

- 5 A particle  $P$  is projected with speed  $u \text{ m s}^{-1}$  at an angle of  $\theta$  above the horizontal from a point  $O$  on a horizontal plane and moves freely under gravity. The horizontal and vertical displacements of  $P$  from  $O$  at a subsequent time  $t$  s are denoted by  $x$  m and  $y$  m respectively.

(a) Show that the equation of the trajectory is given by

$$y = x \tan \theta - \frac{gx^2}{2u^2}(1 + \tan^2 \theta). \quad [4]$$

[illegible]

In the subsequent motion  $P$  passes through the point with coordinates  $(30, 20)$ .

- (b)** Given that one possible value of  $\tan \theta$  is  $\frac{4}{3}$ , find the other possible value of  $\tan \theta$ . [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.