

## Max's Geometric Garden: A Symmetry Challenge

*Learning objective: To identify, describe, and represent the position of a shape following a reflection or translation, and to identify lines of symmetry in 2D shapes.*

Read the story below and help Max the monkey solve his garden planning puzzles. Use your knowledge of lines of symmetry and coordinates to answer the questions.

Max is planning a new vegetable patch in his garden. He wants his garden to look balanced and tidy. Max has designed a rectangular patch that is 8 metres long and 4 metres wide. He has placed a row of carrots along the line of symmetry that runs vertically through the centre of the patch. Max also has a triangular shed that he wants to reflect across the horizontal axis on his grid map. He knows that if he reflects a shape, the distance from each vertex to the mirror line must stay exactly the same.

*Word bank: Symmetry · Reflection · Translation · Vertex · Horizontal · Vertical · Coordinates · Axis*

**1. Max's rectangular garden is 8m by 4m. How many lines of symmetry does a rectangle have, and where are they located? (2 marks)**

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**2. If Max reflects a point at coordinates (2, 3) across the horizontal x-axis, what will the new coordinates of the point be? (2 marks)**

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**3. Max decides to translate his square-shaped compost bin 3 units to the right and 2 units down. If the original bottom-left corner was at (1, 1), what are the new coordinates of that corner? (2 marks)**

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**4. Why is it important for the distance of a vertex to remain the same when reflecting a shape across an axis? (2 marks)**

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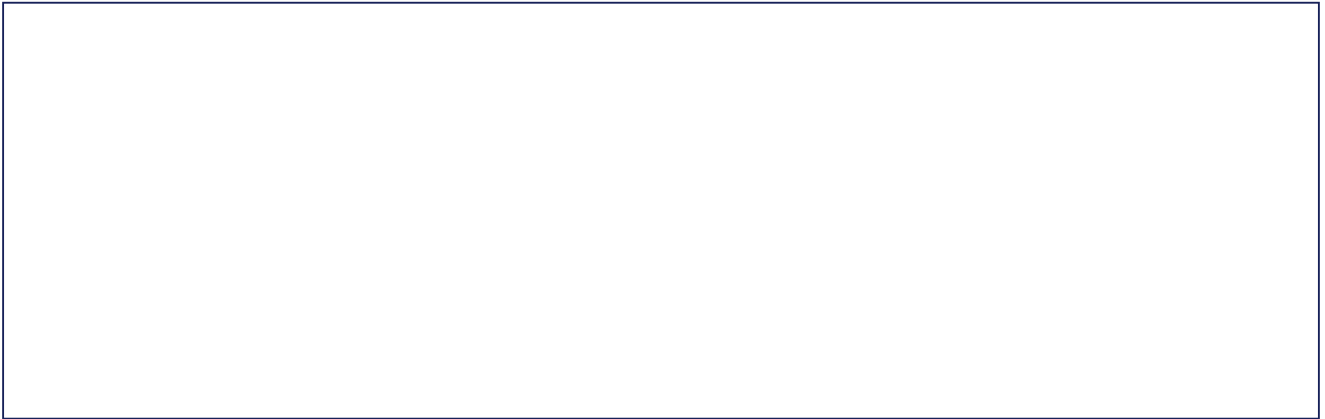
**5. Max buys a hexagonal bird bath. Does a regular hexagon have more or fewer lines of symmetry than a square? Explain your reasoning. (2 marks)**

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**Draw:** Draw a 10x10 grid. Plot a right-angled triangle with vertices at (2, 2), (2, 5), and (6, 2). Draw the reflection of this triangle across the vertical line  $x = 7$ .



*Extension challenge: Max wants to buy decorative tiles for his garden path. Each tile costs £2.50. He needs to cover a space that is 4 metres by 6 metres. If each tile is 1 square metre, how much will it cost Max to pave his path? Reflect on whether this path could have a line of symmetry.*