

淡江大學 107 學年度碩士班招生考試試題

6-1

系別：物理學系

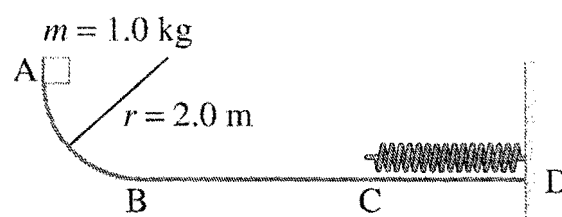
科目：普通物理(含近代物理)

考試日期 3 月 11 日(星期日) 第 1 節

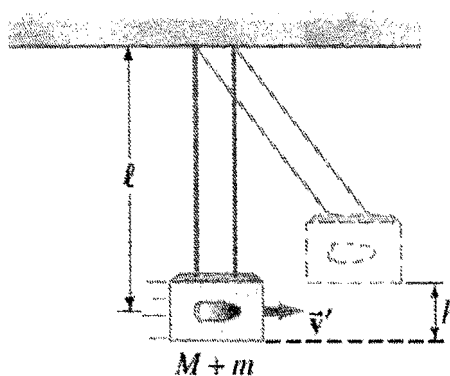
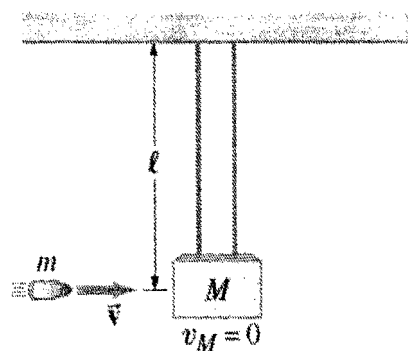
本試題共 4 大題 1 頁

(請盡量描述你的思路，有助於在未取得正確的結果時，仍可得到部分分數。)

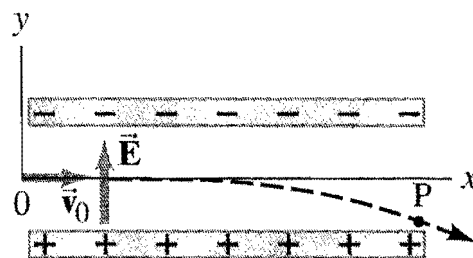
1. Consider the track shown in figure. The section AB is one quadrant (1/4) of a circle of radius 2.0 m and is frictionless. B to C is a horizontal span (延續) 3.0 m long with a coefficient of kinetic friction $\mu_k = 0.25$. The section CD under the spring is frictionless. A block of mass 1.0 kg is released from rest at A. After sliding on the track, it compresses the spring by 0.20 m. Determine (a) the velocity of the block at point B;(7%) (b) the thermal energy produced as the block slides from B to C;(8%) (c) the velocity of the block at point C;(8%) (d) the stiffness constant k for the spring.(7%)



2. The ballistic pendulum is a device used to measure the speed of a projectile, such as a bullet. The projectile, of mass m , is fired into a large block of mass M , which is suspended like a pendulum. As a result of the collision, the pendulum and projectile together swing up to a maximum height h . Determine the relationship between the initial horizontal speed of the projectile, v , and the maximum height h .(25%)



3. Suppose an electron traveling with speed v_0 enters a uniform electric field \vec{E} , which is at right angles to v_0 as shown. Describe its motion by giving the equation of its path while in the electric field. Ignore gravity. (25%)



4. (a) Calculate the energy of a photon of blue light, $\lambda = 450$ nm in air (or vacuum). (10%)
 (b) Will this blue light excite a semiconductor of bandgap of 3.1 eV? Why? (10%)
 (Plank's constant $h = 6.63 \times 10^{-34}$ J·s)