Midterm Examination No. 1   Oct 14, 2019
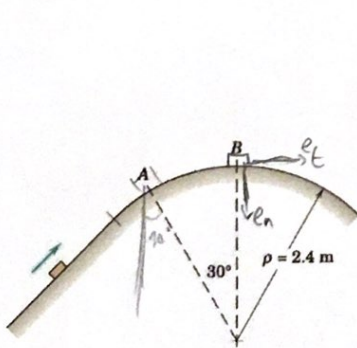
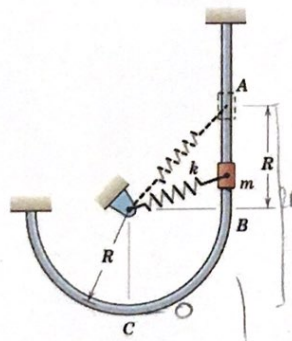The examination has a duration of 50 minutes.
Answer all questions.
All questions carry the same weight.

1. If the 2-kg block passes over the top B of the circular portion of the path with a speed of 3.5 m/s, calculate the magnitude N_B of the normal force exerted by the path on the block. Determine the maximum speed v which the block can have at A without losing contact with the path.

2. The spring of constant k is unstretched when the slider of mass m passes position B. If the slider is released from rest in position A, determine its speeds as it passes points B and C. What is the normal force exerted by the guide on the slider at position C? Neglect friction between the mass and the circular guide, which lies in a vertical plane.

3. The cylindrical plug A of mass m_A is released from rest at B and slides down the smooth circular guide. The plug strikes the block C and becomes embedded in it. Write the expression for the distance s which the block and plug slide before coming to rest. The coefficient of kinetic friction between the block and the horizontal surface is μ_k.
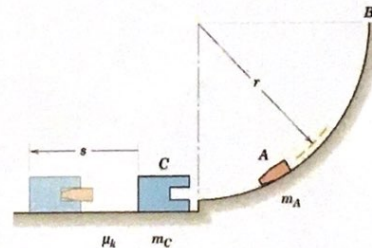

Problem 1   Problem 2 $\frac{1}{2} k (x - x_0)$ Problem 3

use   n - t coords

$\rho = 2.4$ m

30°

Ip unstretched
at $x = R$
The $x = R$