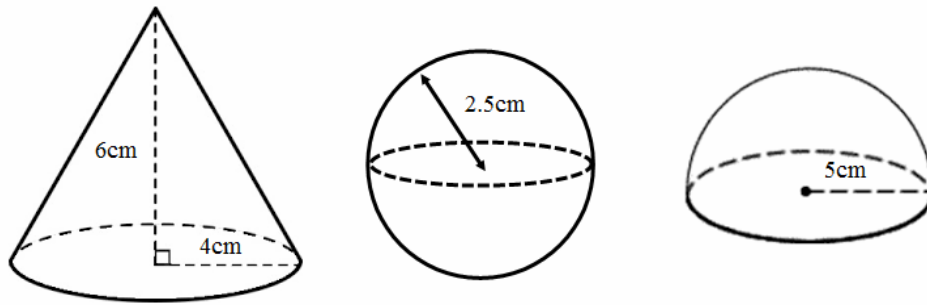
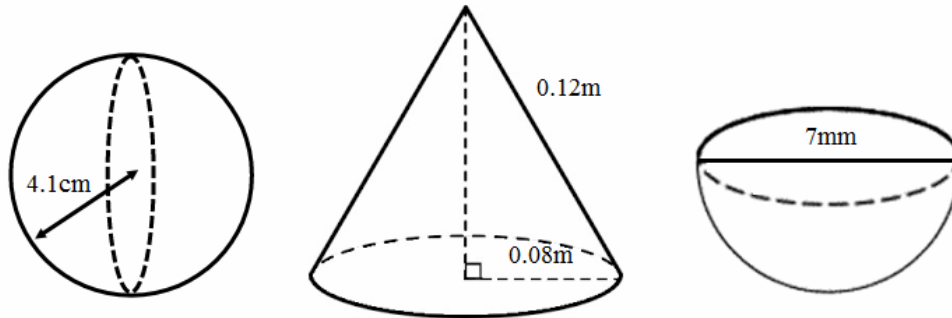


Problem Solving with Volume and Surface Area (Cones/Spheres/Frustums) – www.m4ths.com

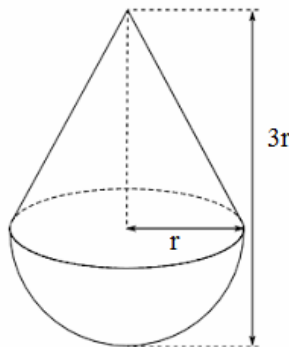
(1) Which of the following solids has the greatest volume? You must show your workings.



(2) Which of the following hollow containers has the greatest capacity?



(3) The solid plastic toy below is made up of a hemisphere and a cone. The cone sits on top of the hemisphere with no overlap. The total height of the toy is $3r$ and the radius of the hemisphere is r .



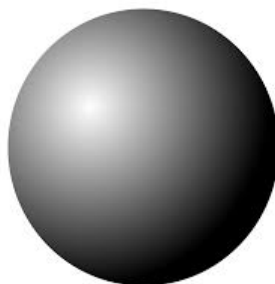
Show that:

(a) The total volume of the toy is $\frac{4}{3}\pi r^3$ cubic units.

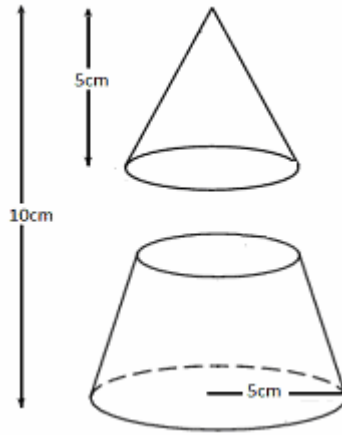
(b) The total surface area of the toy is $\pi r^2(2 + \sqrt{5})$ square units.

(c) Sketch a sphere that has the same volume as the toy.

(4) The sphere below has a Mass of 300g and a density of 2g/cm^3 . Find the surface area of the sphere.

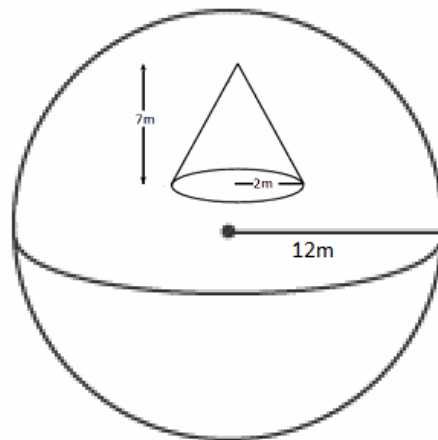


(5) A cone of height 10cm and base radius 5cm is cut in half as shown below.



What proportion of the cone is left in the form of a frustum?
(You can assume the cut is made parallel to the base).

(6) The diagram below shows a cone inside a sphere. The cone has height 7m and radius 2m.



What % of the spheres capacity is taken up by the cone?

(7) Find the surface area of a **solid** hemisphere with diameter x , giving your answer in terms of x .

(8) Here is the hard one from the Grade 9 candidates papers!

(9) Company T are designing a toy to be sold online.
The toy will be made up of a hemisphere with radius X cm and a right cone with radius X cm and height Y cm.
The cone will be attached to the top of the hemisphere as shown below.

Given that the total mass of the toy is 100π grams and the density of the toy is 60 g/cm^3 , express Y in terms of X .
Give your answer in its simplest form.

