

- 5 One end of a light elastic string, of natural length  $12a$  and modulus of elasticity  $kmg$ , is attached to a fixed point  $O$ . The other end of the string is attached to a particle of mass  $m$ . The particle moves with constant speed  $\frac{3}{2}\sqrt{3ag}$  in a horizontal circle with centre at a distance  $12a$  below  $O$ . The string is inclined at an angle  $\theta$  to the downward vertical through  $O$ .

(a) Find, in terms of  $a$ , the extension of the string. [5]

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

**[Turn over**