

- 6 A particle  $P$  is projected with speed  $u$  at an angle  $\theta$  above the horizontal from a point  $O$  on a horizontal plane and moves freely under gravity. The direction of motion of  $P$  makes an angle  $\alpha$  above the horizontal when  $P$  first reaches three-quarters of its greatest height.

**(a)** Show that  $\tan \alpha = \frac{1}{2} \tan \theta$ .

[6]

This image shows a full page of a handwriting practice worksheet. It consists of multiple rows of horizontal dashed lines spaced evenly down the page, providing a guide for letter height and placement. The background is plain white, and there are no other markings or text present.

- (b)** Given that  $\tan \theta = \frac{4}{3}$ , find the horizontal distance travelled by  $P$  when it first reaches three-quarters of its greatest height. Give your answer in terms of  $u$  and  $g$ . [4]

[illegible]