

Metric Unit Conversion

Teacher's Version

For this portion of the lab you are required to do unit conversion between various metric measurements. The goal of this is for the students to understand the conversion process and not get bogged down in the mathematics. It is recommended that students with less math skill use a calculator.

For those more skilled in math, the calculations can be completed by shifting the decimal left or right when dividing or multiplying by a multiple of 10. You simply count the number of zeros and shift the decimal that number of spaces to the right when multiplying and to the left when dividing.

$50 \text{ cm} \times \frac{1 \text{ m}}{100 \text{ cm}} = 0.5 \text{ m}$ -- *When you divide by 100 you count the zeros (2) and move the decimal two place to the left.*

$400 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} = 0.4 \text{ L}$ -- *When you divide by 1000 you count the zeros (3) and move the decimal three place to the left.*

$.025 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1000 \text{ mg}}{1 \text{ g}} = 25000 \text{ mg}$ -- *When you multiply by 1000 and by 1000 you count the total zeros (6) and move the decimal 6 places to the right.*

In this part you're going to learn about the various units used in scientific measurements and how to convert between these units. There are many metric measurements for measuring things that go from very, very small to very, very big. This activity is going to focus on the measurements for the sizes of things that you are most likely to encounter in labs. The measurements taken in labs measure either length, volume (how much a container can hold) or mass (weight). Below are listed the measurements you will use in labs

Length

Millimeters (mm)

Centimeters (cm)

Meters (m)

Kilometers (km)

Volume

Milliliters (mL)

Liters (L)

Kiloliters (kL)

Mass

Milligrams (mg)

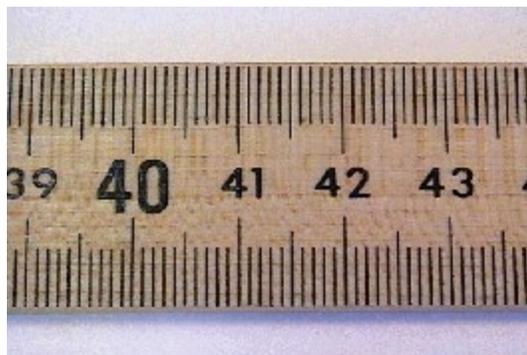
Grams (g)

Kilograms (kg)

To understand the relationship between the units in each group look at a meter stick. You'll notice numbers counting up to 100 and between each number ten small marks. The length of the stick represents 1 meter, the distance between each of the 100 numbers represent 1 centimeter and the small marks between the numbers each represent 1 millimeter. From the meter stick you can see that 1 meter = 100 centimeters and 1 meter = 1000 millimeter.



Meter stick
millimeters



Zoom on meter stick showing centimeters and millimeters

An additional measurement for long distances is a kilometer, which is equal to 1000 meters. The same relationships holds true for grams and liters.

Meters	Liters	Grams
1000 mm = 1 m	1000 mL = 1 L	1000 mg = 1 g
100 cm = 1 m		
1 km = 1000 m	1 kL = 1000 L	1 kg = 1000 g

You can use this information to convert between the various units in each measurement group.

For example to convert from centimeters (cm) to meters (m)

$$50 \text{ cm} \times \frac{1 \text{ m}}{100 \text{ cm}} = 0.5 \text{ m}$$

$$400 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} = 0.4 \text{ L}$$

$$.025 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1000 \text{ mg}}{1 \text{ g}} = 25000 \text{ mg}$$

Try these unit conversions

$$5 \text{ m} \quad \times \quad \frac{1000 \text{ mm}}{1 \text{ m}} = \quad 5000 \text{ mm}$$

$$25 \text{ kg} \quad \times \quad \frac{1000 \text{ g}}{1 \text{ kg}} = \quad 25000 \text{ g}$$

$$350 \text{ mL} \quad \times \quad \frac{1 \text{ L}}{1000 \text{ mL}} = \quad 0.35 \text{ L}$$

$$127 \text{ cm} \quad \times \quad \frac{1 \text{ m}}{100 \text{ cm}} = \quad 1.27 \text{ m}$$

$$22430 \text{ mg} \quad \times \quad \frac{1 \text{ g}}{1000 \text{ mg}} = \quad 22.43 \text{ g}$$

$$2075 \text{ cm} \quad \times \quad \frac{1 \text{ m}}{100 \text{ cm}} \quad \times \quad \frac{1 \text{ km}}{1000 \text{ m}} = \quad 0.02075 \text{ km}$$

$$0.034 \text{ kL} \quad \times \quad \frac{1000 \text{ L}}{1 \text{ kL}} \quad \times \quad \frac{1000 \text{ mL}}{1 \text{ L}} = \quad 34000 \text{ mL}$$