Fluid mechanics

## The hydrostatic pressure

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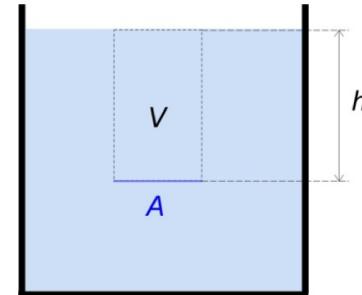
The hydrostatic paradox
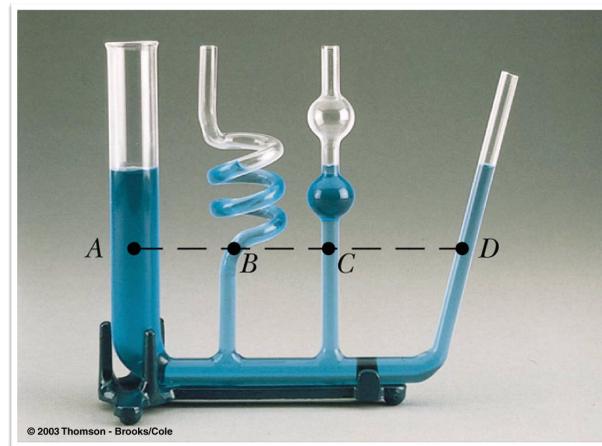
The hydraulic jack (Pascal's principle)

F_1

A_1

A_2

P

P

P

F_2

$$\frac{F_2}{F_1} = \frac{A_2}{A_1}$$
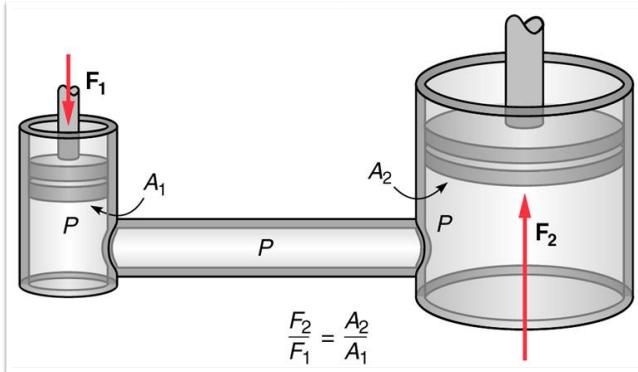
Pressure of gasses

Partial pressure

gas A, P_A gas B, P_B gas C, P_C

all three combined   to make a mixture

mixture A, B, & C $P_{total} = P_A + P_B + P_C \cdots$

Atmospheric pressure

1 m^2 column of air (mass = 10^4 kg)

Gravitational force
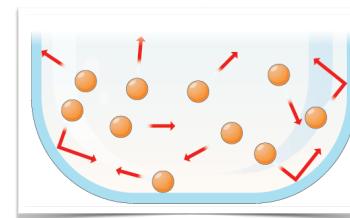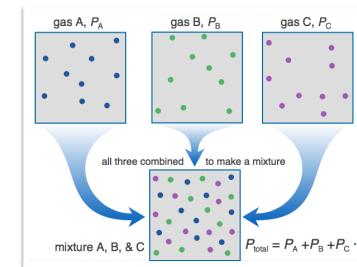
1 atm pressure at surface
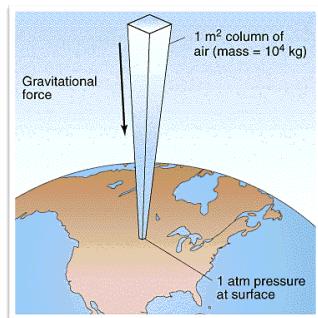
mercury sphygmomanometer

mmHg as a unit of pressure

Oscillations

OSCILLATION : Another perspective of circular motion

$\cos\theta$

$\theta = $

$\sin\Delta\phi$

sin 0° = 0
sin 30° = 0.5
sin 90° = 1

point of equilibrium

https://en.wikipedia.org/wiki/Sine

$y = A\cdot\sin(\omega\cdot t + \varphi_0)$

v

$\Delta\varphi$

phase

$\varphi = \omega\cdot t$

$v = \omega\cdot A\cdot\cos(\omega\cdot t + \varphi_0)$

$\cos\theta$

$\theta = $

$\sin\theta$

$a = -\omega^2 A\cdot\sin(\omega\cdot t + \varphi_0)$

$f = \dfrac{1}{T}$

$\omega = 2\pi\cdot f$
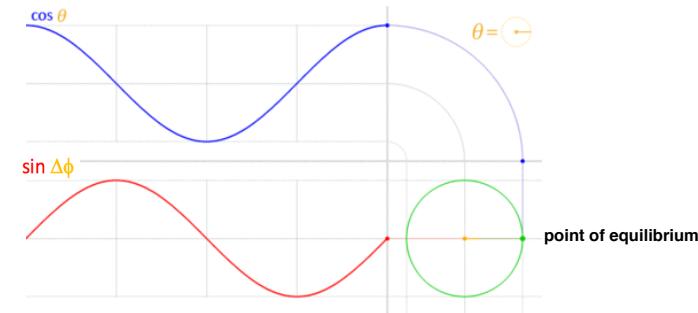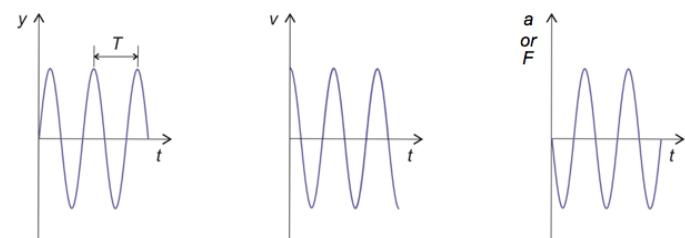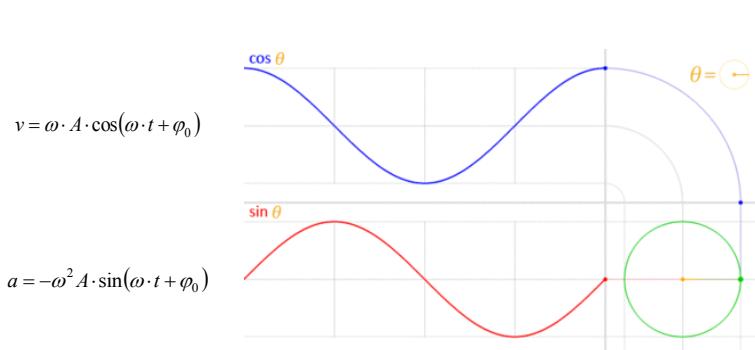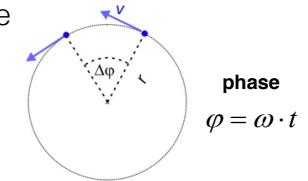
$$F = ma = -m\omega^2 A \cdot sin(\omega \cdot t + \varphi_0) = -m\omega^2 y$$

$$F = -k \cdot s$$

$$k = m \cdot \omega^2$$

$$f = \frac{\omega}{2\pi} = \frac{1}{2\pi}\sqrt{\frac{k}{m}}$$

Resonance curve