4.

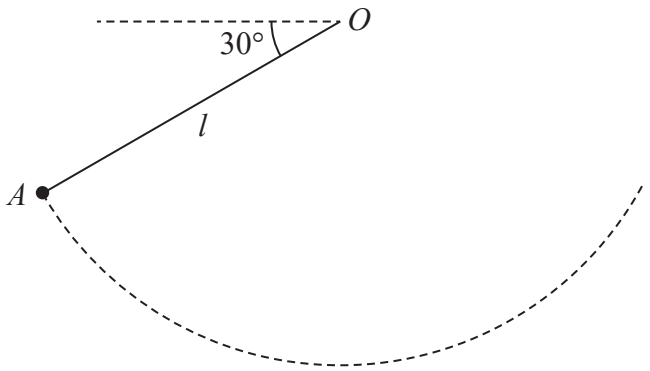


Figure 3

A circus performer has mass m. She is attached to one end of a cable of length l. The other end of the cable is attached to a fixed point O

Initially she is held at rest at point A with the cable taut and at an angle of 30° below the horizontal, as shown in Figure 3.

The circus performer is released from A and she moves on a vertical circular path with centre O

The circus performer is modelled as a particle and the cable is modelled as light and inextensible.

(a) Find, in terms of m and g, the tension in the cable at the instant immediately after the circus performer is released.

(2)

(b) Show that, during the motion following her release, the greatest tension in the cable is 4 times the least tension in the cable.

(7)

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

Question 4 continued

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

Question 4 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 4 continued

(Total for Question 4 is 9 marks)

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