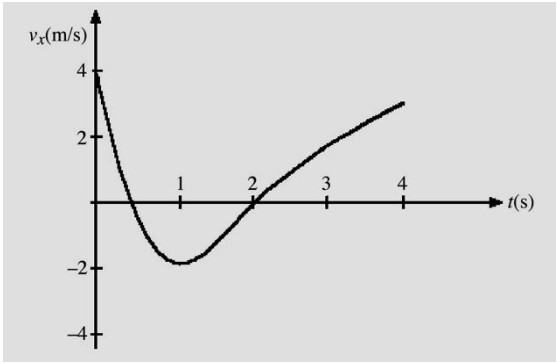
東吳大學 103 學年度轉學生(含進修學士班轉學生)招生考試試題

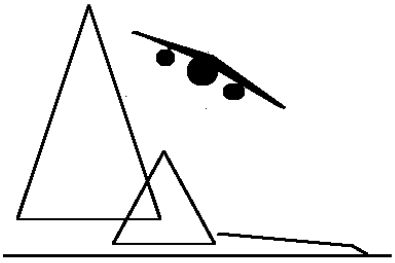
系級	物理學系二年級	考試時間	100 分鐘
科目	普通物理	本科總分	100 分

1.(5 分) 質量 m 物體在一維 x 空間裡運動，右圖代表位能 v(x)隨位置 x 變化的圖，在什麼位置物體的加速度為零?



2.(10分) **A meteoroid, heading straight for Earth, has a speed of 14.8 km/s relative to the center of Earth as it crosses our moon's orbit, a distance of 3.84×10^8 m from the earth's center. What is the meteroid's speed as it hits the earth? You can neglect the effects of the moon, Earth's atmosphere, and any motion of the earth. ($G = 6.67 \times 10^{-11}$ N · m^2/kg^2, $M_{earth} = 5.97 \times 10^{24}$ kg)**

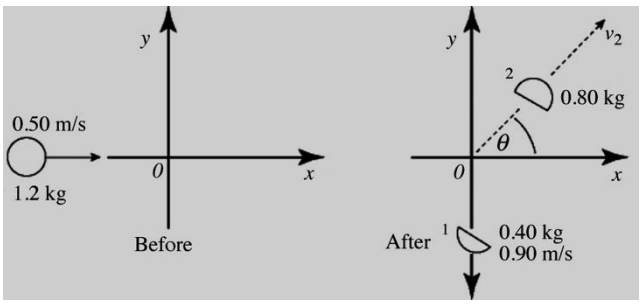
說明: 流星正對地球而來，已知通過月亮的軌道時的速度，忽略地球大氣層,地球的運動與月亮的影響，求出流星撞到地球時的速度.



3.(5 分) 飛機必須以傾斜的姿態轉彎的原因何在?

4.(5 分) **A 900 kg car moving at 10m/s takes a turn around a circle with a radius 0f 25.0 m. Determine the acceleration and the net force acting upon the car.**

5.(10分) **A 1.2-kg spring-activated toy bomb slides on a smooth surface along the *x*-axis with a speed of 0.50 m/s. At the origin *0*, the bomb explodes into two fragments. Fragment 1 has a mass of 0.40 kg and a speed of 0.90 m/s along the negative *y*-axis. In the figure, the angle made by the velocity vector of fragment 2 and the *x*-axis is θ. Calculate the value of θ.**



說明: 一個1.2kg的球在光滑面滑行，中途分成兩塊,一塊的質量是0.4kg，速度是沿著-y

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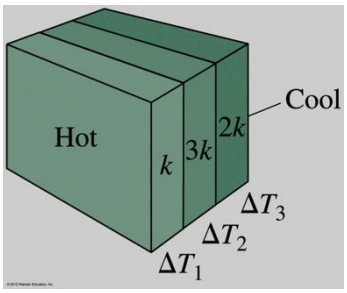
方向. 求第二塊的速度與x軸的夾角.

6.(5 分) 當一物體所受到的力矩與物體的角動量垂直時，證明該物體的轉動動能不變.



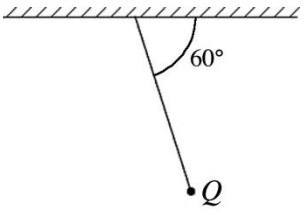
7. (5 分)厚度相同但導熱係數不同的 3 塊板材，前後相連，哪一塊的的溫差比較大? (導熱係數依序是 k,3k,2k)

8.(5 分) If you double the kelvin temperature of a gas, what happens to the thermal speed of the gas molecules? 說明: 如果理想氣體的"絕對"溫度提高一倍，請問氣體分子的熱速度或平均速度會怎麼改變?

9.(10 分) 解釋以下名詞的物理意義: Carnot engine，熱力學第一定律，熱力學第二定律.

10.(5分) 一顆905g的隕石以1629m/s的速度撞擊到地面，假設全部的動能都轉成熱，那麼這個隕石的溫度會上昇多少? 假如隕石沒有融化，而它的比熱是472 J/kg·K.

11.(10 分) A point charge *Q* of mass 8.50 g hangs from the horizontal ceiling by a light 25.0-cm thread. When a horizontal electric field of magnitude 1750 N/C is turned on, the charge hangs away from the vertical as shown in the figure. Determine the value of Q.



12. (5 分) A particle with charge -5.00 C initially moves at $\vec{v}$ = (1.00 $\hat{i}$ + 7.00 $\hat{j}$) m/s. If it

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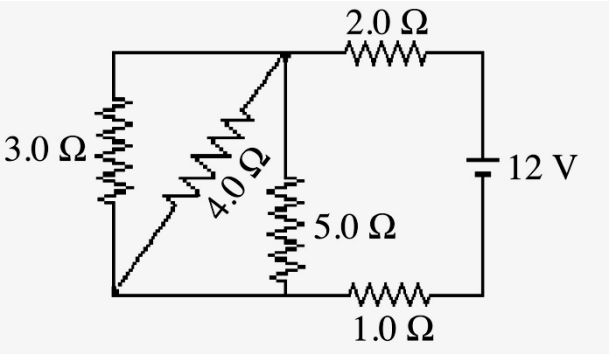
encounters a magnetic field $\vec{B} = 10.00\,\mathrm{T}\,\hat{k},$ Find the magnetic force vector on the particle.

13.(5分) **For the circuit shown in the figure, determine the current in**
(a) the 1.0-Ω resistor.
(b) the 3.0-Ω resistor.
(c) the 4.0-Ω resistor.



14.(10分) **A very long straight wire carries a 12-A current eastward and a second very long straight wire carries a 14-A current westward. The wires are parallel to each other and are 42 cm apart. Calculate the force on a 6.4 m length of one of the wires($\mu_0 = 4\pi \times 10^{-7}$ T · m/A).**

15. (5 分) 下圖, 一個帶電量 +30C 的導體球, 內部有一個球形空洞,(a) 空洞內有一個 +10C 的點電荷在中心位置 a, 討論導體球上電荷的分佈的情形; (b) 如果此點電荷不在中心位置, 而在偏右靠近球的位置 b, 討論導體球上電荷的分佈的情形.