

Symmetry and Geometric Patterns with Zara

Learning objective: To identify, describe, and draw lines of symmetry in 2D shapes, including complex polygons and irregular shapes, and to complete symmetrical figures across a mirror line.

Help Zara the zebra find the patterns in her artwork! Use your knowledge of reflection and symmetry to answer the following questions. Ensure your lines are precise and your reasoning is clear.

Zara the zebra is designing a new mosaic for the school garden. She uses various polygons to create her patterns and needs to ensure that everything is perfectly balanced. A shape has symmetry if it can be folded so that one half exactly matches the other. Some shapes have one line of symmetry, while others have multiple lines.

Word bank: Symmetry · Reflection · Line of symmetry · Polygon · Horizontal · Vertical · Diagonal · Congruent

1. Zara has drawn a regular pentagon. How many lines of symmetry does a regular pentagon have? Sketch the pentagon and mark all the lines of symmetry clearly. (2 marks)

2. Compare and contrast a parallelogram and a rhombus in terms of their lines of symmetry. Justify why one shape has symmetry and the other does not. (3 marks)

3. If a shape has a vertical line of symmetry, explain why the left side must be a mirror image of the right side. What might happen to the symmetry if you translated the shape by 5cm to the right? (3 marks)

4. A rectangle has two lines of symmetry. If you draw a diagonal line through a rectangle, is it a line of symmetry? Explain your reasoning using the properties of the shape's sides and angles. (3 marks)

5. Zara is designing a kite-shaped tile. It has one diagonal line of symmetry. If one side of the kite measures 8cm and the adjacent side measures 5cm, what are the lengths of the other two sides? Explain how you know. (2 marks)

Draw: Draw a complex composite shape made of at least three different polygons that possesses exactly one horizontal line of symmetry. Label the line of symmetry clearly.



Extension challenge: Design an original tessellating pattern for a floor tile that features at least two lines of symmetry. Write a brief paragraph justifying why your chosen pattern is aesthetically balanced using the mathematical vocabulary from the word bank.