

October 29, 2008

1. **(35 points)** Two bodies A ($m_a=40\text{kg}$) and B ($m_b=30\text{kg}$) are connected by a cable as shown in Fig.1. The kinetic coefficient of friction between body A and the inclined surface is $\mu_k = 0.25$, and the system is released from rest. During motion of the bodies, determine

- (a) The acceleration of body A (**15 points**)
- (b) The tension in the cable connecting the bodies (**10 points**)
- (c) The velocity of body B after 5s of motion (**10 points**)

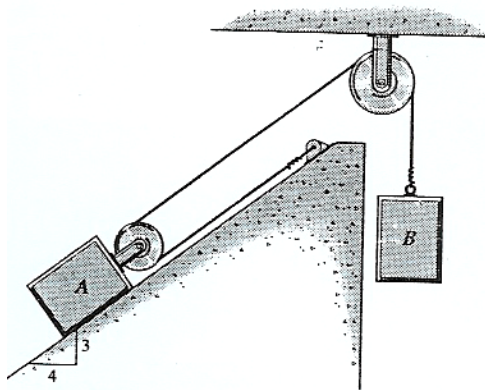


Fig. 1

2. **(30 points)** The periodic time of an earth satellite in a circular polar orbit is 120 minutes.

- (a) Determine the altitude h of the satellite (**15 points**)
- (b) Determine the time during which the satellite is above the horizon for an observer located at the North Pole. (**15 points**)

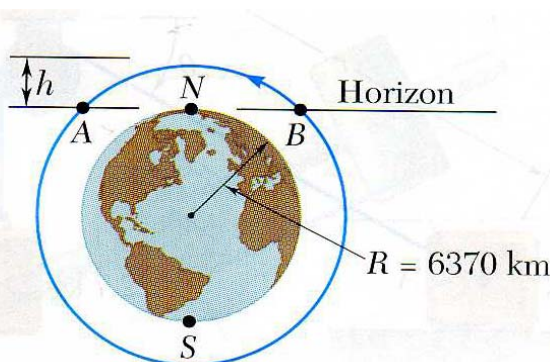


Fig. 2

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3. **(35 points)** A **23.1 kg** sphere A of radius **90 mm** moving with a velocity of magnitude $v_0 = 2$ m/s strikes a **2.1 kg** sphere B of radius **40 mm** which is hanging from an inextensible cord and is initially at rest. Knowing that sphere B swings to a maximum height $h = 0.25$ m.

(a) Set up the equation about coefficient of restitution e **(15 points)**

(b) Determine the coefficient of restitution e between the two spheres **(20 points)**

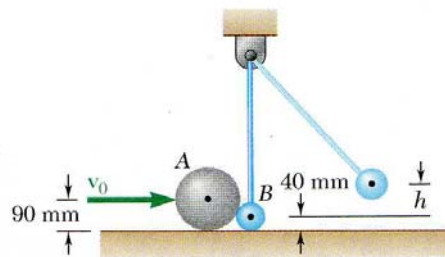


Fig. 3