Solve the following problems:
All Problems carry equal marks

1. The uniform slender pole of 20 kg mass rests against a small frictionless roller at B and a rough horizontal surface at A. If the pole starts to slide to the left at A when the angle \( \theta \) becomes 30\(^\circ\), find:
   a) The reaction at B.
   b) The friction force at A.
   c) The coefficient of static friction, \( \mu_s \).

2. The man on the roof tosses a small tool toward the man on the ground.
   a) What minimum initial horizontal velocity \( v_o \) is necessary so that the tool clears point B?
   b) Locate the point of impact C by specifying the distance \( s \) shown in the figure.

3. The 0.9 kg collar is released from rest at position A and slides without friction up the inclined rod (AB), striking the stop at B with velocity \( v_B \). The spring of stiffness \( k=24 \) N/m has an unstretched length of 375 mm. Calculate:
   a) The velocity of the collar at B, \( v_B \).
   b) The elastic force in the spring at position B