

Pressure is force per unit area, $d\vec{F} = -pd\vec{A}$, where the direction of \vec{A} is outward along the surface normal.

The compressibility of a fluid $k = -(1/V)\partial V/\partial p$. $k = 1/p$ for an ideal gas, but is much smaller for ordinary liquids, which can be regarded as approximately incompressible ($k \approx 0$).

Pressure variation in a column of incompressible liquid $p(z) = p_0 + \rho g(h - z)$ where h is the height of the column. The gradient of the pressure gives the force per unit volume $\vec{f} = -\nabla p$. The volume integral of $\int_V \vec{f} dV$ is the hydrostatic force on the material in the enclosed volume.

Pascal's principle: An external pressure is transmitted undiminished to all parts of a fluid in equilibrium. Note that this is a statement about the pressure, not the force.

Archimedes principle: The bouyant force on an object in a fluid is the weight of the excluded fluid.