

Max's Geometric Masterpiece: A Symmetry Investigation

Learning objective: To identify, describe, and represent the position of shapes reflecting in lines of symmetry, including those parallel to the axes.

Max the monkey has found a collection of patterns in the forest and needs your help to analyse them. Use this template to document your investigation into symmetry. Ensure you use precise mathematical vocabulary when explaining your findings. When drawing, use a ruler to maintain accuracy.

Word bank: reflection · line of symmetry · horizontal · vertical · diagonal · congruent · axis · coordinates · translation · vertices

1. Pattern Observation: Describe the shape you have chosen. How many lines of symmetry does it possess? Explain your reasoning. (3 marks)

2. Coordinate Reflection: If you were to place your shape on a coordinate grid, what would be the new coordinates of its vertices after a reflection across a vertical line of symmetry? (3 marks)

3. Compare and Contrast: Compare a shape with only one line of symmetry to a regular polygon. Justify why the regular polygon has more lines of symmetry. (4 marks)

4. Logical Deduction: Explain why a shape might have rotational symmetry but not reflectional symmetry. Provide an example. (3 marks)

5. Hypothesis: What might happen to the symmetry of an irregular shape if you were to perform a translation followed by a reflection? Does the position change the symmetry? (3 marks)

6. Real-world Application: Identify an object in your classroom that exhibits symmetry. Justify why this symmetry might be important for its function. (2 marks)

Extension challenge: Design an original complex pattern that features exactly two lines of symmetry: one horizontal and one diagonal. Label the lines of symmetry clearly and write a brief explanation justifying why no other lines of symmetry can exist within your design.