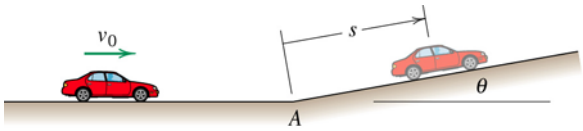
國立彰化師範大學 99 學年度碩士班招生考試試題

系所：車輛科技研究所　　選考乙　　科目：動力學

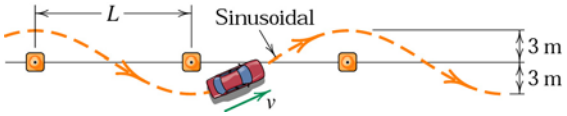
☆☆請在答案紙上作答☆☆　　共 2 頁，第 1 頁

每題各 20 分(得攜帶計算器)

1. The car is traveling at a constant speed $v_0 = 100\ km/h$ on the level portion of the road. When the 6-percent ($\tan\theta = 6/100$) incline is encountered, the driver does not change the throttle setting and consequently the car decelerates at the constant rate $g\sin\theta$. Determine the speed of the car (a) 10 seconds after passing point *A* and (b) when *s* = 100 m.

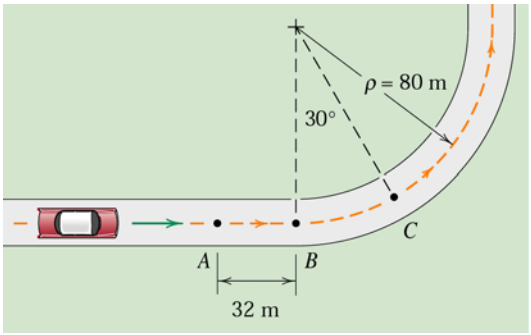


2. In a handling test, a car is driven through the slalom course shown. It is assumed that the car path is sinusoidal and that the maximum lateral acceleration is 0.7*g*. If the testers wish to design a slalom through which the maximum speed is $80km/h$, what cone spacing *L* should be used?



3. A particle moves along the *x*-axis with a constant acceleration. When *t*=0, *x*=4m and $\dot{x} = 3$m/s. Also, when *t*=4 s, a maximum value of *x* is observed. Determine x_{max} and the value of *x* when *t*=12 s. Plot *x* versus *t*.

4. The 1500kg car is traveling at $100km/h$ on the straight portion of the road, and then its speed is reduced uniformly from *A* to *C*, at which point it comes to rest. Compute the magnitude *F* of the total friction force exerted by the road on the car (a) just before it passes point *B*, (b) just after it passes point *B*, and (c) just before it stops at point *C*.



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5. Car B (1500kg) traveling west at $48km/h$ collides with car A (1600kg) traveling north at $32km/h$ as shown. If the two cars become entangled and move together as a unit after the crash, compute the magnitude v of their common velocity immediately after the impact and the angle θ made by the velocity vector with the north direction.