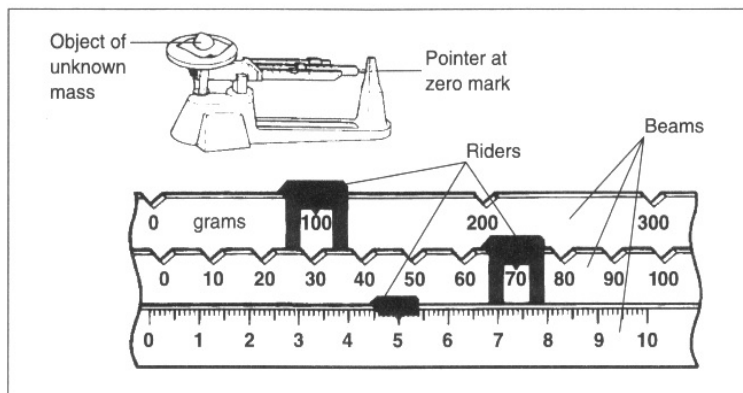


Understanding Metrics

In the United States people usually use English units of measurement such as ounces, pounds, inches, and feet. Most other countries use metric units. Metric units include the gram, kilogram, metre, and centimetre. Scientists also use the metric system. In science, you will use mostly metric units.

Mass & Weight

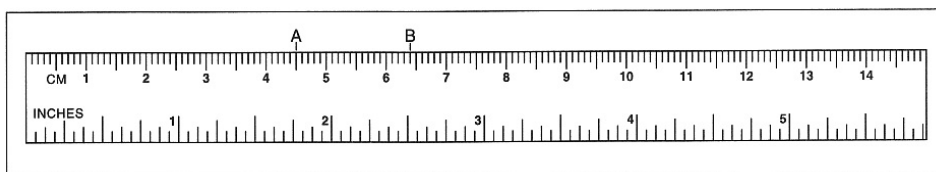
Mass and weight are related, but they are not the same. Mass is a measure of the amount of matter in an object. Weight is a measure of the pull of gravity on an object. The basic unit of mass in the metric system is the kilogram (kg). Mass is measured with a balance.



- The mass of object shown is: _____ g
- Circle the correct word(s) to complete each statement below.
 - In the metric system, the unit of mass is the metre / kilogram / pound.
 - Mass and weight are / are not the same.
 - Mass / Weight is a measure of the amount of matter in an object.
- In the space provided indicate whether each statement below is true or false.
 - ____ (a) Weight is a measure of the pull of gravity on an object.
 - ____ (b) Scientists use English units of measurements such as pounds and feet.
 - ____ (c) The prefix centi- stands for one hundredth (1/100).
 - ____ (d) A graduated cylinder is used to measure mass.
 - ____ (e) The basic unit of length in the metric system is the metre.
 - ____ (f) Volume is a measure of the amount of matter in an object.
 - ____ (g) One kilogram is less than one gram.
 - ____ (h) A measurement has two parts - a number and a unit of measurement.
 - ____ (i) Most countries use the metric system.

Measuring Length

Length is measured with a metric ruler. The basic metric unit of length is the metre (m). A combined metric and inch ruler is shown below. On the metric side of the ruler the distance between numbered lines is equal to one centimetre. Each centimetre is divided into 10 equal parts. Each one of these parts is equal to one millimetre.



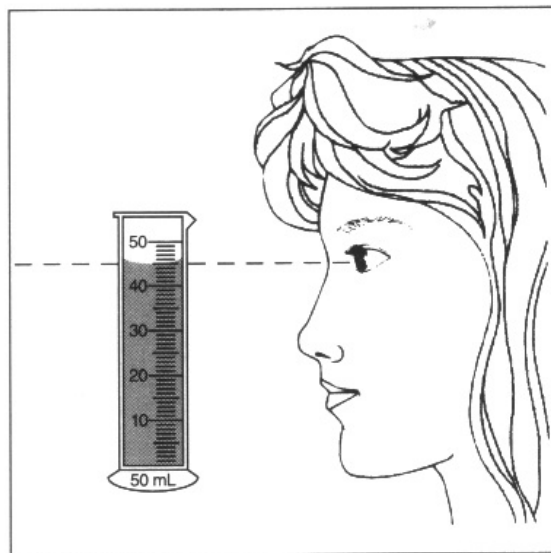
- The length at A may be written as 45 mm. It may also be written as _____ cm.
- The length at B may be written as _____ mm or _____ cm.
- Measure each of the following lengths. Write the lengths on the right in centimetres and millimetres.

(a) _____	(a) _____ cm _____ mm
(b) _____	(b) _____ cm _____ mm
(c) _____	(c) _____ cm _____ mm
(d) _____	(d) _____ cm _____ mm

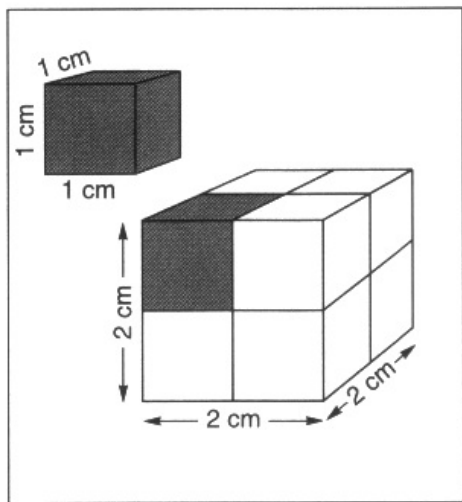
7. To the right of each length, draw a line of that length. (Use the dotted line as a guide.)
- (a) 92 mm
- (b) 9.2 cm
- (c) 43 mm
- (d) 3.5 cm

Measuring Volume

Volume is a measure of the amount of space an object takes up - how big an object is in all three directions. The litre (L) is the basic unit of volume in the metric system. The volume of liquids is measured in a graduated cylinder. A graduated cylinder is a glass tube that is marked with divisions to show the amount of liquid in it. To measure liquid volume, you should place the graduated cylinder on a flat surface and read the level of the liquid at your eye level. The surface of the liquid will have a "belly-down" curve. You should read the mark that lines up with the bottom of the curve.



8. The liquid volume in this graduated cylinder is: _____ mL



What is the volume of a cube that is 2 cm × 2 cm × 2 cm?

$$\text{Volume} = \text{length} \times \text{width} \times \text{height} = L \times W \times H$$

$$= 2 \text{ cm} \times 2 \text{ cm} \times 2 \text{ cm}$$

$$\text{Volume} = 8 \text{ cubic centimetres } \underline{\text{or}}$$

$$\text{Volume} = 8 \text{ cm}^3$$

9. Find the volume of each of the following rectangles:
- (a) 2 cm × 5 cm × 1 cm _____
- (b) 8 m × 2 m × 2 m _____
- (c) 1 mm × 1 mm × 10 mm _____
- (d) 4 cm × 2 cm × 3 cm _____
- (e) 5 mm × 3 mm × 6 mm _____
- (f) 1.2 m × 2.5 m × 3.5 m _____

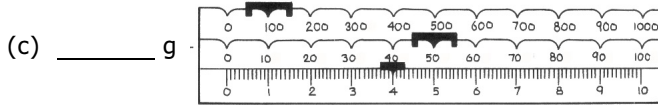
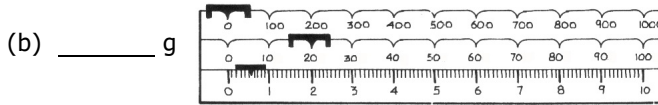
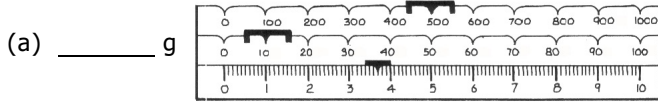
Density

Density is a physical property of matter. Each substance has its own characteristic density. This explains why some materials "float" or "sink" in a liquid. The less dense materials are suspended above the more dense objects. For example, since water has a density of 1.0 g/cm³ & ice has a density of 0.92 g/cm³, ice will float in water.

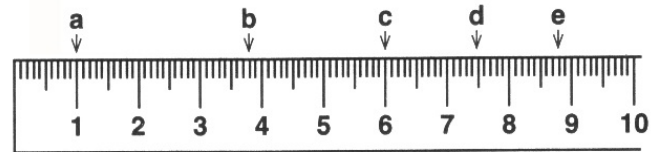
10. If the density of water is 1.0 g/cm³ indicate whether the following substances would float or sink in water?
- (a) gold (19.3 g/cm³) _____
- (b) birch wood (0.66 g/cm³) _____
- (c) cedar wood (0.37 g/cm³) _____
- (d) iron wood (1.23 g/cm³) _____
- (e) vegetable oil (0.79 g/cm³) _____
- (f) silver (10.5 g/cm³) _____

Measurement & Density Review

11. What mass is indicated on each of these balances?



12. What lengths are marked on the centimetre ruler?



(a) _____ cm

(d) _____ cm

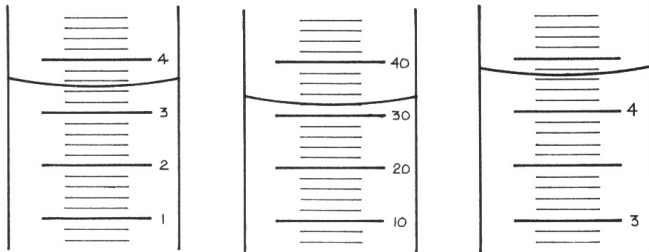
(b) _____ cm

(e) _____ cm

(c) _____ cm

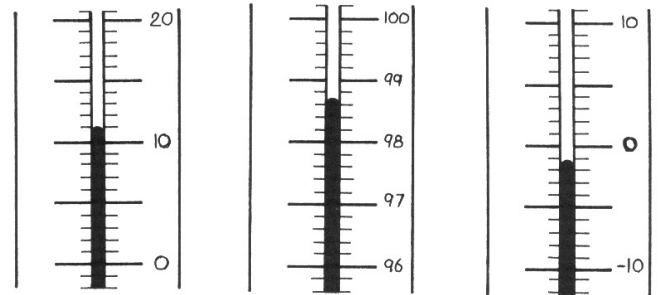
13. What volume is indicated on each of these graduated cylinders?

(a) _____ mL (b) _____ mL (c) _____ mL



14. What temperature is indicated on each of these thermometers?

(a) _____ °C (b) _____ °C (c) _____ °C



15. Find the missing quantity in each of the following density problems, given any two of mass (g), volume (cm^3), and density (g/cm^3). Use the space below to show your work (GRESS)!

(a) mass = 30 g; volume = 2.0 cm^3

(b) mass = 24 g; density = $2.0 \text{ g}/\text{cm}^3$

