Max’s Geometric Garden Adventure

Learning objective: To identify, describe, and represent the position of a shape following a reflection or translation, and to calculate missing angles and side lengths in 2D shapes.

Help Max the monkey solve these shape puzzles by using your knowledge of coordinates, symmetry, and geometric properties. Read each question carefully and show your working out.

Max is designing a symmetrical garden layout for his animal friends. He has plotted the flowerbeds on a four-quadrant grid. He needs to move a triangular rose patch from one side of the garden to the other using translation, and he needs to ensure the hexagonal pond has all its interior angles measured correctly. Max knows that for a regular hexagon, the sum of the interior angles is 720 degrees. He also needs to make sure his square herb garden is perfectly reflected across the y-axis so it matches the vegetable patch on the opposite side.

Word bank: reflection · translation · quadrant · vertex · isosceles · parallel · congruent

1. Max translates a square herb patch 4 units to the right and 3 units down. If the original bottom-left vertex was at (-2, 1), what are the coordinates of the new bottom-left vertex? (2 marks)

2. A regular hexagon has six equal interior angles. Calculate the size of one interior angle of a regular hexagon. (2 marks)

3. If a triangle has angles of 45 degrees and 45 degrees, what is the size of the third angle? What type of triangle is this? (2 marks)

4. Max reflects a shape across the y-axis. If a point on the original shape is at (3, 5), where will that point be located after the reflection? (1 mark)

5. Explain why a square is a special type of parallelogram. Use the word 'parallel' in your answer. (2 marks)

Draw: Draw a set of axes on your paper. Plot a triangle with vertices at (1, 1), (3, 1), and (2, 4). Then, draw the reflection of this triangle across the y-axis.

Extension challenge: Challenge: If Max wants to create a composite shape using two identical isosceles triangles joined at their bases, what 2D shape will he form, and what would be the sum of all its interior angles?