4. (i) The transformation P is represented by the matrix **P** where

$$\mathbf{P} = \begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$$

Determine the equation of the line of invariant points of P.

(1)

(ii) The transformation Q is represented by the matrix **Q** where

$$\mathbf{Q} = \begin{pmatrix} 3 & -1 \\ 3 & 4 \end{pmatrix}$$

(a) Prove that, for the transformation Q, there are no invariant lines.

(4)

The triangle T has vertices at the points $(k, 2)$, $(8, 2)$ and $(8, 4)$ where k is a constant.

Given that

- T is transformed by Q onto the triangle T'

- T' has an area of 75

(b) determine the possible values of k.

(4)