

Name: \_\_\_\_\_

Exam Style Questions

## Volume of a Sphere



Corbettmaths

Ensure you have: Pencil, pen, ruler, protractor, pair of compasses and eraser

You may use tracing paper if needed

### Guidance

1. Read each question carefully before you begin answering it.
2. Don't spend too long on one question.
3. Attempt every question.
4. Check your answers seem right.
5. Always show your workings

Revision for this topic

[www.corbettmaths.com/contents](http://www.corbettmaths.com/contents)

## Video 361



1. A sphere has radius 2cm.  
Calculate the volume of the sphere.  
Give your answer to 1 decimal place.

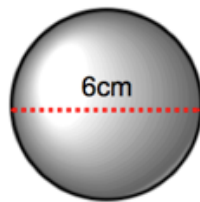
$$\frac{4}{3} \times \pi \times 2^3$$
$$= 33.510\dots$$

$$\underline{\hspace{1cm}} \text{cm}^3$$

(3)

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2. Shown is a sphere with diameter 6cm.



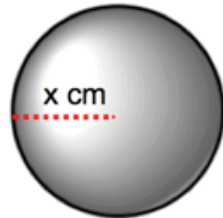
- Calculate the volume of the sphere.  
Give your answer in terms of  $\pi$ .

$$\frac{4}{3} \times \pi \times 3^3$$
$$\frac{4}{3} \times \pi \times 27$$

$$\underline{\hspace{1cm}} \text{cm}^3$$

(3)

3. A sphere has volume  $500\text{cm}^3$ .



Calculate the radius of the sphere,  $x$ .

$$\frac{4}{3} \times \pi \times r^3 = 500$$

$$4\pi r^3 = 1500$$

$$\pi r^3 = 375$$

$$r^3 = 119.366\dots$$

$$\underline{\underline{4.924}} \text{ cm}$$

(3)

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4. The volume of a sphere is  $4500\pi \text{ cm}^3$

Calculate the radius of the sphere.

$$\frac{4}{3} \pi r^3 = 4500\pi$$

$$\frac{4}{3} r^3 = 4500$$

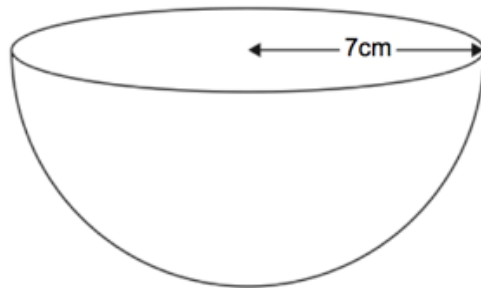
$$4r^3 = 13500$$

$$r^3 = 3375$$

$$\underline{\underline{15}} \text{ cm}$$

(3)

5. Shown below is a hemisphere.



Calculate the volume of the hemisphere.

$$\frac{1}{2} \left( \frac{4}{3} \pi r^3 \right)$$

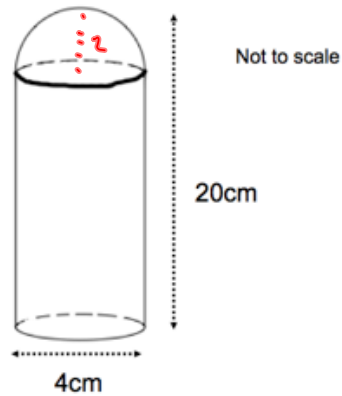
$$\frac{1}{2} \left( \frac{4}{3} \times \pi \times 7^3 \right)$$

$$\frac{1}{2} (1436.75504)$$

$$\underline{718.4} \text{ cm}^3$$

(3)

6. A container is created from a cylinder and a hemisphere.



The height of the container is 20cm.  
The diameter of the cylinder is 4cm.

Calculate the volume of the container.

$$\text{cylinder} : \pi \times 2^2 \times 18$$

$$= 226.1946\dots \text{cm}^3$$

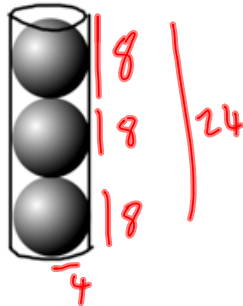
$$\text{hemisphere} : \frac{1}{2} \left( \frac{4}{3} \times \pi \times 2^3 \right) = \frac{1}{2} (33.510\dots)$$

$$= 16.755\dots$$

$$226.1946\dots + 16.755\dots = \underline{242.95\dots} \text{cm}^3$$

(3)

7. Three spheres of radius 4cm fit inside a tube.



Calculate the percentage of the tube that is not filled.

$$\text{Cylinder: } \pi \times 4^2 \times 24 = 1206.37 \dots (384\pi)$$

$$\text{One sphere: } \frac{4}{3} \times \pi \times 4^3 = 268.08 \dots (\frac{256}{3}\pi)$$

$$\text{Three spheres: } \frac{256}{3}\pi \times 3 = 256\pi$$

$$\text{or } 268.08 \dots \times 3 = 804.247 \dots$$

$$\pi \quad 384\pi - 256\pi = 128\pi$$

$$\frac{128\pi}{384\pi} \times 100$$

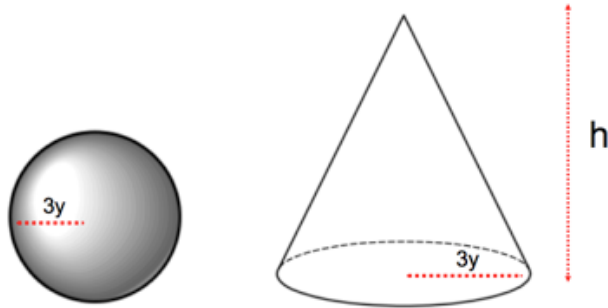
$$33\frac{1}{3} \dots \% \quad (6)$$

or

$$1206.37 \dots - 804.247 \dots = 402.123$$

$$\frac{402.123}{1206.37} \times 100 = 33.33 \dots \%$$

8. This sphere and cone have the same volume.



Find an expression for  $h$  in terms of  $y$ .

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

$$V = \frac{4}{3} \pi \times (3y)^3$$

$$V = \frac{4}{3} \pi \times 27y^3$$

$$\frac{4}{3} \pi \times 27y^3 = \frac{1}{3} \pi \times 9y^2 \times h$$

$$4 \cancel{\pi} \times 27y^3 = \cancel{\pi} \times 9y^2 \times h$$

$$108y^3 = 9y^2 h$$

$$12y = h$$

$$V = \frac{1}{3} (\pi r^2) h$$

$$V = \frac{1}{3} \times \pi \times (3y)^2 \times h$$

$$V = \frac{1}{3} \pi \times 9y^2 \times h$$

$$h = \frac{12y}{1} \quad (5)$$