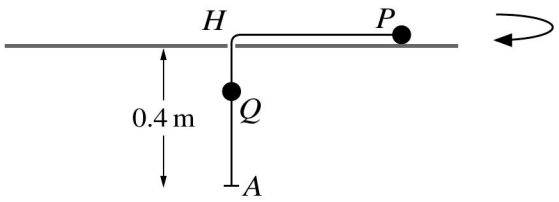

A particle P of mass 0.2 kg is attached to one end of a light inextensible string of length 0.6 m. The other end of the string is attached to a particle Q of mass 0.3 kg. The string passes through a small hole H in a smooth horizontal surface. A light elastic string of natural length 0.3 m and modulus of elasticity 15 N joins Q to a fixed point A which is 0.4 m vertically below H. The particle P moves on the surface in a horizontal circle with centre H (see diagram).

(i) Calculate the greatest possible speed of P for which the elastic string is not extended. [4]

(ii) Find the distance HP given that the angular speed of P is 8 rad s^{-1}. [5]