ME 104: Midterm II Review

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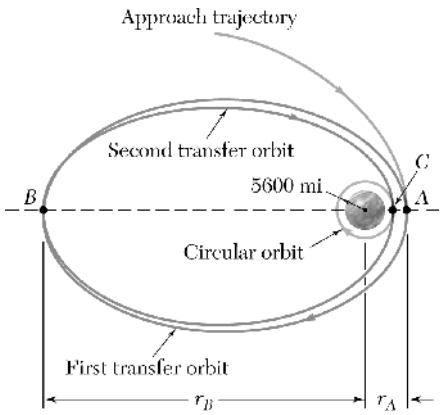
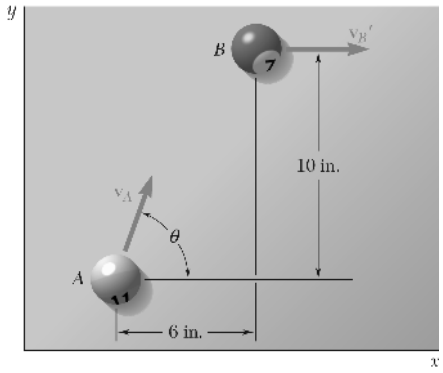
Chapter 12, Problem 106



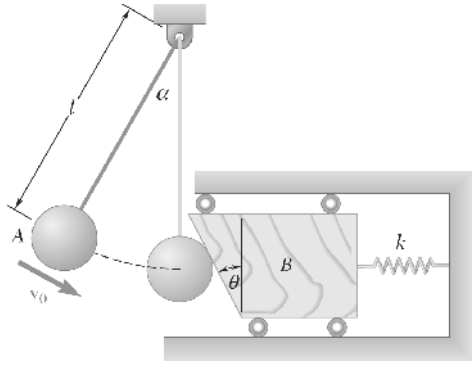
A space probe is to be placed in a circular orbit of 5600 mi radius about the planet Venus in a specified plane. As the probe reaches *A*, the point of its original trajectory closest to Venus, it is inserted in a first elliptic transfer orbit by reducing its speed by Δv_A. This orbit brings it to Point *B* with a much reduced velocity. There the probe is inserted in a second transfer orbit located in the specified plane by changing the direction of its velocity and further reducing its speed by Δv_B. Finally, as the probe reaches Point *C*, it is inserted in the desired circular orbit by reducing its speed by Δv_C. Knowing that the mass of Venus is 0.82 times the mass of the earth, that $r_A = 9.3 \times 10^3$ mi and $r_B = 190 \times 10^3$ mi, and that the probe approaches *A* on a parabolic trajectory, determine by how much the velocity of the probe should be reduced (*a*) at *A*, (*b*) at *B*, (*c*) at *C*.

Chapter 13, Problem 168



The coefficient of restitution is 0.9 between the two 2.37-in. diameter billiard balls *A* and *B*. Ball *A* is moving in the direction shown with a velocity of 3 ft/s when it strikes ball *B*, which is at rest. Knowing that after impact *B* is moving in the *x* direction, determine (*a*) the angle θ, (*b*) the velocity of *B* after impact.

Chapter 13, Problem 188



When the rope is at an angle of $\alpha = 30°$, the 2-lb sphere *A* has a speed $v_0 = 2$ ft/s. The coefficient of restitution between *A* and the 4-lb wedge *B* is 0.8 and the length of rope $l = 3$ ft. The spring constant has a value of 100 lb/ft and $\theta = 20°$. Determine the velocity of *A* and *B* immediately after the impact.