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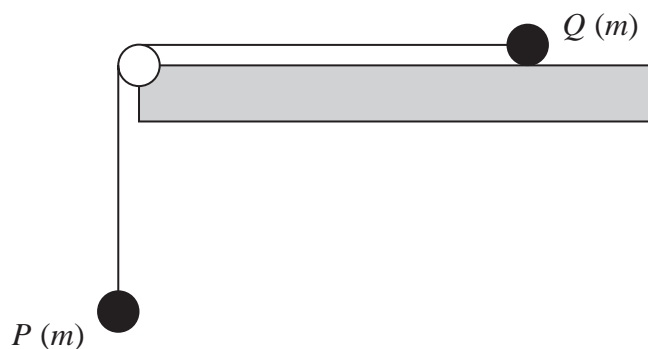


Figure 4

A particle P of mass m is attached to one end of a light inextensible string. Another particle Q , also of mass m , is attached to the other end of the string. The string passes over a small smooth pulley which is fixed at the edge of a rough horizontal table. Particle Q is held at rest on the table and particle P hangs vertically below the pulley with the string taut, as shown in Figure 4.

The pulley, P and Q all lie in the same vertical plane.

The coefficient of friction between Q and the table is μ , where $\mu < 1$

Particle Q is released from rest.

The tension in the string before Q hits the pulley is kmg , where k is a constant.

(a) Find k in terms of μ .

(7)

Given that Q is initially a distance d from the pulley,

(b) find, in terms of d , g and μ , the time taken by Q , after release, to reach the pulley.

(4)

(c) Describe what would happen if $\mu \geq 1$, giving a reason for your answer.

(2)



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