# CLASS VIII – MATHEMATICS

## Chapter Test: Exploring Some Geometric Themes

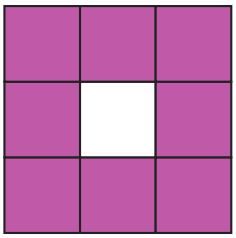
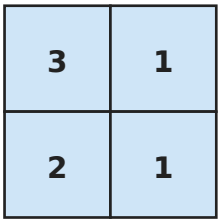
(Ganita Prakash, Grade 8, Part II – Chapter 4)

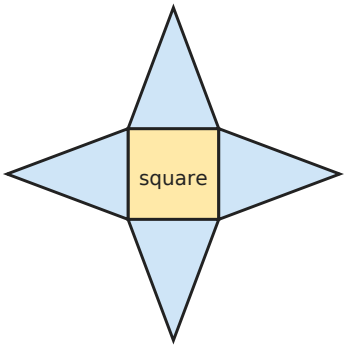
**Time: 1½ Hours** **M. M.: 40**

**General Instructions:**

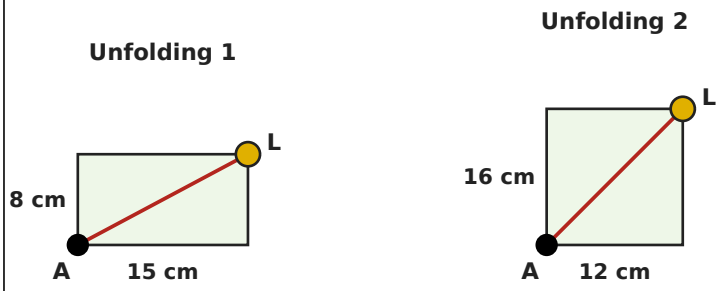
**1.** This paper contains 20 questions. All questions are compulsory.
**2.** This paper is divided into 4 sections: **A, B, C** and **D**.
**3.** In **Section A**, Questions no. 1 to 10 are Multiple Choice Questions carrying 1 mark each.
**4.** In **Section B**, Questions no. 11 to 13 are Very Short Answer type questions carrying 2 marks each.
**5.** In **Section C**, Questions no. 14 to 17 are Short Answer type questions carrying 3 marks each.
**6.** In **Section D**, Questions no. 18 to 20 are Long Answer / Case-based questions carrying 4 marks each.
**7.** There is no overall choice. However, an internal choice has been provided in 1 question of Section B, 3 questions of Section C and 2 questions of Section D.
**8.** Figures are only for reference and are not drawn to scale. Questions 9, 10, 11, 14 and 18 are figure-based.
**9.** Show all the steps of your working.
**10.** Use of calculator is **not** allowed.

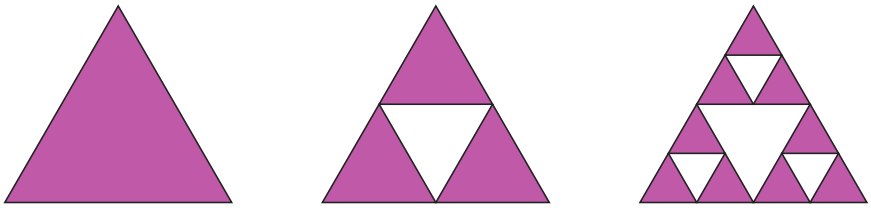
| Q. No. | Section – A | Marks |
|---|---|---|
| **1** | The number of squares that remain at Step 2 of the Sierpinski Carpet is<br>(A) 16 (B) 64<br>(C) 72 (D) 81 | **[1]** |
| **2** | The number of triangles that remain at Step 3 of the Sierpinski Gasket is<br>(A) 9 (B) 12<br>(C) 81 (D) 27 | **[1]** |
| **3** | The number of edges of a prism whose bases are pentagons is<br>(A) 15 (B) 10<br>(C) 12 (D) 20 | **[1]** |
| **4** | A square pyramid has how many edges?<br>(A) 6 (B) 10<br>(C) 8 (D) 12 | **[1]** |
| **5** | The number of sides of the shape at Step 1 of the Koch Snowflake is<br>(A) 9 (B) 12<br>(C) 16 (D) 6 | **[1]** |
| **6** | The net of a cone consists of a circle and a<br>(A) rectangle (B) triangle<br>(C) trapezium (D) sector of a circle | **[1]** |
| **7** | The length of the projection of a line segment on a plane is _____ the actual length of the segment.<br>(A) at most equal to (B) always more than<br>(C) always equal to (D) always double | **[1]** |
| **8** | The number of different nets that a cube has is<br>(A) 6 (B) 9<br>(C) 11 (D) 12 | **[1]** |

| Q. No. | Section – A | Marks |
|---|---|---|
| **9** | Fig. 1 shows Step 1 of the Sierpinski Carpet made from a square of side 9 cm. The area of the remaining (coloured) region is<br><br>**Side = 9 cm**<br>  <br>Fig. 1: Step 1 of the Sierpinski Carpet<br>(A) 9 $cm^2$ (B) 72 $cm^2$<br>(C) 63 $cm^2$ (D) 81 $cm^2$ | **[1]** |
| **10** | Fig. 2 shows the top view of a stack of unit cubes, with the number of cubes in each column. The total number of cubes in the stack is<br><br>Top view (numbers show the cubes in each column)<br>  <br><br>Fig. 2: Top view of a stack of unit cubes<br>(A) 6 (B) 8<br>(C) 7 (D) 9 | **[1]** |

| Q. No. | Section – B | Marks |
|---|---|---|
| **11** | Fig. 3 shows a net made of one square and four identical triangles.<br><br>  <br><br>Fig. 3: A net<br>(i) Name the solid that can be folded from this net. [1]<br>(ii) Write the number of faces, edges and vertices of this solid. [1] | **[2]** |
| **12** | (A) Find the number of holes at Step 3 of the Sierpinski Gasket.<br>**OR**<br>(B) Write the number of faces, edges and vertices of a hexagonal prism. | **[2]** |

| Q. No. | Section – B | Marks |
|---|---|---|
| **13** | The Koch Snowflake starts with an equilateral triangle of side 1 unit. Find the perimeter of the shape at Step 2. | **[2]** |

| Q. No. | Section – C | Marks |
|---|---|---|
| **14** | An ant at A wants to reach a laddu at L on the surface of a box. Fig. 4 shows two ways of unfolding the box, with the distances between A and L along the sides of each net.<br>  <br><br>Fig. 4: Two ways of unfolding a box (A = ant, L = laddu)<br>(i) Find the length of the straight path AL in Unfolding 1. [1]<br>(ii) Find the length of the straight path AL in Unfolding 2. [1]<br>(iii) Which unfolding gives the shortest path on the box, and by how much is it shorter than the other? [1] | **[3]** |
| **15** | (A) For the Sierpinski Carpet, write the formula for the number of remaining squares $R_n$ at Step n. Find $R_3$ and the number of holes at Step 3.<br>**OR**<br>(B) For the Sierpinski Gasket, find the number of triangles remaining at Step 4. If the starting triangle has area 1 sq. unit, find the area remaining at Step 4. | **[3]** |
| **16** | (A) In the Koch Snowflake (starting side 1 unit), find at Step 3: (i) the number of sides, (ii) the length of each side, (iii) the perimeter.<br>**OR**<br>(B) A cylinder has radius 7 cm and height 10 cm. Write the dimensions of the rectangle in its net and find the area of the rectangle. (Use π = 22/7.) | **[3]** |
| **17** | (A) A solid is made of 4 identical unit cubes: three cubes in a row and one cube placed on top of the leftmost cube. Describe its front view, top view and side view (the side view is seen from the right).<br>**OR**<br>(B) A cuboid is 6 cm long, 4 cm wide and 3 cm high. Find the dimensions of its front view, top view and side view. | **[3]** |

| Q. No. | Section – D | Marks |
|---|---|---|
| **18** | (A) Fig. 5 shows the first three steps of the Sierpinski Gasket.<br>  <br>**Step 0** **Step 1** **Step 2**<br>Fig. 5: First three steps of the Sierpinski Gasket<br>(i) Write the number of triangles remaining at Steps 0, 1 and 2. [1]<br>(ii) Write the number of holes at Steps 0, 1 and 2. [1]<br>(iii) If the area of the triangle at Step 0 is 64 $cm^2$, find the area remaining at Step 2. [1]<br>(iv) How many triangles remain at Step 5? [1]<br>**OR**<br>(B) A box is a cuboid 6 cm × 4 cm × 3 cm.<br>(i) Write its number of faces, edges and vertices. [1]<br>(ii) Find the total area of its net (its surface area). [2]<br>(iii) How many different nets does a cube have? [1] | **[4]** |
| **19** | (A) An ant on the surface of a cuboid wants to reach a laddu. When the cuboid is unfolded in one way, the ant and the laddu are 24 cm apart in one direction and 10 cm apart in the perpendicular direction. In another unfolding the distances are 20 cm and 21 cm.<br>(i) Find the straight-line distance in the first unfolding. [1]<br>(ii) Find the straight-line distance in the second unfolding. [1]<br>(iii) Which gives the shortest path and how long is it? [1]<br>(iv) Why must we check different unfoldings to find the shortest path? [1]<br>**OR**<br>(B) A prism has bases that are 12-sided polygons and a pyramid has a 12-sided polygon as its base.<br>(i) Find the number of faces, edges and vertices of the prism. [2]<br>(ii) Find the number of faces, edges and vertices of the pyramid. [2] | **[4]** |
| **20** | **Case Study:** A tile designer makes a square tile of side 27 cm and prints the Sierpinski Carpet pattern on it up to Step 2 (by removing the central square at each stage).<br>(i) Find the area of the original tile. [1]<br>(ii) How many small squares remain at Step 2, and what is the side of each? [1]<br>(iii) Find the area of the coloured (remaining) region at Step 2. [1]<br>(iv) What fraction of the original area remains? [1] | **[4]** |

**— End of Question Paper —**