Pressure

Pressure is the force applied to the surface per unit area:

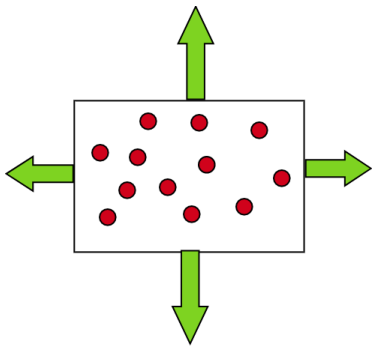
$$p = \frac{F}{A} \longrightarrow [p] = 1\frac{N}{m^2} = 1Pa$$

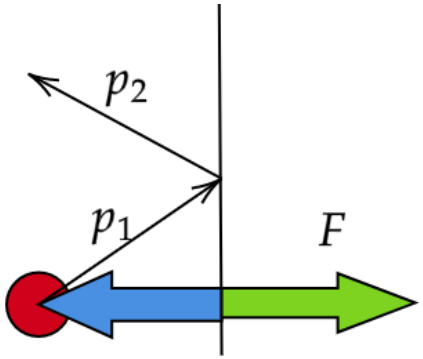
Here, the force is perpendicular to the surface.

Pressure in a liquid with density ρ at a given depth h:

$$p = \rho \cdot g \cdot h$$

Pressure in gases:





Homework 21

Problem 1.
A $45\ kg$ skier has his skis on. Each ski is $1.5\ m$ long and $10\ cm$ wide. Find the pressure that the skier is applying to the snow.

Problem 2.
What pressure do you produce when pushing a pushpin into a wall with a force of $50\ N$? Take the area of the pushpin tip as $0.01\ mm^2$.

Problem 3.
A fish tank $60\ cm$ long, $40\ cm$ wide, and $30\ cm$ high is full of water. Calculate the pressure produced by the fish tank to the table's surface. Water has a density of $1000\ \frac{kg}{m^3}$.

Problem 4* (bonus problem).
Estimate the mass of Earth's atmosphere. You are given atmospheric pressure $p_0 = 100000\ Pa$ and radius of the Earth $R = 6400\ km$.

Hint: surface area of a sphere of radius R is $4 \cdot \pi \cdot R^2$.