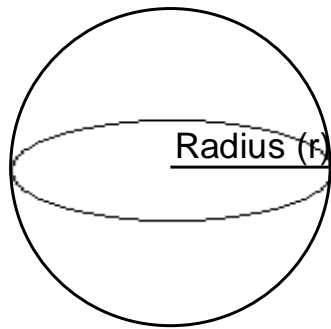


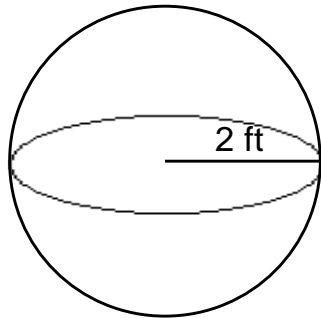
## Volume of Spheres

### Sphere



$$V = \frac{4\pi r^3}{3}$$

**Example 1:** Determine the volume of this sphere in  $\text{ft}^3$ .



**Example 2:** Determine the volume of this basketball if the diameter is 30cm.



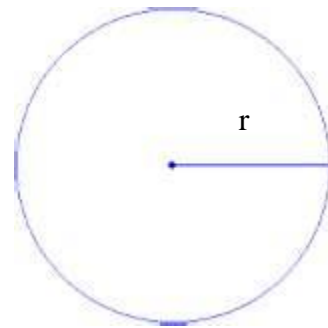
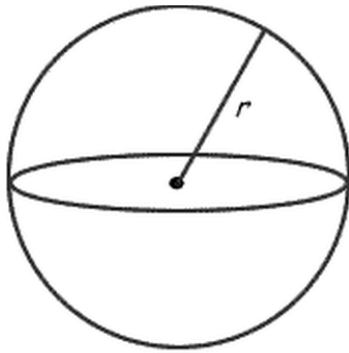
**Example 3:** A soup bowl is in the shape of a hemi-sphere (half sphere). If the bowl is filled to the rim, and has a diameter of 6.5in, how much soup is there?



## Surface Area of Spheres

The surface area of a sphere is **four** times the surface area of one cross section through the centre of the sphere.

$$A = 4\pi r^2$$



**Example 1:** Determine the surface area of the basketball if the diameter is 30cm.



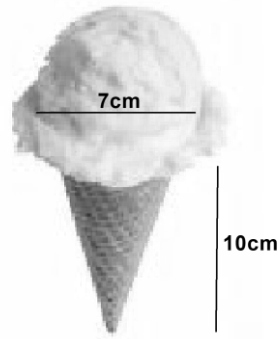
**Example 2:** This foam piece is in the shape of a hemisphere. You plan to paint the entire outer surface. Calculate the surface area if the radius of the circle base is 2.5cm.



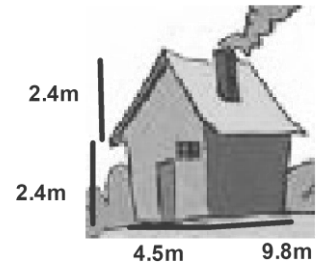
## Composite Volume of Prisms, Pyramids, Cylinders, Cones, and Spheres

Composite shapes are shapes that don't have a 'unique' name, but they are made up of other shapes we are familiar with. An icecream for example, is a cone with a hemisphere.

a. How much icecream is here, assuming the cone is filled with icecream?



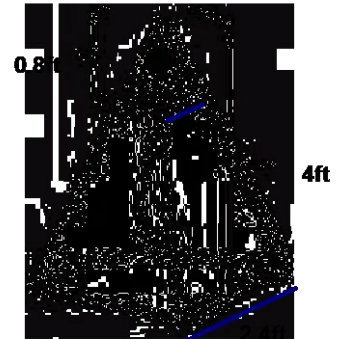
b. How much air is inside this empty house, which is made up of a rectangular prism base and a triangular prism roof?



c. Pineapple can be bought in sliced rings that look like the sketch provided. If the outer ring has a radius of 7cm and the inner ring has a radius of 3cm, where the height is 1cm in both cases, find the **volume** of this pineapple slice.



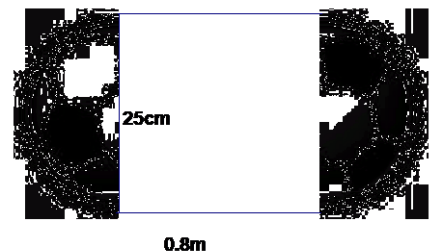
d. The following shape is called a frustum. It is a square-based pyramid with the tip cut off. Find the volume of the frustum.



e. Three tennis balls are packaged tightly into a cylindrical container. The diameter of one tennis ball is 1.7in. Determine the volume of the space in the can not taken up by the tennis balls.



f. A shipping tube that ships 3-packs of soccerballs is made from a cylindrical center with a hemisphere at each end. Calculate the space that is inside the container.  
 \*watch for the units



ANSWERS: a.  $218.08\text{cm}^3$ , b.  $158.76\text{m}^3$ , c.  $125.6\text{cm}^3$ , d.  $7.7\text{ft}^3$ , e.  $3.9\text{in}^3$ , f.  $47,451\text{cm}^3$

h. A rectangular prism has a volume of  $603\text{cm}^3$ . If a rectangular pyramid has the same base and height as this prism, calculate the volume of the pyramid.

i. A rectangular prism has a volume of  $73.6\text{m}^3$ . If the length is  $8\text{m}$ , the width is  $4\text{m}$ , what is the height?

j. A cylinder has a volume of  $2009.6\text{cm}^3$ . If the radius is  $8\text{cm}$ , find the height of this cylinder.

ANSWERS: h.  $201\text{cm}^3$ , i.  $2.3\text{m}$ , j.  $10\text{cm}$