

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.

Help Max the monkey design his new garden! Use your knowledge of coordinates, symmetry, and measurement to solve the challenges below. Show all your working out clearly.

Max is planning a garden for his friends. He has marked out a rectangular patch that is 8 metres long and 5 metres wide. Within this, he wants to place a smaller square pond with side lengths of 2 metres. Max also wants to add a L-shaped flowerbed made of two rectangles: one measuring 3m by 2m, and the other measuring 2m by 2m joined to its side. Max needs to ensure his garden layout is precise before he starts planting.

Word bank: Translation · Reflection · Vertex · Composite · Rectilinear · Coordinates · Perimeter · Area · Symmetry

1. Calculate the total perimeter of the L-shaped flowerbed. Explain your method for ensuring you have accounted for all sides. (2 marks)

2. If Max reflects the square pond across a vertical line of symmetry located at $x = 6$, what would the new coordinates of the vertices be if the original pond occupied (4,1) to (6,3)? (2 marks)

3. Max translates the pond 3 units to the right and 2 units up. What is the new coordinate of the bottom-left vertex? Justify your answer. (2 marks)

4. Compare and contrast the area of the rectangular garden patch with the combined area of the pond and the L-shaped flowerbed. How much space remains for grass? (3 marks)

5. What might happen to the perimeter of the L-shaped flowerbed if Max decided to increase the area of the smaller section by 1 square metre? Explain why the perimeter does not necessarily increase by the same amount as the area. (3 marks)

Draw: On a piece of centimetre squared paper, draw Max's garden layout. Use a scale of 1cm = 1m. Label the pond, the L-shaped flowerbed, and the remaining grass area.



Extension challenge: Design a new, more complex composite shape for a vegetable patch that has an area of exactly 15 square metres. Write a set of instructions for a friend explaining how to translate your shape across a coordinate grid without changing its orientation.