Patterns of Light: Designing Rangoli

1. Symmetry means that one side of a design is a mirror image of the other. It is used to create balance, harmony, and visual appeal in the pattern. (2 marks)

Working: Definition of reflectional symmetry and the aesthetic purpose of balance.

1 mark for defining symmetry; 1 mark for explaining the purpose (balance/beauty).

2. A regular hexagon has 6 lines of symmetry (3 through opposite vertices, 3 through the midpoints of opposite sides). (2 marks)

Working: Visual identification of lines of symmetry on a 6-sided regular polygon.

1 mark for drawing a hexagon; 1 mark for correctly marking all 6 lines of symmetry.

3. £9.80 (2 marks)

Working: £2.45 x 4 = £9.80

1 mark for correct calculation; 1 mark for correct units (£).

4. If the pattern has rotational symmetry of order 4 or higher, it will look identical. If it has lower order symmetry, the orientation of the shapes will change, making the pattern look different. (2 marks)

Look for: Reference to rotational symmetry and the concept of order.

Good: The pattern will look different because it has turned around.

Better: If the pattern has rotational symmetry, it might look the same, but if it doesn't, the shapes will be in a new position.

Best: If the design has rotational symmetry of order 4, it will look identical after a 90-degree turn. Otherwise, the geometric shapes will appear in a new orientation.

What moves an answer up: Moving from a simple observation to explaining the mathematical condition (order of symmetry) required for the pattern to remain unchanged.

5. Student design should feature triangles and circles with a clear horizontal axis. Explanation should link the shapes to the desired balance. (3 marks)

Look for: Presence of triangles, circles, and a clear horizontal line of reflection.

Good: I drew circles and triangles in a line. It is symmetrical because the top matches the bottom.

Better: I used circles in the centre and triangles pointing outwards. I drew a horizontal line through the middle to show the reflection.

Best: My design uses a central circle with triangles mirrored across a horizontal axis. This creates a balanced, geometric pattern that feels welcoming for guests.

What moves an answer up: Moving from basic description to explaining the design intent and the relationship between the shapes and the reflection.

What a secure answer looks like

A secure answer demonstrates an understanding that symmetry is a mathematical property used to achieve aesthetic balance. Students should be able to apply this to both geometric shapes and financial calculations.

If your child is stuck

Ask the child to fold a piece of paper in half and draw half a shape against the fold; when they open it, they will see the reflection. For the maths, suggest they multiply the pounds and pence separately (£2 x 4 and 45p x 4).

Common mistakes to watch for

Confusing lines of symmetry with rotational symmetry, and forgetting to include the '£' sign or decimal point in money calculations.