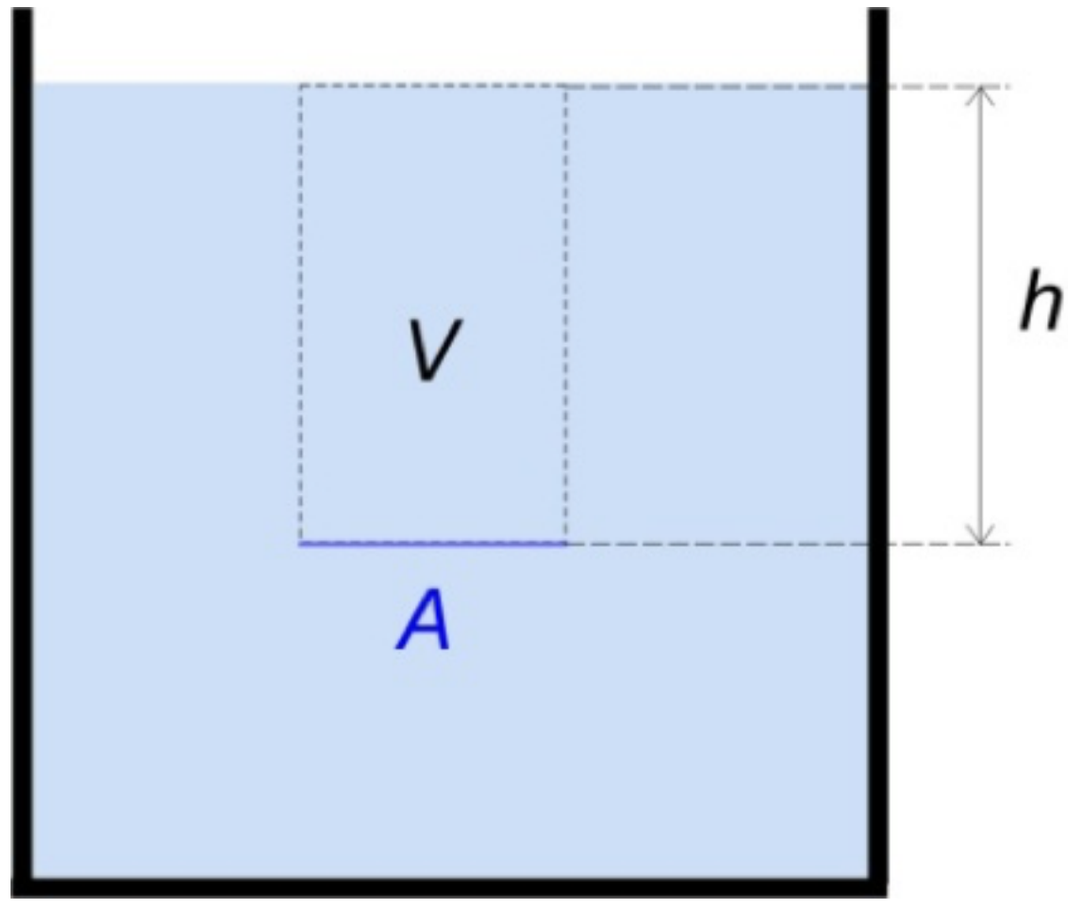
Fluid mechanics

The hydrostatic pressure

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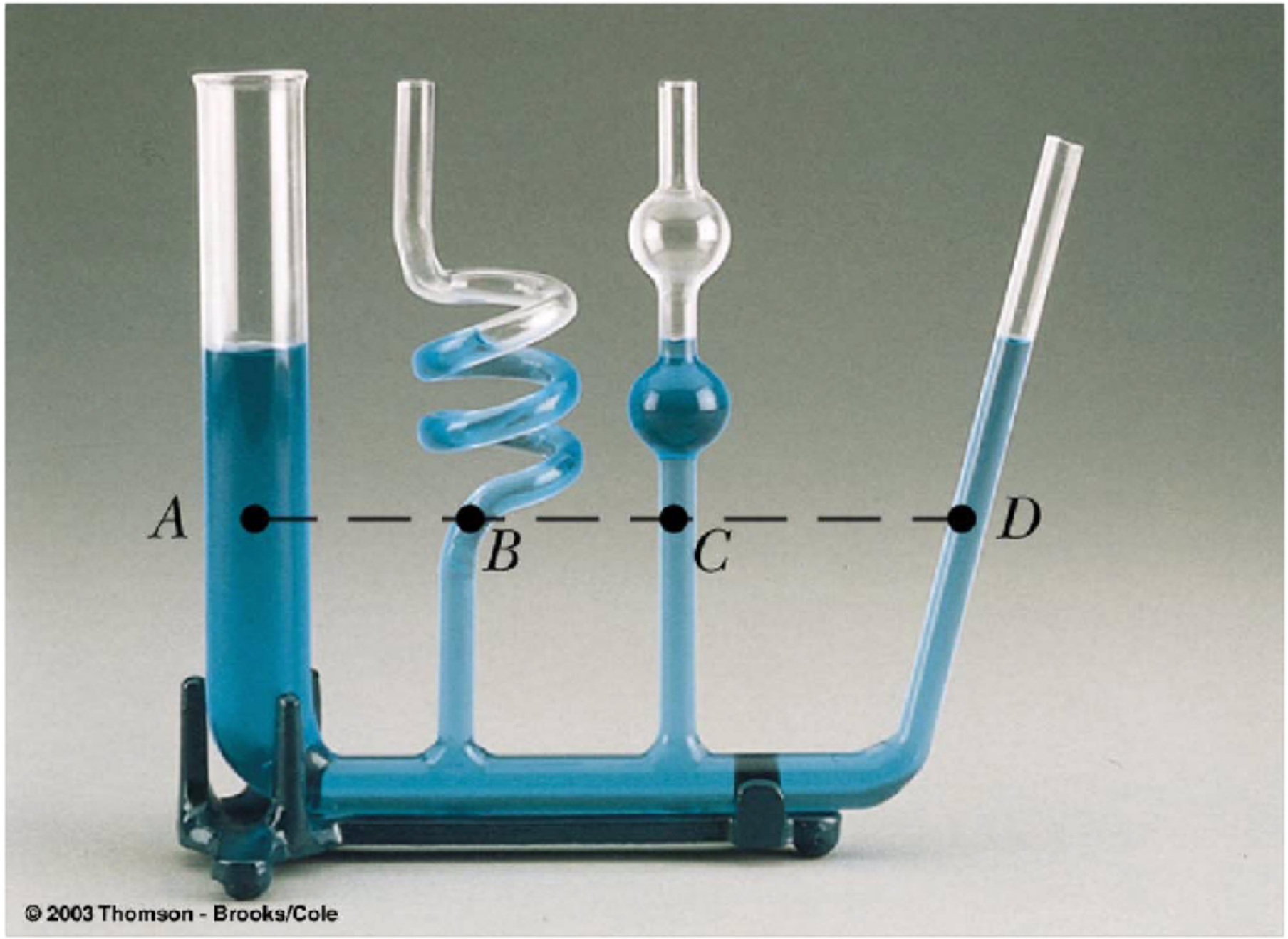
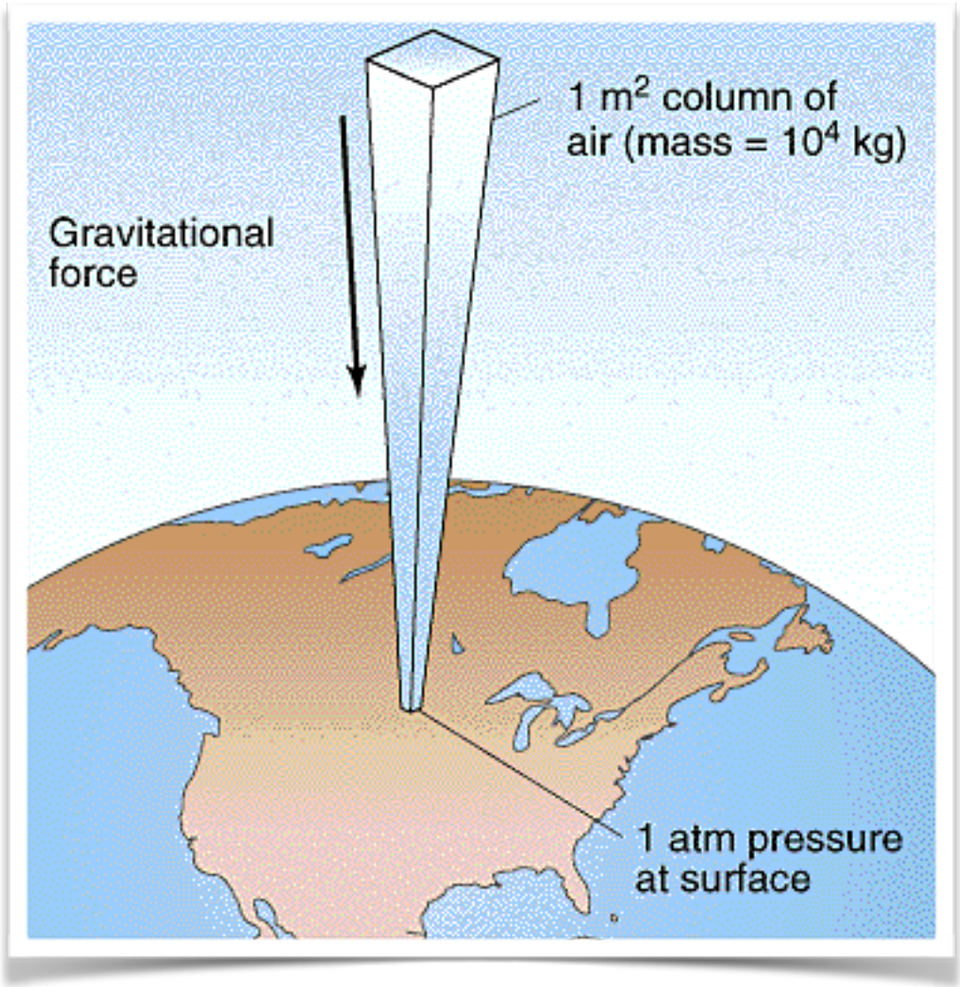
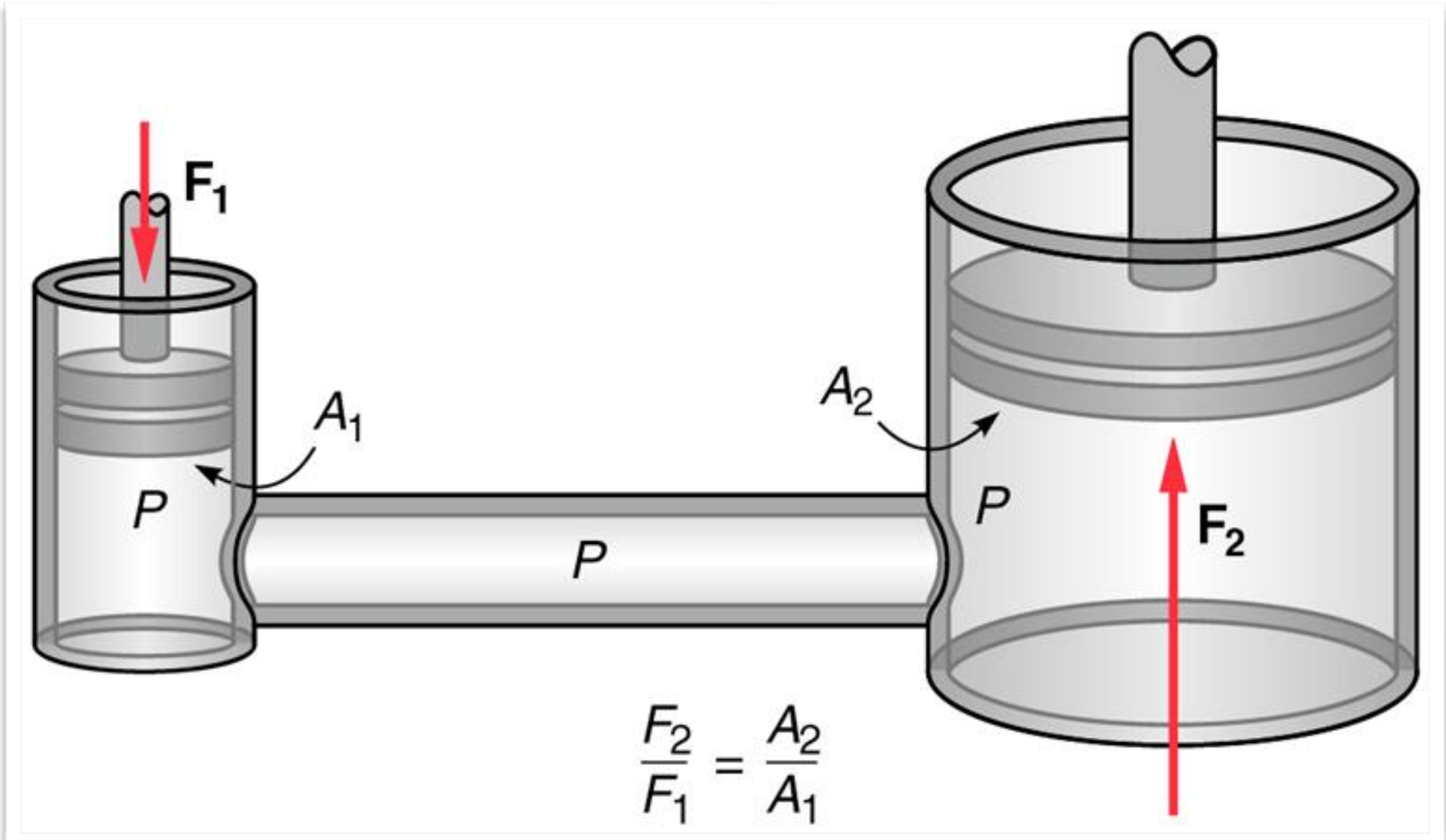
The hydrostatic paradox



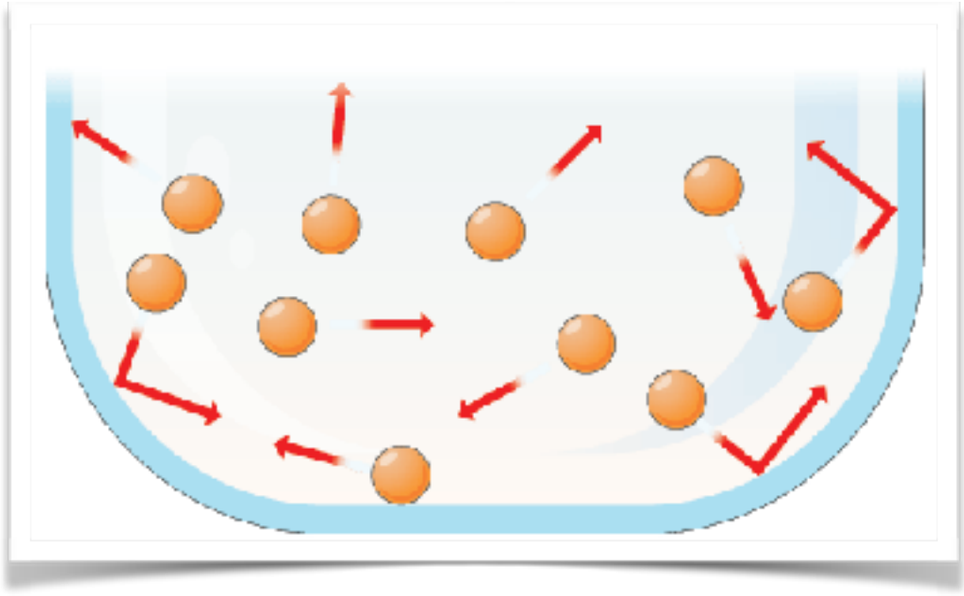
Atmospheric pressure



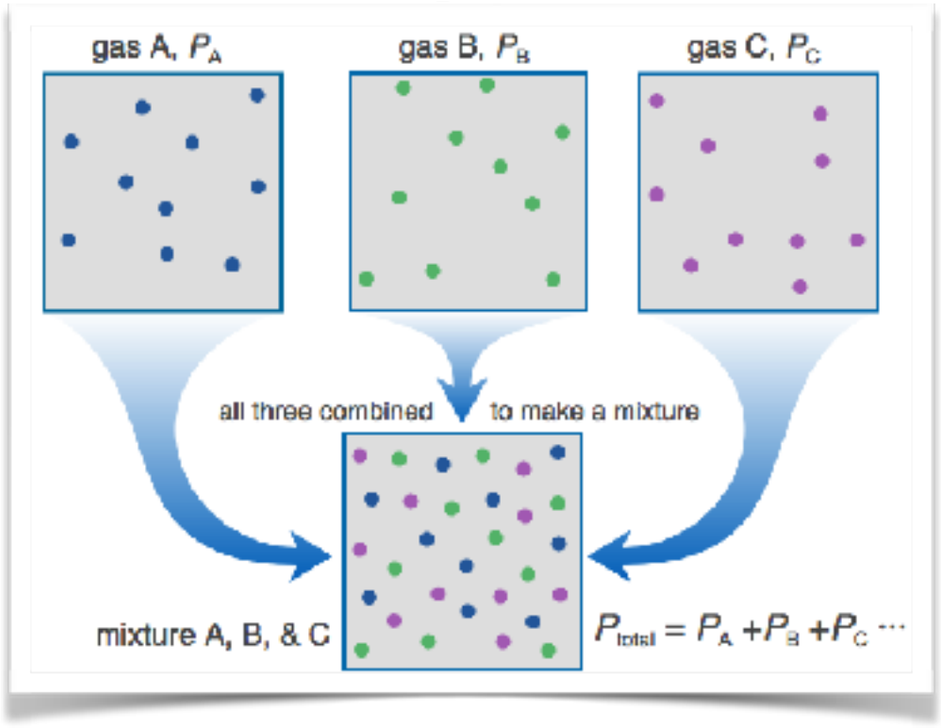
The hydraulic jack
(Pascal's principle)



Pressure of gasses

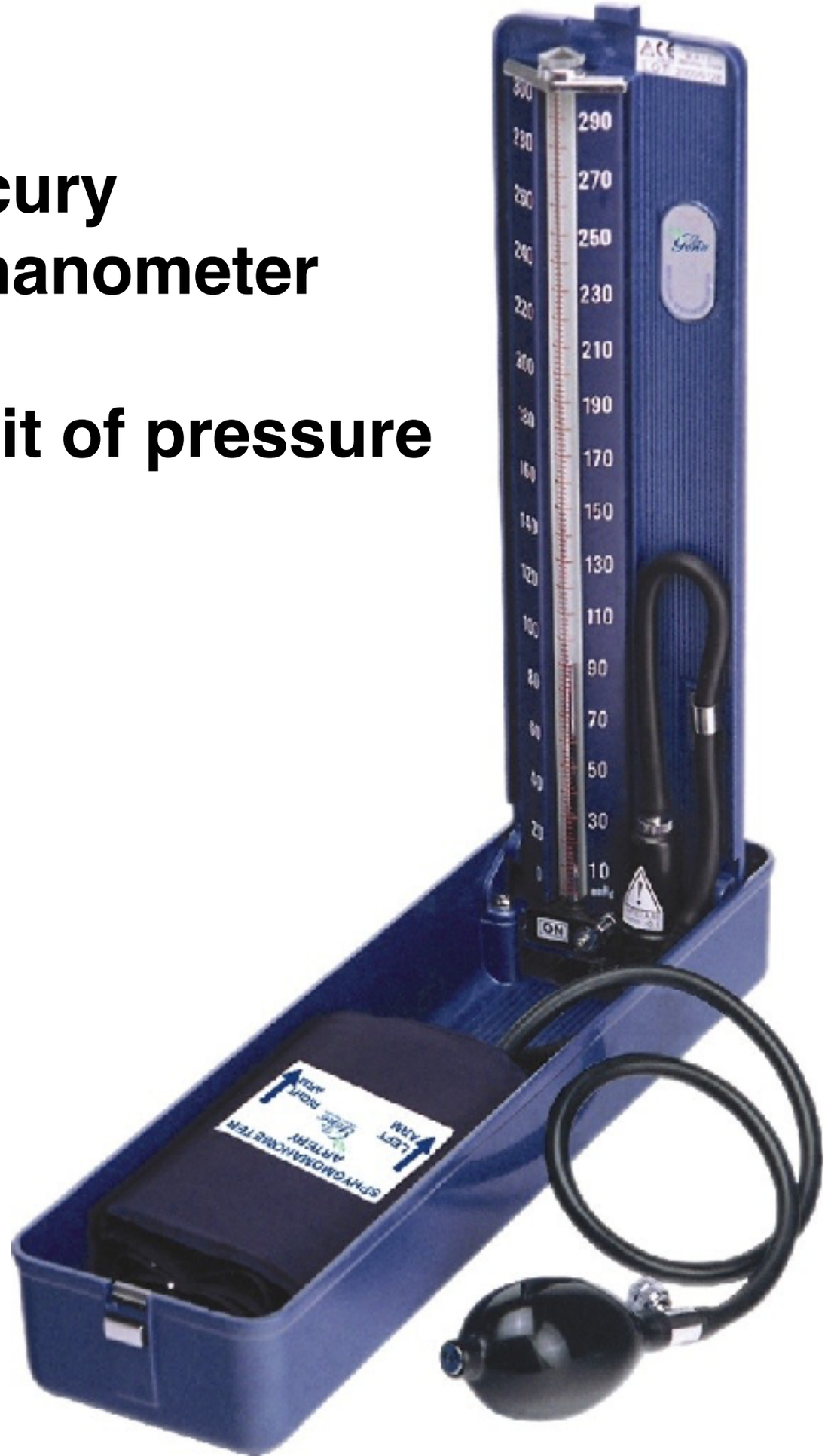


Partial pressure



mercury sphygmomanometer

mmHg as a unit of pressure



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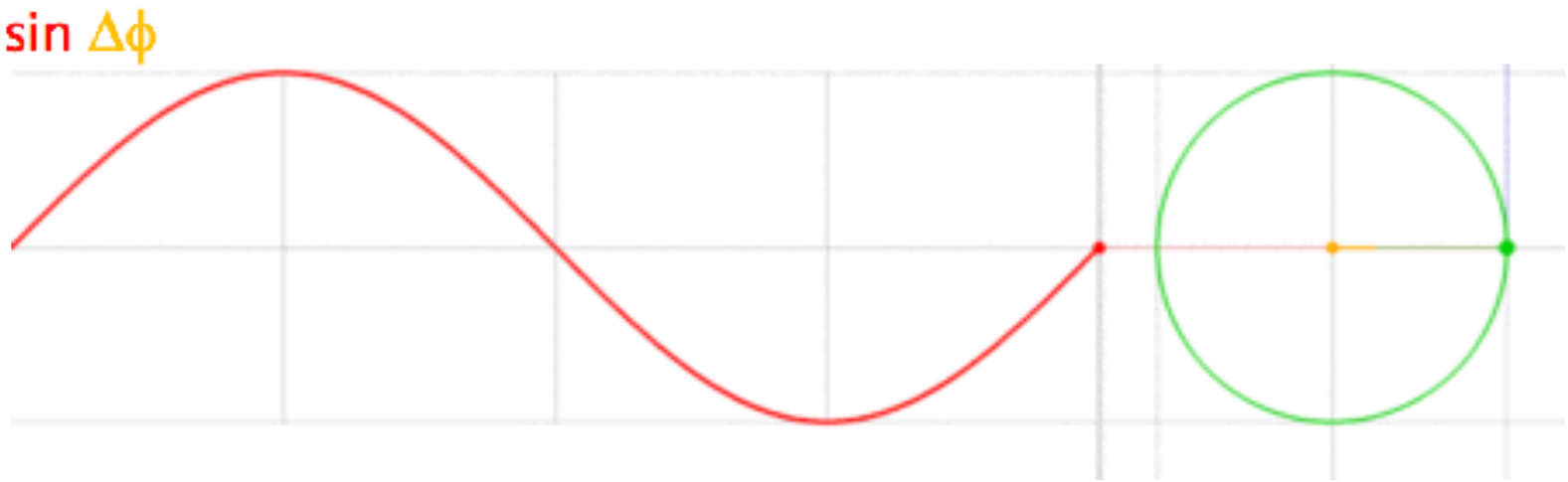
Oscillations

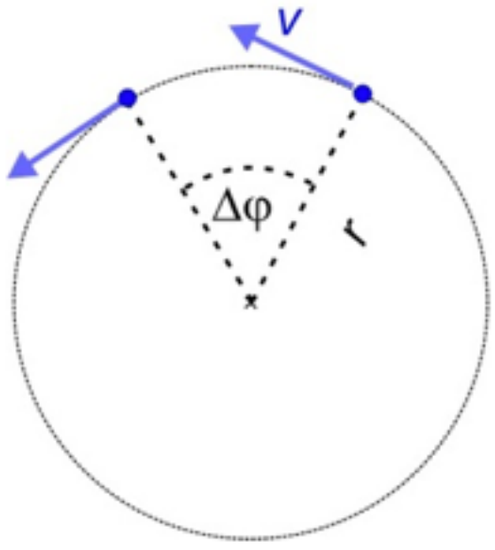
OSCILLATION : Another perspective of circular motion

sin 0° = 0
sin 30° = 0.5
sin 90° = 1



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

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

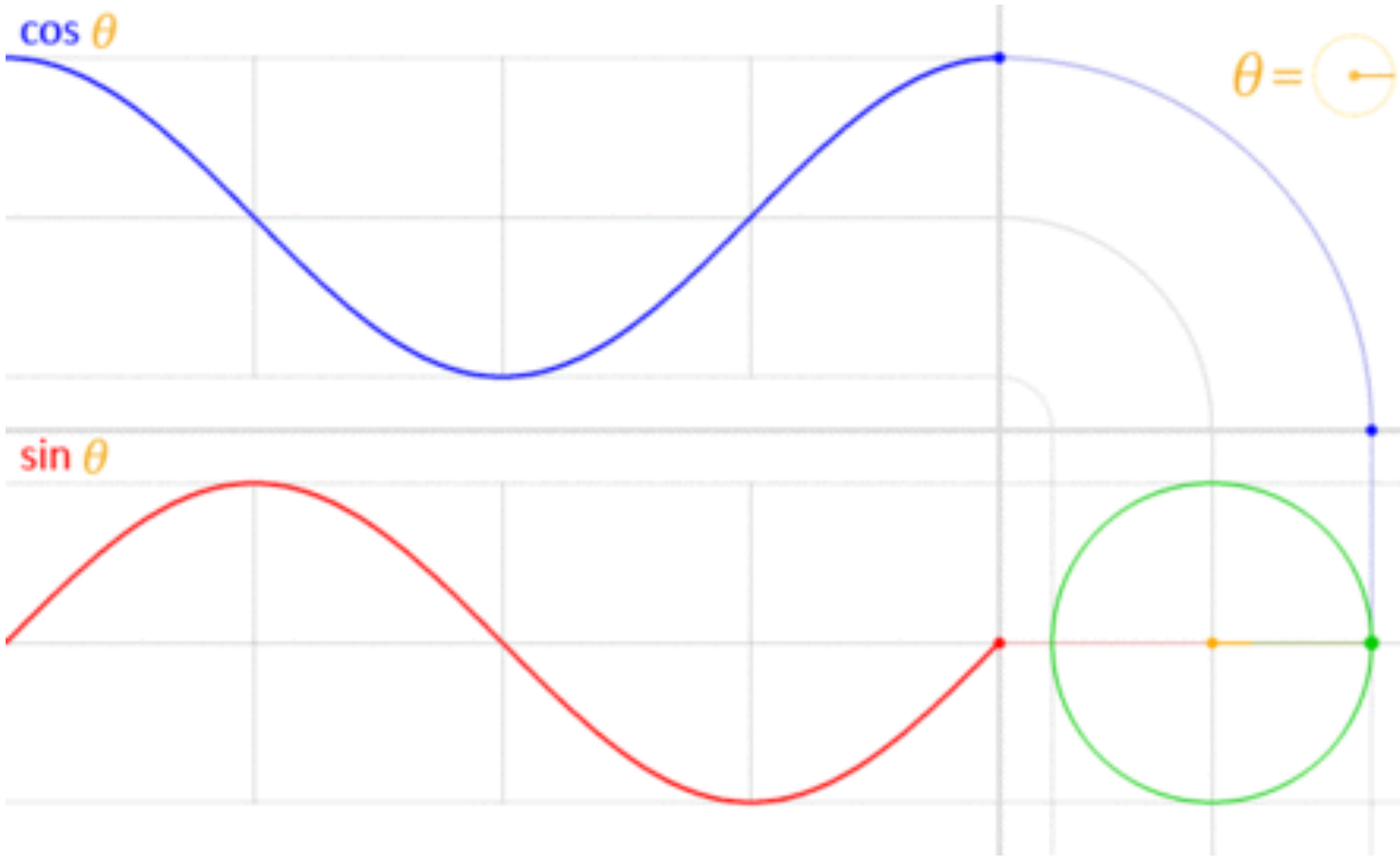


phase

$$\varphi = \omega \cdot t$$

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

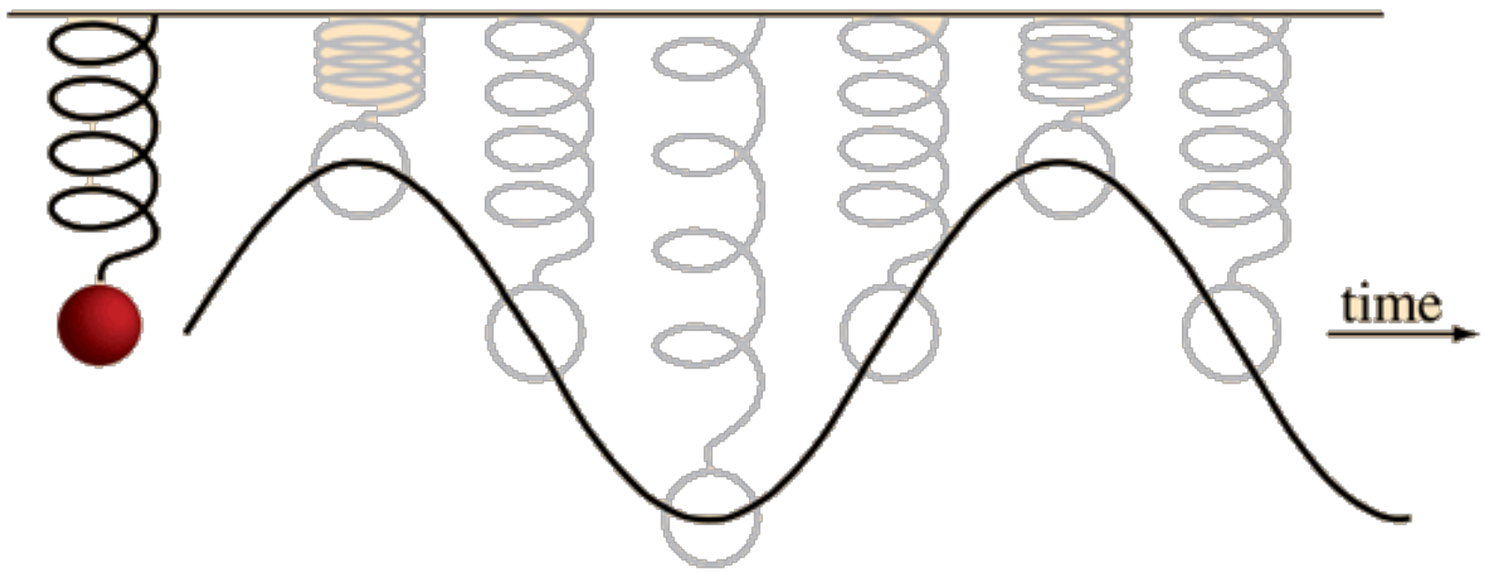
$$a = -\omega^2 A \cdot \sin\left(\omega \cdot t + \varphi_0\right)$$



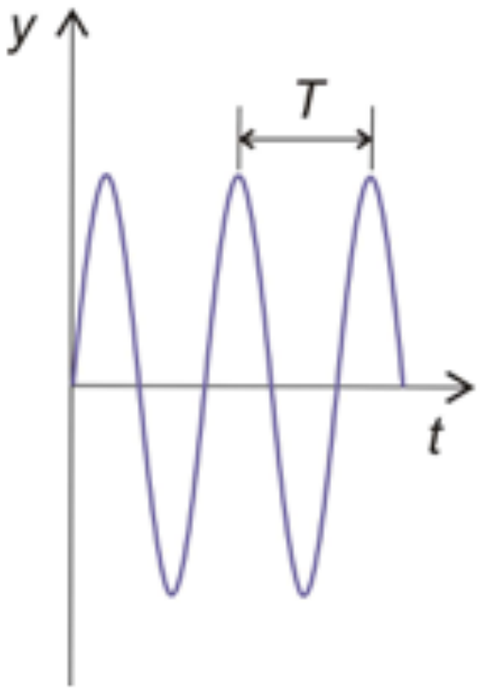
Simple harmonic oscillation

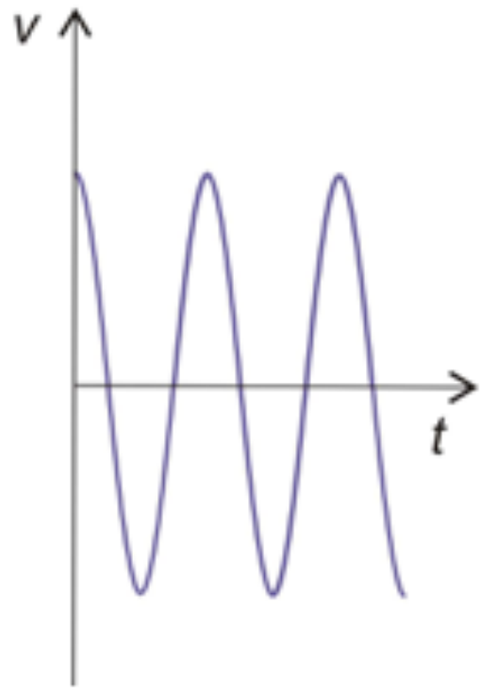
Restoring force is proportional to displacement

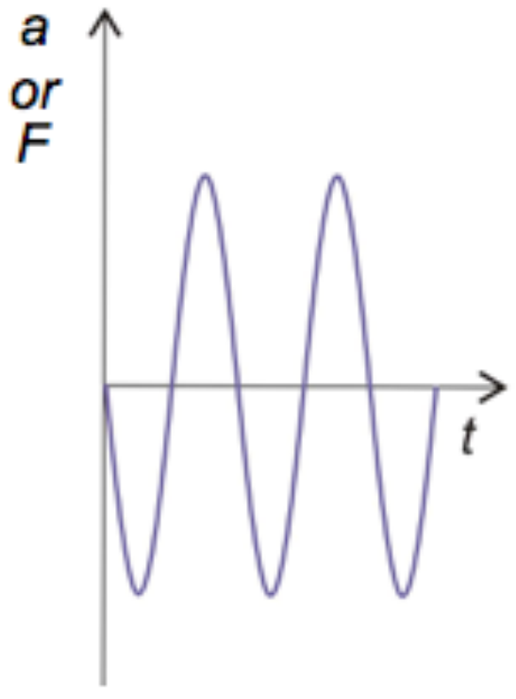
$$f = \frac{1}{T}$$



$$\omega = 2\pi \cdot f$$







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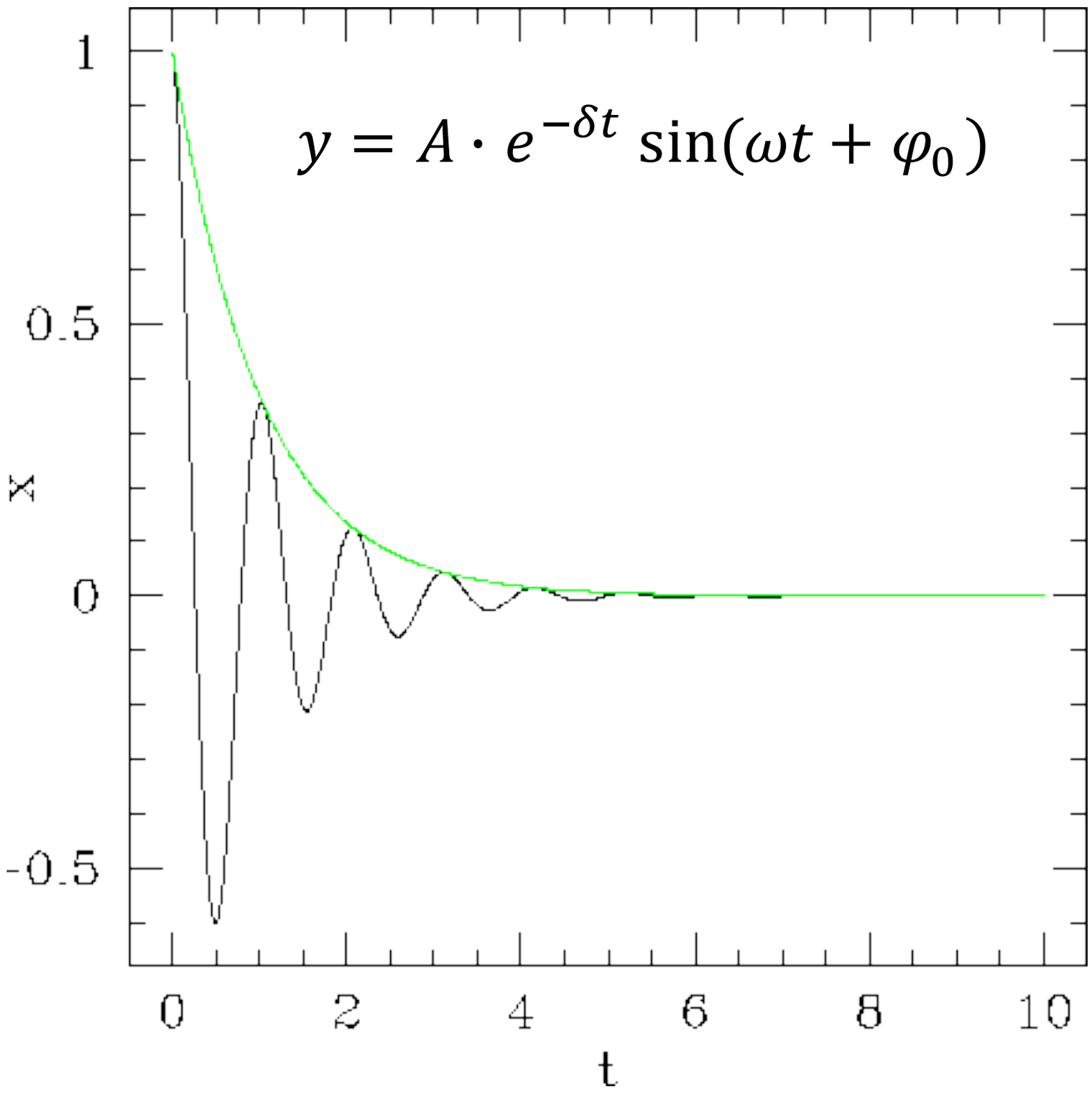
Damped oscillation



Eigenfrequency
(natural frequency)

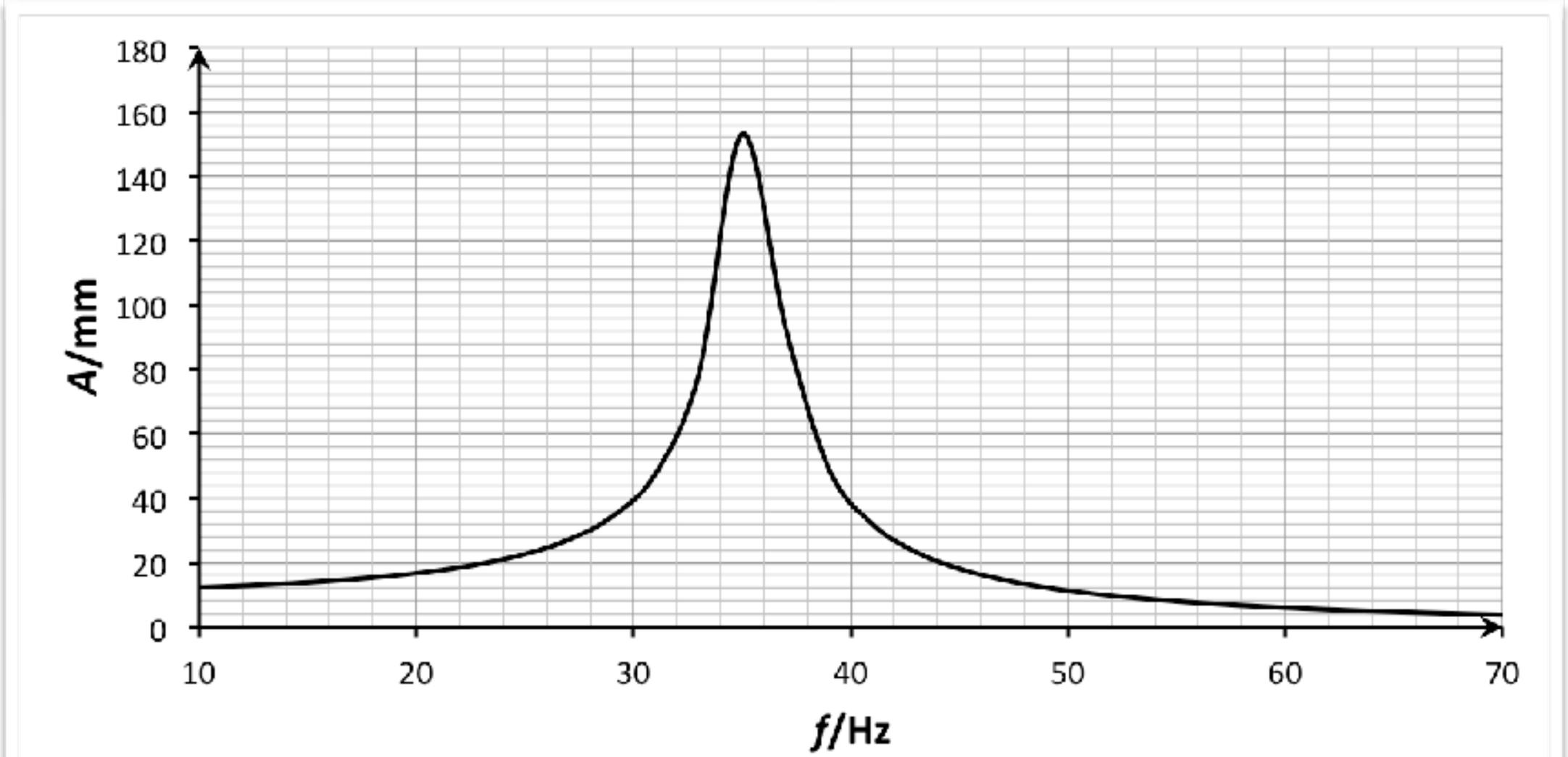
$$F = ma = -m\omega^2 A \cdot sin(\omega \cdot t + \varphi_0) = -m\omega^2 y$$

$$F = -k \cdot s$$

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

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

Resonance curve



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