V International Physics Olympiad, 1971

Sofia, Bulgaria

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Reference: O. F. Kabardin, V. A. Orlov, in "International Physics Olympiads for High School Students", eds. V. G. Razumovski, Moscow, Nauka, 1985. (In Russian).

Theoretical problems

Question 1.

A triangular prism of mass M is placed one side on a frictionless horizontal plane as shown in Fig. 1. The other two sides are inclined with respect to the plane at angles α_1 and α_2 respectively. Two blocks of masses m_1 and m_2, connected by an inextensible thread, can slide without friction on the surface of the prism. The mass of the pulley, which supports the thread, is negligible.

- Express the acceleration a of the blocks relative to the prism in terms of the acceleration a_0 of the prism.
- Find the acceleration a_0 of the prism in terms of quantities given and the acceleration g due to gravity.
- At what ratio m_1/m_2 the prism will be in equilibrium?

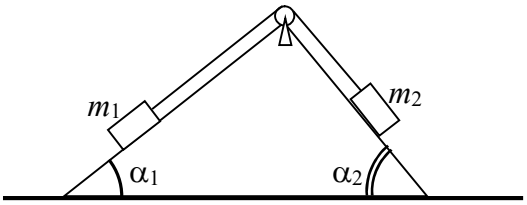

Fig. 1