**24** The diagram shows a solid cone and a solid sphere.

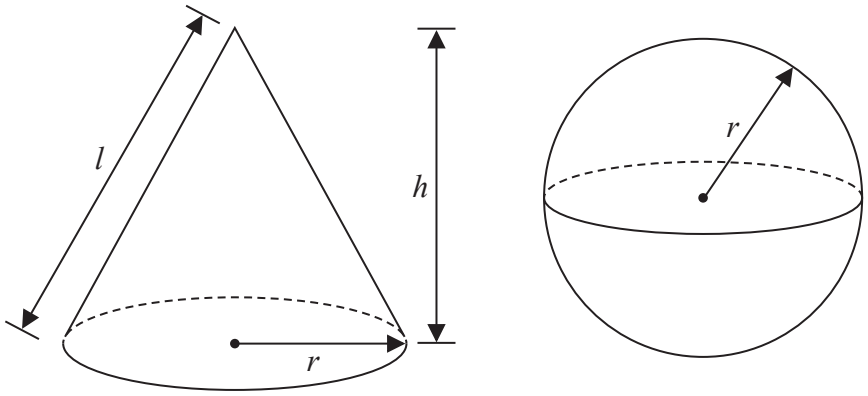



Diagram **NOT** accurately drawn

The cone has base radius $r$, slant height $l$ and perpendicular height $h$
The sphere has radius $r$

The base radius of the cone is equal to the radius of the sphere.

Given that

$$k \times \text{volume of the cone} = \text{volume of the sphere}$$

show that the **total** surface area of the cone can be written in the form

$$\pi r^2 \left( \frac{k + \sqrt{k^2 + a}}{k} \right)$$

where $a$ is a constant to be found.

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**(Total for Question 24 is 6 marks)**

**Turn over for Question 25**