

GCSE Maths: Spheres and hemispheres (Higher): answers

GCSE Maths - Volume, Surface Area and 3D Shapes - Higher - Lesson 19.9

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch19-volume-surface-area-3d/higher/spheres-and-hemispheres/

Exercise 19K Spheres and hemispheres Non-calculator

1 Work out the volume of each sphere. Give your answers in terms of π .

(a) radius 3 cm

Answer: $36\pi \text{ cm}^3$

(b) radius 6 cm

Answer: $288\pi \text{ cm}^3$

(c) diameter 10 cm

Answer: $\frac{500}{3}\pi \text{ cm}^3$

(d) radius 1.5 cm

Answer: $4.5\pi \text{ cm}^3$

2 Work out the surface area of each sphere. Give your answers in terms of π .

(a) radius 5 cm

Answer: $100\pi \text{ cm}^2$

(b) radius 7 cm

Answer: $196\pi \text{ cm}^2$

(c) diameter 12 cm

Answer: $144\pi \text{ cm}^2$

3 Work out the volume of each hemisphere. Give your answers in terms of π .

(a) radius 3 cm

Answer: $18\pi \text{ cm}^3$

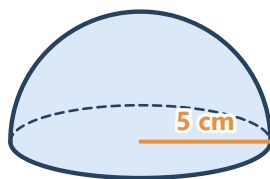
(b) radius 6 cm

Answer: $144\pi \text{ cm}^3$

(c) radius 9 cm

Answer: $486\pi \text{ cm}^3$

4 A solid hemisphere has radius 5 cm. Work out, in terms of π , (a) its curved surface area, (b) its total surface area.



- (a) Curved surface area

Answer: $50\pi \text{ cm}^2$

- (b) Total surface area

Answer: $75\pi \text{ cm}^2$

5 Work out the volume of each sphere, correct to 3 significant figures.

- (a) radius 4.5 cm

Answer: 382 cm^3

- (b) diameter 15 cm

Answer: 1770 cm^3

6 A tennis ball has a diameter of 6.7 cm. Work out its surface area, correct to 3 significant figures.

Answer: 141 cm^2

7 Work out the radius of each sphere.

- (a) Volume $36\pi \text{ cm}^3$

Answer: 3 cm

- (b) Volume $288\pi \text{ cm}^3$

Answer: 6 cm

- (c) Volume $972\pi \text{ cm}^3$

Answer: 9 cm

8 Work out the radius of each sphere.

- (a) Surface area $100\pi \text{ cm}^2$

Answer: 5 cm

- (b) Surface area $144\pi \text{ cm}^2$

Answer: 6 cm

- (c) Surface area $324\pi \text{ cm}^2$

Answer: 9 cm

9 A bowl is the shape of a hemisphere with inside radius 12 cm. Work out its capacity in litres, correct to 3 significant figures.

Answer: 3.62 litres

- 10** A metal sphere of radius 3 cm is lowered into a cylindrical tank of water with radius 6 cm. The sphere is completely covered by water. Work out how far the water level rises.

Answer: 1 cm

- 11** A sphere of radius 5 cm just fits inside a cube of side 10 cm. Show that the sphere takes up $\pi/6$ of the volume of the cube.

Answer: $\pi/6$

- 12** Show that the total surface area of a solid hemisphere with radius r is $3\pi r^2$.

Answer: $3\pi r^2$

- 13** A sphere and a cylinder both have radius r . The cylinder has height $2r$, so the sphere fits inside it exactly. Show that the volume of the sphere is two thirds of the volume of the cylinder.

Answer: sphere = $\frac{4}{3}\pi r^3$, cylinder = $2\pi r^3$; ratio 2 : 3

- 14** Sam says, "If I double the radius of a sphere, its surface area doubles and its volume doubles." Is Sam correct? Explain.

Answer: No. Surface area is multiplied by 4 and volume by 8.

- 15** For one particular sphere the volume (in cm^3) and the surface area (in cm^2) have the same numerical value. Work out the radius of this sphere.

Answer: 3 cm