**Volume and Surface Area**

**(Spheres)**

**Points to Note:**

<table>
<thead>
<tr>
<th>Volume of Sphere</th>
<th>Volume of hemisphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{4}{3} \pi r^3 )</td>
<td>( \frac{2}{3} \pi r^3 )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Surface area of Sphere</th>
<th>Surface area of hemisphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 4\pi r^2 )</td>
<td>curved surface area + base area</td>
</tr>
<tr>
<td></td>
<td>( = 2\pi r^2 + \pi r^2 )</td>
</tr>
</tbody>
</table>
Practice:

1) A metal sphere has a radius of 8 cm. Find its volume and surface area.
   Give your answers to 3 significant figures.
   Take \( \pi = 3.142 \)

2) A hemispherical bowl has a radius of 15 cm. If it is filled completely with water and covered with a lid,
   (a) find the volume of the water
   (b) find the surface area of the bowl (including the lid).
   Give your answers to 3 significant figures.
   Take \( \pi = 3.142 \)
3) A sphere has radius 4.5 cm. Find the volume and surface area of the sphere. Give your answers to 3 significant figures. Take $\pi = 3.142$

4) A bowl has the form of a hollow hemisphere of radius 8.4 cm. Find the external surface area and the volume of the bowl. Give your answers to 3 significant figures. Take $\pi = 3.142$
5) Find the radius of a sphere whose volume is $288\pi$ cm$^3$
Give your answers to 3 significant figures.

6) Find the radius of an opened hemisphere whose surface area is 1 762 cm$^2$
Give your answers to 3 significant figures.
Take $\pi = 3.142$
7) A sphere has radius 12.6 cm. Find the volume and surface area. Give your answers to 3 significant figures. Take \( \pi = 3.142 \)

8) A hemisphere has diameter 22.4 cm. Find the volume and closed surface area. Give your answers to 3 significant figures. Take \( \pi = 3.142 \)
9) Given that the volume of a sphere is 5276 cm³, find its radius and surface area.
Give your answers to 3 significant figures.
Take \( \pi = 3.142 \)

10) The total surface area of a hemisphere is given as 618 cm².
(a) Find the radius of the hemisphere.
(b) Find the volume of the hemisphere.
(c) Find the external surface area of the hemisphere if it is hollow.
Give your answers to 3 significant figures.
Take \( \pi = 3.142 \)
11) A hemispherical bowl has a radius of 10 cm.
(a) Calculate the volume of the bowl.
(b) A cylinder of radius 7 cm and height $h$ cm has the same volume as the bowl. Calculate the value of $h$.
(c) Water is poured into the bowl so that the depth is 4 cm. Find the vertical distance of the surface of the water below the rim of the bowl.

Give your answers to 3 significant figures.
Take $\pi = 3.142$

(N Level 1999 P2 Q7)
12) A solid cone has a base radius of 5 cm and height 12 cm.
A solid hemisphere has a radius of 5 cm.
A metal toy is formed by joining the plane faces of the cone and the hemisphere.

(a) Show that the length of the slant edge of the cone is 13 cm.

(b) Calculate
(i) the surface area of the toy
(ii) the volume of the toy.

(c) A solid metal cylinder has a radius of 1.5 m and height 2 m. The cylinder was melted down and all of the metal was used to make a large number of these toys. Calculate the number of toys that were made.

Give your answers to 3 significant figures.
Take \( \pi = 3.142 \)

(O Level 2005 P2 Q9)