Dynamics I

1. A hockey puck on a frozen pond is hit and given an initial speed of 20 m/s. If the puck always remains on the ice and slides 115 m before coming to rest, determine the coefficient of kinetic friction between the puck and the ice.

2. Two blocks of mass 3.50 kg and 8.00 kg are connected by a massless string that passes over a frictionless pulley (Fig.1). The inclines are frictionless. Find (a) the magnitude of the acceleration of each block and (b) the tension in the string.

3. A mass m_1 on a rough, horizontal surface is connected to a second mass m_2 by a lightweight cord over a lightweight, frictionless pulley as in Fig.2. A force of magnitude F at an angle θ with the horizontal is applied to m_1 as shown. The coefficient of kinetic friction between m_1 and the surface is μ. Determine the magnitude of the acceleration of the masses and the tension in the cord.

4. What horizontal force must be applied to the cart shown in Fig.3 in order that the blocks remain stationary relative to the cart? Assume all surfaces, wheels, and pulley are frictionless. (*Hint: Note that the force exerted by the string accelerates* m_1).

5. A rope lies on a table so that part of it hangs over (Fig.4). The rope begins to slide when the length of the hanging part is 25 per cent of the entire length. What is the coefficient of friction between the rope and the table?

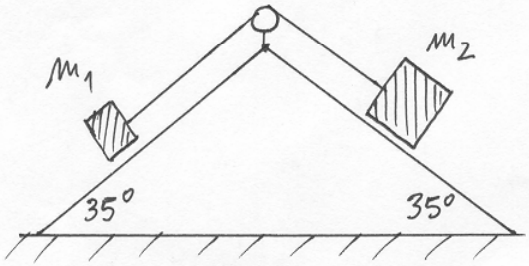

Fig. 1.

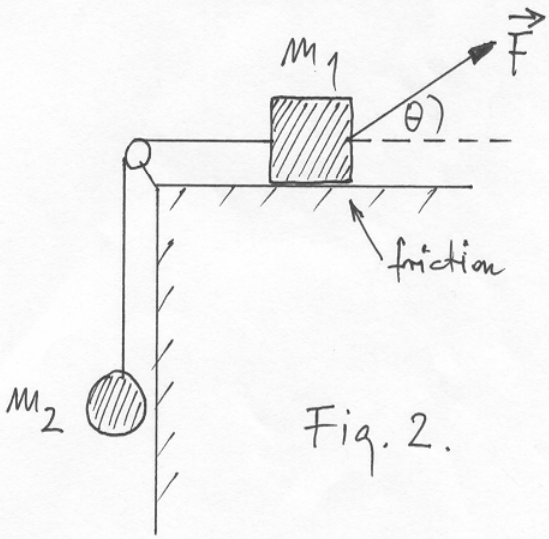

Fig. 2.

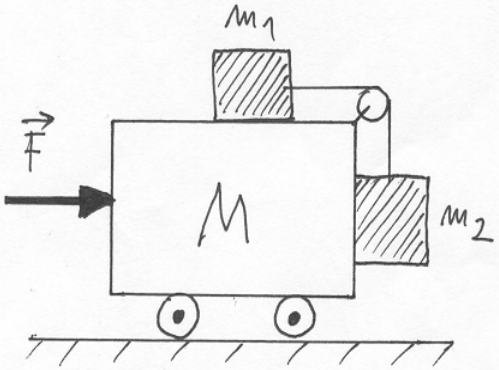

Fig. 3.

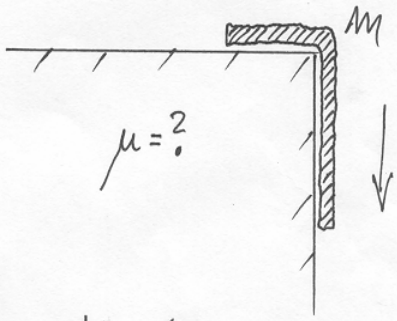

Fig. 4.