Exercises and Complements for the Introduction to Physics I

for Students

of Biology, Pharmacy and Geoscience

Sheet 4 / September 30, 2019 $\qquad$ Discussion of the Exercises: **15.10.2019/16.10.2019**

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°. Calculate the force of a tensioning rope pulling parallel to the ground to keep the post in balance.
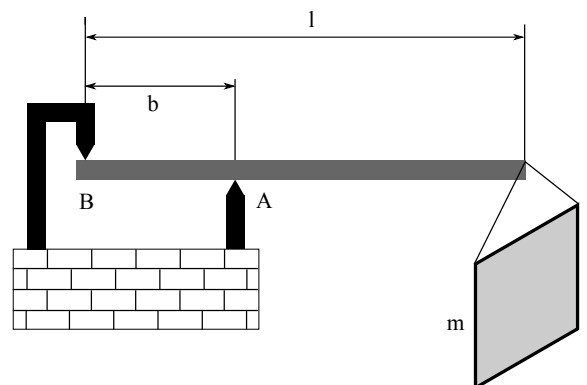
Exercise 17.
Look at the following four cases: Is the system in equilibrium or not? Give reasons for your answer.

$$\vec{F_1} + \vec{F_2} = 0 \qquad \vec{F_1} + \vec{F_2} + \vec{F_3} = 0 \qquad 2|\vec{F}| \qquad \vec{F_1} + \vec{F_2} + \vec{F_3} = 0$$
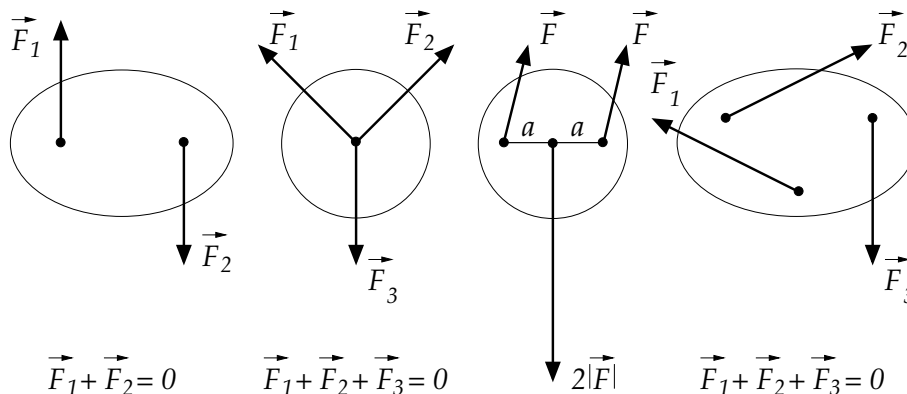
Exercise 18.
A horizontal flagpole (mass $M = 5.2$ kg, length $l = 2$ m, $b = 0.5$ m) is mounted on a roof overhang as shown in the figure. At the end of the pole a poster with a mass of $m = 8$ kg is attached.

(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 m/s² while sliding down an inclined plane which has a angle of 20°. How big is the coefficient of sliding friction μ_g? How big must the coefficient of static friction μ_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 μ_g. A force $\vec{F}$ acts on mass m_2, see figure.

$$m_1 \qquad \vec{F_1} \qquad m_2 \qquad \vec{F}$$
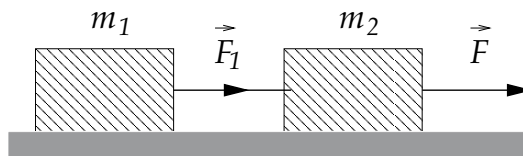
(a) How big is the acceleration $\vec{a}$ of the masses?
(b) How big is the force $\vec{F_1}$?

Solutions:

Exercise 16. 6083 N

Exercise 18. 415.9 N and 286.4 N

Exercise 19. 0.2 and 0.36