Solutions by
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GCSE (9-1) Grade 6 Enlargement by Negative Scale Factor



Instructions

Use **black** ink or ball-point pen.
Fill in the boxes at the top of this page with your name.
Answer **all** questions.
Answer the questions in the spaces provided
- there may be more space than you need.

Show all your working out

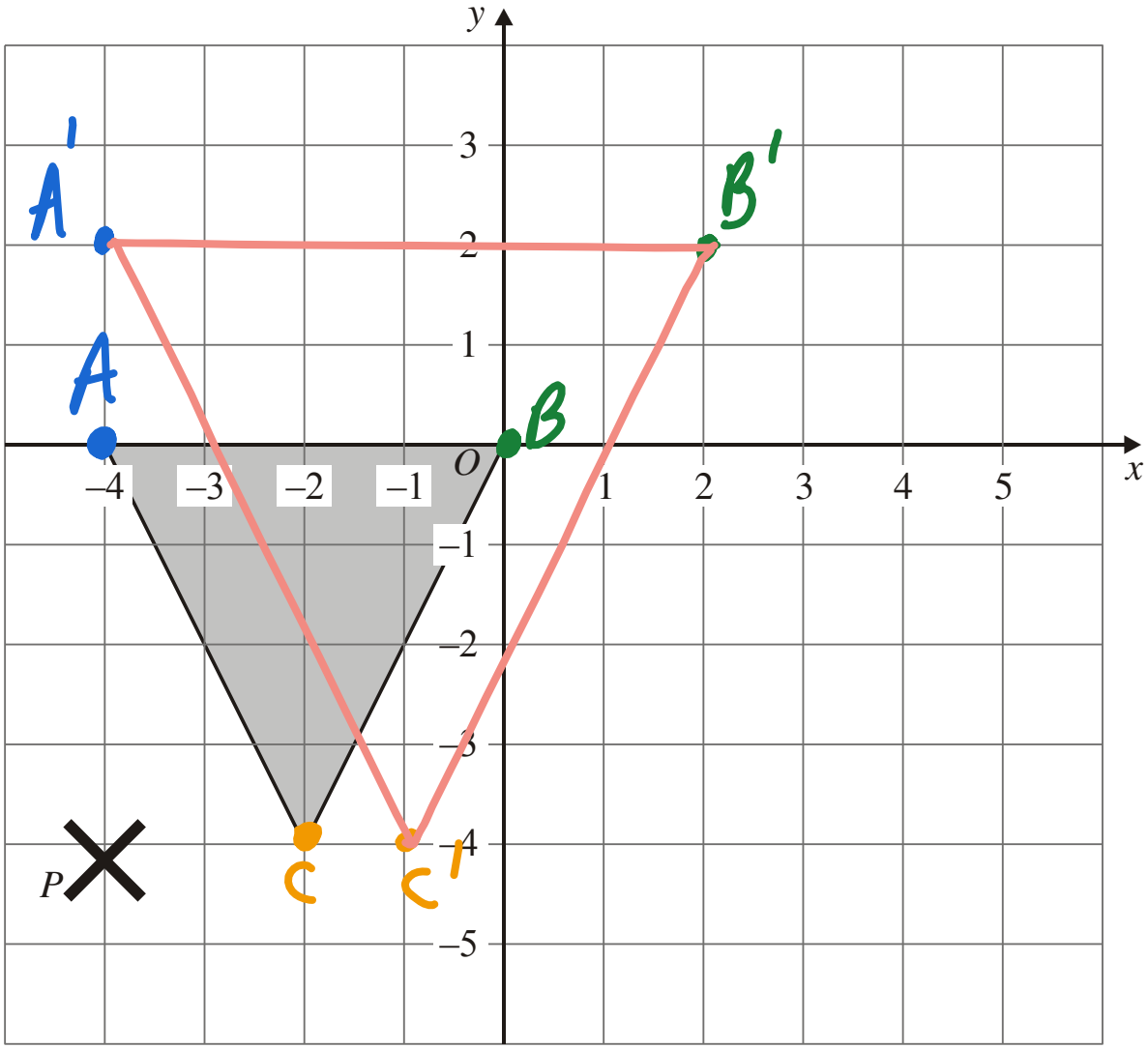
Information

The marks for **each** question are shown in brackets.
use this as a guide as to how much time to spend on each question.
Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed

Advice

Read each question carefully before you start to answer it
Attempt every question
Check your answers if you have time at the end

1.



Enlarge the shaded triangle by a scale factor $1\frac{1}{2}$, centre P.

(Total 3 marks)

$\overrightarrow{PA} = \begin{pmatrix} 0 \\ 4 \end{pmatrix}$

$\overrightarrow{PA'} = \begin{pmatrix} 0 \\ 4 \end{pmatrix} \begin{matrix} \times 1.5 \\ \times 1.5 \end{matrix} = \begin{pmatrix} 0 \\ 6 \end{pmatrix}$

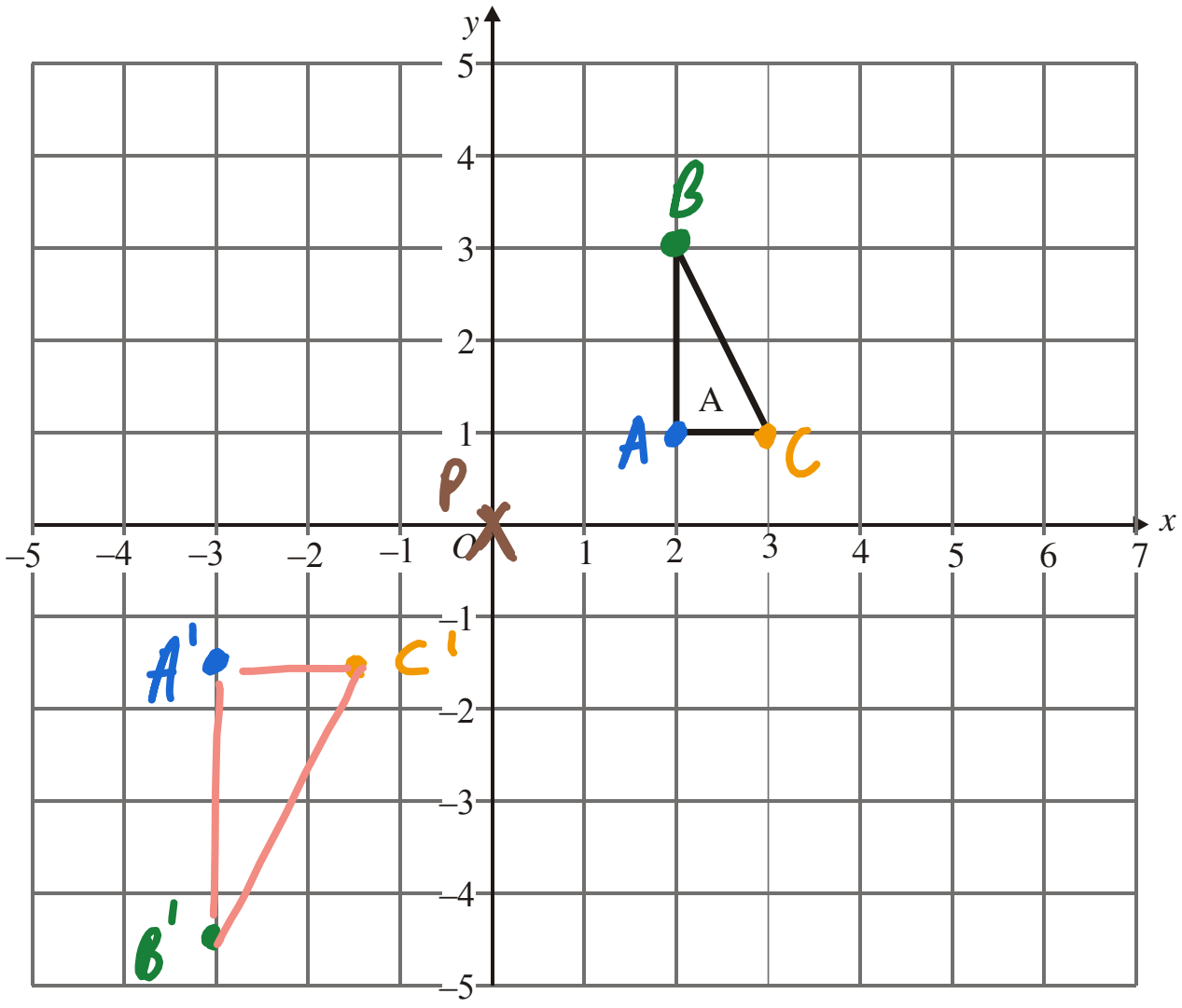
$\overrightarrow{PB} = \begin{pmatrix} 4 \\ 4 \end{pmatrix}$

$\overrightarrow{PB'} = \begin{pmatrix} 4 \\ 4 \end{pmatrix} \begin{matrix} \times 1.5 \\ \times 1.5 \end{matrix} = \begin{pmatrix} 6 \\ 6 \end{pmatrix}$

$\overrightarrow{PC} = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$

$\overrightarrow{PC'} = \begin{pmatrix} 2 \\ 0 \end{pmatrix} \begin{matrix} \times 1.5 \\ \times 1.5 \end{matrix} = \begin{pmatrix} 3 \\ 0 \end{pmatrix}$

2.



Enlarge triangle **A** by scale factor $-1\frac{1}{2}$, centre O.

(Total 3 marks)

$\overrightarrow{PA} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$

$\overrightarrow{PA'} = \begin{pmatrix} 2 \\ 1 \end{pmatrix} \begin{matrix} \times -1.5 \\ \times -1.5 \end{matrix} = \begin{pmatrix} -3 \\ -1.5 \end{pmatrix}$

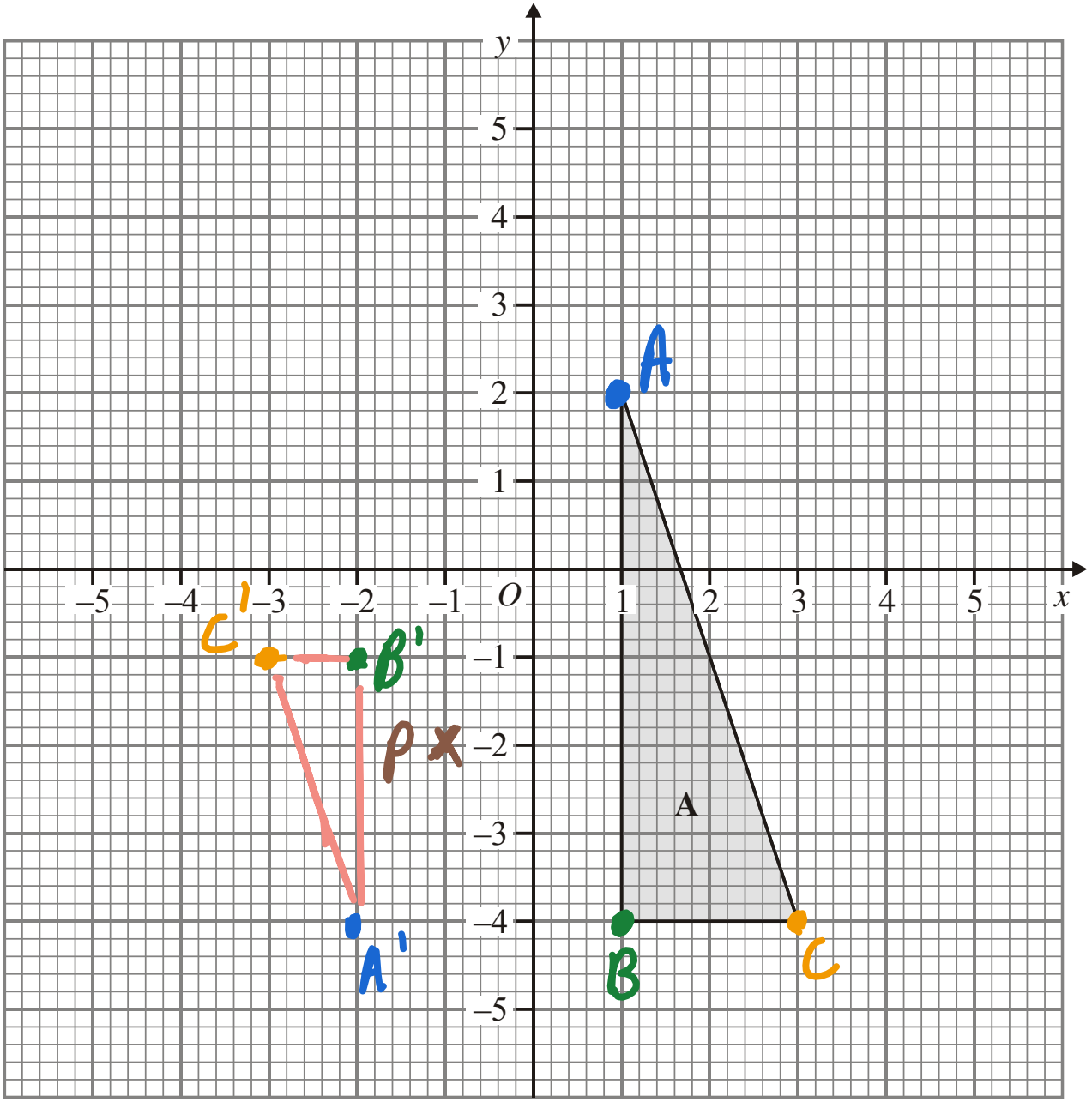
$\overrightarrow{PB} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$

$\overrightarrow{PB'} = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \begin{matrix} \times -1.5 \\ \times -1.5 \end{matrix} = \begin{pmatrix} -3 \\ -4.5 \end{pmatrix}$

$\overrightarrow{PC} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$

$\overrightarrow{PC'} = \begin{pmatrix} 3 \\ 1 \end{pmatrix} \begin{matrix} \times -1.5 \\ \times -1.5 \end{matrix} = \begin{pmatrix} -4.5 \\ -1.5 \end{pmatrix}$

3.



Enlarge triangle **A** by scale factor $-\frac{1}{2}$, centre (–1, –2).

Label your triangle **B**.

$\overrightarrow{PC} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$

$\overrightarrow{PA} = \begin{pmatrix} 2 \\ 4 \end{pmatrix}$

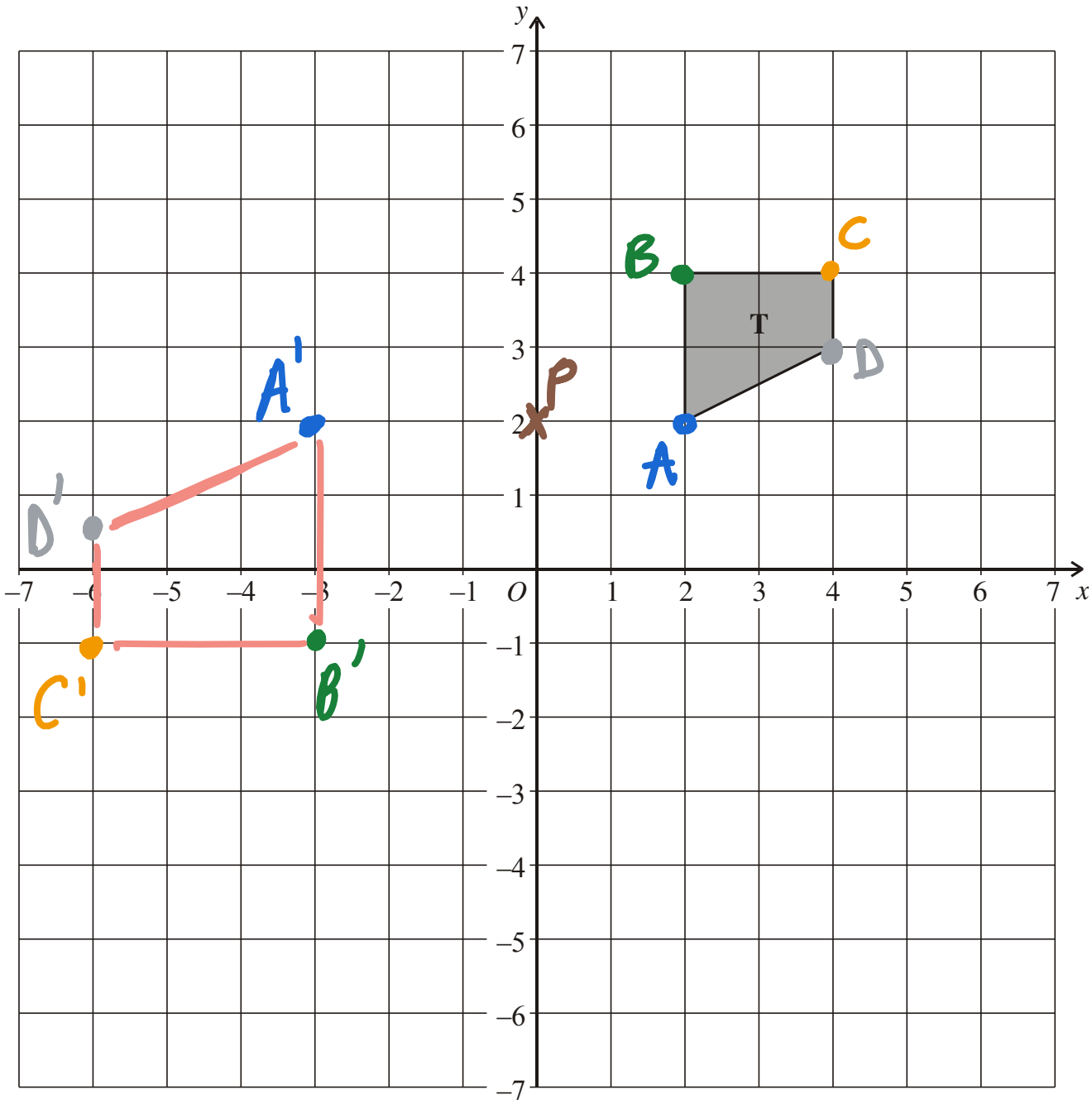
$\overrightarrow{PB} = \begin{pmatrix} 2 \\ -2 \end{pmatrix}$

$\overrightarrow{PC'} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}^{x-\frac{1}{2}}_{x-\frac{1}{2}} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$

$\overrightarrow{PA'} = \begin{pmatrix} 2 \\ 4 \end{pmatrix}^{x-\frac{1}{2}}_{x-\frac{1}{2}} = \begin{pmatrix} -1 \\ -2 \end{pmatrix}$

$\overrightarrow{PB'} = \begin{pmatrix} 2 \\ -2 \end{pmatrix}^{x-\frac{1}{2}}_{x-\frac{1}{2}} = \begin{pmatrix} -1 \\ 1 \end{pmatrix}$

4.



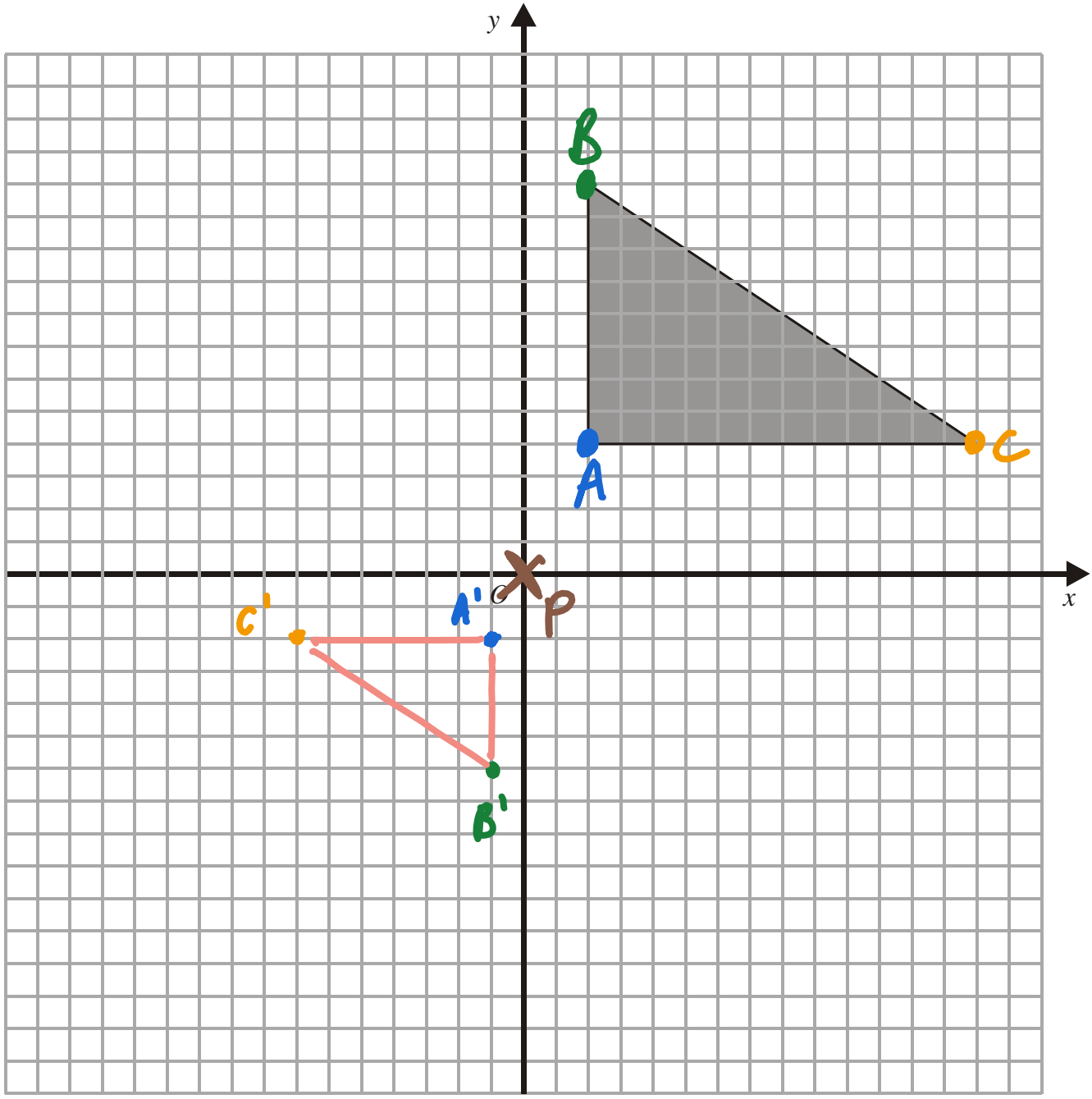
Enlarge shape **T** with scale factor –1.5, centre (0, 2).

(Total 3 marks)

$\overrightarrow{PA} = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$ $\overrightarrow{PB} = \begin{pmatrix} 2 \\ 2 \end{pmatrix}$ $\overrightarrow{PC} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$ $\overrightarrow{PD} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$

$\overrightarrow{PA'} = \begin{pmatrix} -3 \\ 0 \end{pmatrix}$ $\overrightarrow{PB'} = \begin{pmatrix} -3 \\ -3 \end{pmatrix}$ $\overrightarrow{PC'} = \begin{pmatrix} -6 \\ -3 \end{pmatrix}$ $\overrightarrow{PD'} = \begin{pmatrix} -6 \\ -1.5 \end{pmatrix}$

5.



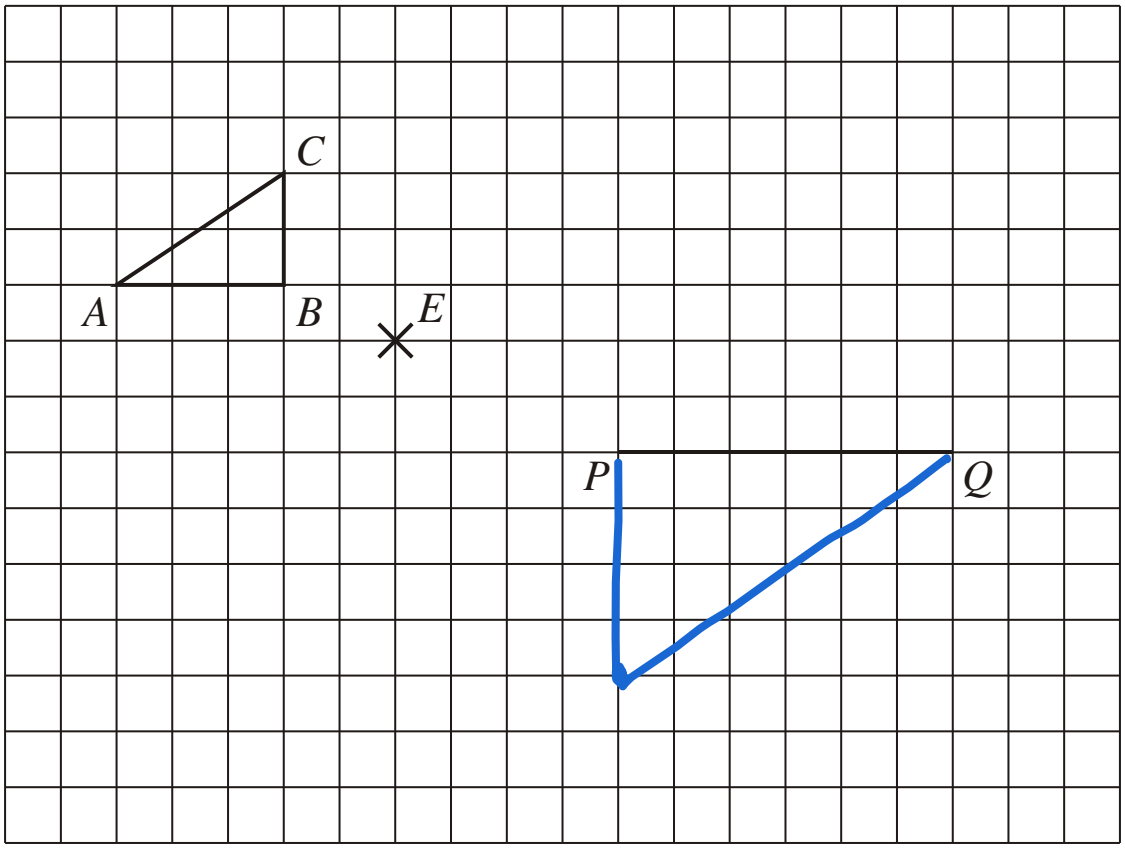
Enlarge the triangle by a scale factor of $-\frac{1}{2}$, centre O

$\overrightarrow{PA} = \begin{pmatrix} 2 \\ 4 \end{pmatrix}$ $\overrightarrow{PB} = \begin{pmatrix} 2 \\ 12 \end{pmatrix}$ $\overrightarrow{PC} = \begin{pmatrix} 4 \\ 14 \end{pmatrix}$

$\overrightarrow{PA'} = \begin{pmatrix} -1 \\ -2 \end{pmatrix}$ $\overrightarrow{PB'} = \begin{pmatrix} -1 \\ -6 \end{pmatrix}$ $\overrightarrow{PC'} = \begin{pmatrix} -2 \\ -7 \end{pmatrix}$

(Total 2 marks)

6. The triangle *ABC* is to be enlarged, using *E* as the centre, to give the triangle *PQR*. The line *PQ* is the image of the line *BA*.



(a) Write down the scale factor of the enlargement.

-2

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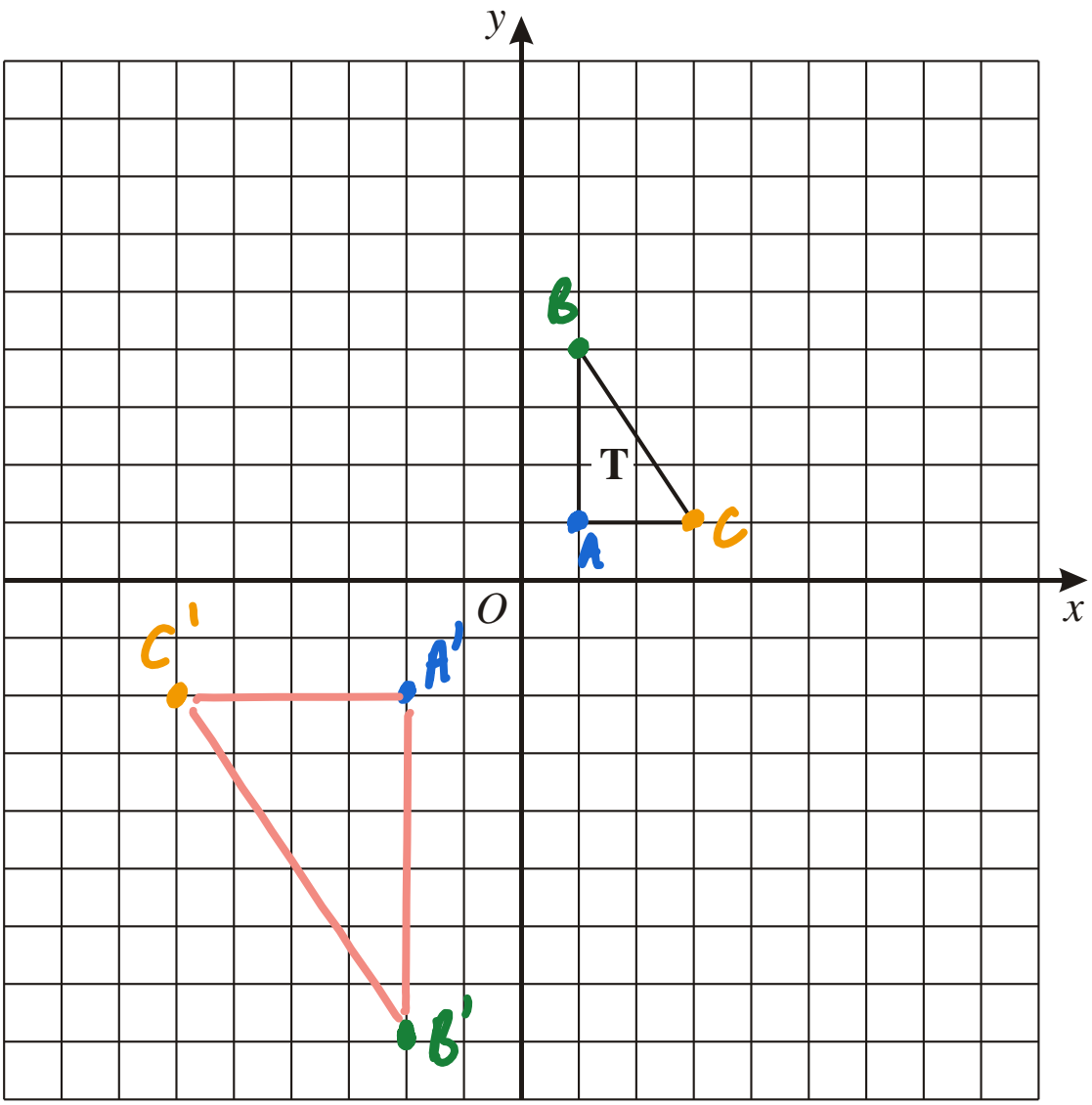
(1)

(b) Complete the triangle *PQR*.

(1)

(Total 2 marks)

7.



Enlarge triangle **T**, scale factor –2, centre *O*.

(Total 2 marks)