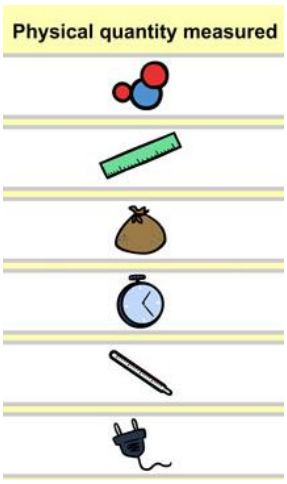
Measurements and units review questions

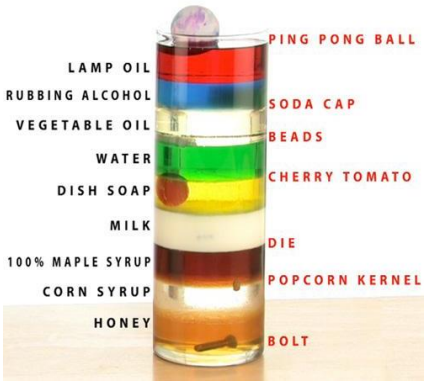
1) SI base units



The pictures on the right represent the main six base units from which the System International of units is built. Create a table for these six units as below:

Quantity	Symbol	Units
Amount of substance	n	mol

The first row is done for you as it is more Chemistry than Physics.



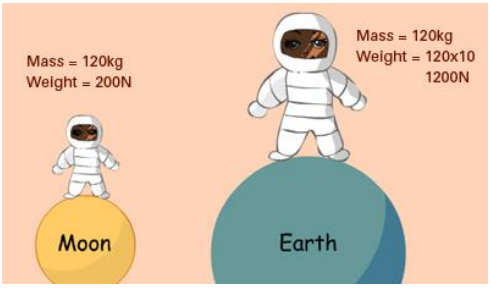
2) Derived units and prefixes

(a) What is this distance: km ?
(b) What are these times:
ns, µs, ms?
(c) What is the unit for volume?
(d) Define density and state its units.
(e) If $2m^3$ of aluminium has a mass of 5400kg what is the density of aluminium?
(f) A cm^3 is the same volume as a ml (milli-litre)
   a. How many cm^3 are there in a m^3?
   b. How many litres are there in a m^3?

3) Smaller and bigger
Write down two mathematical equivalents of the following unit prefixes. (for example for nano [a billionth] you would write 1/1,000,000,000 and 10^{-9})
a) kilo (k) b) milli (m) c) Mega (M) d) centi (c)

4) Measuring density
a) Explain how a measuring cylinder can be used to accurately measure the volume of:
   i) A liquid
   ii) A small solid object that sinks
   iii) A small solid that floats
b) Explain how a mass balance can be used to accurately measure the mass of a liquid.
c) Explain whether a solid of volume $12cm^3$ that has a mass of 14g floats in pure water.
d) Opposite is a photograph of a displacement can. Explain how this can be used to measure the volume of a solid object.

5) Mass and weight
a) A planets's density varies. Are planets denser in the central core or at the outer layers?
b) A large, dense planet will have the greatest gravity.
   i) Uranus has a similar gravitational field strength to Earth and Venus but is much larger. Compare the density of the Earth and Venus to the density of Uranus
   ii) Mars and Venus have similar gravitational field strength (0.4 N/kg).
      a) How much would a person of mass 80kg weigh on Mars or Venus.
      b) Mercury is denser than Mars, which planet is smaller?
c) Look at the picture opposite. What is the gravitational field strength on the moon?



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