

Max's Geometry Challenge: Shapes and Symmetry

Learning objective: To identify, describe, and compare 2D and 3D shapes, understand symmetry, and calculate properties of angles.

Read each question carefully. Show your working out for any calculations. Use a ruler where necessary. Good luck!

Max the monkey is organising his jungle workshop. He has found various 3D shapes and 2D patterns scattered around. He needs your help to classify them correctly and solve the mathematical puzzles hidden within his collection.

Word bank: acute · obtuse · vertex · parallel · perpendicular · symmetrical · quadrilateral · polygon

1. Max has a shape with four equal sides and four right angles. Identify the name of this shape and explain why it is also classified as a parallelogram. (2 marks)

2. Compare an acute angle and an obtuse angle. How can you tell the difference between them without using a protractor? (2 marks)

3. Max finds a 3D object with 6 square faces, 8 vertices, and 12 edges. Name the shape and describe one real-world item that matches this geometry. (2 marks)

4. Look at a regular hexagon. How many lines of symmetry does it have? Draw a diagram or explain your reasoning clearly. (3 marks)

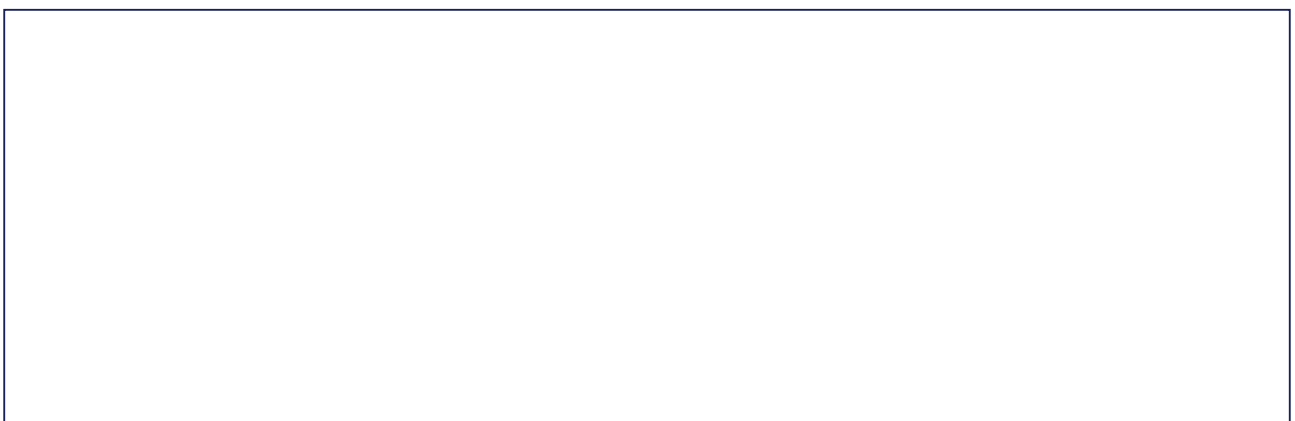
5. If a triangle has one angle of 40 degrees and one of 50 degrees, what is the size of the third angle? Justify your answer using your knowledge of triangle properties. (3 marks)

6. Max is building a display. He buys 3 wooden cubes for £4.50 each and 2 triangular prisms for £3.20 each. Calculate the total cost and explain the shape properties of the prisms (number of faces, edges, and vertices). (4 marks)

7. Extended Response: Imagine a world where shapes could change their properties. If you were to create a new, original 2D polygon, how many sides would it have? Describe its properties, including whether it has parallel lines or lines of symmetry, and name it. (5 marks)

8. What might happen to the internal angles of a shape if you were to increase the number of sides indefinitely? Explain your hypothesis. (4 marks)

Draw: In the space below, draw a composite shape made of a rectangle and a right-angled triangle. Label all parallel and perpendicular lines using appropriate symbols.



Extension challenge: Total: /25. Challenge: Research the difference between 'regular' and 'irregular' polygons. Write a short paragraph explaining why a square is always a regular polygon but a rectangle is not.