Name: SOLUTIONS

GCSE (1 - 9) Invariant Points	Solutions by Kenneth Stafford MATHS TUTOR ken@kennethstafford.co.uk

These questions are compiled from released Pearson Edexcel GCSE maths exam papers

They contain exam questions from up until the ***November 2023*** exam series

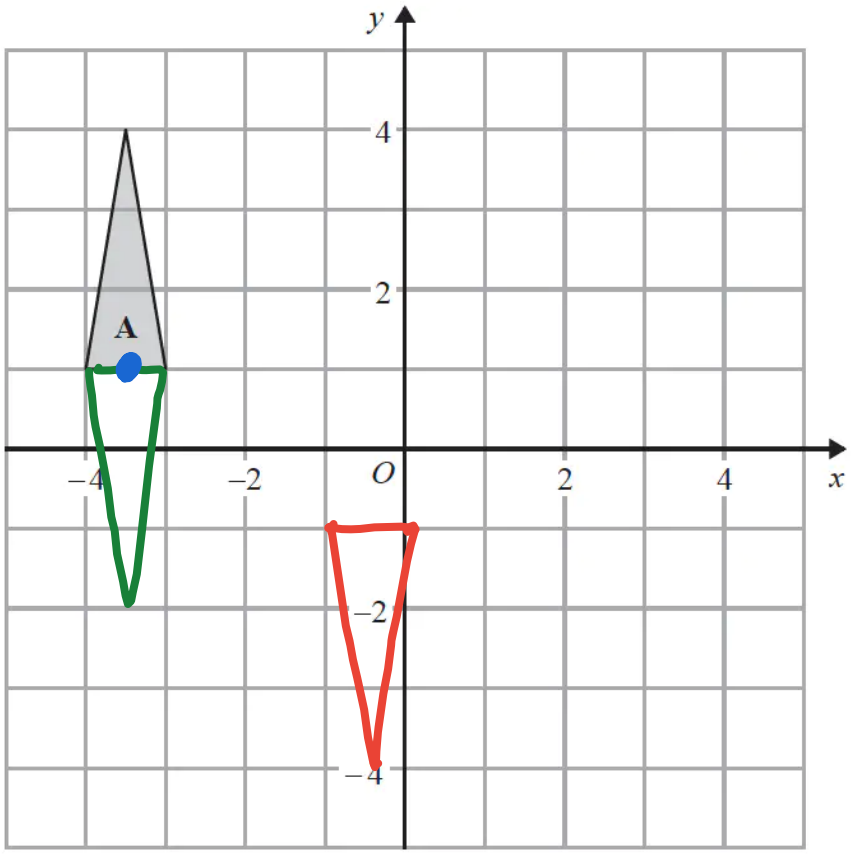
More recent exam papers do exist but are withheld for mock exams

As new exam papers are released these worksheets will gradually be updated

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1



Triangle **A** is transformed by the combined transformation of a rotation of 180° about the point (−2, 0) followed by a translation with vector $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$

One point on triangle **A** is invariant under the combined transformation.

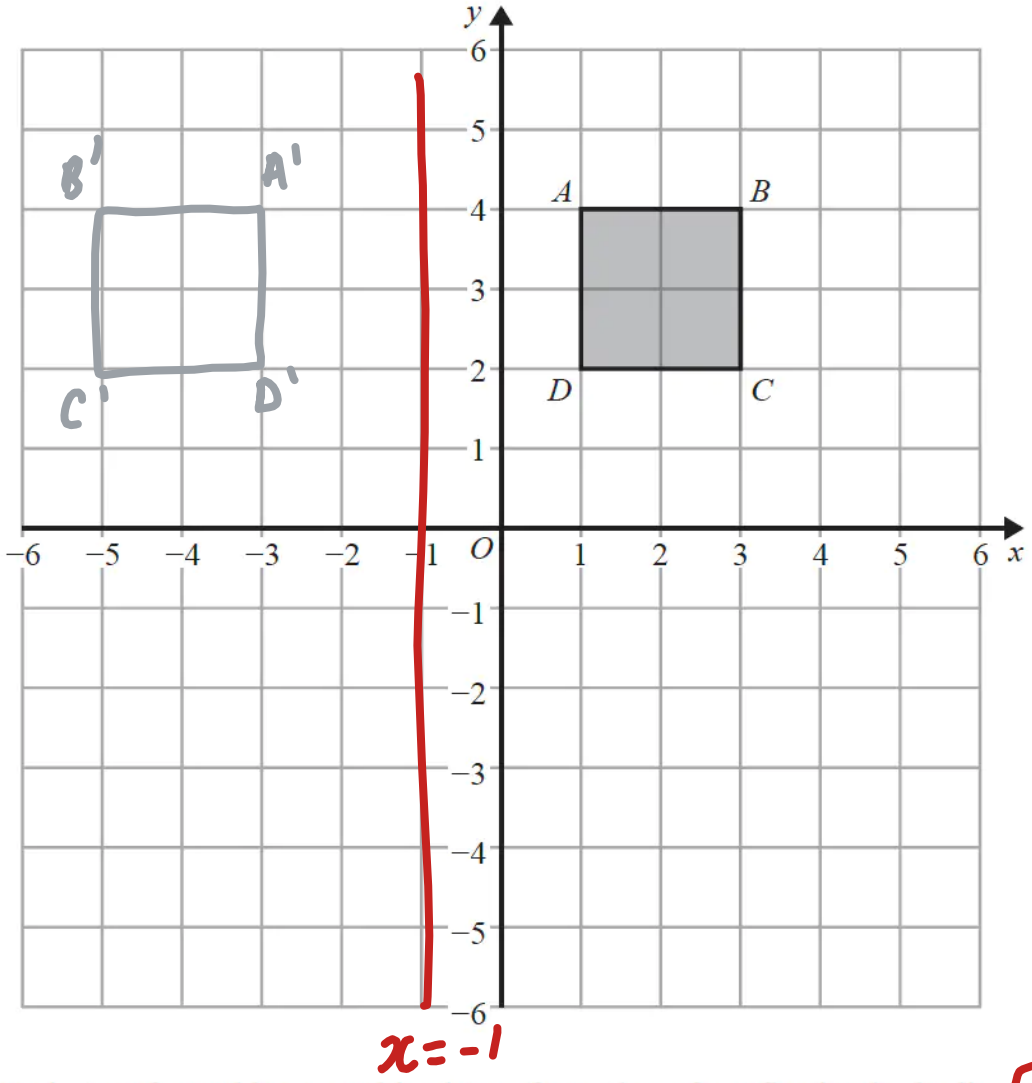
Find the coordinates of this point.

(-3.5 , 1)

(Total for Question 20 is 2 marks)

[Edexcel, GCSE, Autumn 2018, Paper 3H, Q20]

2



Square $ABCD$ is transformed by a combined transformation of a reflection in the line $x = -1$ followed by a rotation.

Under the combined transformation, two vertices of the square $ABCD$ are invariant.

Describe fully one possible rotation.

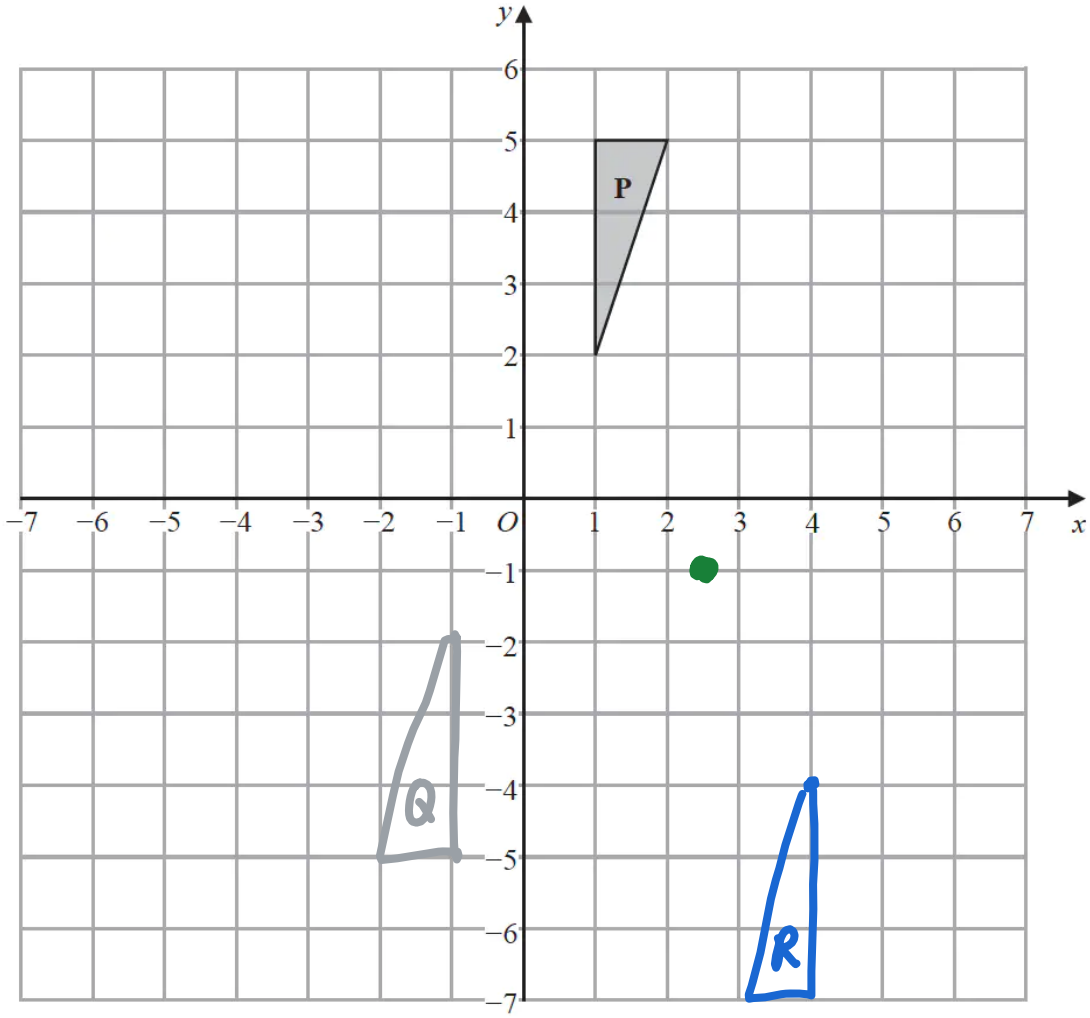
(rotation) 90° clockwise about (–1, 0)
or (rotation) 90° anticlockwise about (–1, 6)
or (rotation) 180° about (–1, 2)
or (rotation) 180° about (–1, 4)

(Total for Question 24 is 2 marks)

[Edexcel, GCSE, Autumn 2019, Paper 2H, Q24]

3

The diagram shows a triangle **P** on a grid.



Triangle **P** is rotated 180° about (0, 0) to give triangle **Q**.

Triangle **Q** is translated by $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$ to give triangle **R**.

(a) Describe fully the single transformation that maps triangle **P** onto triangle **R**.

rotation of 180° about (2.5, −1)
or enlargement by scale factor −1, centre (2.5, −1)

(3)

Under the transformation that maps triangle **P** onto triangle **R**, the point A is invariant.

(b) Write down the coordinates of point A.

(2.5, −1) ft from rotation or enlargement in (a)

(2.5 , −1)

(1)

(Total for Question 11 is 4 marks)

[Edexcel, GCSE, Autumn 2020, Paper 3H, Q11]