

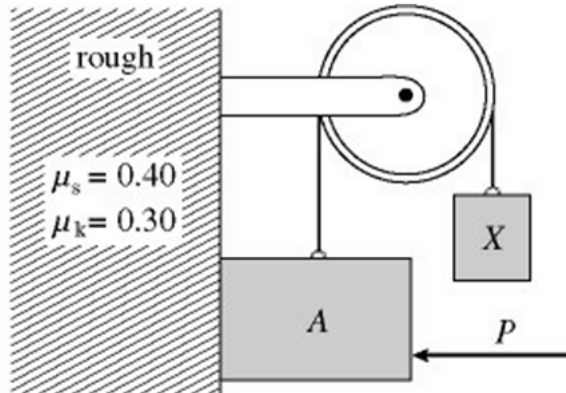
## General Physics B 1- Homework Set 1

Due on 10/21/2022, 5:00PM sharp. Please hand in your homework via eLearn.

1 points for each problem. Total:5 points.

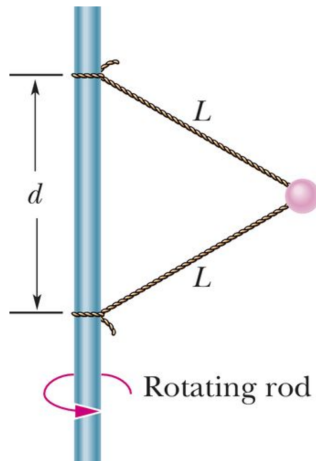
### 1. Newton's law on Multiple Objects

Block A of mass 8.00 kg and block X are attached to a rope that passes over a pulley. A 50.00N force P is applied horizontally to block A, keeping it in contact with a rough vertical face. The coefficients of static and kinetic friction between the wall and block A are  $\mu_s = 0.40$  and  $\mu_k = 0.30$ . The pulley is light and frictionless. In the figure, the mass of block X is adjusted until block A descends at constant velocity of 5.00 cm/s when it is set into motion. What is the mass of block X? (1point)



### 2. Force for an Uniform Circular Motion

In the following figure, a 1.34 kg ball is connected by means of two massless strings, each of length  $L = 1.70$  m, to a vertical, rotating rod. The strings are tied to the rod with separation  $d = 1.70$  m and are taut. The tension in the upper string is 35.00 N. What are the (a) tension in the lower string (0.5point) (b) speed of the ball? (0.5point)

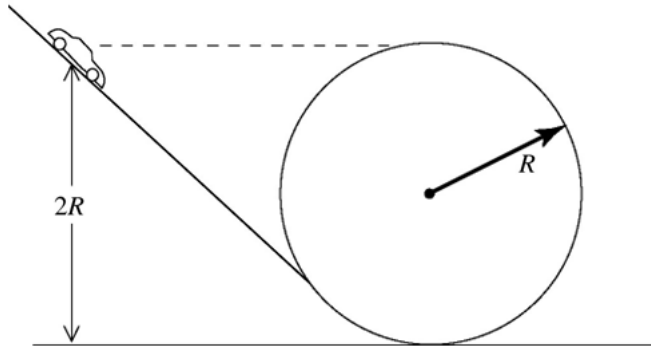


### 3. Work Done by a Variational Force

A force on a particle depends on position such that  $F(x) = [3.00(N/m^2)x^2 + 6.00(N/m)x]i + 5.00(N)\hat{j}$  for a particle constrained to move along the x-axis. There is no motion in y-axis. What work is done by this force on a particle that moves from  $x = 0.00$  m to  $x = 2.00$  m? (1point)

#### 4. Conservation of energy in a Looping-Loop

In the figure, a toy race car of mass  $m=0.1\text{kg}$  is released from rest on the loop-the-loop track. If it is released at a height  $2R=2.00\text{m}$  above the floor, how high is it above the floor when it leaves the track, neglecting friction? (1point)



#### 5. Circular Motion around the Moon

During the Apollo Moon landings, one astronaut remained with the command module in lunar orbit, about 130km above the moon surface. For half of each orbit, this astronaut was completely cut off from the rest of humanity as the spacecraft rounded the far side of the Moon. How long did this period last? (1point) Given the radius of the Moon is  $R_M = 1.74 \times 10^6\text{m}$  and the mass of the Moon is  $M = 7.35 \times 10^{22}\text{kg}$ . The gravitational constant  $G = 6.67 \times 10^{-11}\text{N} \cdot \text{m}^2/\text{kg}^2$ .