FOUNDATION & HIGHER

SAME AT BOTH TIERS

Name ..... Class .....

G17: Circles and solids

Reason with circle formulae and volumes and surface areas of solids

20 marks · 25 minutes · Calculator allowed

1) Explain why the circumference of a circle is πd.

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[Question 1: 1 marks]

2) Show that the perimeter of a semicircle with diameter 10 cm is $5\pi + 10$ cm.

[Question 2: 2 marks]

3) Kim says a circle with radius 3 cm has area 6π cm^2. Explain her mistake.

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[Question 3: 2 marks]

4) Show that a sphere with radius 3 cm has volume 36π cm^3. ($V = \frac{4}{3}\pi r^3$)

[Question 4: 2 marks]

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5) How does the volume of a cone compare with a cylinder with the same base and height?

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[Question 5: 1 marks]

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6) A cone has radius 3 cm and height 4 cm. Show that its slant height is 5 cm and its curved surface area is 15π cm^2. (Curved area = πrl)

[Question 6: 3 marks]

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7) Ben says the total surface area of a solid hemisphere is $2\pi r^2$. Explain his mistake.

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[Question 7: 2 marks]

8) Which is bigger: a sphere with radius 3 cm or a cube with side 4.8 cm? Show your working.

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[Question 8: 2 marks]

9) The radius of a circle is doubled. Explain what happens to its area.

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[Question 9: 2 marks]

10) Show that a pyramid with a 6 cm square base and height 5 cm has volume 60 cm^3.

[Question 10: 1 marks]

11) Explain why 28.3 cm is not the exact circumference of a circle with radius 4.5 cm.

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[Question 11: 1 marks]

12) Explain why the perimeter of a composite shape does not include internal lines.

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[Question 12: 1 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	Explanation	π is defined as circumference ÷ diameter (C1).
2	Shown	Half of 10π plus the diameter (M1); C1.
3	9π	She did $2r$ not r^2 (C1); B1.
4	Shown	$\frac{4}{3}\pi \times 27$ (M1); C1.
5	It is one third	C1.
6	Shown	$\sqrt{9+16} = 5$ (M1); $\pi \times 3 \times 5$ (M1); C1.
7	$3\pi r^2$	He forgot the flat circular base (C1); B1.
8	Sphere	113.1 and 110.6 (M1); C1.
9	Multiplied by 4	$\pi(2r)^2 = 4\pi r^2$ (C2).
10	Shown	$\frac{1}{3} \times 36 \times 5$ (C1).
11	Explanation	It is rounded; exact value is 9π (C1).
12	Explanation	Perimeter is the distance around the outside (C1).