

Max's Geometric Garden Design

Learning objective: To identify, describe, and represent the position of a shape following a reflection or translation, and to calculate the area and perimeter of composite rectilinear shapes.

Use your knowledge of coordinates and geometric properties to help Max solve his garden design puzzles. Ensure you use a ruler for all drawings and show your working for all calculations.

Max the monkey is designing a new playground for his friends. He needs to calculate the space for new equipment and ensure all shapes are perfectly positioned on his coordinate grid.

Word bank: reflection · translation · coordinate · rectilinear · perimeter · area · vertex · quadrant

1. Max has a rectangular flower bed with a length of 8m and a width of 4m. He decides to add a smaller square patch of 2m by 2m to the corner. Calculate the total perimeter of this new composite rectilinear shape. Explain your method. (3 marks)

2. A triangular climbing frame has vertices at (2, 2), (6, 2), and (4, 5). If Max translates this shape 3 units to the left and 2 units down, what will the new coordinates of the vertices be? (3 marks)

3. Compare and contrast the properties of a square and a rhombus. Why are both shapes considered quadrilaterals, yet they differ in their internal angles? (2 marks)

4. Max wants to build a path that costs £12.50 per square metre. If his path is a rectangle measuring 6m by 3m, what is the total cost of the path? Show your calculation. (2 marks)

5. Justify your answer: If you reflect a shape across a vertical line on a coordinate grid, which coordinate (x or y) stays the same, and which coordinate changes? Explain why this happens. (3 marks)

Draw: On a piece of squared paper, draw a 10x10 coordinate grid. Plot a right-angled triangle with vertices at (1, 1), (1, 4), and (5, 1). Reflect this shape across the line $x = 6$.



Extension challenge: Imagine Max wants to create a new play area shaped like an 'L'. Design an 'L' shaped polygon on a coordinate grid where the total area is 24cm^2 . Label the coordinates of every vertex. What might happen to the perimeter if you rearranged the same total area into a long, thin rectangle instead? Justify your prediction using mathematical reasoning.