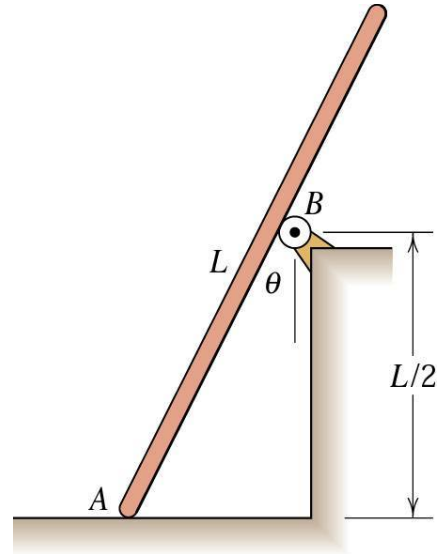
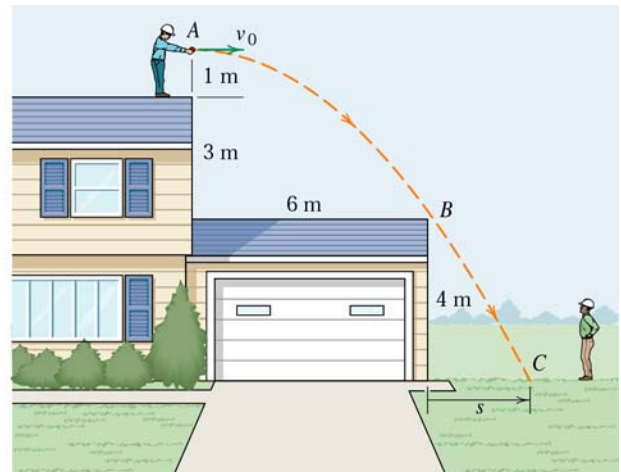


**Solve the following problems:**  
**All Problems carry equal marks**

- 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:
  - The reaction at B.
  - The friction force at A.
  - The coefficient of static friction,  $\mu_s$ .



- The man on the roof tosses a small tool toward the man on the ground.
  - What minimum initial horizontal velocity  $v_0$  is necessary so that the tool clears point B?
  - Locate the point of impact C by specifying the distance  $s$  shown in the figure.



- 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:
  - The velocity of the collar at B,  $v_B$ .
  - The elastic force in the spring at position B

