

# Exercises and Complements for the Introduction to Physics I

## for Students

### of Biology, Pharmacy and Geoscience

Sheet 4 / 8.10.2020

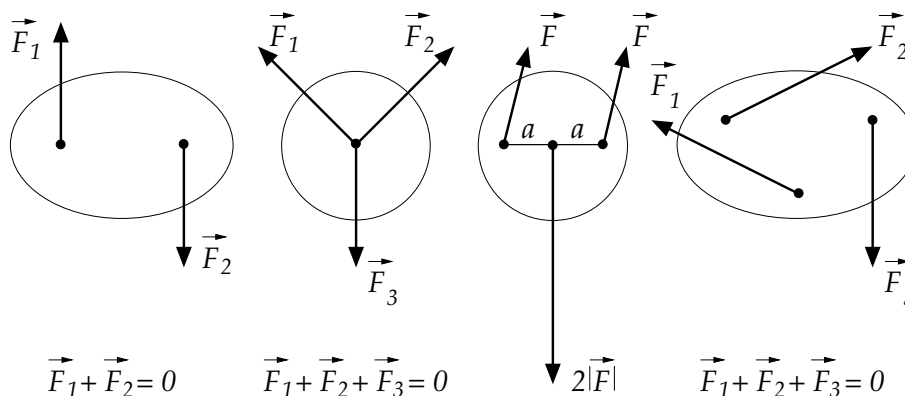
Zoom - Q&A on the Exercises: 13.10.2020/14.10.2020

**Exercise 16.**

At a post, a fence pulls with 4000 N and another with 7000 N parallel to the ground. The angle between the fences is  $120^\circ$ . Calculate the force of a tensioning rope pulling parallel to the ground to keep the post in balance.

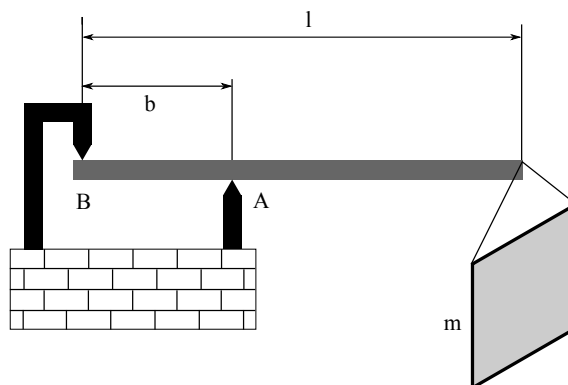
**Exercise 17.**

Look at the following four cases: Is the system in equilibrium or not? Give reasons for your answer.



**Exercise 18.**

A horizontal flagpole (mass  $M = 5.2$  kg, length  $l = 2$  m,  $b = 0.5$  m) is mounted on a roof overhang as shown in the figure. At the end of the pole a poster with a mass of  $m = 8$  kg is attached.



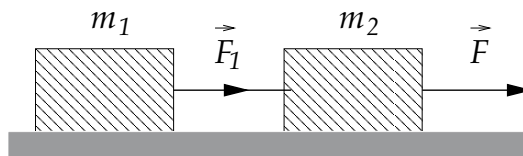
- (a) Sketch all the forces acting on this system.
- (b) Calculate the supporting force at position A and B.

### Exercise 19.

An object obtains an acceleration of  $1.5 \text{ m/s}^2$  while sliding down an inclined plane which has a angle of  $20^\circ$ . How big is the coefficient of sliding friction  $\mu_g$ ? How big must the coefficient of static friction  $\mu_H$  be for the limiting case such that the object does not move/slide?

### Exercise 20.

Two masses  $m_1$  and  $m_2$  are connected with a thin rope. The dynamic friction of the masses on the support plate is  $\mu_g$ . A force  $\vec{F}$  acts on mass  $m_2$ , see figure.



- (a) How big is the acceleration  $\vec{a}$  of the masses?
- (b) How big is the force  $\vec{F}_1$ ?

### Solutions:

Exercise 16. 6083 N

Exercise 18. 415.9 N and 286.4 N

Exercise 19. 0.2 and 0.36