

Max's Geometric Garden: A Symmetry Challenge

Learning objective: To identify, describe, and represent the position of shapes reflecting in a line of symmetry, including those with more than one line of symmetry.

Max the monkey has been busy designing a perfectly symmetrical flowerbed. However, some of his garden tiles have been misplaced! Study the grid provided. Each shape on the left side of the vertical line of symmetry must have a matching 'reflection' on the right side. Complete the grid by drawing the missing tiles to ensure absolute symmetry. Then, answer the questions below to demonstrate your understanding of geometric properties.

Word bank: Reflection · Symmetrical · Axis · Vertex · Horizontal · Vertical · Congruent · Polygon

1. If a square tile is placed 2 squares to the left of the vertical axis, at what coordinate position must its symmetrical reflection be placed on the right? Justify your answer. (2 marks)

2. Explain why a regular pentagon has five lines of symmetry, whereas an irregular pentagon might have none. You may use a diagram to support your explanation. (3 marks)

3. Max decides to add a triangular tile. If he places it so that the line of symmetry passes directly through the centre of the triangle, what must be true about that triangle's side lengths? (2 marks)

4. Compare and contrast the properties of a rectangle and a parallelogram regarding their lines of symmetry. Why does a rectangle possess two, while a standard parallelogram possesses none? (3 marks)

5. What might happen to the overall symmetry of Max's garden if he decides to rotate one of the tiles by 90 degrees? Explain the effect on the reflected image. (2 marks)

6. If a shape has a vertical line of symmetry and a horizontal line of symmetry, must it also have rotational symmetry? Justify your reasoning. (2 marks)

Draw: Draw a 10x10 grid. Place a vertical line of symmetry down the centre. On the left side, draw a composite shape made of a triangle, a square, and a hexagon. Task the student to draw the exact reflection on the right side of the axis.



Extension challenge: Design your own 'Symmetrical Masterpiece' on squared paper. Your design must include at least three different types of polygons and possess at least two lines of symmetry (one vertical and one horizontal). Write a short paragraph explaining the mathematical steps you took to ensure every vertex of your design is perfectly reflected.