Frosty the snowman is made from two uniform spherical snowballs, of initial radii 2*R* and 3*R*. The smaller (which is his head) stands on top of the larger.

As each snowball melts, its volume decreases at a rate which is directly proportional to its surface area, the constant of proportionality being the same for both snowballs. During melting each snowball remains spherical and uniform.

Let *V* and *h* denote Frosty's **total** volume and height at time *t*.

* Show that, for ,
* Derive the corresponding expression for
* Sketch  as a function of *h* for .    
  Hence give a rough sketch of *V* as a function of *h*.

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Let *V* and *h* denote Frosty's **total** volume and height at time *t*.

* Show that, for ,
* Derive the corresponding expression for
* A snowman with a hat and scarf

  Description automatically generated with medium confidenceSketch  as a function of *h* for .    
  Hence give a rough sketch of *V* as a function of *h*.