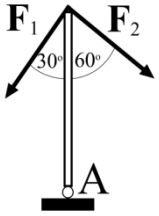
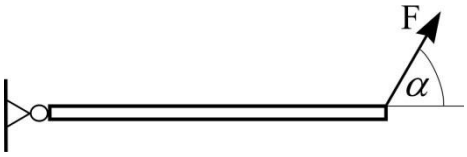
Equilibrium of planar, rigid bodies

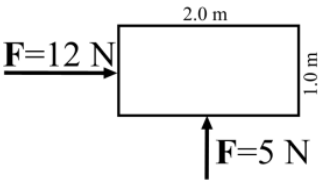
1. Forces F_1 and F_2 altogether have zero moment about point A. Determine the proportion between the magnitudes of the forces (i.e. $|F_1|/|F_2|$=?)! Determine the direction of the resultant force! [M]



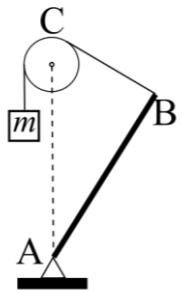
2. The figure shows a homogenous, horizontal bar with a weight of 250 N, fixed to the wall by a hinge on the left side. Force F keeps it in equilibrium. Determine the magnitude of force F, if
   a) F is vertical (i.e. α=90°), [M]
   b) α=45°, [M]
   c) α is a parameter.



3. Given a rectangle-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 crosses the centroid (=middle) of the body. We would like to balance the body by a single force. Determine the **magnitude** of this balancing force! Where does the line of action of this balancing force cross the upper edge of the body? [MM]



4. ~~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.