

Class 4 Assessment: The Symmetry of Nature and Art

Learning objective: To identify, describe, and complete symmetric 2D shapes with respect to a line of symmetry.

Read each question carefully. Use a ruler for drawing lines of symmetry. Show your working out where necessary. Good luck!

Max the monkey and Zara the zebra are helping to organise the Great Garden Exhibition. They are using patterns found in nature to decorate the path. Max is measuring the geometric shapes, while Zara is ensuring that every petal and leaf design is perfectly balanced.

Word bank: Symmetry · Line of symmetry · Reflect · Horizontal · Vertical · Diagonal · Congruent · Pattern

1. Max has drawn a regular pentagon. How many lines of symmetry does a regular pentagon have? Explain how you know. (2 marks)

2. Zara is painting a square tile. Draw all the possible lines of symmetry on a square. How many lines did you find? (2 marks)

3. Look at the letter 'H'. Identify its lines of symmetry. Can you find another capital letter that has both a vertical and a horizontal line of symmetry? Justify your choice. (3 marks)

4. A shape has a diagonal line of symmetry. Does this mean it must be a square? Use your knowledge of triangles to compare and contrast a square and an isosceles triangle regarding their symmetry. (4 marks)

5. Max says, 'If I draw a line through a rectangle horizontally and vertically, I have created four identical smaller rectangles.' Is Max correct? Explain your reasoning using the properties of symmetry. (4 marks)

6. Zara is designing a butterfly wing pattern. If she draws the left wing, describe the mathematical process she must use to ensure the right wing is a perfect reflection. What might happen to the balance of the design if the line of symmetry is not perfectly straight? (5 marks)

7. If a shape has no lines of symmetry, what term do we use to describe it? Give an example of a shape that fits this description. (2 marks)

8. Calculate the cost: Zara needs 5 wooden frames to display her art. Each frame costs £3.50. If she pays with a £20 note, how much change should she receive? Does the shape of the frame affect the cost? (3 marks)

Draw: On a piece of squared paper, draw a composite shape (a shape made of two or more combined shapes) that possesses exactly one vertical line of symmetry. Mark the line of symmetry with a dashed line.



Extension challenge: Imagine you are an architect designing a new bridge for the forest. Describe how you would incorporate rotational and reflective symmetry into the bridge's design to ensure it is structurally balanced. Why is symmetry often used in engineering and design? Total: /25