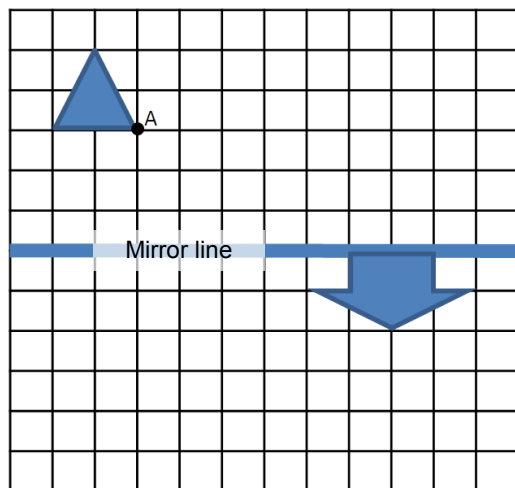


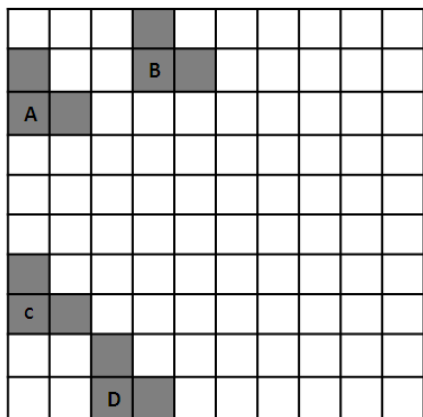
## Topic Check In - 9.01 Plane isometric transformations

Use the grid below to answer questions 1-3:

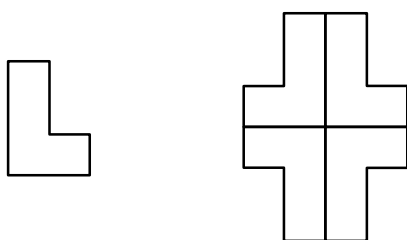


1. Reflect the triangle in the mirror line.
2. Reflect the arrow in the mirror line.
3. Rotate the original triangle  $90^\circ$  clockwise about point A.

Use the diagram below to answer questions 4-8:



4. Describe the translation of shape **A** to shape **B** as a column vector.
  5. Translate shape **A** by  $\begin{pmatrix} 2 \\ -1 \end{pmatrix}$ . Label it **E**.
  6. Kirsty says you can get from shape **A** to shape **C** by using a translation. Explain why Kirsty is correct.
  7. Liam says you can get from shape **C** to shape **D** by using a rotation of  $180^\circ$ . Explain why Liam is NOT correct.
  8. Mia says you can get from shape **C** to shape **D** by using a reflection. Explain why Mia is correct.
9. Neil starts with this shape. Write a list of instructions using only transformations to create the pattern.

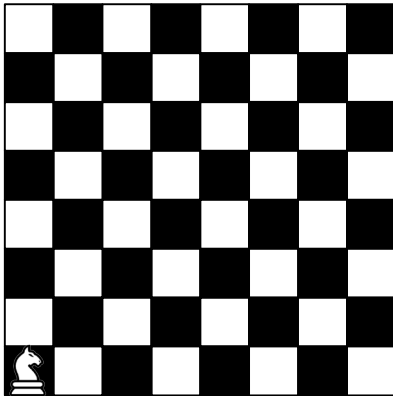


# GCSE (9-1) MATHEMATICS

10. A knight on a chessboard can move either 2 squares vertically and one square horizontally, or 1 square horizontally and 2 squares vertically. Write down all the possible moves a knight can make as column vectors.

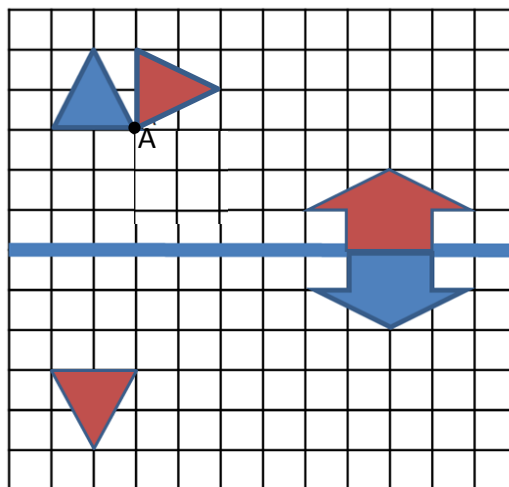
## Extension

A knight starts in the bottom left corner of the chessboard. What is the minimum number of completed moves it would have to make in order to have visited every square (a square is visited if the knight ends a complete move on that square)?



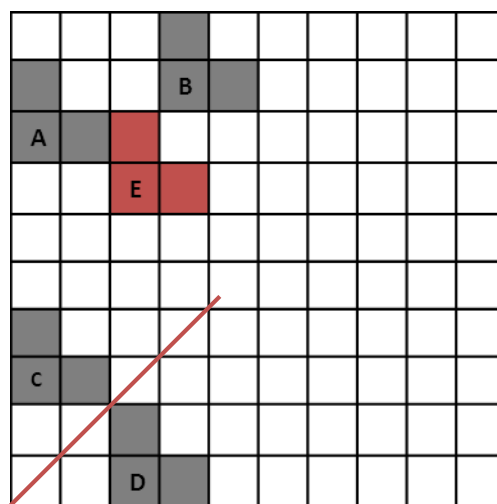
## Answers

1. Inverted triangle shown on diagram.
2. Inverted arrow shown on diagram.
3. Rotated triangle shown on diagram.



4.  $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$

5. See diagram.
6. Both shape **A** and shape **C** are the same size and orientation so a translation is possible.
7. Both shapes are the same orientation and have rotational symmetry of order 1, so a rotation cannot have happened.
8. Possible to draw a diagonal mirror line between shape **C** and shape **D** starting in bottom left hand corner (see diagram).



9. Students may annotate the diagram to add axis or a grid. Assuming a set of axis with the bottom left vertex of the shape at the origin, reflect the shape in the y axis, followed by a reflection of both shapes in the x axis oe.
10.  $\begin{pmatrix} 1 \\ 2 \end{pmatrix}, \begin{pmatrix} 1 \\ -2 \end{pmatrix}, \begin{pmatrix} -1 \\ 2 \end{pmatrix}, \begin{pmatrix} -1 \\ -2 \end{pmatrix}, \begin{pmatrix} 2 \\ 1 \end{pmatrix}, \begin{pmatrix} 2 \\ -1 \end{pmatrix}, \begin{pmatrix} -2 \\ 1 \end{pmatrix}, \begin{pmatrix} -2 \\ -1 \end{pmatrix}$

## Extension

Minimum is 63 moves if each square is only visited once.



# GCSE (9-1) MATHEMATICS



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| Assessment Objective | Qu. | Topic  | R | A | G |
|----------------------|-----|--|---|---|---|
| AO1                  | 1   | Reflect a shape in a mirror line.                      |   |   |   |
| AO1                  | 2   | Reflect a shape in a mirror line.                      |   |   |   |
| AO1                  | 3   | Rotate a shape 90°.                                    |   |   |   |
| AO1                  | 4   | Use a column vector to describe a translation.         |   |   |   |
| AO1                  | 5   | Use a column vector to perform a translation.          |   |   |   |
| AO2                  | 6   | Explain use of a translation.                          |   |   |   |
| AO2                  | 7   | Explain use of a rotation.                             |   |   |   |
| AO2                  | 8   | Explain use of a reflection.                           |   |   |   |
| AO3                  | 9   | Apply knowledge of reflection to make a shape.         |   |   |   |
| AO3                  | 10  | Apply knowledge of translation to make a tessellation. |   |   |   |

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| AO3                  | 10  | Apply knowledge of translation to make a tessellation. |   |   |   |

