



5.16F Spheres and Cones: Foundation Tier Practice

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 55 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1 Write down the formula for the volume V of a sphere in terms of its radius r .

(Total for Question 1 is 1 mark)

- 2 A small ball has radius 6 cm. Calculate its volume. Give your answer in terms of π .

(Total for Question 2 is 1 mark)

- 3 The volume of a sphere is $36\pi\text{ cm}^3$. Work out its radius in cm. Give your answer in exact form.

(Total for Question 3 is 2 marks)

- 4 A cone has radius 5 cm and height 12 cm. Calculate its volume. Give your answer to 1 decimal place. Use $\pi = 3.14159265$ or your calculator's π key.

(Total for Question 4 is 2 marks)

- 5 A toy cone and a toy sphere are made from the same material. The cone has radius 4 cm and height 9 cm. The sphere has radius 6 cm. Which object has the larger volume and by how much? Give your answer to 1 decimal place.

(Total for Question 5 is 3 marks)

- 6** A right circular cone has sloping edge (the slant height) 13 cm and radius 5 cm. Calculate the height of the cone. Give your answer in cm.

(Total for Question 6 is 3 marks)

- 7** A hemisphere is half of a sphere. A hemisphere has radius 7 cm. Calculate its curved surface area (not including the base). Give your answer to 1 decimal place. Use the curved surface area of a sphere = $4 \pi r^2$, so hemisphere curved area = $2 \pi r^2$.

(Total for Question 7 is 4 marks)

- 8** A cone and a cylinder have the same radius 3 cm. The cone has height 8 cm and the cylinder has height 8 cm. Work out the total volume of the two solids. Give your answer in terms of π .

(Total for Question 8 is 6 marks)

- 9** A solid is made by placing a sphere of radius 4 cm on top of a cone whose base radius is 4 cm and height 6 cm so that the sphere touches the cone along the circle of the cone's top. Calculate the total volume of the solid. Give your answer to 1 decimal place.

(Total for Question 9 is 8 marks)

Mark scheme · 5.16F Spheres and Cones: Foundation Tier Practice

Question 1

- **B1** $V = (4/3) \pi r^3$ or equivalent cao
- **Answer:** $V = (4/3) \pi r^3$

Question 2

- **B1** $288 \pi \text{ cm}^3$ cao
- **Answer:** $288 \pi \text{ cm}^3$

Question 3

- **M1** use $(4/3) \pi r^3 = 36 \pi$ and cancel π then $r^3 = 27$
- **A1** $r = 3 \text{ cm}$ cao
- **Answer:** 3 cm

Question 4

- **M1** use $V = (1/3) \pi r^2 h$ with $r=5$, $h=12$
- **A1** 314.2 cm^3 awrt
- **Answer:** 314.2 cm^3

Question 5

- **M1** calculate cone volume: $(1/3) \pi (4^2) * 9 = 48 \pi$
- **M1** calculate sphere volume: $(4/3) \pi * 6^3 = 288 \pi$
- **A1** sphere larger by $240 \pi = 754.0 \text{ cm}^3$ awrt
- **Answer:** The sphere is larger by 754.0 cm^3 (to 1 d.p.)

Question 6

- **M1** use Pythagoras: $\text{height}^2 + 5^2 = 13^2$
- **M1** compute $\text{height}^2 = 169 - 25 = 144$
- **A1** height = 12 cm cao
- **Answer:** 12 cm

Question 7

- **M1** use hemisphere curved area = $2 \pi r^2$ with $r=7$
- **M1** compute $2 * \pi * 49 = 98 \pi$
- **M1** convert to decimal using π : $98 * \pi = 307.87608...$
- **A1** 307.9 cm^2 awrt
- **Answer:** 307.9 cm^2

Question 8

- **M1** find r^2 : $3^2 = 9$
- **M1** cylinder volume method: $V = \pi r^2 h$, so $9 * 8 = 72$, cylinder = 72π
- **M1** cone method: $V = (1/3) \pi r^2 h$, so $(1/3) * 9 * 8 = 24$, cone = 24π
- **M1** write cone volume = 24π and cylinder = 72π
- **A1** add volumes: $72 \pi + 24 \pi = 96 \pi$
- **A1** $96 \pi \text{ cm}^3$ cao
- **Answer:** $96 \pi \text{ cm}^3$

Question 9

- **M1** compute sphere volume formula substitution: $(4/3) \pi * 4^3$
- **M1** simplify sphere volume to $(256/3) \pi$
- **M1** compute cone volume formula substitution: $(1/3) \pi * 4^2 * 6$
- **M1** simplify cone volume to 32π
- **M1** convert sphere volume to decimal: $(256/3) \pi = 268.082... \text{ cm}^3$
- **M1** convert cone volume to decimal: $32 \pi = 100.531... \text{ cm}^3$
- **M1** add decimal volumes: $268.082... + 100.531... = 368.613...$
- **A1** 368.6 cm^3 awrt
- **Answer: 368.6 cm^3**