

- 2 A particle  $P$  of mass  $m$  is attached to one end of a light inextensible string of length  $a$ . The other end of the string is attached to a fixed point  $O$ . The particle  $P$  is moving in a complete vertical circle about  $O$ . The points  $A$  and  $B$  are on the circle, at opposite ends of a diameter, and such that  $OA$  makes an acute angle  $\alpha$  with the upward vertical through  $O$ . The speed of  $P$  as it passes through  $A$  is  $\frac{3}{2}\sqrt{ag}$ . The tension in the string when  $P$  is at  $B$  is four times the tension in the string when  $P$  is at  $A$ .

(i) Show that  $\cos \alpha = \frac{3}{4}$ .

[6]

[illegible]

(ii) Find the tension in the string when  $P$  is at  $B$ .

[2]