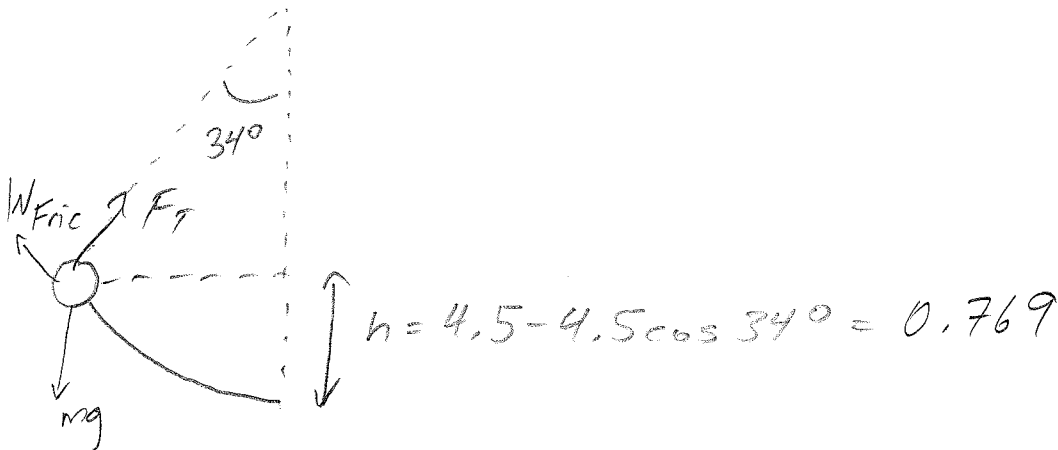


Physics 10154 - Exam #5A

Answer the following two questions. Be sure to clearly indicate your answer with a circle or box. Show all work. If I cannot see how you arrived at an answer, I will deduct points!

1. A 3.0-kg mass is attached to a 4.5-meter massless string attached to a pivot in the ceiling. The string is initially at an angle of 34° with respect to the vertical. When the mass passes through the lowest point of its pendulum motion, it is moving at a speed of 3.2 m/s. $v_0 = 0$

Find the work done by frictional forces in this problem.



$$W_T = 0$$

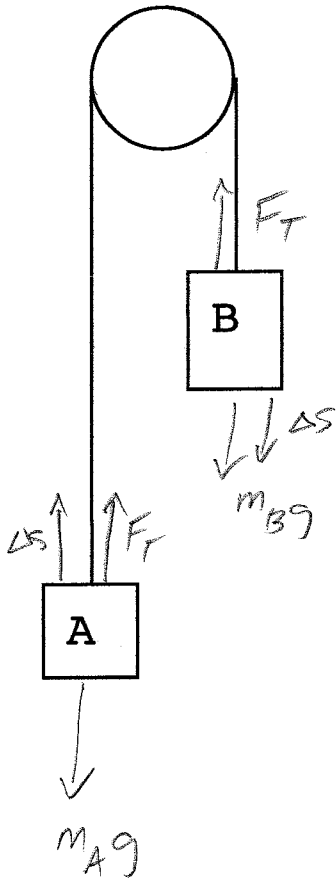
$$W_{\text{grav}} = mgh = (3.0)(9.8)(.769) = 22.6 \text{ J}$$

$$0 + 22.6 + W_{\text{Fric}} = \frac{1}{2} (3)(3.2)^2 - 0$$

$$22.6 + W_{\text{Fric}} = 15.4$$

$$W_{\text{Fric}} = -7.2 \text{ J}$$

2. Two masses are attached by a massless string draped over a frictionless, massless pulley as shown below. Mass A is 4.5 kg, mass B is 7.5 kg. The system is initially at rest with neither object touching the ground. How fast is mass A moving after it has moved upwards a distance of 1.5 meters?



$$\begin{aligned}
 M_A : W_{\text{grav}} &= (m_A g) \Delta s \cos 180^\circ \\
 &= -(4.5)(9.8)(1.5) \\
 &= -66.15 \text{ J}
 \end{aligned}$$

$$W_T = F_T \Delta s \cos 0^\circ$$

$$M_B : W_T = F_T \Delta s \cos 180^\circ$$

$$W_{\text{grav}} = (m_B g) \Delta s \cos 0^\circ$$

$$= (7.5)(9.8)(1.5)(1)$$

$$= 110.25 \text{ J}$$

$$-66.15 + F_T \Delta s - F_T \Delta s + 110.25 = \frac{1}{2} (m_A + m_B) v^2$$

$$44.1 = \frac{1}{2} (12) v^2$$

$$v = 2.7 \text{ m/s}$$