(b) Find the 2 by 2 matrix representing the transformation which maps triangle
(i) T onto R, [2]
(ii) U onto Q. [2]

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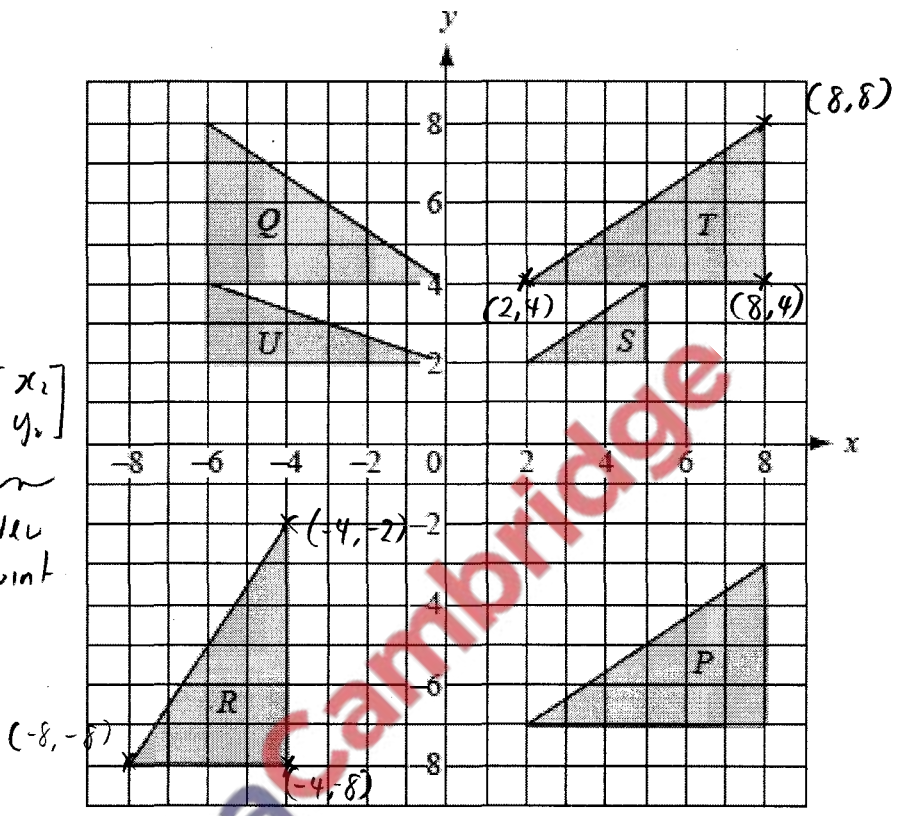

Use

$\begin{bmatrix} \text{T. matrix} \end{bmatrix} \begin{bmatrix} x_1 \\ y_1 \end{bmatrix} = \begin{bmatrix} x_2 \\ y_2 \end{bmatrix}$

original point — New point

bi) T is transformed to R
(2,4) is transformed to (-4,-2)
(8,4) is transformed to (-4,-8)

Let the transformation matrix be $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$

$\begin{pmatrix} a & b \\ c & d \end{pmatrix}\begin{pmatrix} x_1 \\ y_2 \end{pmatrix} = \begin{pmatrix} x_2 \\ y_2 \end{pmatrix}$

$\begin{pmatrix} a & b \\ c & d \end{pmatrix}\begin{pmatrix} 2 \\ 4 \end{pmatrix} = \begin{pmatrix} -4 \\ 2 \end{pmatrix}$ } first point

$\begin{pmatrix} 2a + 4b \\ 2c + 4d \end{pmatrix} = \begin{pmatrix} -4 \\ -2 \end{pmatrix}$

$2a + 4b = -4$ ①

$2c + 4d = -2$ ②

$\begin{pmatrix} a & b \\ c & d \end{pmatrix}\begin{pmatrix} 8 \\ 4 \end{pmatrix} = \begin{pmatrix} -4 \\ -8 \end{pmatrix}$

$\begin{pmatrix} 8a + 4b \\ 8c + 4d \end{pmatrix} = \begin{pmatrix} -4 \\ -8 \end{pmatrix}$ } 2nd point.

$8a + 4b = -4$ ③

$8c + 4d = -8$ ④

Solving ① & ③
$a = 0$
$b = -1$

Solving ② & ④
$c = -1$
$d = 0$

Transformation matrix

$\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$ #