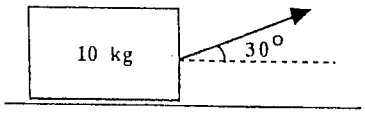
國立中央大學98學年度碩士班考試入學試題卷

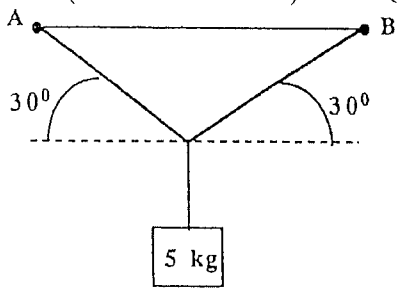
所別：系統生物與生物資訊研究所碩士班 一般生　科目：普通物理　共 2 頁 第 1 頁

＊請在試卷答案卷（卡）內作答

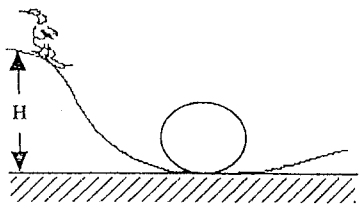
1. A man pulls a 10 kg block 10 meters along a level floor at a constant speed with a force directed 30° above the horizontal. If the coefficient of kinetic friction between the block and floor is 0.20, how much work does the man do on the block? (10)



2. A rope is fixed at the points A and B. Calculate the magnitude of the tension in the rope between A and C. (Answer in Newtons.) (10)



3. An athlete is about to ski a downhill run with a circular "loop the loop" at the bottom, as shown. The radius of the vertical loop is 20 meters. If he starts from rest (a reasonable assumption) and if frictional and air resistance effects are negligible (a less reasonable assumption), what is the smallest value of H, his starting height as shown, that will ensure he does not leave the surface of the track when he is upside down at the top of the loop? Answer in meters. (10)



參考用

4. Fifty grams of ice at 0℃ is placed in a thermos bottle containing one hundred grams of water at 6 ℃. How many grams of ice will melt? (10)

5. The grams of ice at –20℃ is to be changed to steam at 130℃. The specific heat of both ice and

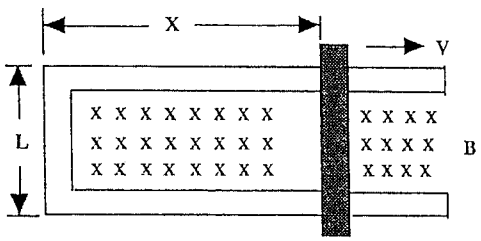
注意：背面有試題

steam is 0.5 cal/gm℃. The heat of fusion is 80 cal/gm and the heat of vaporization is 540 cal/gm. The entire process requires how many cal? (10)

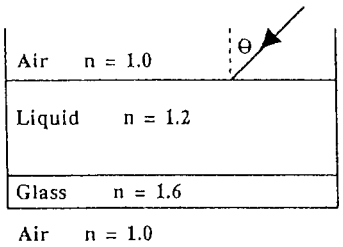
6. Two point charges, 8×10^{-9} C and -2×10^{-9} C are separated by 4 m. The electric field intensity (in N/C) midway between them is? (10)

7. Charge Q is distributed uniformly throughout an insulating sphere of radius R. The magnitude of the electric field at a point R/2 from the center is? (10)

8. A rod with resistance R lies across frictionless conducting rails in a uniform magnetic field B, as shown. Assume the rails have negligible resistance. The force that must be applied by a person to pull the rod to the right at constant speed v is? (10)



9. A level glass-bottomed tank contains liquid as shown. A beam of light is incident at angle θ on the upper liquid surface. Select the largest value for θ in degrees given below which permits this light to leave through the bottom glass-air surface. (10)



10. A certain metal is bombarded with light of wavelength λ = 250 nm in a demonstration of the photoelectron effect. The stopping potential was found to be 3.00 volts. What would be the stopping potential for light of wavelength λ = 150 nm? Answers given are in volts. (10)

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