(102)輔仁大學碩士班招生考試試題	考試日期：102 年 3 月 8 日第 2 節
	本試題共 2 頁 (本頁為第 1 頁)

科目： 普通物理　　系所組： 物理學系碩士班

1. Assume that a 70-kg skater, on level ice, has built up her speed to 36 km/h. (a) How far will she coast before the sliding friction dissipates her energy? (the coefficient of kinetic friction between steel and ice is 0.01) (10 %) (b) How does the distance of coasting depend on the mass of the skater? (5 %) (Use $g = 10\ m/s^2$)

2. An athlete throws a javelin a distance of 80.0 m at the Olympics held at the equator, where $g = 9.78\ m/s^2$. Four years later, the Olympics are held at the North Pole, where $g = 9.83\ m/s^2$. Assuming that the thrower provides the javelin with exactly the same initial velocity as she did at the equator, how far does the javelin travel at the North Pole? (10 %)

3. If you squeeze the handle of a spray bottle, you cause air to flow horizontally across the opening of a tube that extends down into the liquid almost to the bottom of the bottle. If the air is moving at 50 m/s, what is the pressure difference between the top of the tube and the atmosphere? Assume that the density of air is $1.2\ kg/m^3$. (10 %)

4. An ideal diatomic gas enters an adiabatic nozzle at 1.30 atm and 25 °C with a velocity of 2.5 m/s. The nozzle entrance diameter is 120 mm. The gas exits the nozzle at 1.24 atm with a velocity of 90 m/s. Determine (a) the temperature of the exiting gas (10 %) and (b) the nozzle exit diameter. (10 %)

5. Light of wavelength $\lambda = 532$ nm is incident perpendicular on two glass plates spaced at one end by a thin piece of kapton film, as illustrated in Fig.1. Due to the wedge of air created by this film, 25 bright interference fringes are observed across the top place, with a dark fringe at the end by the film. How thick is the film? (10 %)

※ 注意：1.考生須在「彌封答案卷」上作答。
2.本試題紙空白部份可當稿紙使用。
3.考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

6. Consider a RL circuit in Fig.2. (a) Find the time constant of the circuit. (10 %) (b) The switch in Fig.2 is closed at $t = 0$. Calculate the current in the circuit at $t = 2.00$ ms. (10 %)

7. An electric dipole consists of two charges of equal magnitude and opposite sign separated by a distance 2a as shown in Fig.3. The dipole is along the x axis and is centered at the origin. (a) Calculate the electric potential at point P along the y axis. (5 %) (b) Calculate the electric potential at point R on the positive x axis. (5 %) (c) Calculate the electric field at a point on the x axis far from the dipole. (5 %) (Use k_e as the Coulomb constant)

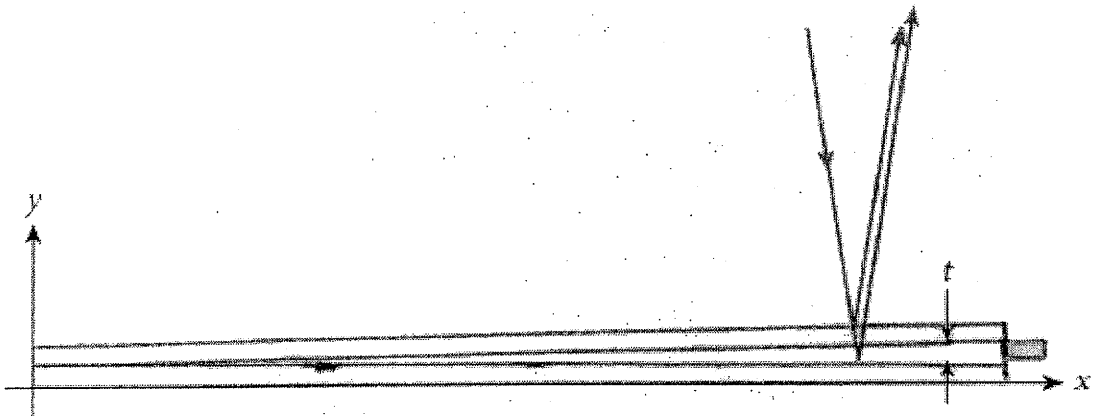

Fig.1.

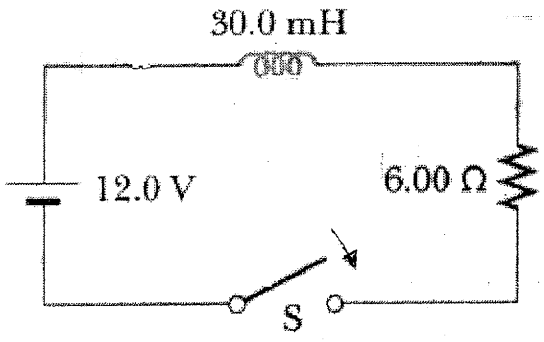

Fig.2.

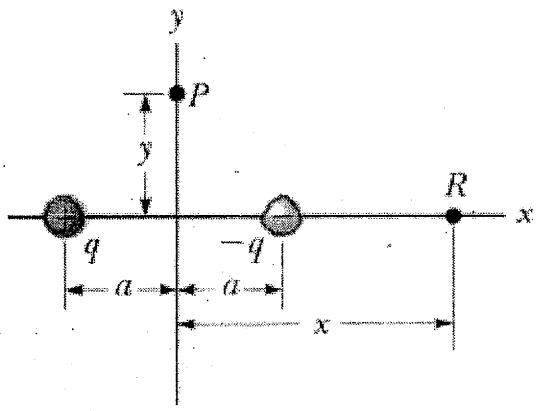

Fig.3.

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