



Two uniform smooth spheres  $A$  and  $B$  of equal radii have masses  $2m$  and  $m$  respectively. Sphere  $B$  is at rest on a smooth horizontal surface. Sphere  $A$  is moving on the surface with speed  $u$  and collides with  $B$ . Immediately before the collision, the direction of motion of  $A$  makes an angle  $\alpha$  with the line of centres of the spheres, where  $\tan \alpha = \frac{4}{3}$  (see diagram). The coefficient of restitution between the spheres is  $\frac{1}{3}$ .

Find the speed of  $A$  after the collision.

[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.