



5.16H Spheres and Cones: Higher Tier Practice

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 55 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** Work out the volume of a sphere with radius 5 cm. Give your answer in terms of π .

(Total for Question 1 is 2 marks)

- 2** A metal ball has diameter 12 cm. Calculate the surface area of the ball. Give your answer in terms of π .

(Total for Question 2 is 2 marks)

- 3** A cone has radius 3 cm and height 10 cm. Work out the volume of the cone. Give your answer in terms of π and then to 3 significant figures.

(Total for Question 3 is 3 marks)

- 4** A hemisphere of radius 4 cm is fixed on top of a right circular cylinder of radius 4 cm and height 6 cm. Calculate the total volume of the solid. Give your answer in terms of π and then to 3 significant figures.

(Total for Question 4 is 4 marks)

- 5 Two cones are similar. Cone A has height 9 cm and volume 216 cm^3 . Cone B has height 15 cm. Work out the volume of cone B.

(Total for Question 5 is 3 marks)

- 6 A right cone has height 12 cm. Its volume is $432 \pi \text{ cm}^3$. Find the radius of the base of the cone. Give your answer to 3 significant figures.

(Total for Question 6 is 3 marks)

- 7 A frustum is formed by cutting the top from a right cone. The lower radius is 6 cm, the upper radius is 2 cm and the height of the frustum is 9 cm. Calculate the volume of the frustum. Give your answer in terms of π and then to 3 significant figures.

(Total for Question 7 is 4 marks)

Mark scheme · 5.16H Spheres and Cones: Higher Tier Practice

Question 1

- **M1** substitute into $V = \frac{4}{3} \pi r^3$, showing $\frac{4}{3} * \pi * 5^3$ or equivalent method
- **A1** $500/3 \pi \text{ cm}^3$ cao
- **Answer: $500/3 \pi \text{ cm}^3$ (approx 523.6 cm³)**

Question 2

- **M1** use $A = 4 \pi r^2$ with $r = 6 \text{ cm}$ or equivalent method
- **A1** $144 \pi \text{ cm}^2$ cao
- **Answer: $144 \pi \text{ cm}^2$ (approx 452.39 cm²)**

Question 3

- **M1** substitute into $V = \frac{1}{3} \pi r^2 h$, showing $\frac{1}{3} * \pi * 3^2 * 10$ or equivalent
- **M1** simplify to 30π
- **A1** $30 \pi \text{ cm}^3$; 94.2 cm³ to 3 s.f. cao
- **Answer: $30 \pi \text{ cm}^3$ (approx 94.2 cm³)**

Question 4

- **M1** calculate hemisphere volume = $\frac{1}{2} * \frac{4}{3} \pi r^3 = \frac{2}{3} \pi r^3$ with $r = 4$
- **M1** calculate cylinder volume = $\pi r^2 h$ with $r = 4$, $h = 6$
- **A1** sum volumes: $(\frac{128}{3} + 96) \pi = \frac{416}{3} \pi \text{ cm}^3$ ft
- **A1** numeric to 3 s.f.: 436 cm³ (awrt 435.63 cm³) allow 436 cm³
- **Answer: $\frac{416}{3} \pi \text{ cm}^3$ (approx 435.63 cm³, or 436 cm³ to 3 s.f.)**

Question 5

- **M1** find linear scale factor = $15/9 = 5/3$ and state volume scale = $(5/3)^3 = 125/27$
- **M1** multiply 216 by $125/27$ or equivalent method
- **A1** 1000 cm³ cao
- **Answer: 1000 cm³**

Question 6

- **M1** use $V = \frac{1}{3} \pi r^2 h$ and substitute $432 \pi = \frac{1}{3} \pi r^2 * 12$ to give $432 = 4 r^2$
- **M1** solve $r^2 = 108$ and $r = \sqrt{108}$
- **A1** $r = 6 \sqrt{3} \text{ cm}$ (approx 10.39 cm to 3 s.f.) cao
- **Answer: $6 \sqrt{3} \text{ cm}$ (approx 10.4 cm to 3 s.f.)**

Question 7

- **M1** use frustum volume formula $V = \frac{1}{3} \pi h (R^2 + Rr + r^2)$ with $R = 6$, $r = 2$, $h = 9$
- **M1** substitute values to get $\frac{1}{3} \pi * 9 * (36 + 12 + 4)$ or equivalent simplification
- **A1** simplify to $156 \pi \text{ cm}^3$
- **A1** numeric to 3 s.f.: 490 cm³ (awrt 490.09 cm³) cao
- **Answer: $156 \pi \text{ cm}^3$ (approx 490 cm³ to 3 s.f.)**