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6-1

1. 描述彈簧回復力力力為所謂的Hook's Law(虎克定律律)，F=-kx。k稱為彈簧彈性係數，x為彈簧的壓縮 或伸長量量。(a) 請利利用用量量綱分析給出彈性係數k的單位。(請使用用SI單位制)(10%)(b) 我們可以 利利用用掛於彈簧上質量量為m的物體來來回振盪一一次的時間稱為『週期 T』;或者是用用每單位時間(SI 單位制通常使用用每秒)振盪的次數，我們稱為『頻率 f = 次數/s』，請利利用用(a)的結果並利利用用量量綱 分析給出頻率 f 的可能關係 (10%)。

2. A car's velocity as a function of time is given by $V_x(t)=\alpha + \beta t^2$, where α=3 m/s and β=0.1 m/s^3. (a) Calculate the average acceleration for the time interval t=0 to t=5.00 s. (10%) (b) Calculate the instantaneous acceleration for t=0 s and t=5.00 s. (10%) (c) Draw V_x-t and a_x-t graphs for the car's motion between t=0 s and t=5.00 s. (10%)

3. A 3.0-kg block is pushed against a spring with negligible mass and spring constant k=600 N/m, compressing it 0.5m. When the block is released, it moves along a frictionless, horizontal surface and then up a frictionless incline with slope 37°. (a) What is the speed of the block as it slides along the horizontal surface after leaving the spring ? (10%) (b) How far does the block travel up the incline before starting to slide back down ? (10%)

4. 請試計算質量為M半徑為R的實心球、圓環和圓盤滾動時的移動動能和轉動動能的百分比分別為何 ？ （30%）

✦ 你可能需要各類型的質心轉動慣量：
實心球：$(2/5)MR^2$；空心球：$(2/3)MR^2$；圓盤：$(1/2)MR^2$；圓環：MR^2；長度L的長條：$(1/12)ML^2$