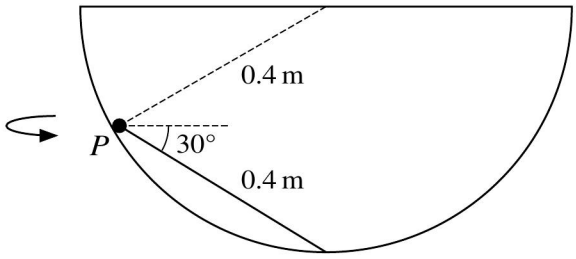

One end of a light inextensible string of length 0.4 m is attached to the lowest point of a hemisphere of radius 0.4 m fixed with its axis vertical. A particle P of mass 0.3 kg is attached to the other end of the string. The string is straight and makes an angle of 30° with the horizontal. P moves on the smooth inner surface of the hemisphere in a horizontal circle (see diagram).

(i) Calculate the smallest possible angular speed of P. [4]

(ii) Given that the greatest possible tension in the string is 5 N, calculate the greatest possible speed of P. [4]