

銘傳大學 100 學年度研究所碩士班招生考試

國際企業學系碩士班(甲組)

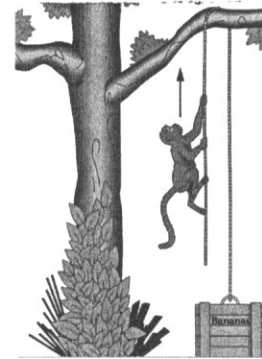
第三節

普通物理學試題

(第 1 頁共 1 頁) (限用答案本作答)

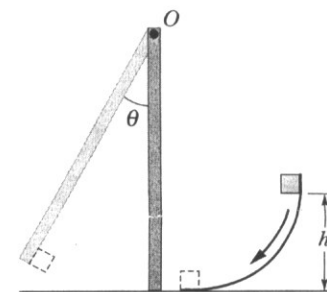
可使用計算機 不可使用計算機

1. A 10kg monkey climbs up a massless rope that runs over a frictionless tree limb and back down to a 15kg package on the ground. What is the magnitude of the least acceleration the monkey must have if it is to lift the package off the ground? (15%)

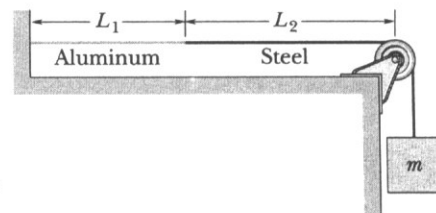


2. A 1.5kg block is initially at rest on a horizontal frictionless surface when a horizontal force along an x axis is applied to the block. The force is given by $\mathbf{F}(x) = (2.5 - x^2)\mathbf{i}$ N, where x is in meters and the initial position of the block is x=0. (a) What is the kinetic energy of the block as it passes through x=2.0m? (b) What is the maximum kinetic energy of the block between x=0 and x=2.0m? (15%)

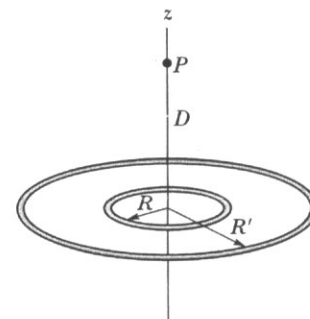
3. A small 50g block slides down a frictionless surface through height h=20cm and then sticks to a uniform rod of mass 100g and length 40cm. The rod pivots about point O through angle θ before momentarily stopping. Find θ . (20%)



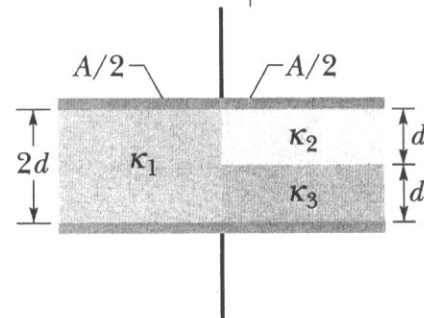
4. A aluminum wire, of length $L_1 = 60\text{cm}$, cross-sectional area $1 \times 10^{-2}\text{cm}^2$, and density 2.6g/cm^3 , is joined to a steel wire, of density 7.8g/cm^3 and the same cross-sectional area. The compound wire, loaded with a block of mass $m = 10\text{kg}$, is arranged so that the distance L_2 from the joint to the supporting pulley is 86.6cm. Transverse waves are set up on the wire by an external source of variable frequency; a node is located at the pulley. (a) Find the lowest frequency that generates a standing wave having the joint as one of the nodes. (b) How many nodes are observed at this frequency? (20%)



5. Two concentric rings, of radii R and $R' = 3R$, that lie on the same plane. Point P lies on the central z axis, at distance $D = 2R$ from the center of the rings. The smaller ring has uniformly distributed charge +Q. In terms of Q, what is the uniformly distributed charge on the larger ring if the net electric field at P is zero? (15%)



6. A parallel-plate capacitor of plate area $A = 10.5\text{cm}^2$ and plate separation $2d = 7.12\text{mm}$. The left half of the gap is filled with material of dielectric constant $\kappa_1 = 21$; the top of the right half is filled with material of dielectric constant $\kappa_2 = 42$; the bottom of the right half is filled with material of dielectric constant $\kappa_3 = 58$. What is the capacitance? (15%)



$g = 9.8\text{m/s}^2, \epsilon_0 = 8.85 \times 10^{-12}\text{C}^2/\text{N}\cdot\text{m}^2$

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