FOUNDATION & HIGHER

SAME AT BOTH TIERS

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

G12: 3D shapes

Reason about faces, edges and vertices of solids

20 marks · 25 minutes · Non-calculator

1) Is a cylinder a prism? Explain.

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[Question 1: 2 marks]

2) Show that a cube satisfies $F + V - E = 2$

[Question 2: 2 marks]

3) Explain why a prism with an n-sided cross-section has $3n$ edges.

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[Question 3: 2 marks]

4) Kim says a cone has 2 faces and 1 edge. Comment on her statement.

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[Question 4: 2 marks]

5) Explain why a pyramid with an n-sided base has $n + 1$ faces.

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[Question 5: 2 marks]

6) Show that a triangular prism satisfies $F + V - E = 2$

[Question 6: 2 marks]

7) Could a solid have 7 faces, 10 vertices and 15 edges? Explain.

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[Question 7: 2 marks]

8) Explain why a sphere has no edges or vertices.

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[Question 8: 2 marks]

9) Explain why a cube has 12 edges.

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[Question 9: 2 marks]

10) A prism has 21 edges. Show that its cross-section is a heptagon.

[Question 10: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	Explanation	Constant circular cross-section (C1); but not a polyhedron, as the cross-section is not a polygon (C1).
2	Shown	$6 + 8 - 12$ (M1); C1.
3	Explanation	n edges on each end (C1); n joining edges (C1).
4	Partly right	One flat face and one curved surface (C1); one curved edge (C1).
5	Explanation	Base plus one triangle per side (C2).
6	Shown	$5 + 6 - 9$ (M1); C1.
7	Yes	$7 + 10 - 15 = 2$ (M1); e.g. a pentagonal prism (C1).
8	Explanation	One smooth curved surface, so no lines or corners where surfaces meet (C2).
9	Explanation	4 on top, 4 on bottom, 4 vertical (C2).
10	Shown	$3n = 21$ (M1); $n = 7$ (C1).