Name	Class

MATHS TEACHER HUB

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Transformations

(9 – 1) Topic booklet

Higher

These questions have been collated from previous years GCSE Mathematics papers.

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.	Total Marks

Instructions

•Use **black** ink or ball-point pen.
•**Fill in the boxes** at the top of this page with your name, centre number and candidate number.
•Answer **all** questions.
•Answer the questions in the spaces provided
– *there may be more space than you need*.
•Diagrams are NOT accurately drawn, unless otherwise indicated.
•You must **show all your working out.**
•If the question is a **1H** question you are not allowed to use a calculator.
•If the question is a **2H** or a **3H** question, you may use a calculator to help you answer.

Information

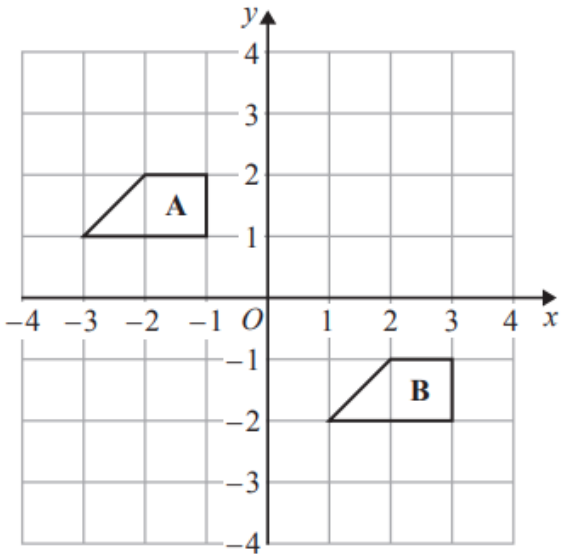
•The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question*.

Advice

•Read each question carefully before you start to answer it.
•Keep an eye on the time.
•Try to answer every question.
•Check your answers if you have time at the end.

Answer ALL questions
Write your answers in the space provided.
You must write down all the stages in your working.

1



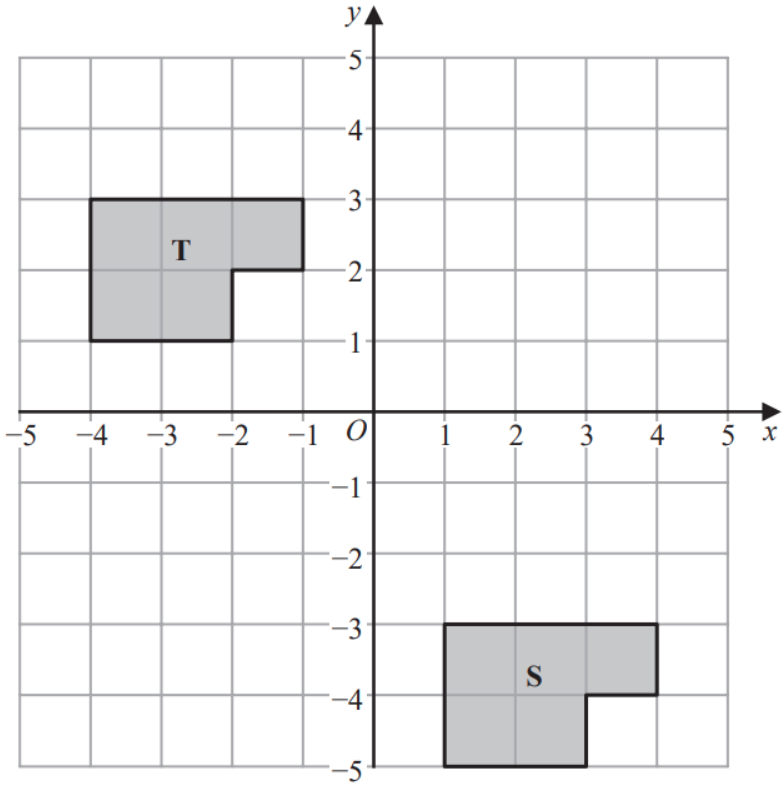
Describe the single transformation that maps shape **A** onto shape **B**.

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.....

(Total for Question 1 is 2 marks)

2



Describe fully the single transformation that maps shape **S** onto shape **T**.

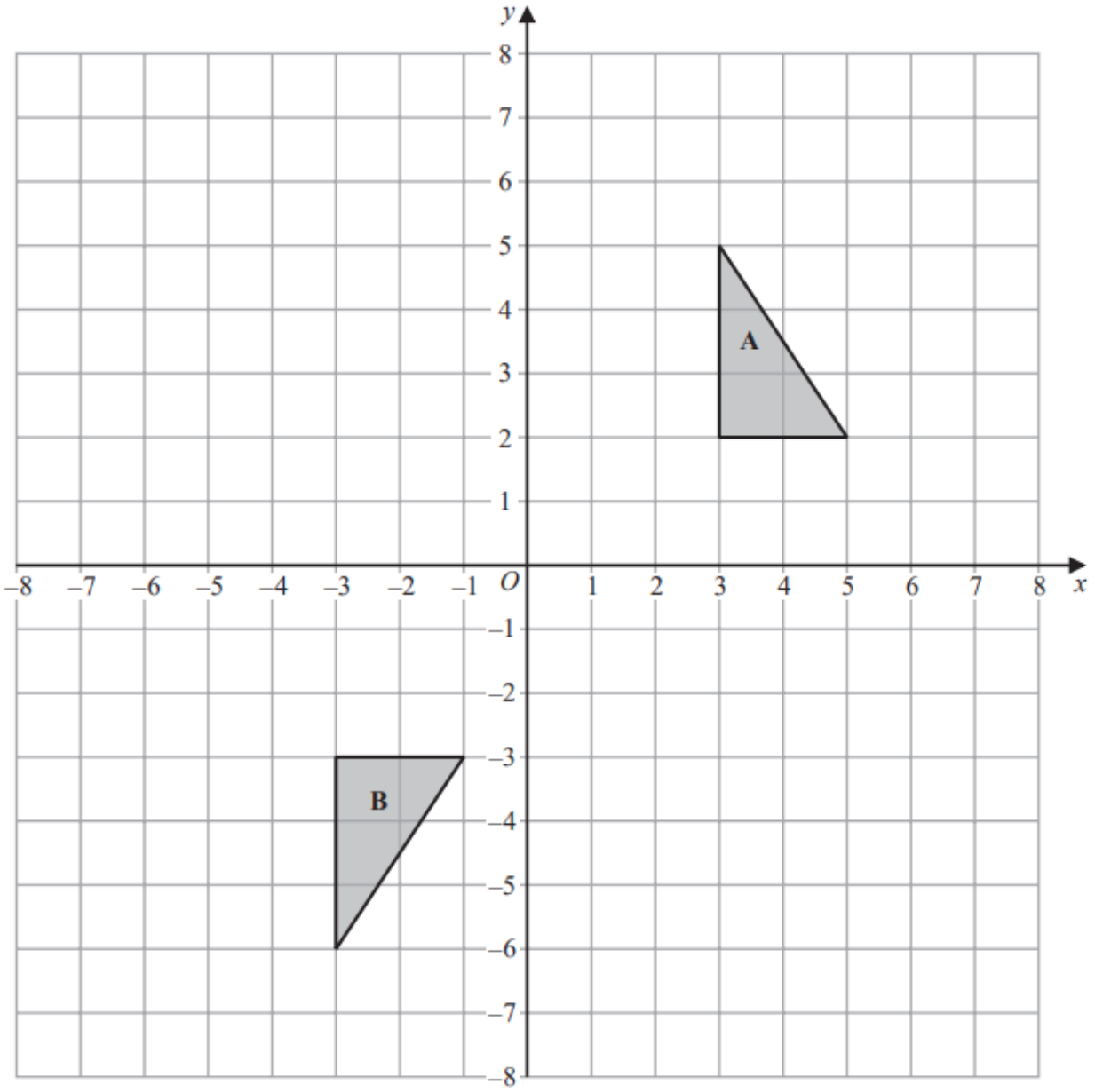
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June 2022 – Paper 2H **(Total for Question 2 is 2 marks)**

5



Shape **A** can be transformed to shape **B** by a reflection in the x-axis followed by a translation $\begin{pmatrix} c \\ d \end{pmatrix}$

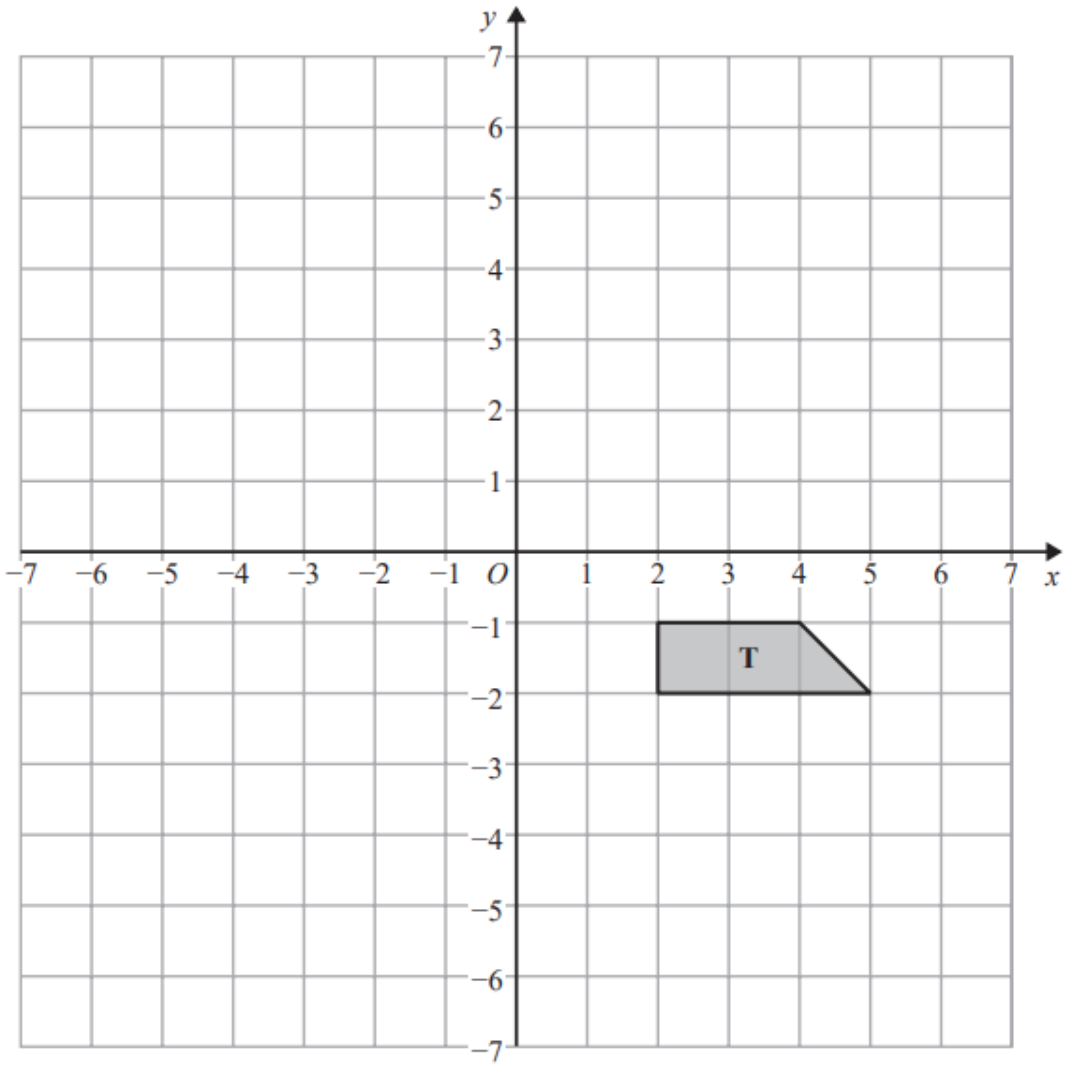
Find the value of c and the value of d.

$c =$ .....

$d =$ .....

(Total for Question 5 is 3 marks)

5



(a) Rotate trapezium **T** 180° about the origin.
Label the new trapezium **A**.

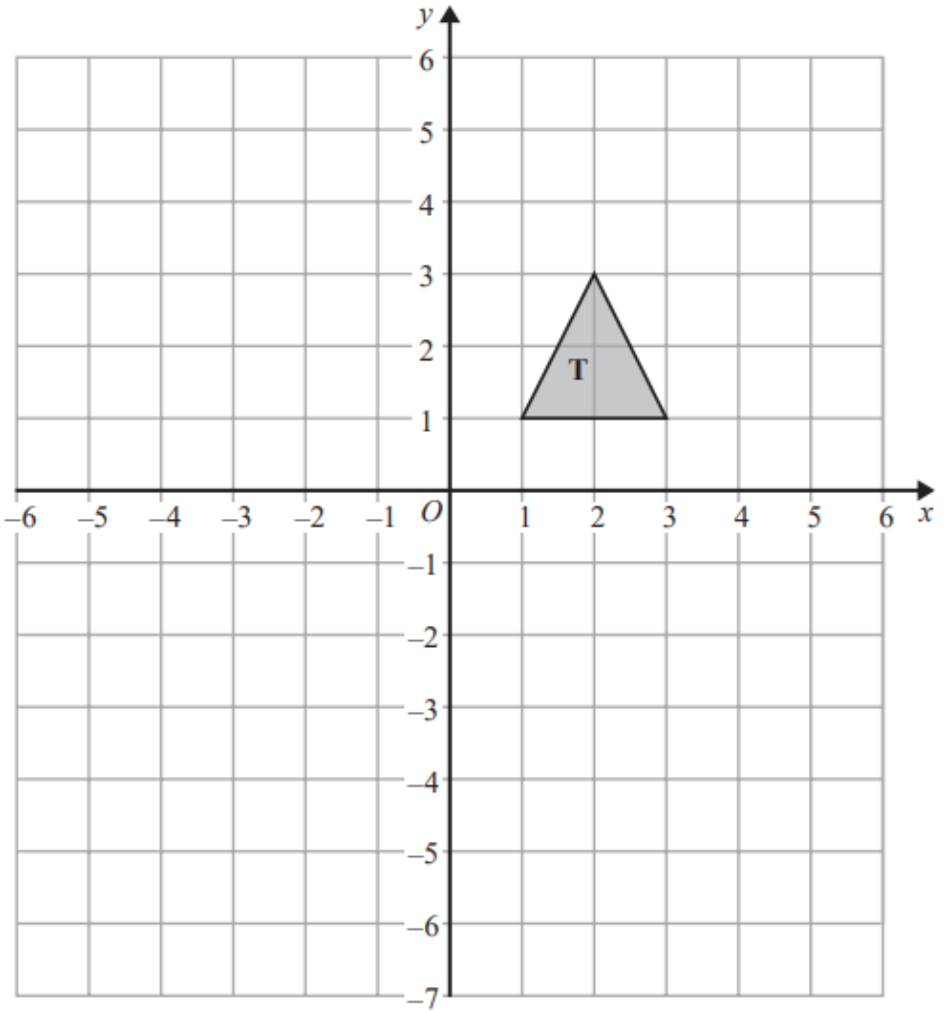
(1)

(b) Translate trapezium **T** by the vector $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$
Label the new trapezium **B**.

(1)

November 2017 – Paper 2H **(Total for Question 5 is 2 marks)**

7



Shape **T** is reflected in the line $x = -1$ to give shape **R**.
Shape **R** is reflected in the line $y = -2$ to give shape **S**.

Describe the **single** transformation that will map shape **T** to shape **S**.

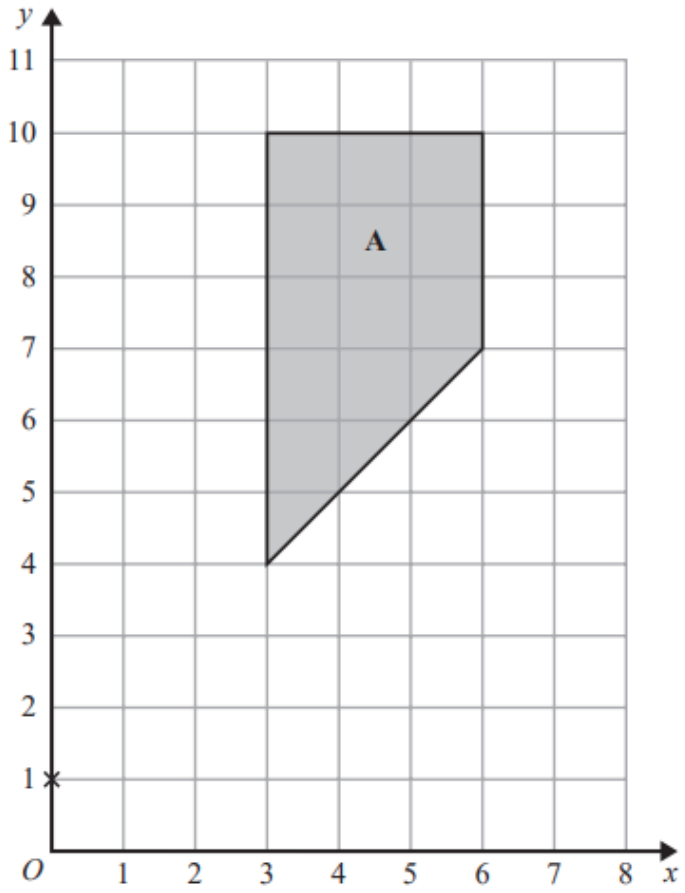
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(Total for Question 7 is 2 marks)

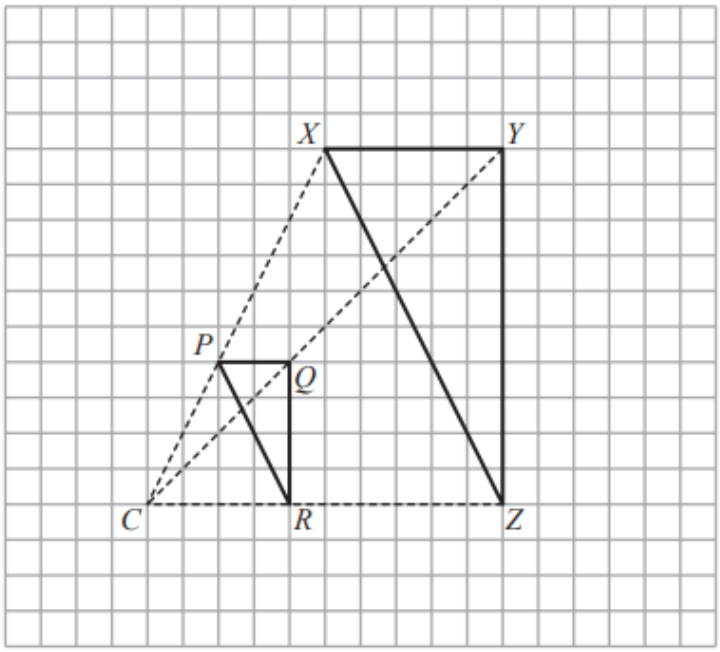
7



Enlarge shape **A** by scale factor $\frac{1}{3}$ centre (0, 1)

June 2018 – Paper 2H **(Total for Question 7 is 2 marks)**

8



Roy is going to enlarge triangle PQR with centre C and scale factor $1\frac{1}{2}$

He draws triangle XYZ.

Explain why Roy's diagram is **not** correct.

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.....

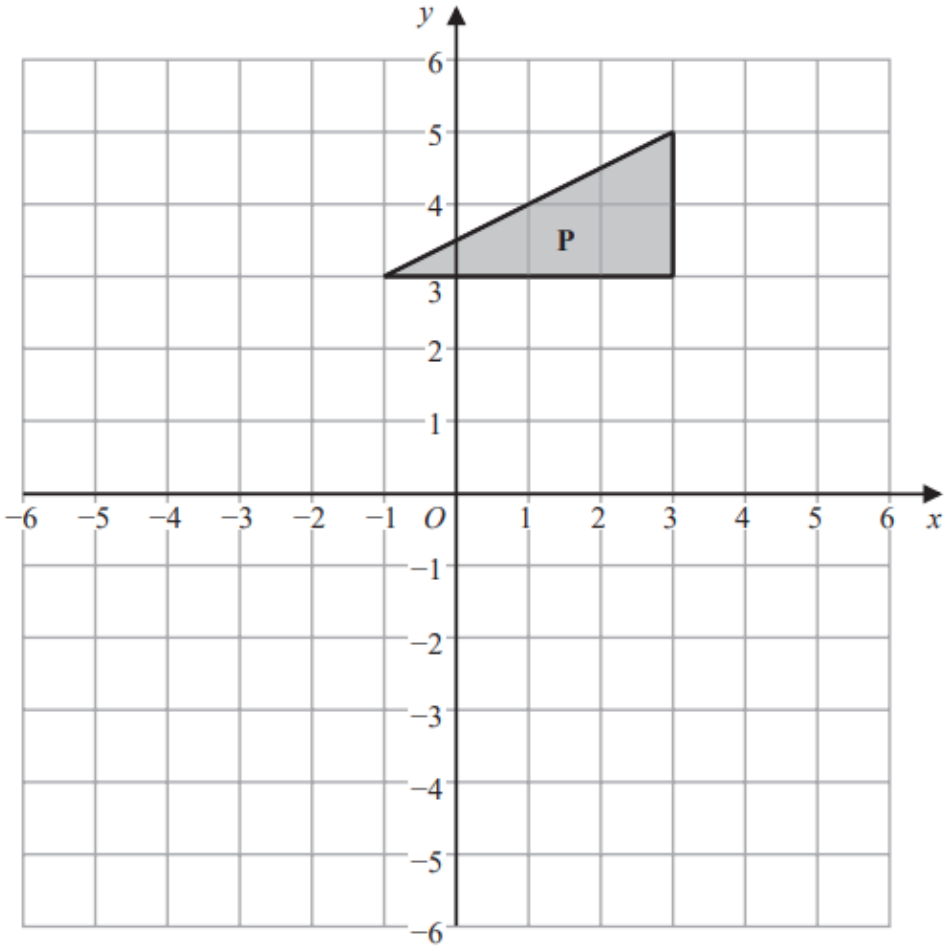
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(1)

June 2019 – Paper 3H

(Total for Question 8 is 1 mark)

8



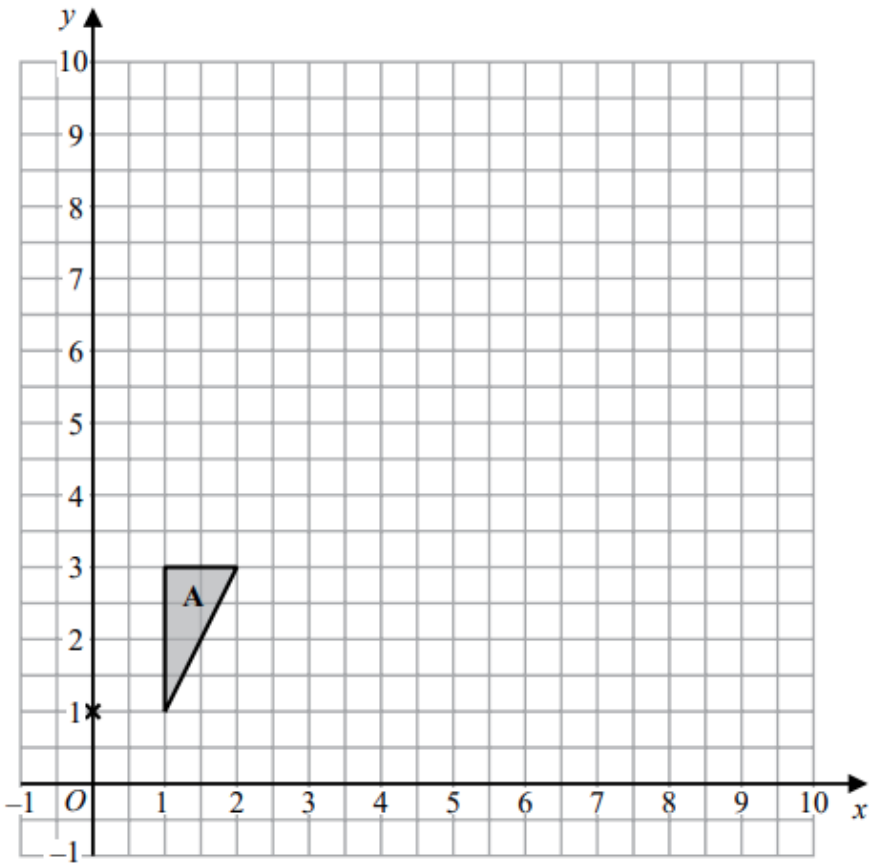
Triangle **P** is reflected in the line $y = -x$ to give triangle **Q**.
Triangle **Q** is reflected in the line $x = -1$ to give triangle **R**.

Describe fully the single transformation that maps triangle **R** to triangle **P**.

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November 2018 – Paper 2H **(Total for Question 8 is 3 marks)**

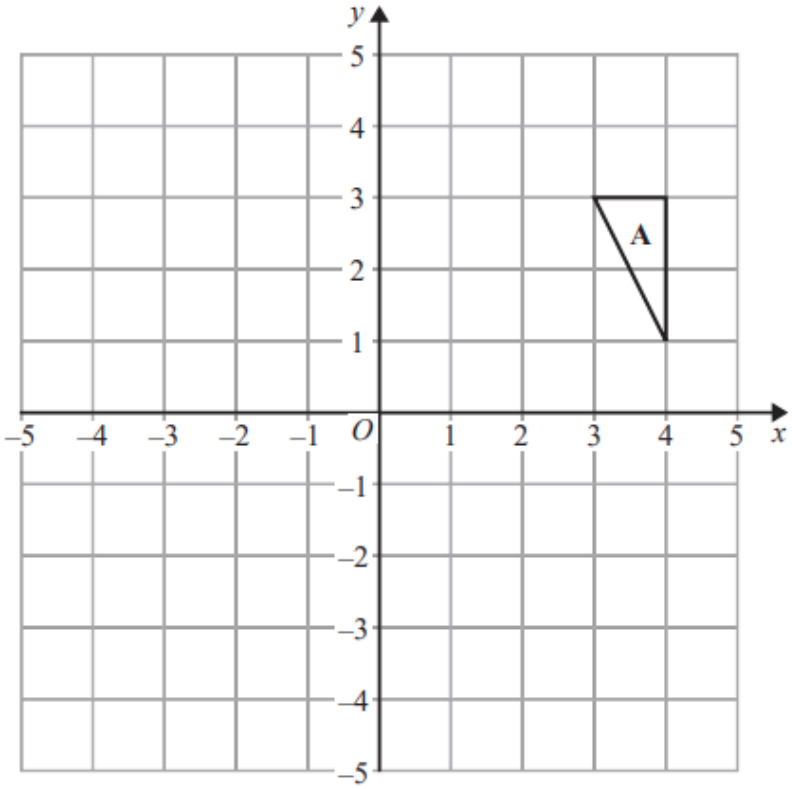
9



Enlarge triangle **A** by scale factor 2.5 with centre (0, 1)

November 2019 – Paper 3H **(Total for Question 9 is 2 marks)**

9 The diagram shows triangle **A** drawn on a grid.



Kyle reflects triangle **A** in the x-axis to get triangle **B**.
He then reflects triangle **B** in the line $y = x$ to get triangle **C**.

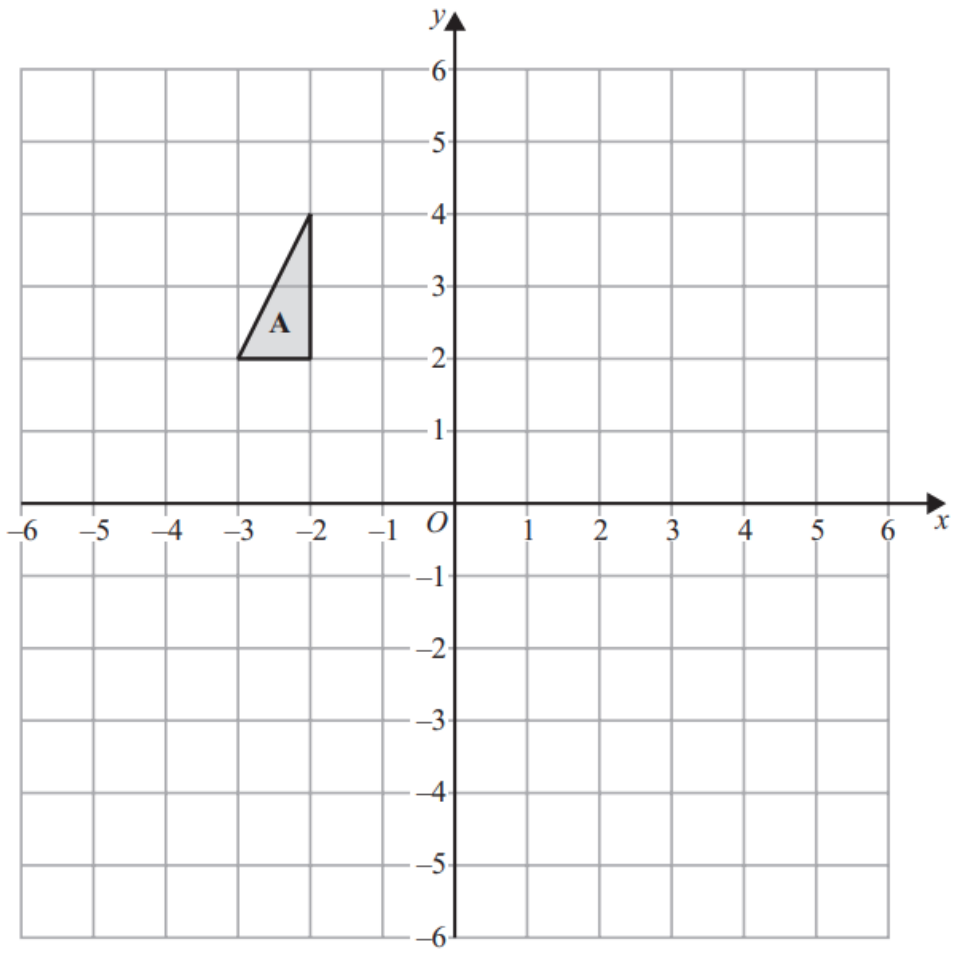
Amy reflects triangle **A** in the line $y = x$ to get triangle **D**.
She is then going to reflect triangle **D** in the x-axis to get triangle **E**.

Amy says that triangle **E** should be in the same position as triangle **C**.

Is Amy correct?
You must show how you get your answer.

(Total for Question 9 is 3 marks)

11



Triangle **A** is translated by the vector $\begin{pmatrix} 6 \\ -4 \end{pmatrix}$ to give triangle **B**.

Triangle **B** is rotated 90° clockwise about the point (1, 2) to give triangle **C**.

Describe fully the single transformation that maps triangle **A** onto triangle **C**.

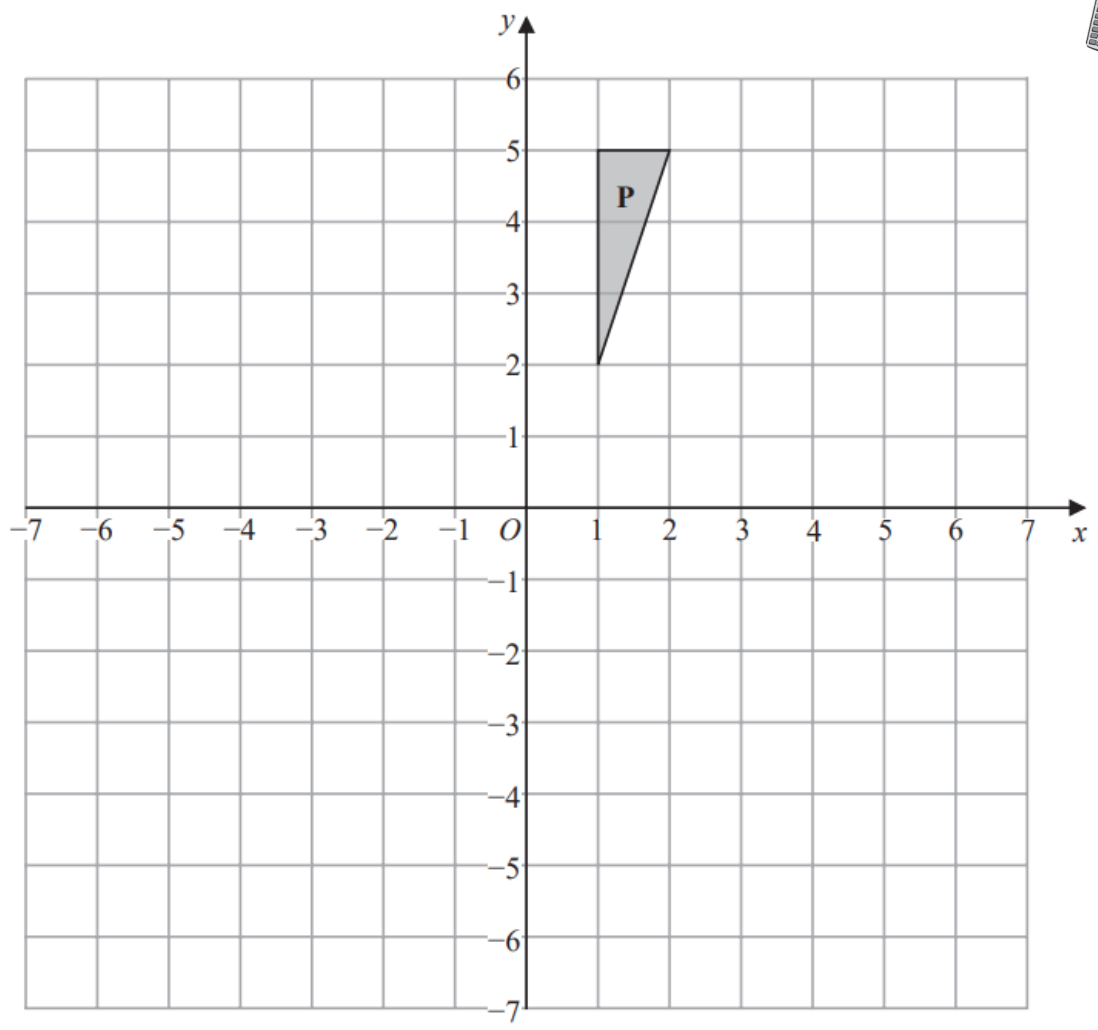
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May 2024 – Paper 1H **(Total for Question 11 is 3 marks)**

11 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**.

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.....

(3)

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

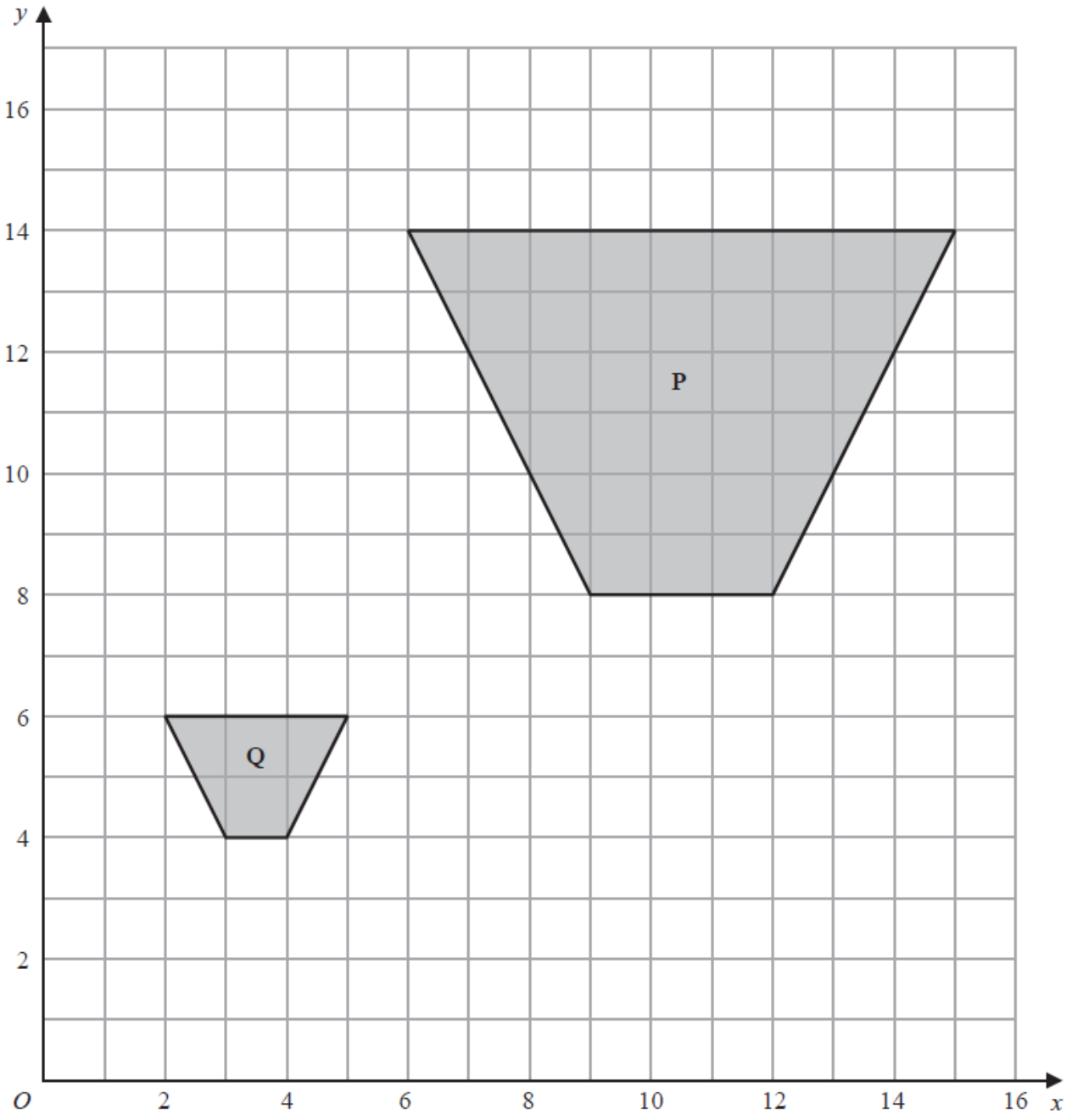
(b) Write down the coordinates of point A.

(..... , ...)

(1)

(Total for Question 11 is 4 marks)

11



Describe fully the single transformation that maps shape **P** onto shape **Q**.

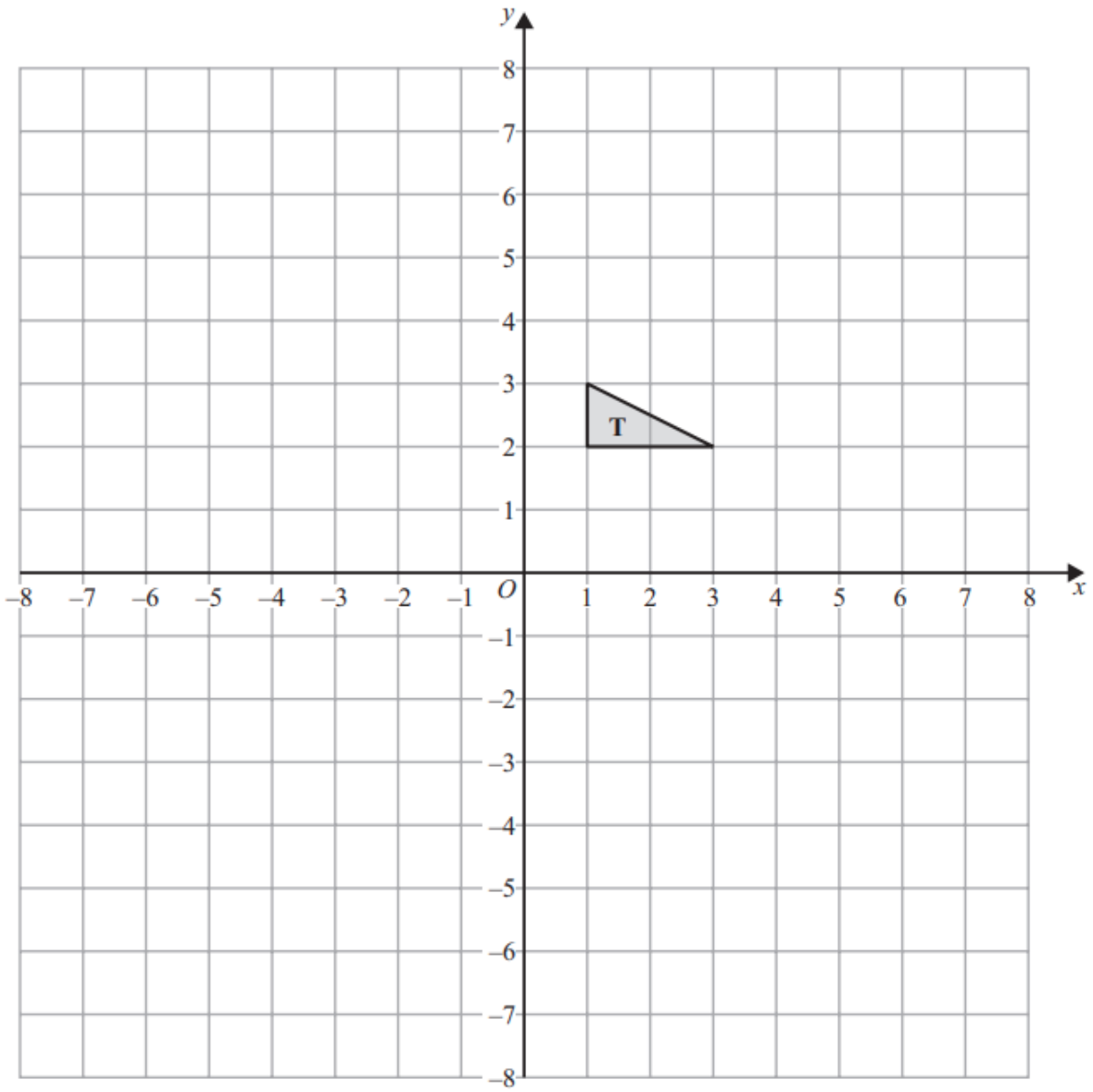
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 (Total for Question 11 is 2 marks)

12 The diagram shows triangle **T** drawn on a grid.

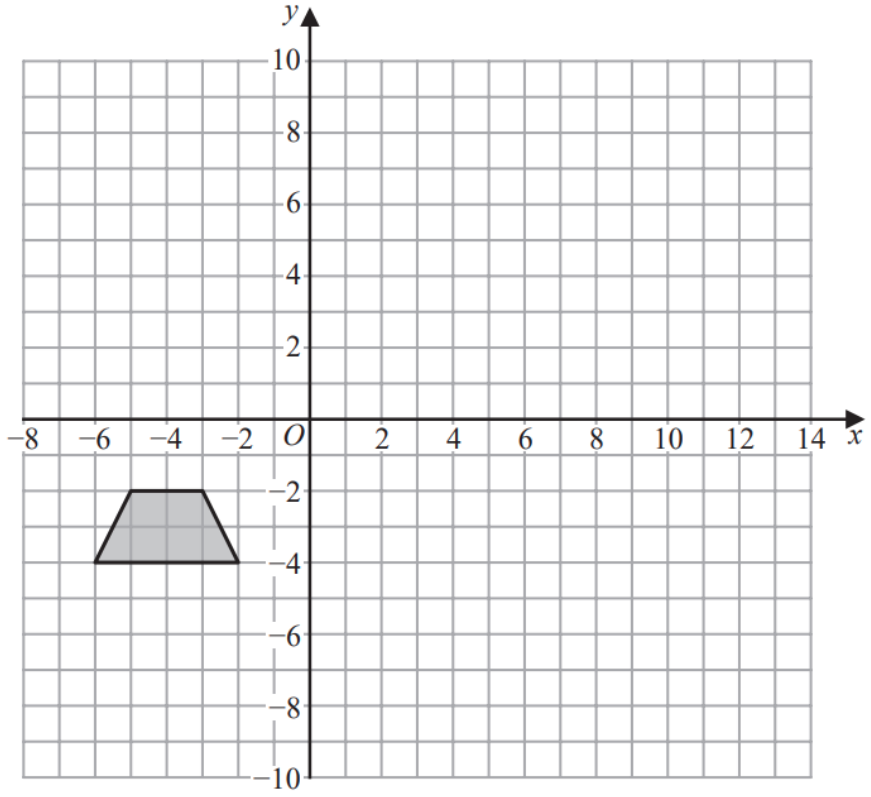


Enlarge triangle **T** by scale factor –2 with centre of enlargement (0, 0)

June 2024 – Paper 3H

(Total for Question 12 is 2 marks)

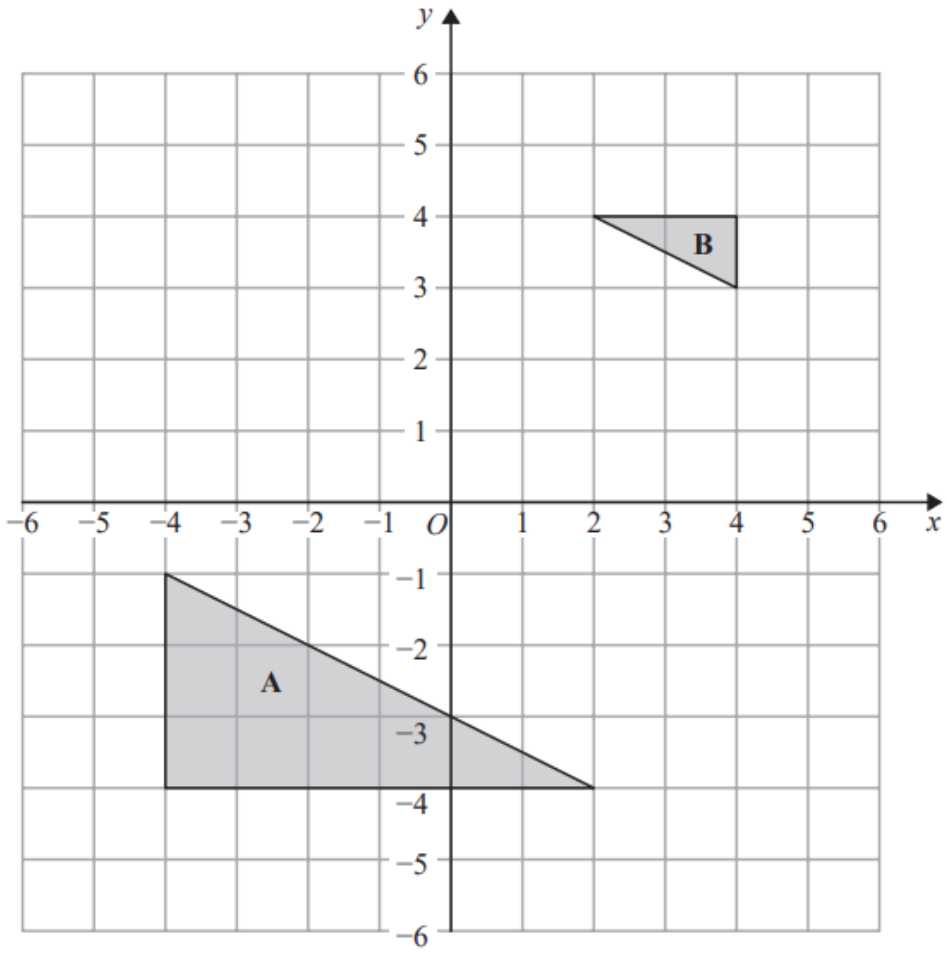
13



Enlarge the shaded shape by scale factor −2 with centre of enlargement (0, 0)

June 2022 – Paper 2H **(Total for Question 13 is 2 marks)**

13

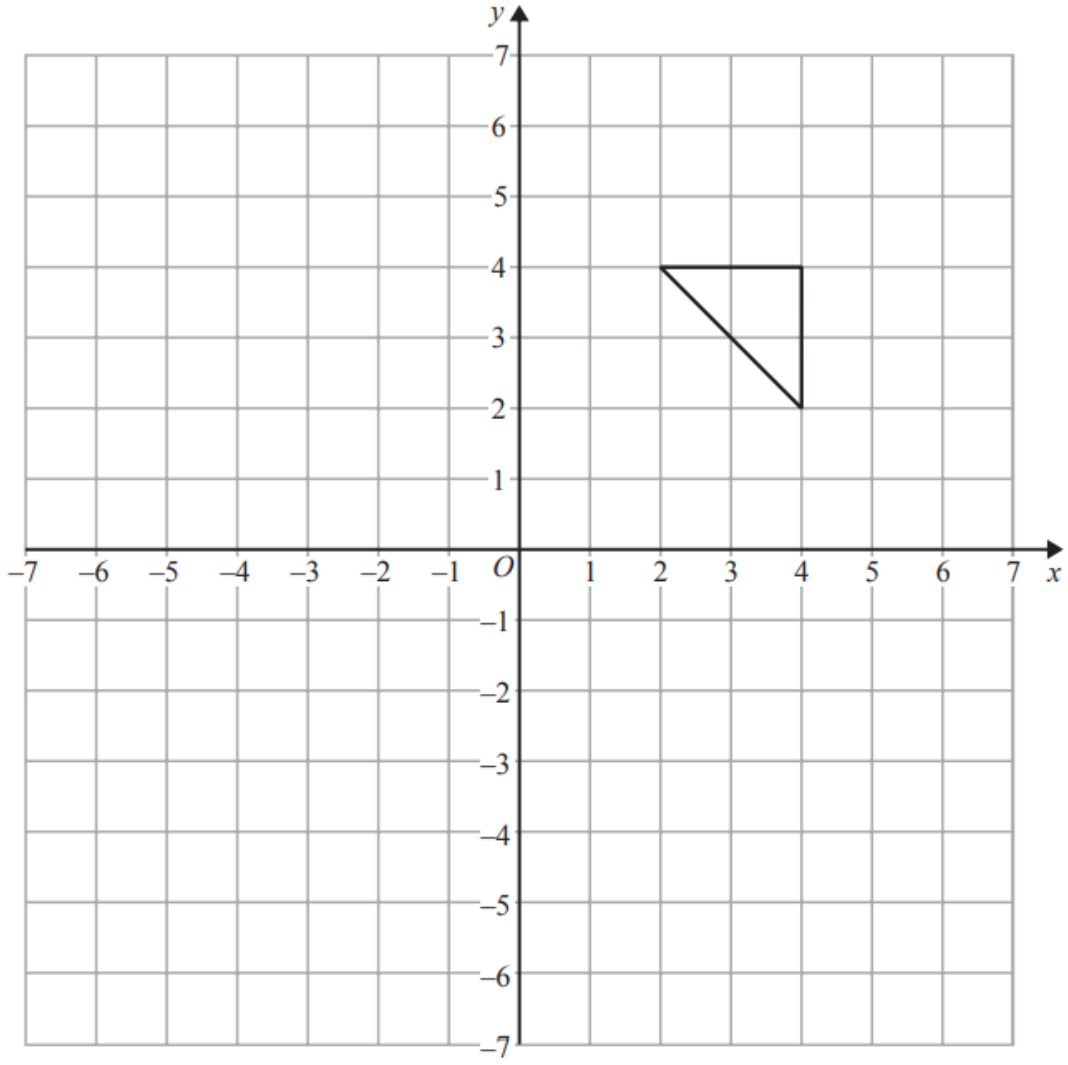


Describe fully the single transformation that maps triangle **A** onto triangle **B**.

.....

November 2018 – Paper 1H **(Total for Question 13 is 2 marks)**

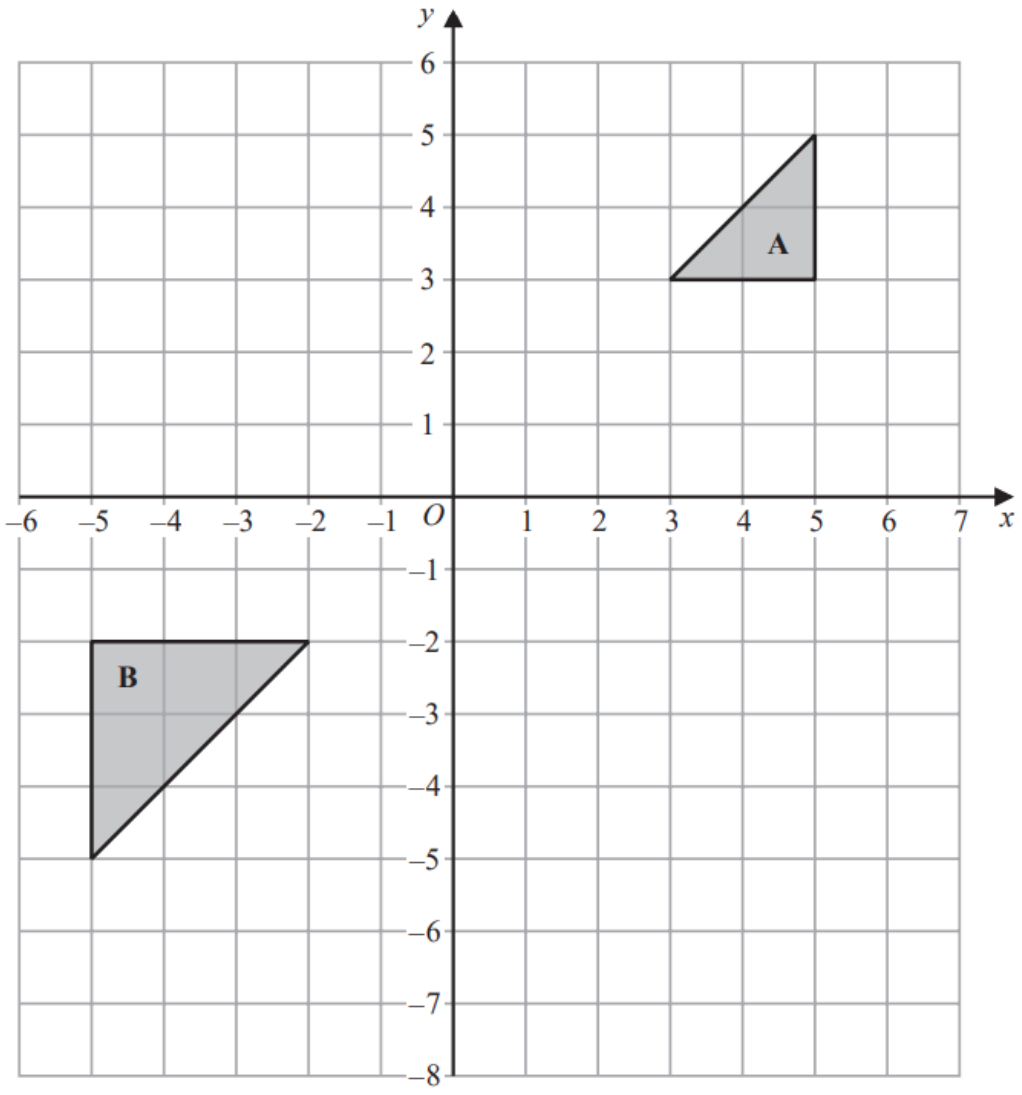
13



On the grid, enlarge the triangle by scale factor $-1\frac{1}{2}$, centre (0, 2)

(Total for Question 13 is 2 marks)

15



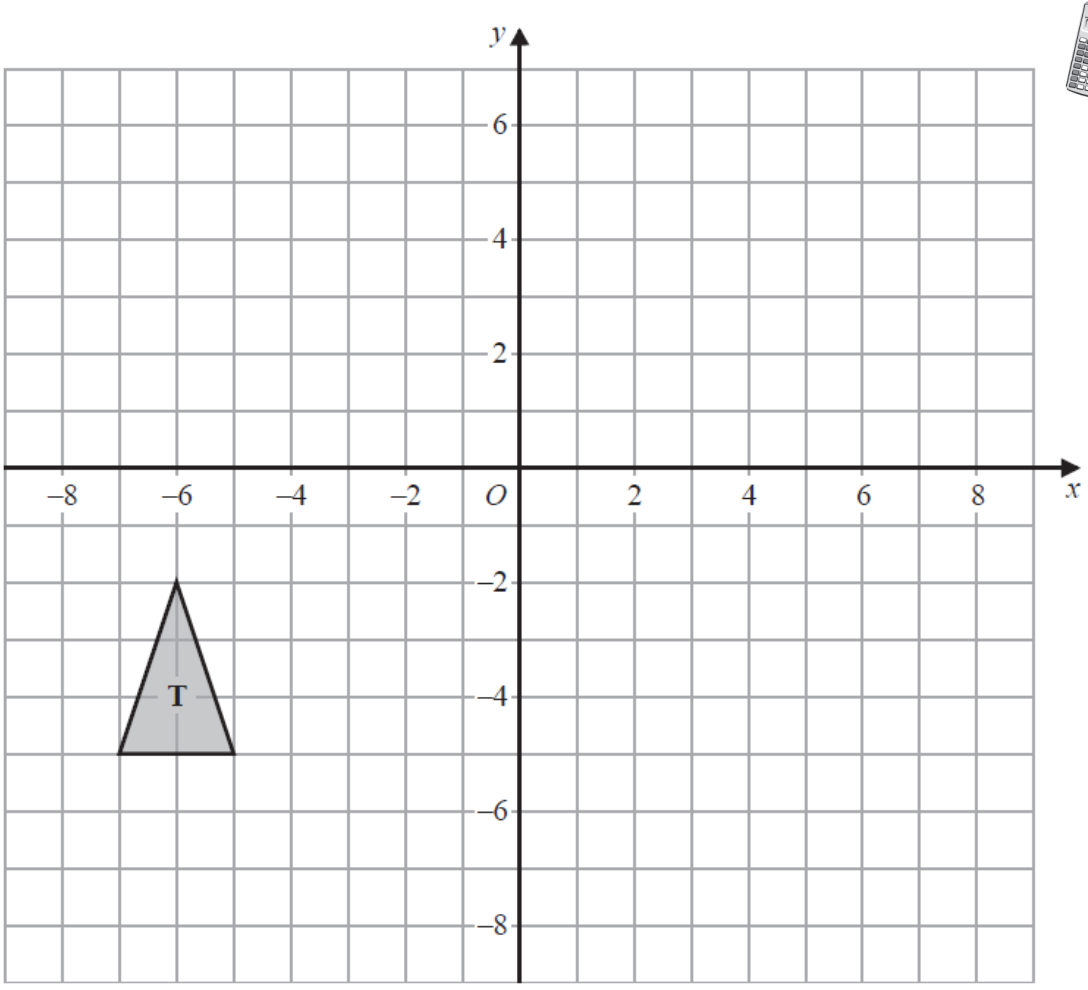
Describe fully the single transformation that maps triangle **A** onto triangle **B**.

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November 2020 – Paper 2H **(Total for Question 15 is 2 marks)**

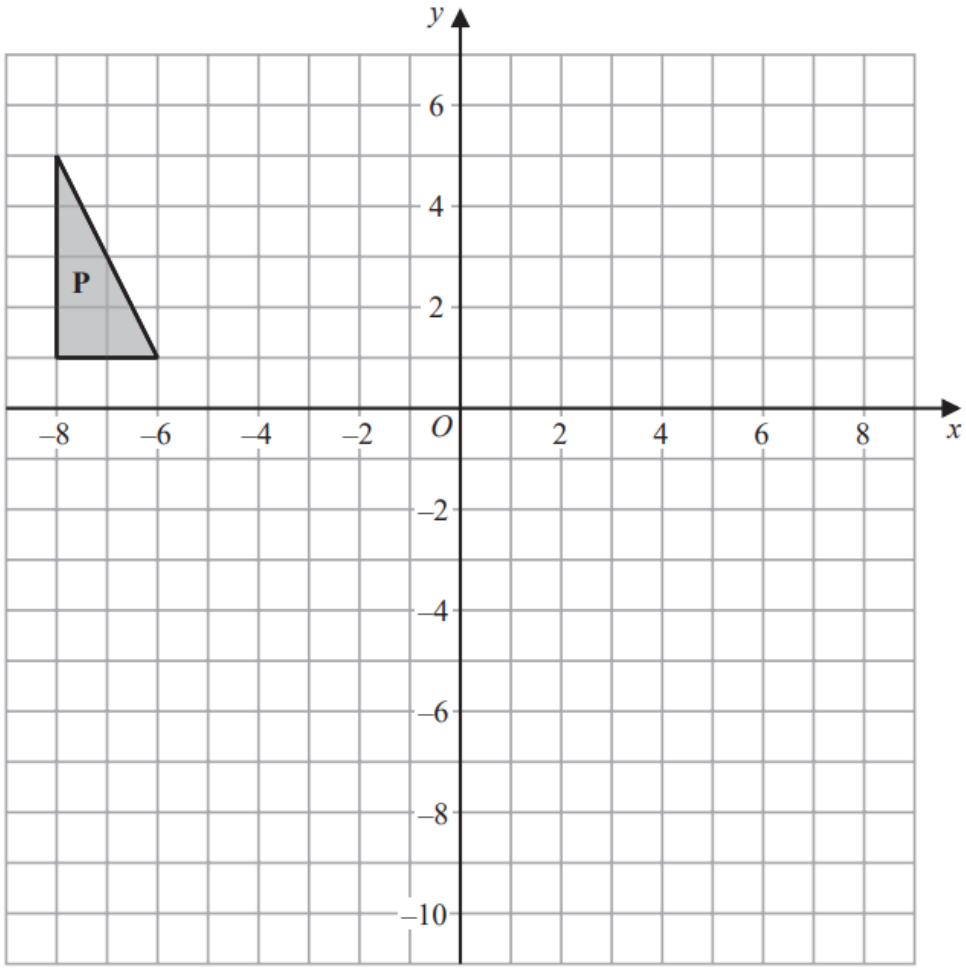
16



On the grid, enlarge triangle **T** by scale factor –2 with centre of enlargement (–2, –2)

June 2023 – Paper 3H **(Total for Question 16 is 2 marks)**

18



(a) Enlarge triangle **P** by scale factor $-1\frac{1}{2}$ with centre of enlargement (–2, –1)

Label your image **Q**.

(2)

Triangle **P** is transformed by a combined transformation of a rotation of 90° anticlockwise about the origin followed by a translation to give triangle **R**.

Exactly one vertex of triangle **P** is invariant under the combined transformation.

(b) Find one possible column vector for the translation.

(.....)
(.....)

(1)

(Total for Question 18 is 3 marks)

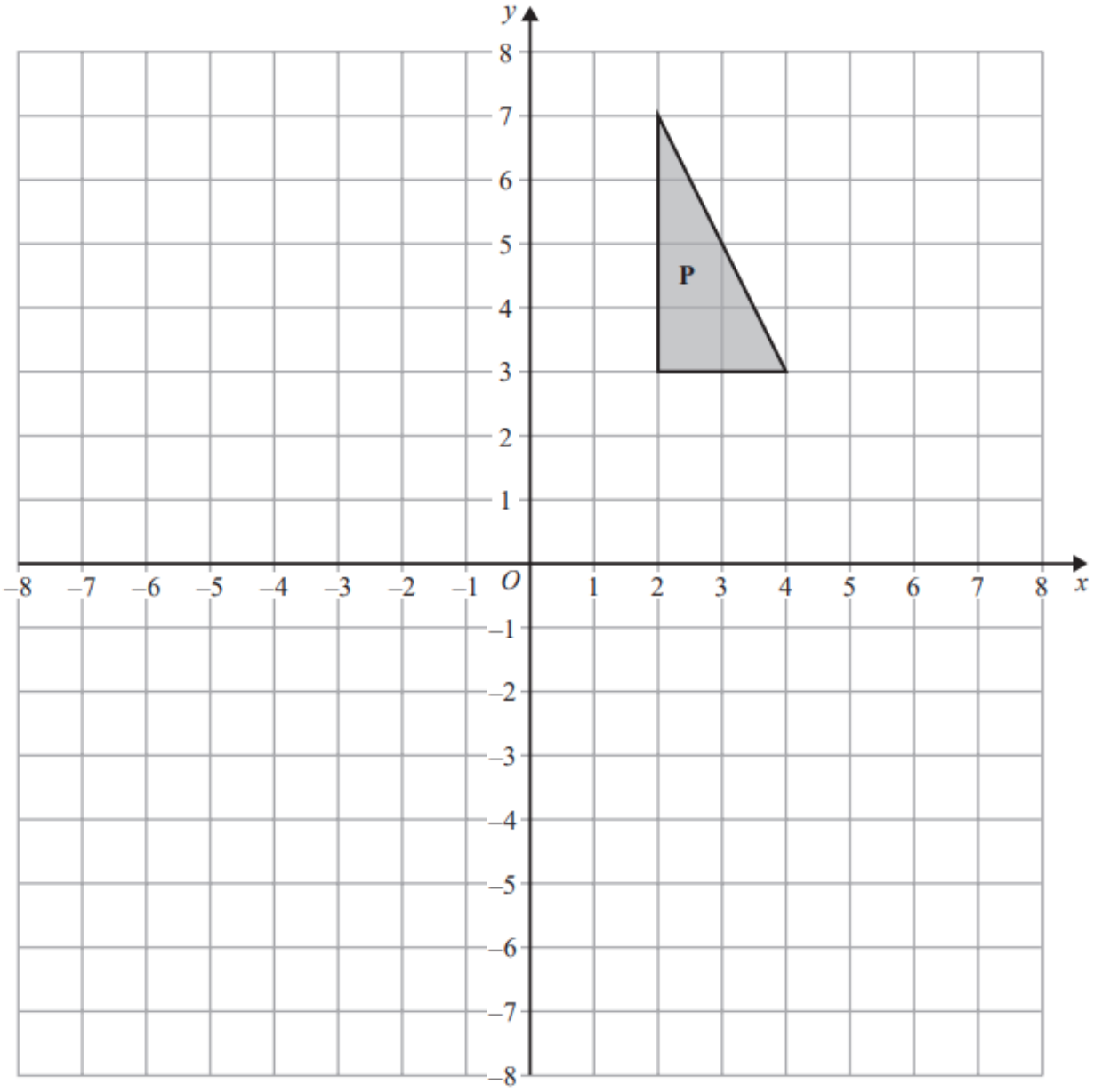
18 Shape **A** is reflected in the line with equation $x = 2$ to give shape **B**.
Shape **B** is reflected in the line with equation $x = 6$ to give shape **C**.



Describe fully the **single** transformation that maps shape **A** onto shape **C**.

(Total for Question 18 is 2 marks)

18

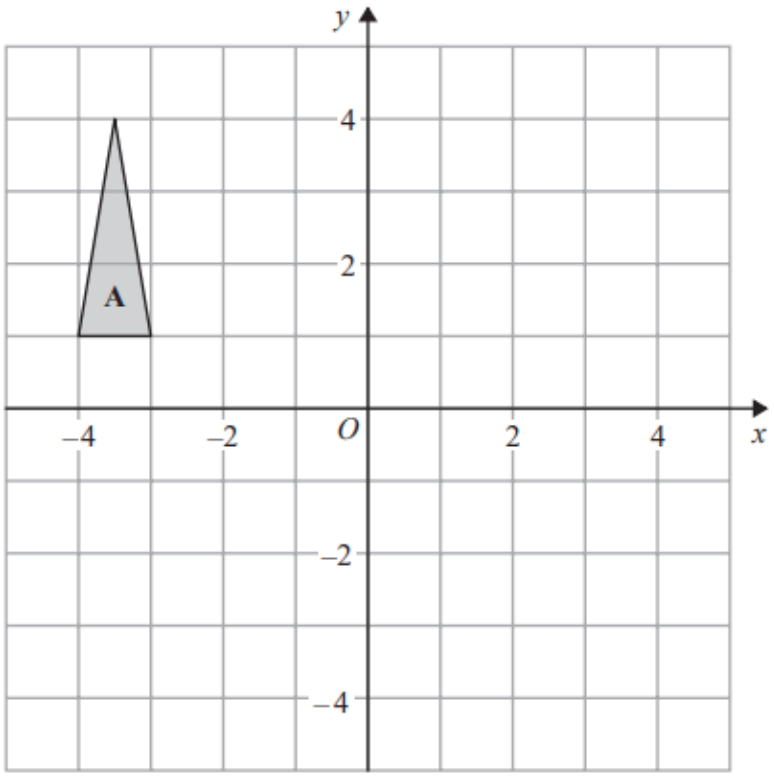


Enlarge shape **P** by scale factor $-\frac{1}{2}$ with centre of enlargement (0, 0).

Label your image **Q**.

November 2017 – Paper 1H **(Total for Question 18 is 2 marks)**

20



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

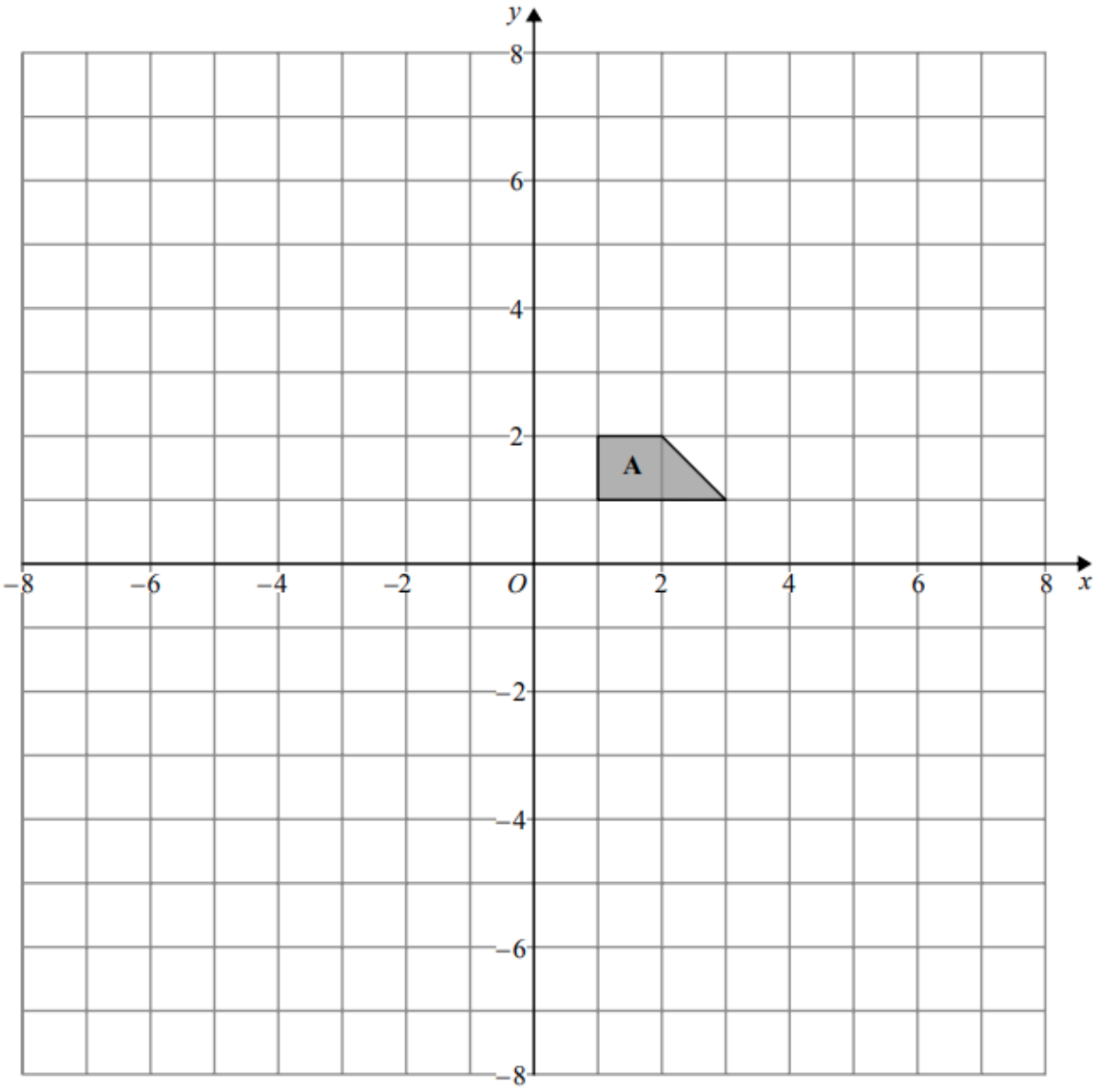
One point on triangle **A** is invariant under the combined transformation.

Find the coordinates of this point.

(..... , ...)

November 2018 – Paper 3H **(Total for Question 20 is 2 marks)**

20



(a) Enlarge shape **A** by scale factor −2, centre (0, 0)
Label your image **B**.

(2)

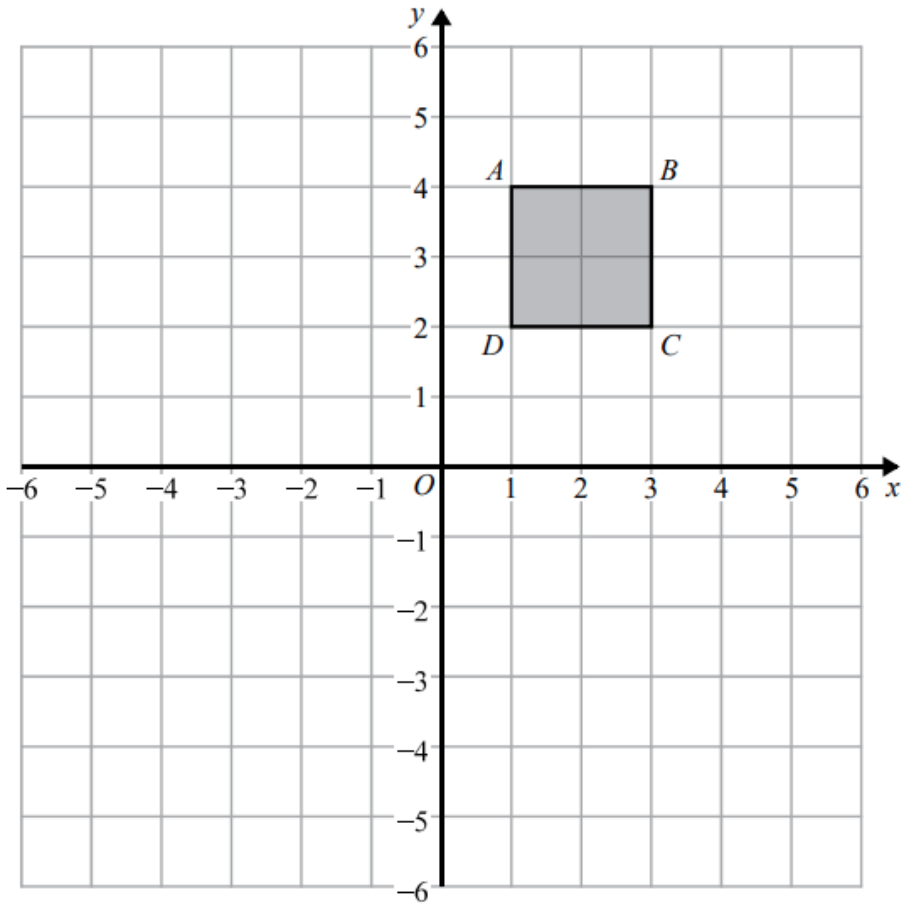
(b) Describe fully the single transformation that will map shape **B** onto shape **A**.

.....

(1)

Sample 1 – Paper 1H **(Total for Question 20 is 3 marks)**

24



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.

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November 2019 – Paper 2H **(Total for Question 24 is 2 marks)**