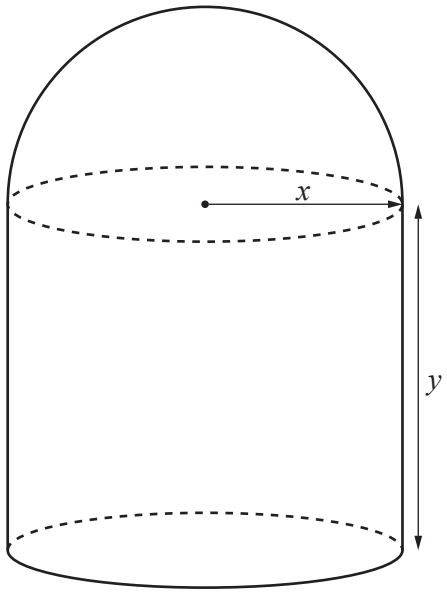
11 In this question all lengths are in centimetres.

The volume and surface area of a sphere of radius r are $\frac{4}{3}\pi r^3$ and $4\pi r^2$ respectively.



The diagram shows a solid object made from a hemisphere of radius x and a cylinder of radius x and height y. The volume of the object is $500\,\text{cm}^3$.

(a) Find an expression for y in terms of x and show that the surface area, S, of the object is given by $S = \frac{5}{3}\pi x^2 + \frac{1000}{x}$. [4]

(b) Given that x can vary and that S has a minimum value, find the value of x for which S is a minimum. [4]