

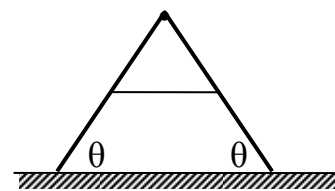
Physics Problems – Feb2009

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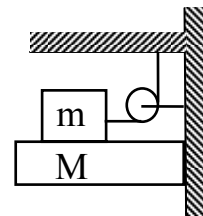
Q1. A massive rod is pivoted through a fixed smooth pin passing through one of its ends and is held at rest in a horizontal orientation lying on an inclined plane of coefficient of friction as μ . If released from rest the maximum angular displacement it undergoes before coming to rest on its own is θ . Find the inclination of the plane with respect to the horizontal.

Q2. Two massive identical rods are joined by a light string attached to their midpoints & are also pivoted through a smooth pin passing through one end of each rod. The entire structure looks like the alphabet A. The system always remains in a vertical plane with the two remaining free ends of the rods on a smooth horizontal surface. The angle made by each rod with the horizontal is θ . If the string is suddenly cut find the **initial** acceleration of the pivot point.



Q3. A gun is located on the ground at a distance l from the foot of a fixed, inclined, long rod of inclination α to the horizontal. If it can fire shots with a speed v_0 then what can be the maximum horizontal range attained by the shots? Consider all the shots to be in the vertical plane containing the rod.

Q4. The system shown in the figure is assembled with the string taut with its portions properly horizontal & vertical. Friction coefficient between all the surfaces is μ . What is the minimum required value of μ such that arrangement remains at rest when released carefully?



Q5. A projectile is thrown at an inclination θ_0 . A bird follows the path of the projectile maintaining a constant speed same as the initial speed of the projectile. Find the bird's acceleration at its highest point?