

# Metric System

## Linear Measurements

The smallest unit for visible objects is the **millimeter** (mm). This is about equal to the thickness of the wire in a paper clip.. You can usually hold your thumb and index finger about 1 mm apart without touching.

Ten millimeters make a **centimeter** (cm). One of your fingernails is usually about 1 cm wide. Which one?

One hundred centimeters make a **meter** (m). A meter is a little longer than a yard. Do you see that a thousand millimeters also make a meter? One thousand meters makes a kilometer (km).

Use a small rulers and the meter stick to become familiar with these units. Hold the meter stick up between your hands. Get the "feel" of a meter.

Make the following measurements:

Sugar cube: length, width, height = \_\_\_\_\_ mm

Classroom: length = \_\_\_\_ m, width = \_\_\_\_ m, height = \_\_\_\_ m

This paper: width = \_\_\_\_ cm, length = \_\_\_\_ cm.

Your height: \_\_\_\_\_ cm.

## Surface Area

For rectangular areas, multiply length times width. Both dimensions must be in the same units and the answer will be in "square" units. For example, if length and width are in centimeters, surface area will be in square centimeters, abbreviated "cm<sup>2</sup>".

Irregular surfaces which do not have straight edges or square corners are more common in the body and cannot be calculated by multiplying. Use the graph paper to measure the surface area of your hand (palmer surface from fingertips to first wrinkle on wrist).

Palmar surface of hand: \_\_\_\_\_ cm<sup>2</sup>

## Volume

For objects with square corners, multiply length x width x height. The answer will be in "cubic" units. If dimensions are in centimeters, volume will be in cubic centimeters (cc).

Liquids are measured with graduated cylinders and pipettes of various sizes. The basic unit is the **liter** (l). The liter contains on thousand **milliliters** (ml).

If the liquid "creeps" up the walls of a container but remains lower in the center, a "meniscus" is formed. Always read the bottom of the meniscus.

Measure the volume of a quart of milk: \_\_\_\_\_ l = \_\_\_\_\_ ml

How many drops of water make a milliliter? \_\_\_\_\_ drops = 1 ml.

A milliliter is the same as a cubic centimeter. ( 1 ml = 1 cc)

It is a special problem to measure the volume of irregular objects. Determine the volume of a nickel: \_\_\_\_\_ ml or cc. Your hand (to first wrist wrinkle) : \_\_\_\_\_ cc.

## Weight

The basic weight unit is the **gram** (gm). One thousand grams make a kilogram (kg). Weigh the following:

a nickel: \_\_\_\_\_ gm  
two paper clips: \_\_\_\_\_ gm  
a pound of sugar: \_\_\_\_\_ gm = \_\_\_\_\_ kg  
yourself: \_\_\_\_\_ kg  
a liter of water: \_\_\_\_\_ gm = \_\_\_\_\_ kg.

## Density

To get the density of a substance, divide the weight by the volume. If a material is “dense”, a small quantity of it will be comparatively heavy.

## Temperature

Temperature in the metric system is measured in degrees **Celsius**, also called degrees **centigrade** (°C).

Normal body temperature is considered to be 37 °C. Use a clinical thermometer to take  
your temperature: \_\_\_\_\_ °C

Use the laboratory thermometer for temperature of an ice cube: \_\_\_\_\_ °C.  
Boiling water: \_\_\_\_\_ °C  
The classroom: \_\_\_\_\_ °C

Using the measurements made in class, calculate the following:

your height in millimeters: \_\_\_\_\_ mm  
width of sugar cube in centimeters: \_\_\_\_\_ cm  
surface area of this paper in square centimeters: \_\_\_\_\_ cm<sup>2</sup>  
floor of classroom in square meters: \_\_\_\_\_ m<sup>2</sup>  
volume of sugar cube in cubic centimeters: \_\_\_\_\_ cc  
classroom in cubic meters: \_\_\_\_\_ m<sup>3</sup>

What is the density of water in grams per milliliters? \_\_\_\_\_ gm/ml

The temperature in your bedroom is 12 °C Will you be comfortable without a blanket? \_\_\_\_\_

In the sun the temperature is 40 °C, would it be wise to go out and play tennis? \_\_\_\_\_

A patient has a temperature of 36 °C, should you give aspirin and open the windows or provide a hating pad and extra blankets? \_\_\_\_\_