Mass, volume, density

- **Mass of an object describes the amount of matter contained in it. Mass is denoted by *m*.**

Units of mass are kilograms (kg), grams (g), tons, pounds, ounces, etc.

- **Volume of an object tells us how much space does the object take up. Volume is denoted by *V*.**

Units of volume are liters(l), milliliters (ml), cubic meters (m^3), gallons, etc.

- **Density is a property of a material: it tells us how much mass is contained in a given volume of the material. It tells us how tightly the matter is packed. Density is denoted by ρ (Greek letter "rho").**

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}} \quad \textbf{or} \quad \rho = \frac{m}{V}$$

Homework 9

Problem 1.
A pirate gives you a cube that he claims is made of pure gold. The side of the cube is 4 cm. You measure its mass and find that it is 900 grams. Is the pirate lying to you? Gold density is 19.3 g/cm^3.

Problem 2.
The planet Earth's total mass can be measured and turns out to be about $6 \cdot 10^{24}$ kilograms. The Earth is almost a perfect sphere with the radius approximately 6400 km. Find the average density of the Earth in kg/m^3 and compare to gold density from the last problem and to the density of water (1000 kg/m^3).

Hint: Volume of a spherical body can by found with the formula $V = \frac{4}{3}\pi R^3$ where R is the radius.

Problem 3 (optional, but highly recommended).
Find density of some object in your home by experimentally measuring its mass and its volume. To measure its mass you can use a kitchen scale or a bathroom scale, if you have them at home. Please clearly describe what object you were measuring, how you found its mass and volume and what is the resulting density.