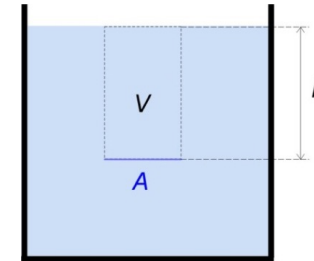


Fluid mechanics

1

The hydrostatic pressure

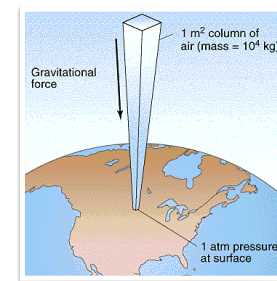


2



3

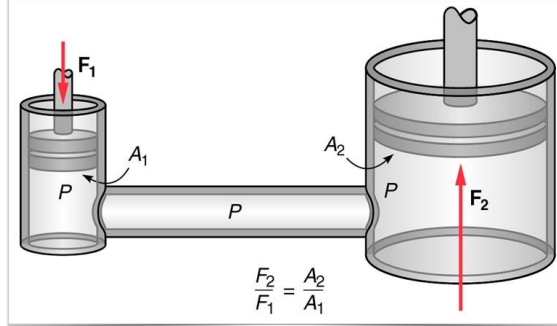
Atmospheric pressure



4

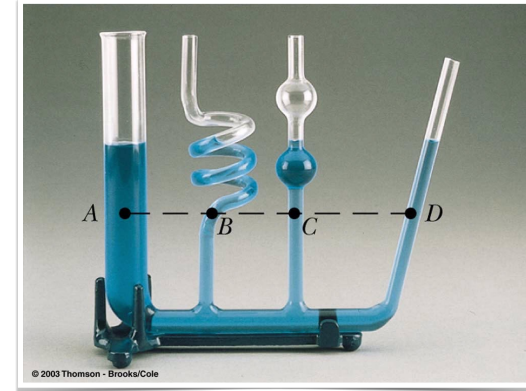
The hydraulic jack (Pascal's principle)

In a fluid at rest in a closed container, a pressure change in one part is transmitted without loss to every portion of the fluid and to the walls of the container.



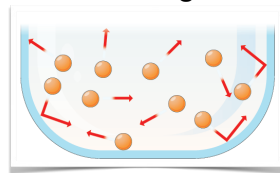
5

The hydrostatic paradox

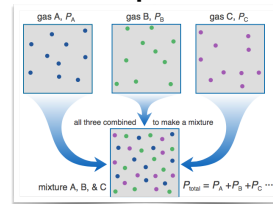


6

Pressure of gasses



Partial pressure



7

mercury sphygmomanometer

mmHg as a unit of pressure

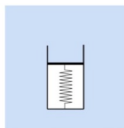


8

Problem 6/8

Problem 6/9

8. The figure shows a device for a simple pressure measurement. The small cylinder has vacuum inside and its top is sealed with a light piston. The piston is connected to the bottom of the cylinder with a spring. If we place this device in vacuum, then the spring will be uncompressed. The cross-sectional area of the piston is 2 cm^2 , and the spring constant is $4 \cdot 10^3 \text{ N/m}$.
- a) When this device is placed in the atmosphere, the compression of the spring is 5.1 mm. Calculate the atmospheric pressure!
- b) Calculate the compression of the spring if we place the device to the bottom of a 10-m-deep pond, that has a temperature of 4°C ! Assume that the atmospheric pressure is the same as in part a).
9. Calculate the hydrostatic pressure generated by blood in the foot of a standing man. Density of blood is 1.05 g/cm^3 and the height of the man is 170 cm.

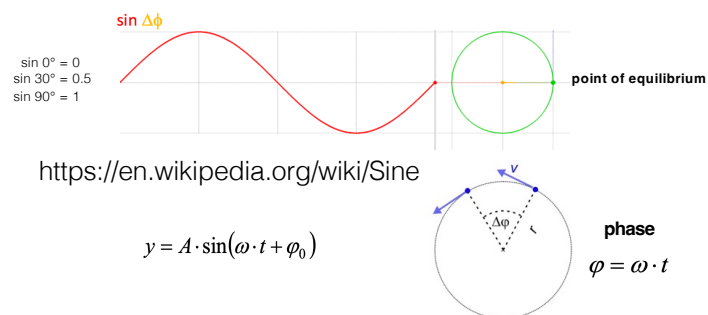


9

Oscillations

10

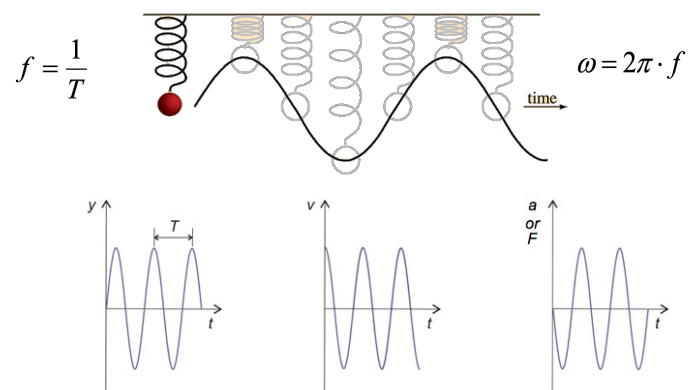
OSCILLATION : Another perspective of circular motion



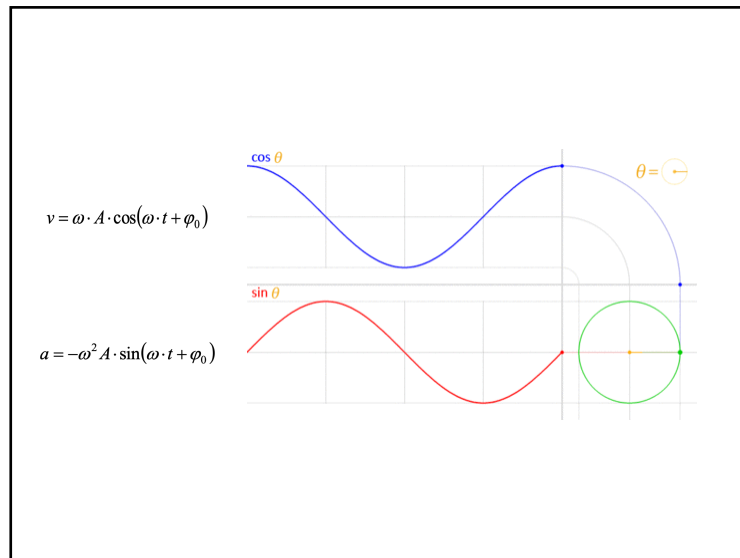
11

Simple harmonic oscillation

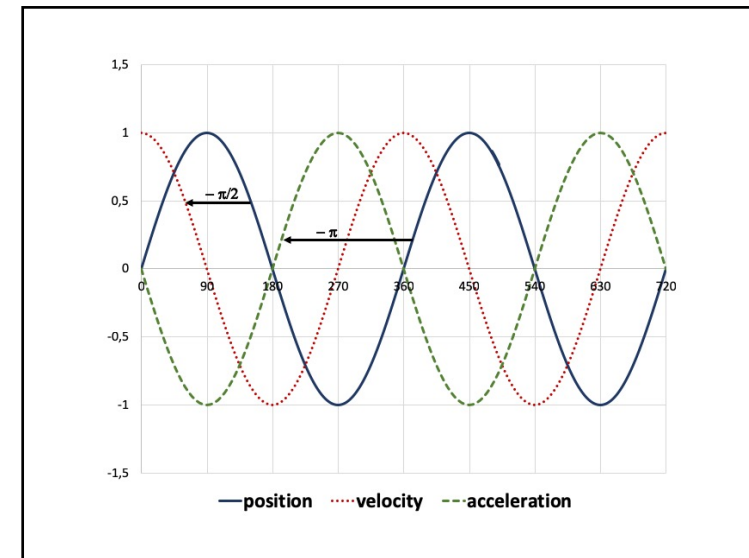
Restoring force is proportional to displacement



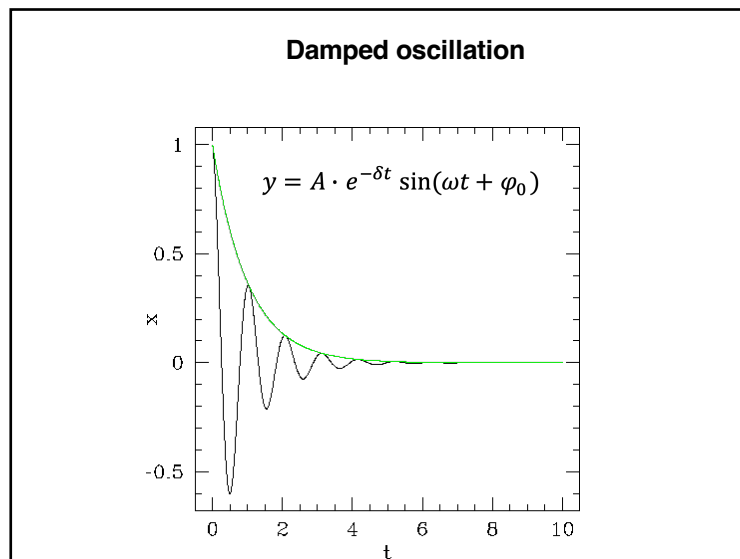
12



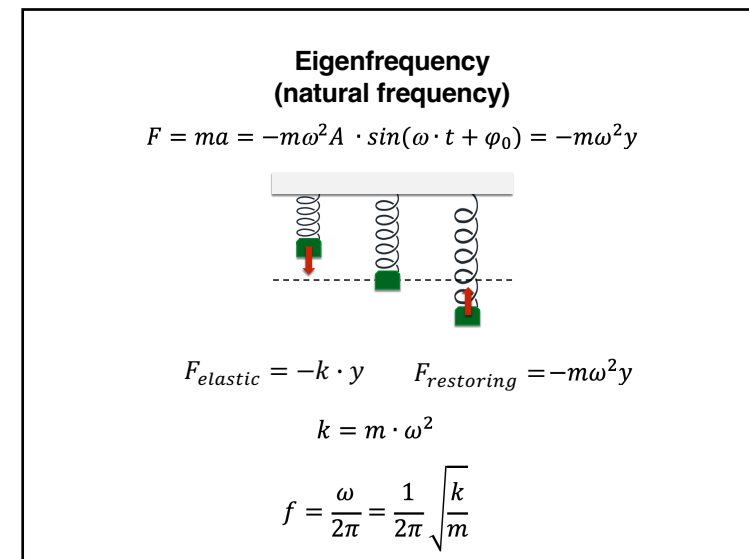
13



14

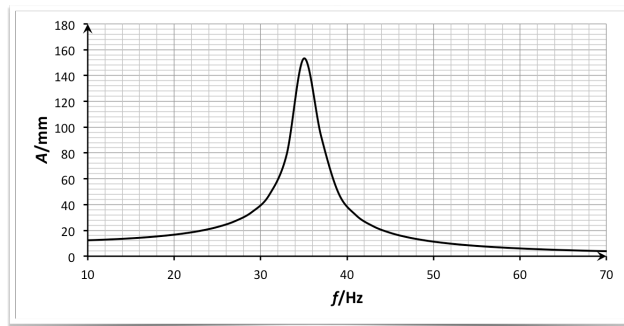


15



16

Resonance curve

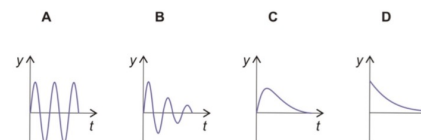


17

Problem 7/15

15. We suspend a ball of 0.4 kg on a vertically positioned spring with a spring constant of 60 N/m. Upon releasing the ball the system undergoes harmonic oscillation.
- Calculate the amplitude of the oscillation!
 - Calculate the period of the oscillation!

16. Which of these figures show damped oscillation?



18