CLASS 8 MATHS EXTRA QUESTIONS

Extra Questions for Class 8 Maths Chapter 11: Exploring Some Geometric Themes – HOTS

Original HOTS-level (Higher Order Thinking Skills) practice questions for Class 8 Maths Chapter 11 (Exploring Some Geometric Themes), extending beyond the textbook exercise. Full worked solutions included.

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Q1 (Fractal area at a specific step). For the Sierpinski Gasket (triangle fractal), find the fraction of area remaining after 5 steps, as a decimal rounded to 3 places.
Solution: Area after step n = $(3/4)^n$. After 5 steps: $(3/4)^5$ = 243/1024 ≈ **0.237** (about 23.7% of the original area remains).

Q2 (Fractal side count). After how many steps does the Koch Snowflake first have more than 1000 sides?
Solution: Sides at step n = 3×4^n. Step 4: 3×256 = 768 (not enough). Step 5: 3×1024 = 3072 (exceeds 1000). So **step 5** is the first step with more than 1000 sides.

Q3 (Euler's formula, prism). A prism has 24 edges. If it's a right prism with a regular polygon base, find the number of sides of its base, and its faces and vertices.
Solution: Edges = 3n = 24 ⇒ n = **8** (octagonal base). Faces = n+2 = **10**. Vertices = 2n = **16**. Check (Euler): 16−24+10 = 2. ✓

Q4 (Euler's formula, pyramid). A pyramid has 14 vertices. Find the number of sides of its base, and its faces and edges.
Solution: Vertices = n+1 = 14 ⇒ n = **13** (13-sided base). Faces = n+1 = **14**. Edges = 2n = **26**. Check: 14−26+14 = 2. ✓

Q5 (Assertion–Reason). Assertion (A): A cube and a square-based pyramid can have the same number of vertices. Reason (R): A cube has 8 vertices, and a square pyramid (n=4) has n+1 = 5 vertices.
Solution: A cube has 8 vertices; a square pyramid has 4+1 = 5 vertices — these are **not equal**, so **Assertion is false**. The Reason's arithmetic (5 vertices for a square pyramid) is itself **true**, but since it doesn't match a cube's 8, it does not support the (false) Assertion.

Q6 (Net area, cylinder). A cylinder has radius 7 cm and height 10 cm. Find the area of the rectangular part of its net. (Use π = 22/7.)
Solution: Rectangle length = circumference = 2πr = 2×22/7×7 = 44 cm. Rectangle area = length × height = 44×10 = **440 cm²**.

Q7 (Spot the error). A student says: "Since a cube's shadow can be a hexagon, a cube must have 6 identical hexagonal faces." Explain the error.
Solution: Incorrect. A cube always has 6 identical *square* faces — the hexagonal shape only appears as an outline/silhouette when the cube is viewed along a body diagonal (corner-to-corner), because three square faces are then equally visible and their outer edges combine into a hexagon shape. The hexagon is a projection effect, not an actual face of the cube.

Q8 (Combining fractal ideas). If the Sierpinski Carpet starts with a square of area 81 sq. units, find the area remaining after 2 steps.
Solution: Area after step n = starting area × $(8/9)^n$. After 2 steps: 81 × $(8/9)^2$ = 81 × 64/81 = **64 sq. units**.

Q9 (Net identification, reasoning). A net has 6 squares arranged in a straight row of 4, with one extra square attached above the 2nd square and another attached below the 3rd square. Will this fold into a cube? Explain your reasoning.
Solution: Yes. A row of 4 squares can fold around into 4 of the cube's side faces (like a belt), and the two

extra squares (one above, one below, attached at different points along the row) fold in to become the top and bottom faces — a valid, well-known cube net pattern (this is one of the 11 standard nets, sometimes called the “1-4-1” or cross-like arrangement).

Q10 (Comparing growth rates). Which grows faster as n increases: the number of holes in a Sierpinski Triangle at step n, or the number of sides in a Koch Snowflake at step n? Explain using the formulas.
Solution: Holes at step n = $(3^n-1)/2$, which grows like 3^n. Sides at step n = 3×4^n, which grows like 4^n. Since 4^n grows faster than 3^n as n increases, **the Koch Snowflake’s side count grows faster** than the Sierpinski Triangle’s hole count.