

Max's Geometric Architect Log

Learning objective: To identify, describe, and classify 2D and 3D shapes, including regular and irregular polygons, and to understand properties such as parallel and perpendicular sides.

Max the monkey is designing a new treetop adventure park and needs your help to classify the shapes he has used. Choose three different shapes you might find in his park—one 2D shape, one 3D shape, and one irregular polygon. Use your mathematical vocabulary to describe their properties and justify why they are suitable for his construction.

Word bank: polygon · parallel · perpendicular · vertices · faces · edges · symmetrical · quadrilateral · prism · acute · obtuse

1. Shape 1 (2D): Identify a 2D shape from the park. List its properties, including the number of sides, vertices, and any parallel or perpendicular lines. Explain why this shape is useful for building a stable platform. (3 marks)

2. Shape 2 (3D): Choose a 3D shape used for the park's supports. Describe the number of faces, edges, and vertices. Compare and contrast this shape with a cube; what makes it unique? (3 marks)

3. Shape 3 (Irregular Polygon): Draw and label an irregular polygon. Explain why this shape is classified as 'irregular' and describe the angles within it (e.g., are they acute or obtuse?). (3 marks)

4. Justify your answer: If Max wanted to build a bridge using only shapes with at least one pair of parallel sides, which shapes would be the most efficient to use? Explain your reasoning. (2 marks)

5. What might happen if Max designed the park using only shapes with no vertices? Discuss the structural challenges this would create for his treetop platforms. (2 marks)

6. Design Challenge: Max wants to create a tessellating pattern for the floor of his treehouse. Which shape would you choose to ensure there are no gaps? Justify your choice using your knowledge of internal angles. (2 marks)

Extension challenge: Max has a budget of £500 to buy materials. If a wooden square panel costs £12.50 and a triangular support beam costs £8.75, calculate the maximum number of squares he can buy if he must also purchase exactly 10 support beams. Show your calculation steps.