Hands-on Workshop Activities

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VOLUME AND CAPACITY

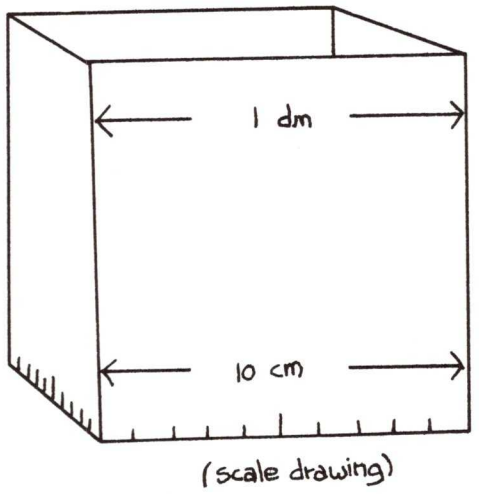
The Cubic Decimetre

1. (a) Using the sheet of cardboard supplied, construct on open rectangular box with each edge 1 dm long. Use plastic tape to secure the edges.

   (b) Compare your container to the milk carton.

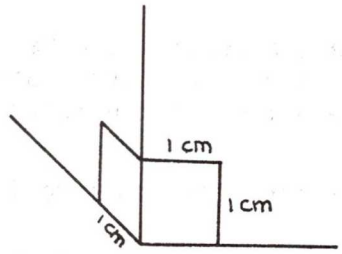
   (c) Select one bottom corner and mark in centimetre scales along each dimension.

   (d) Label 3 adjacent edges as 1 dm.



(scale drawing)

2. (a) Select another bottom corner and draw in the lines to show the size 1 cm^3.



(b) How many centimetre cubes would fit along <u>one</u> row of the bottom? _____

(c) How many such rows would fit into the bottom? _____

(d) How many cm^3 would there be in this bottom layer? _____

(e) How many layers would fit into the whole box? _____

(f) How many centimetre cubes would fit into the whole box? _____

_____ cm^3 = _____1_____ dm^3

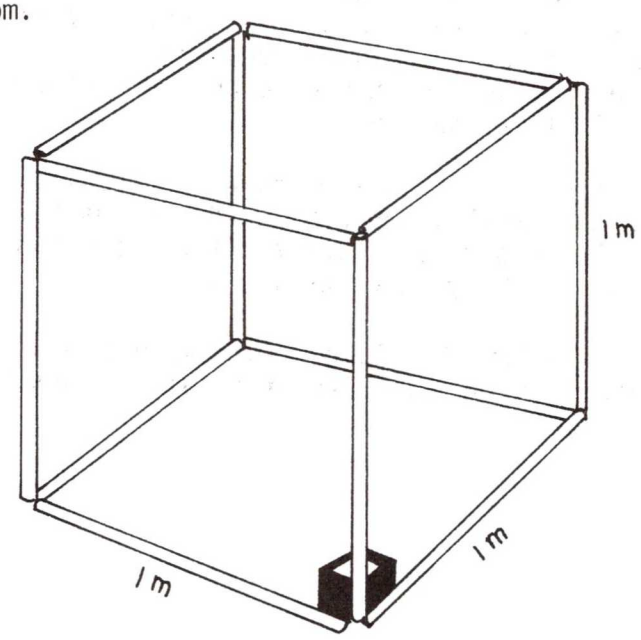
3. (a) The capacity of this box is 1 litre (1 ℓ). What is the capacity of 1 cm^3? _____

4.

Container	*Your Estimate of Capacity in ml*	*Actual Capacity by Calculation*	*Error*
Shopping bag	_____	_____	_____

The Cubic Metre

1. (a) Please contribute 12 "newspaper" metre measures and your assistance to construct the skeleton of a metre cube, in the corner of the room.



(b) Place a decimetre cube within the metre cube in one corner. How many decimetre cubes (litres) would fit into one row along the bottom of the metre cube? _____

(c) How many such rows would fit in the bottom? _____

(d) How many decimetre cubes (litres) would there be in this layer? _____

(e) How many layers would fit into the whole metre cube? _____

(f) How many litres have the same capacity as 1 m^3? _____

(g) The capacity of 1 m^3 is _____.

Additional Notes

The cubic centimetre (cm^3) may be used to express the volume of small rectangular boxes, blocks, cylinders, spheres, cones, and other solids whose volumes can be determined by mathematical formulae.

The cubic metre (m^3) will be used to state the volume of a building, the hold of a ship, the amount of concrete in a dam, the earth moved in an excavation, and the gravel, sand or loam delivered by a truck.

The millilitre (ml) will occur when stating volumes of milk, drinks, oils, paraffin, fluid medicines, shampoos, toothpaste, lotions, solvents, paints, and similar fluids in containers generally holding less than one litre. The millilitre will appear on measuring spoons and in recipe books. Medicinal doses will often be administered by the 5 ml teaspoonful.

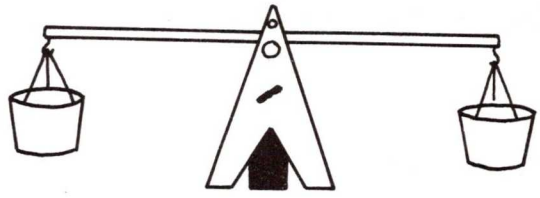
The litre (ℓ) will be used to express a measure of gasoline, antifreeze, paint, solvents, milk and various drinks, and household liquids having volumes generally of one litre or more. The capacity of car radiators and gas tanks, of refrigerators and wheelbarrows will likely be given in litres.

The kilolitre (kl) may help describe large fluid volumes such as water consumption shown on hydro metres or the capacity of a swimming pool, reservoir, gasoline truck or oil tank.

MASS

Mass Comparisons

1. (a) Assemble the balance provided.



(b) Adjust balance by adding paper clips to pans, as needed.

2. Using sand in plastic bags, prepare a set of mass units consisting of:
   (i) A 50 g mass (0.05 kg)
   (ii) A 100 g mass (0.1 kg)
   (iii) A 200 g mass (0.2 kg)
   (iv) A 200 g mass (0.2 kg)
   (v) A 500 g mass (0.5 kg)
   (vi) A 1 000 g mass (1.0 kg)

3. Complete the following -

	Mass	Your Estimate (To nearest 100 g)	Actual Mass	Error
(a)	Of your shoe	_____ • _____ kg	_____	_____
(b)	Of this booklet	_____ • _____ kg	_____	_____
(c)	Of a pair of scissors	_____ • _____ kg	_____	_____
(d)	Of a math book	_____ • _____ kg	_____	_____

4. Using a sheet of light plastic, provide a water-tight lining for a litre container (1 dm^3).

   Fill the container to the top edge with water. Because the sides are flexible, the box will bulge a little. Avoid this by having two colleagues hold the sides vertical with their hands.

   Empty the water (good luck!) into one of the plastic containers of the balance. Use your sets of units to find the mass of the water. Measure to the nearer 100 g.

   Mass of 1 litre of water is _____.

5. If 1 ℓ of water has a mass of _____kg
then 1 kl of water has a mass of _____kg
which is equal to _____Mg.
1 kl is the capacity of _____ m^3
therefore _____ m^3 of water has a mass of _____Mg.

This unit of mass, the Mg, is called a tonne (t).

Additional Notes

As Canada goes metric, many small goods will have specifications in grams (g). Among these there will be butter, cheese, packaged meat, jams, jellies, spices, canned fruit, nuts, loose candies, nails, putty and paste fillers. Knitting wool will be shown in grams. Perhaps kitchen scales in grams and kilograms will become popular.

The kilogram (kg) will be used in buying meat, vegetables, fruit, sugar, flour, fertilizer, lawn seed, cement. Baggage limits when travelling by air are stated now as 20 kg for economy and 30 kg for first class. The kilogram will also be used to express a person's own mass which we have so often called our weight.

The tonne (t) will be useful in expressing the annual yield in grain crops, in specifying the mass of very large loads, such as a truckload of bricks, or almost any type of massive cargo which may be shipped or transported from one place to another.

The milligram (mg) is a very small mass and therefore not too common in daily life except in pharmaceutical quantities where the contents of drugs may be shown in milligrams.