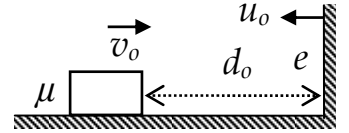


Physics Problems April-2009

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- Q1. A block, at rest at a distance d_0 from a massive wall, is given an impulsive velocity v_0 towards the wall which in turn is approaching the block with a speed u_0 . The coefficient of restitution of the wall is given to be e . The coefficient of friction of the ground is μ . Find the minimum value of u_0 required such that the block may just cross its original position back again. Assume that the wall starts moving just before the collision.



- Q2. A uniform chain of mass m & length l is kept at rest as a heap on a horizontal surface. One end of the chain is pulled horizontally by applying a constant force F . Find the displacement law $x(t)$ for this end. Neglect friction everywhere. Also, at any time the remaining portion of the heap is assumed to be at rest on the surface.
- Q3. A monkey of mass m_1 is sitting on one end of a plank of mass m_2 & length l which is initially at rest on a smooth horizontal floor. The monkey wants to jump to reach the other end of the plank. What is the minimum velocity required, with respect to the plank, to accomplish his(her!!) mission?

- Q4. In the arrangement shown in the figure the solid cylindrical drum of mass m and radius R initially rotates with an angular velocity ω_0 , its own axis being horizontal. To stop the drum, a mass m is hung on the belt which has a friction coefficient with the drum material as μ . Find the number of rotations the drum makes before coming to rest.

