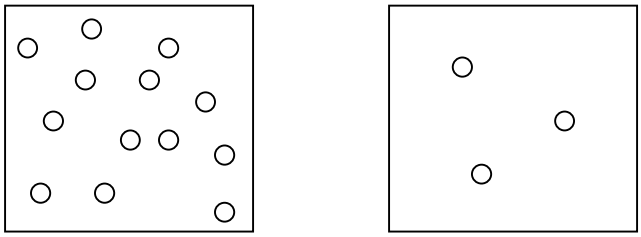
Lab Notes

Below are examples of lab notes for the write-up. Each lab requires one page of notes. Each lab need not include everything shown here. Each lab is different and the notes lab to lab should reflect that. Discussion points should always be included. Discussion points will occur during the pre-lab during the explanation of the lab and during the presentations following the lab.

Constraints and Parameters

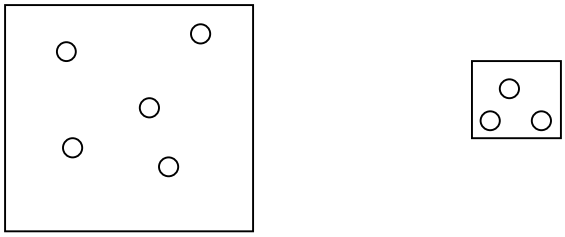
The material used for all measurements was iron.

Discussion Points (This should *ALWAYS* be included)



Density is an expression of the compactness of particles. Looking at the equation for density, $\rho = \frac{m}{V}$, if two volumes are the same the object with more mass will have more density.

However, it is possible for the object with more mass to be less dense.



Less Dense *More Dense*

Unit Conversions and Analysis

$$3\frac{g}{cm^3}\cdot\frac{100\ cm}{1\ m}\cdot\frac{100\ cm}{1\ m}\cdot\frac{100\ cm}{1\ m}\cdot\frac{1\ kg}{1000\ g} = 3000\ kg/m^3$$

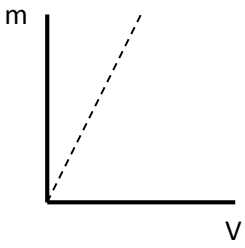
$$x\cdot\rho = x\cdot\frac{m}{V} = x\cdot\frac{m}{x^3} = \frac{m}{x^2} = \sigma = surface\ density$$

Relevant Facts

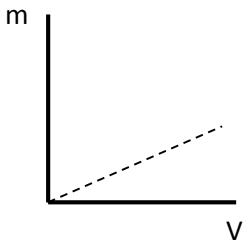
Density of water: $1000\ kg/m^3$

Density of air: $1.1\ kg/m^3$ to $1.4\ kg/m^3$ at the surface of the Earth depending on the temperature

Additional Graphs



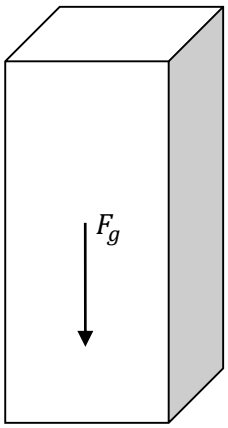
High Density



Low Density

Derived Equations

Derivation of atmospheric pressure using the weight of a column of water:



$$F = mg$$

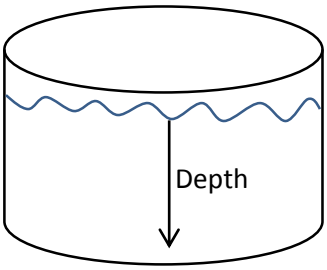
$$F = \rho V g$$

$$F = \rho g h A$$

$$\frac{F}{A} = \frac{\rho g h A}{A}$$

$$P = \rho g h$$

Related Information



While the pressure increases with depth, the density stays the same.

In reality, the density does change, but just barely and is often ignored.

Gases *DO* increase in density as depth increases.

Problem Example

What is the mass of air in a living room with dimensions 4.0 m x 6.0 m x 2.5 m?

$$V = (4.0\ m) \cdot (6.0\ m) \cdot (2.5\ m) = 60 m^3$$

$$m = \rho V = (1.2\ kg/m^3) \cdot (60 m^3) = \mathbf{72\ kg}$$

New Terms

Mass – The amount of particles in an object

Volume – The “bigness” of something

Density – How packed in the particles are in an object