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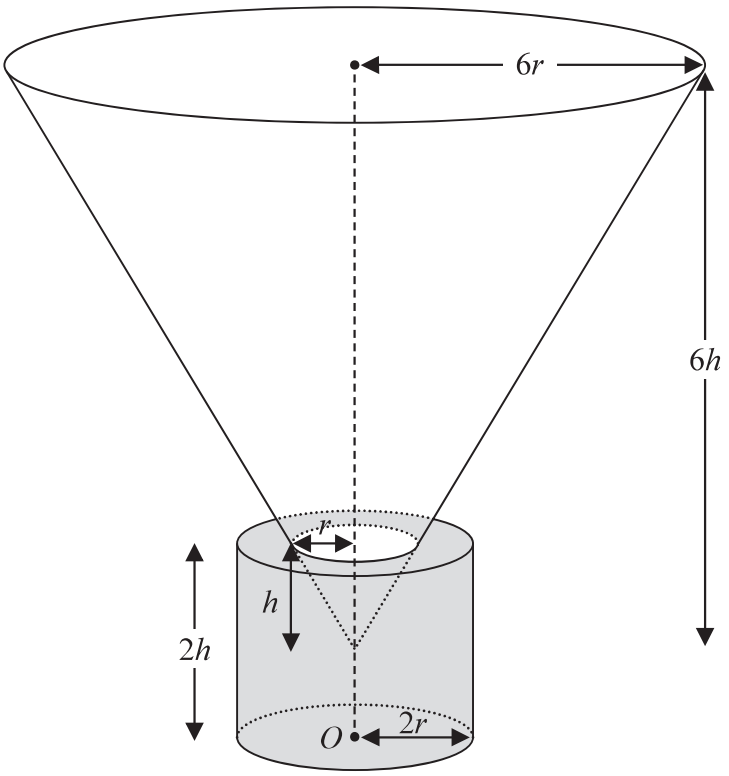


Figure 1

A cone is removed from a uniform solid right circular cylinder of mass M to form the solid with a conical hole shown shaded in Figure 1. A container is made by fixing a uniform conical shell of mass $\frac{1}{12}M$ in the hole. The cylinder has radius $2r$ and height $2h$, the conical hole has base radius r and height h and the conical shell has base radius $6r$ and height $6h$. The vertex of the shell coincides with the vertex of the hole. The axis of the shell, the axis of the hole and the axis of the cylinder are all vertical and coincide. The centre of the plane circular base of the container is O, as shown in Figure 1.

Find, in terms of h, the distance of the centre of mass of the container from O.

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