2.

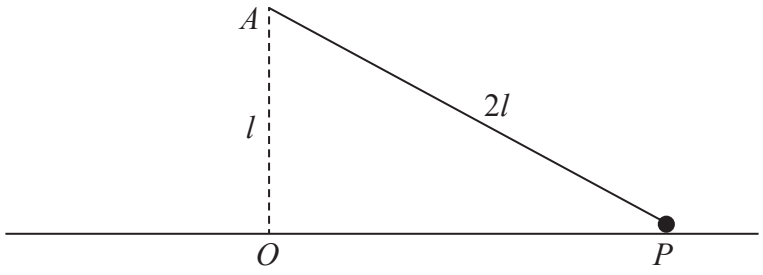


Figure 2

A particle P of mass m is attached to one end of a light inextensible string of length $2l$. The other end of the string is attached to a fixed point A above a smooth horizontal floor. The particle moves in a horizontal circle on the floor with the string taut. The centre O of the circle is vertically below A with $OA = l$, as shown in Figure 2.

The particle moves with constant angular speed ω and remains in contact with the floor.

Show that

$$\omega \leqslant \sqrt{\frac{g}{l}}$$

(8)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 2 continued

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 2 continued

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 2 continued

(Total for Question 2 is 8 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA