Max’s Geometry Garden: Mastering Transformations

Learning objective: To be able to translate, reflect, and rotate 2D shapes on a four-quadrant coordinate grid.

Read each challenge carefully. Use a pencil and ruler to plot your transformations accurately on the coordinate grid provided in your workbook. Remember to label your final shapes with the correct prime notation (e.g., A').

Max the monkey is helping his friends design a geometric garden. He uses coordinate grids to plan where to place the flowerbeds, the pond, and the benches. To make sure everything fits perfectly, he uses translations, reflections, and rotations.

Word bank: Translation · Reflection · Rotation · Coordinate · Vertex · Axis · Clockwise · Anticlockwise · Quadrant

1. A triangular flowerbed has vertices at (1, 2), (3, 2), and (2, 5). Max translates the shape 4 units to the left and 3 units down. Write the new coordinates of the vertices. (2 marks)

2. The pond is a square with vertices at (-4, 1), (-2, 1), (-4, 3), and (-2, 3). Reflect this shape across the y-axis. What are the new coordinates of the square? (2 marks)

3. A garden bench is represented by a line segment between (1, 1) and (1, 4). Rotate this segment 90 degrees clockwise about the origin (0,0). Where is the new position of the bench? (2 marks)

4. Explain the difference between a translation and a rotation. Use a diagram or a sentence to describe how the orientation of the shape changes in each. (2 marks)

5. Max places a fountain at (2, 2). If he rotates the fountain 180 degrees about the origin, what will its new coordinate position be? (1 mark)

Draw: Draw a 5x5 coordinate grid. Plot a rectangle with vertices at (1, 1), (3, 1), (3, 2), and (1, 2). Perform a reflection across the x-axis and draw the resulting shape in a different color.

Extension challenge: Challenge: If you reflect a shape across the x-axis and then reflect that result across the y-axis, is it the same as rotating the original shape 180 degrees about the origin? Prove your answer using the coordinates (2, 3), (4, 3), and (3, 5).