3. A uniform solid right circular cone C has base radius r, height H and vertex V.
A uniform solid S, shown in Figure 3, is formed by **removing** from C a uniform solid right circular cone of height h ($h < H$) that has the same base and axis of symmetry as C.

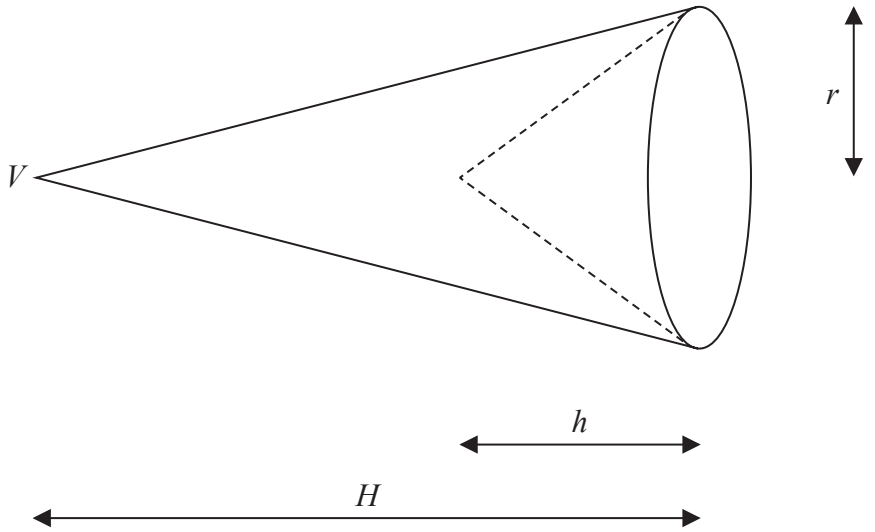


Figure 3

(a) Show that the distance of the centre of mass of S from V is

$$\frac{1}{4}(3H - h)$$

(5)

The solid S is suspended by two vertical light strings. The first string is attached to S at V and the second string is attached to S at a point on the circumference of the circular base of S.
The solid S hangs freely in equilibrium with its axis of symmetry horizontal.
The tension in the first string is T_1 and the tension in the second string is T_2

(b) Find $\frac{T_1}{T_2}$, giving your answer in terms of H and h, in its simplest form.

(3)

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Question 3 continued

(Total for Question 3 is 8 marks)