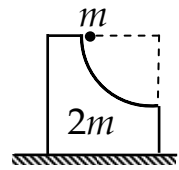


Physics Problems:- May-2011

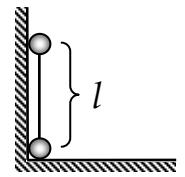
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- Q1. Find the minimum value of the coefficient of friction required between the ground and the block of mass $2m$ such that the block does not move till the small ball of mass m is separated when released from the top most position on the groove as shown in the figure. The groove is smooth and is an exact quarter of a circle.



- Q2. A dumbbell consisting of two small, solid, massive spheres attached at the ends of a light rod of length l is standing vertical near the corner of a wall as shown in the figure. The lower sphere is slightly moved towards right so that the dumbbell starts falling on its own. Find the speed of the bottom sphere when the top sphere loses contact with the wall.



- Q3. A uniform slender rod of mass m_0 has a length l_0 at a temperature T_0 . Its coefficient of linear expansion is given as $\alpha = bT$ and its specific heat capacity is given to be $c = a/T$ where a and b are suitable physical constants. If the rod is given total heat energy of ΔQ uniformly over its volume, then find its new length.

- Q4. Nine wires each of resistance R are joined to form a prism as shown in the figure. Find the effective resistance between (a) a and d (b) a and b?

