Max’s Geometry Garden: Mastering Transformations

Learning objective: To describe and draw translations and reflections of 2D shapes on a coordinate grid.

Help Max the monkey organize his geometric garden. Read the passage carefully, then use your knowledge of coordinates, axes, and transformations to solve the puzzles below.

Max is designing a symmetrical vegetable patch in his garden. He uses a coordinate grid to plan where each plant goes. Max starts by placing a triangular carrot bed with vertices at (1, 2), (3, 2), and (2, 5). To make space for his watering equipment, he decides to translate the carrot bed 4 units to the right and 3 units up. Once he has moved his carrots, Max wants to add a mirror-image beetroot patch. He decides to reflect his original carrot bed across the y-axis to create a perfectly balanced design for his garden paths.

Word bank: Translation · Reflection · Coordinate · X-axis · Y-axis · Vertex · Quadrant · Horizontal · Vertical

1. Using Max's original carrot bed vertices (1, 2), (3, 2), and (2, 5), write the new coordinates after a translation of 4 units right and 3 units up. (2 marks)

2. If Max reflects the original carrot bed (vertices at (1, 2), (3, 2), and (2, 5)) across the y-axis, what will the new coordinates of the vertices be? (2 marks)

3. Explain the difference between a translation and a reflection in your own words. (2 marks)

4. Max decides to buy new fencing for his garden. He needs 12 metres of fencing at £4.50 per meter. How much will he spend in total? (2 marks)

5. If Max moves a shape 2 units left and 5 units down, describe how the x and y coordinates change mathematically. (2 marks)

Draw: Draw a 10x10 coordinate grid. Plot Max's original triangle with vertices (1, 2), (3, 2), and (2, 5) in blue. Then, draw the translated triangle in green and the reflected triangle in red.

Extension challenge: Imagine Max rotates his triangle 90 degrees clockwise around the origin (0,0). Can you predict where the new vertices would be located on the grid?