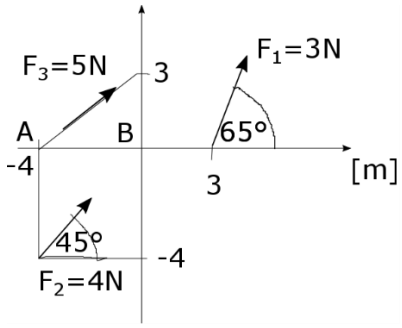
Equilibrium of planar, rigid bodies

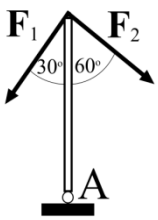
in year 2017: solve 2 of these excercises for extra point!

1. Break up the forces to horizontal and vertical components! Find the moments of these forces about point A and about point B!

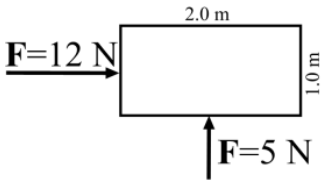


2. In the previous exercise, add a horizontal force (A_x) acting at point A as well as vertical forces (A_y, B_y) acting at points A and B, such that the system of forces is in equilibrium. Find the sizes of A_x,A_y,B_y!

3. Forces F_1 and F_2 altogether have zero net moment about point A. Determine the proportion between the magnitudes of the forces (i.e. $|F_1|/|F_2|$=?)! Determine the direction of the resultant force! [M]

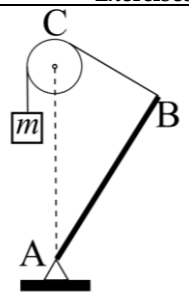


3. Given a rectangular-shaped rigid body. Its longer, horizontal edge is 2 meters long, the shorter edge is 1 m long. Two forces act on the body according to the figure: both lines of action cross the centroid of the body. We would like to balance the body by a sole force acting at the upper edge of the body. Determine the magnitude of this balancing force and its point of action! [MM]



[M]: These examples originate from the exercise book „Moór Ágnes: Középiskolai fizikapéldatár" (Cser kiadó)
[MM]:This example is Márk Mezei's example.

4.— ~~(solution requires a trick!) Bar AB with a mass of 10 kg can rotate around hinge A (according to the figure). Between point B and the other mass m=2.5 kg there is a rope, which is thrown across a frictionless pulley. The axis of the pulley (which is point C) and point A lie on the same vertical line, and AC=AB. Determine the angle CAB if the system is in equilibrium! Determine the force (magnitude and direction!) acting on hinge A! [M]~~



[M]: These examples originate from the exercise book „Moór Ágnes: Középiskolai fizikapéldatár" (Cser kiadó)
[MM]:This example is Márk Mezei's example.