

Max's Geometric Garden Design Challenge

Learning objective: To identify, describe, and classify 2D shapes, including regular and irregular polygons, based on reasoning about equal sides and angles.

Max the monkey is designing a symmetrical garden. He has laid out various 2D shapes to create flower beds. Your task is to examine his designs, sort the polygons based on their properties, and justify why certain shapes belong in specific categories. Use the mathematical vocabulary provided to explain your reasoning.

Word bank: Polygon · Regular · Irregular · Symmetry · Parallel · Perpendicular · Vertex · Interior angles

1. Max has a flower bed shaped as a regular pentagon and one as an irregular pentagon. Explain the difference between these two shapes in terms of their side lengths and interior angles. (2 marks)

2. Max says, 'All squares are rectangles, but not all rectangles are squares.' Justify this statement using your knowledge of geometric properties. (2 marks)

3. Look at a rhombus and a parallelogram. Compare and contrast these two quadrilaterals. What properties do they share, and what makes them different? (3 marks)

4. If Max creates a shape with six equal sides but unequal interior angles, is it a regular hexagon? Explain your reasoning. (2 marks)

5. What might happen to the internal angles of a square if you were to 'push' the corners to transform it into a rhombus? Would the sum of the angles change? Why or why not? (3 marks)

6. Max wants to build a path that is a composite shape made of a rectangle and a triangle. If the rectangle is 4m by 3m and the triangle has a base of 4m and a height of 2m, sketch the design and label the vertices. (2 marks)

Draw: Draw a complex garden design for Max that includes at least one regular polygon, one irregular polygon, and one set of parallel lines. Annotate your drawing to show where the lines of symmetry are located.



Extension challenge: Design a tessellating pattern for a patio using only irregular quadrilaterals. Write a short paragraph explaining why your chosen shape is capable of tessellating without leaving any gaps or overlaps.