit factoring.

1. 500 mL = \_\_\_\_\_ L
2. 25 cg = \_\_\_\_\_ g
3. 400 mg = \_\_\_\_\_ kg
4. 30 cm = \_\_\_\_\_ mm
5. 3500 secs = \_\_\_\_\_ hr
6. 2 yrs = \_\_\_\_\_ secs (Assume 1 year = 365 days)
7. 15 m = \_\_\_\_\_ mm
8. 0.75 L = \_\_\_\_\_ mL
9. 6.4 kg = \_\_\_\_\_ g
10. 7200 m = \_\_\_\_\_ km
11. 4.2 L = \_\_\_\_\_ cm<sup>3</sup>
12. 0.35 km = \_\_\_\_\_ m
13. 2.3 L = \_\_\_\_\_ mL
14. 4.5 yds = \_\_\_\_\_ in
15. 50 mm = \_\_\_\_\_ km
16. 150 mg = \_\_\_\_\_ g
17. 150 kg = \_\_\_\_\_ g
18. 23 mL = \_\_\_\_\_ L
19. 0.156 g = \_\_\_\_\_ mg
20. 1.25 L = \_\_\_\_\_ mL