9 The points (4, 2), (4, 3) and (6, 3) are the vertices of triangle *S*.

(a) On the grid opposite, draw and label triangle *S*.

(1)

Triangle *T* is the image of triangle *S* under a reflection in the line with equation *y* = *x*

(b) On the grid opposite, draw and label triangle *T*.

(2)

Triangle *U* is the image of triangle *T* under a rotation through 180° about the point (–2, 2)

(c) On the grid opposite, draw and label triangle *U*.

(3)

Triangle *U* is transformed to triangle *V* under the translation $\begin{pmatrix} 5 \\ -1 \end{pmatrix}$

(d) On the grid opposite, draw and label triangle *V*.

(2)

Triangle *V* is transformed to triangle *W* under the transformation with matrix **P** where

$$\mathbf{P} = \begin{pmatrix} -3 & 1 \\ 1 & 1 \end{pmatrix}$$

(e) On the grid opposite, draw and label triangle *W*.

(3)

(f) Find the determinant of the matrix **P**.

(1)

(g) Write down the ratio (area of triangle *S*) : (area of triangle *W*) in the form 1 : *n*

(1)

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$$\left[\text{Determinant of matrix} \begin{pmatrix} a & b \\ c & d \end{pmatrix} = ad - bc \right]$$

Question 9 continued
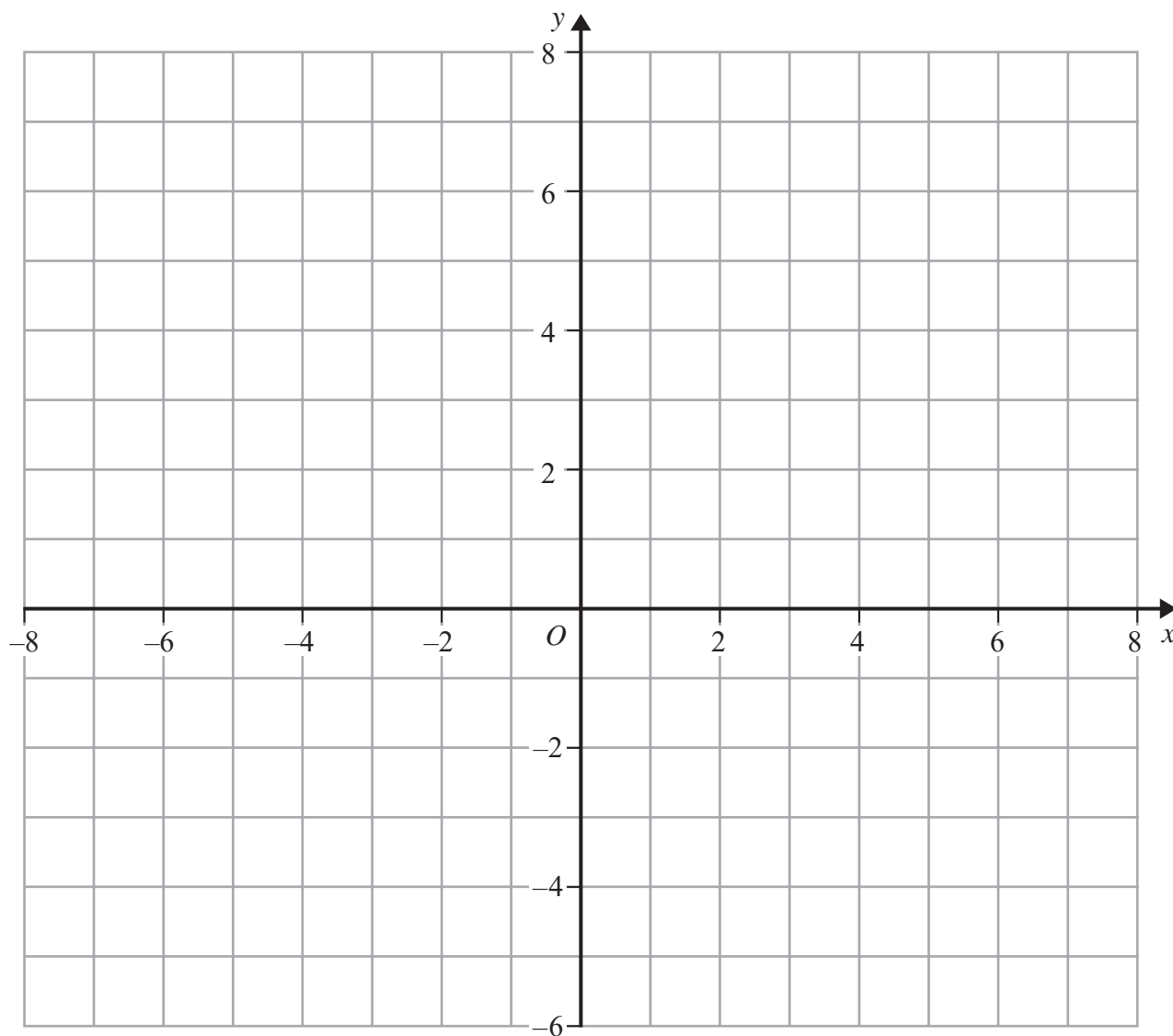
Turn over for a spare grid if you need to redraw your triangles.

P 5 3 3 0 9 A 0 2 1 3 2

Question 9 continued

Question 9 continued

Only use this grid if you need to redraw your triangles.

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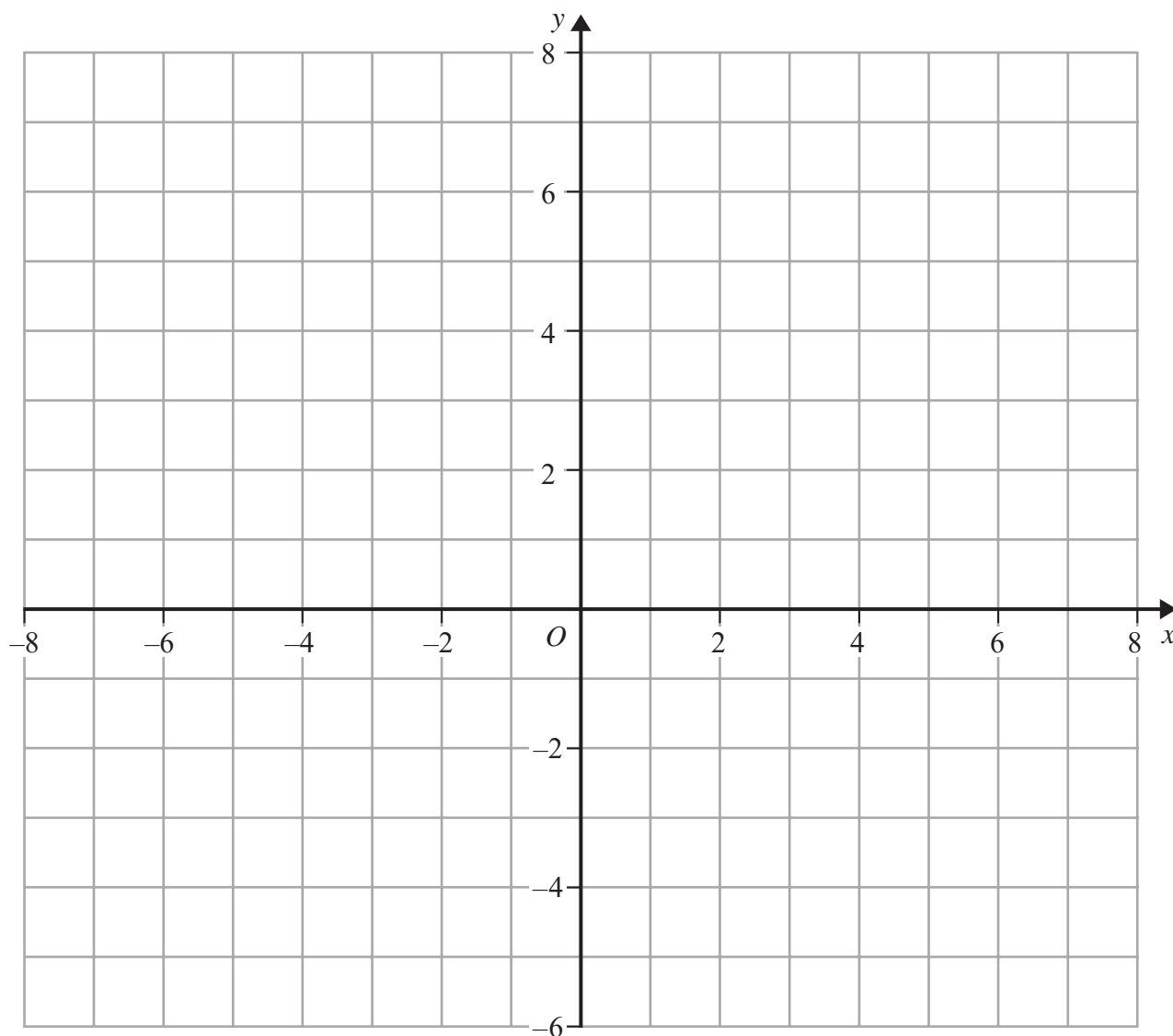
(Total for Question 9 is 13 marks)