

國立臺北科技大學九十八學年度碩士班招生考試

系所組別：1310 車輛工程系碩士班甲組

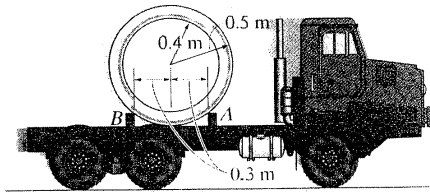
第一節 動力學 試題

第一頁 共一頁

注意事項：

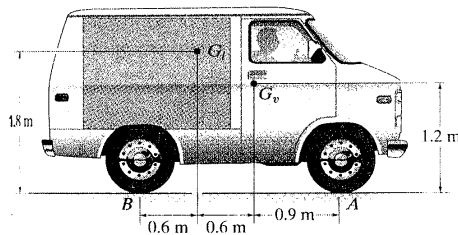
1. 本試題共五題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. The pipe has a mass of 200 kg and is held in place on the truck bed using the two boards A and B. Determine the greatest acceleration of the truck so that the pipe begins to lose contact at A and the bed of truck and starts to pivot about B. Assume board B is fixed on the truck bed, and the pipe is smooth. Also determine the force that board B exerts on the pipe during the acceleration.



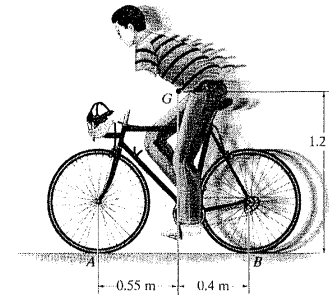
(20 %)

2. The van has a mass of 2000 kg and center of gravity at G_v . It carries a fixed 400 kg load which has a center of gravity at G_l . If the van is traveling at 40 km/hr, determine the distance it skids before stopping. The brakes cause all the wheels to lock or skid. The coefficient of kinetic friction between the wheels and the pavement is $\mu_k = 0.3$. Also compare this distance with that of the van being empty. Neglect the mass of the wheels.



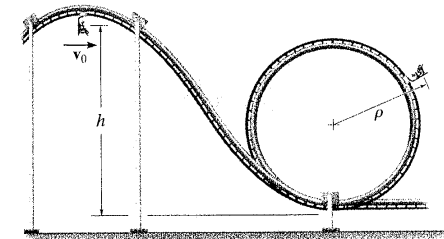
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3. The bicycle and rider have a mass of 90 kg with center of mass located at G . Determine the minimum coefficient of kinetic friction between the road and the wheels so that the rear wheel B will start to lift off the ground when the rider applies the brakes to the front wheel. Neglect the mass of the wheels.



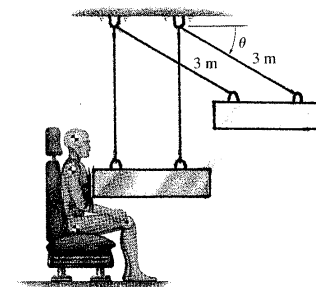
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4. Passengers are belted into seats resembling ski-lift chairs in an outside loop roller coaster. If the cars travel at $v_0 = 5$ m/s when they are at the top of the hill, determine their speed when they are at the top of the loop and the reaction of the 60-kg passenger on his seat at this instant. The car has a mass of 50 kg. If $h = 15$ m and $\rho = 5$ m. Neglect friction and the size of the car and passenger.



(20 %)

5. Tests of impact on the fixed crash dummy are conducted using the 100-kg ram that is released from rest at $\theta = 30^\circ$, and allowed to fall and strike the dummy at $\theta = 90^\circ$. If the coefficient of restitution between the dummy and the ram is $e = 0.3$, determine the maximum angle to which the ram will rebound. Also determine the impact energy that absorbed by the dummy.



(20 %)