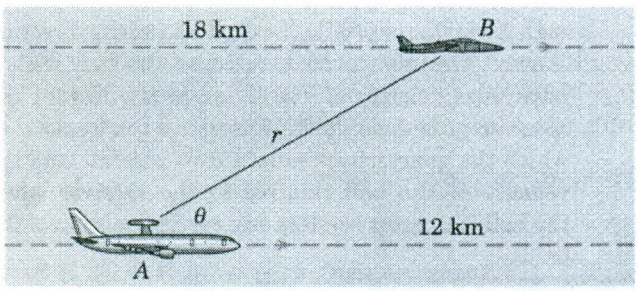
جامعة المنصورة — التاريخ: ٢٠١٤/٥/٢١

كلية الهندسة — (الفرقة الأولى قسم هندسة الغزل والنسيج) — المادة: ميكانيكا تطبيقية

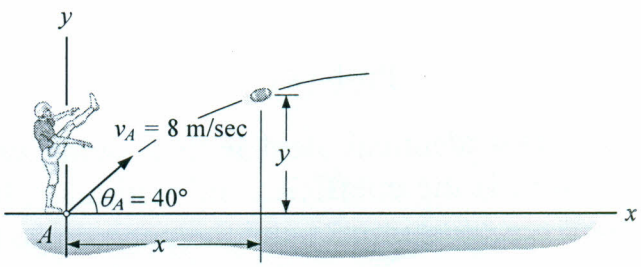
قسم الرياضيات والفيزياء الهندسية — الزمن: ٣ ساعات

أجب على جميع الأسئلة – الامتحان في صفحتين – لا يشترط الإجابة حسب ترتيب الأسئلة

1] The aircraft A with radar detection equipment is flying horizontally at an altitude of 12 km and is increasing its speed at the rate of 1.2 m/sec each second. Its radar locks onto an aircraft B flying in the same direction and in the same vertical plane at an altitude of 18 km. If A has a speed of 1000 km/h at the instant when $\theta = 30°$, determine the values of $\ddot{r}$ and $\ddot{\theta}$ at this same instant if B has a constant speed of 1500 km/h.



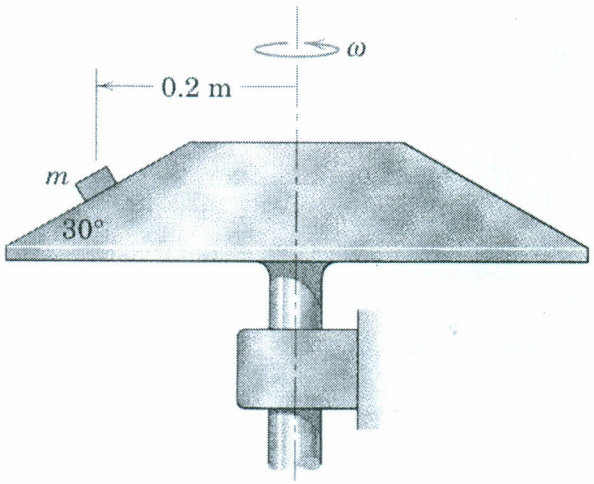
Prob.(1)



Prob.(2)

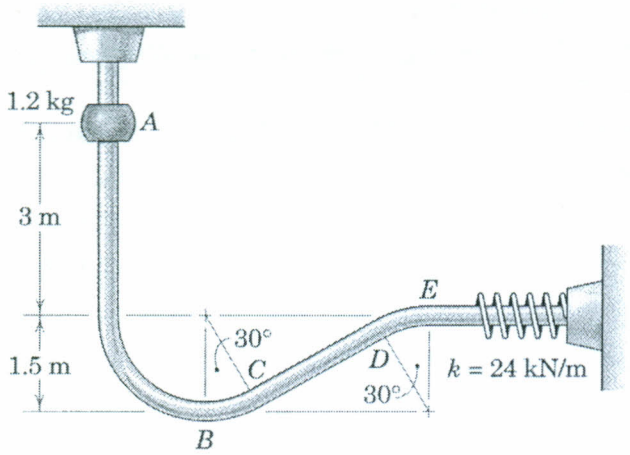
2] The ball is kicked with an initial speed $v_A = 8$ m/sec at an angle $\theta_A = 40°$ with the horizontal. Find the equation of the path $y = f(x)$, and then determine the ball's velocity and the normal and tangential components of its acceleration when $t = 0.25$ sec.

3] The small object of mass m is placed on the rotating conical surface at the radius shown. If the coefficient of static friction between the object and the rotating surface is 0.8, calculate the maximum angular velocity ω of the cone about the vertical axis for which the object will not slip. Assume very gradual angular-velocity changes.

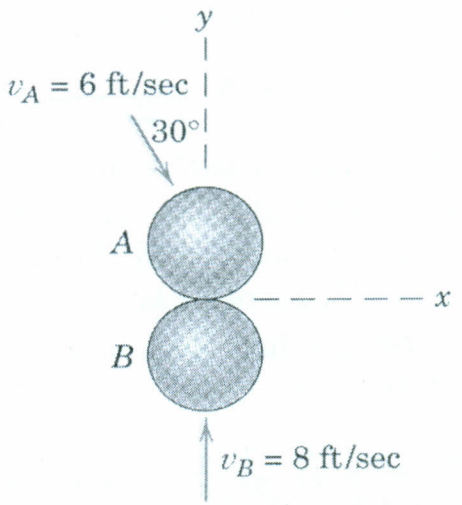


باقي الأسئلة في الصفحة التالية

4] The 1.2-kg slider is released from rest in position A and slides without friction along the vertical-plane guide shown. Determine (a) the speed v_B of the slider as it passes position B and (b) the maximum deflection δ of the spring.



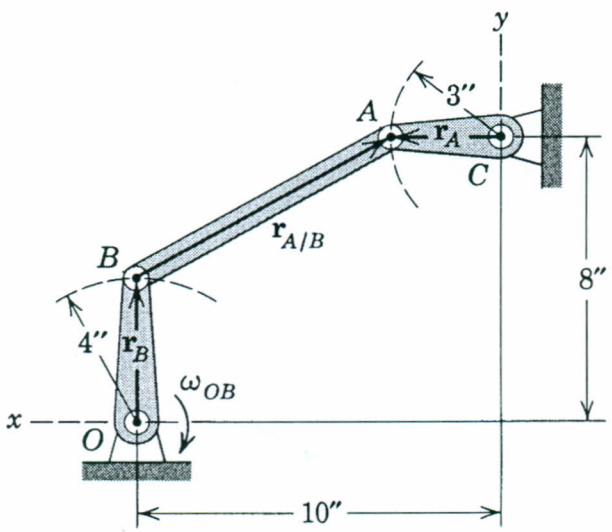
Prob.(4)



Prob.(5)

5] The two identical steel balls moving with initial velocities v_A and v_B collide as shown. If the coefficient of restitution is $e = 0.7$, determine the velocity of each ball just after impact and the percentage loss n of system kinetic energy.

6] Crank OB of the linkage oscillates about O through a limited arc, causing crank AC to oscillate about C. When the linkage passes the position shown with OB normal to the x-axis and CA normal to the y-axis, the angular velocity of OB is 2 rad/sec clockwise and constant. For this instant calculate the angular accelerations of CA and AB.



مع أطيب الأمنيات بالنجاح والتوفيق،