



An object is formed by removing a cylinder of radius $\frac{2}{3}a$ and height kh ($k < 1$) from a uniform solid cylinder of radius a and height h . The vertical axes of symmetry of the two cylinders coincide. The upper faces of the two cylinders are in the same plane as each other. The points A and B are the opposite ends of a diameter of the upper face of the object (see diagram).

- (a) Find, in terms of h and k , the distance of the centre of mass of the object from AB . [4]

When the object is suspended from A , the angle between AB and the vertical is θ , where $\tan \theta = \frac{3}{2}$.

- (b) Given that $h = \frac{8}{3}a$, find the possible values of k . [3]