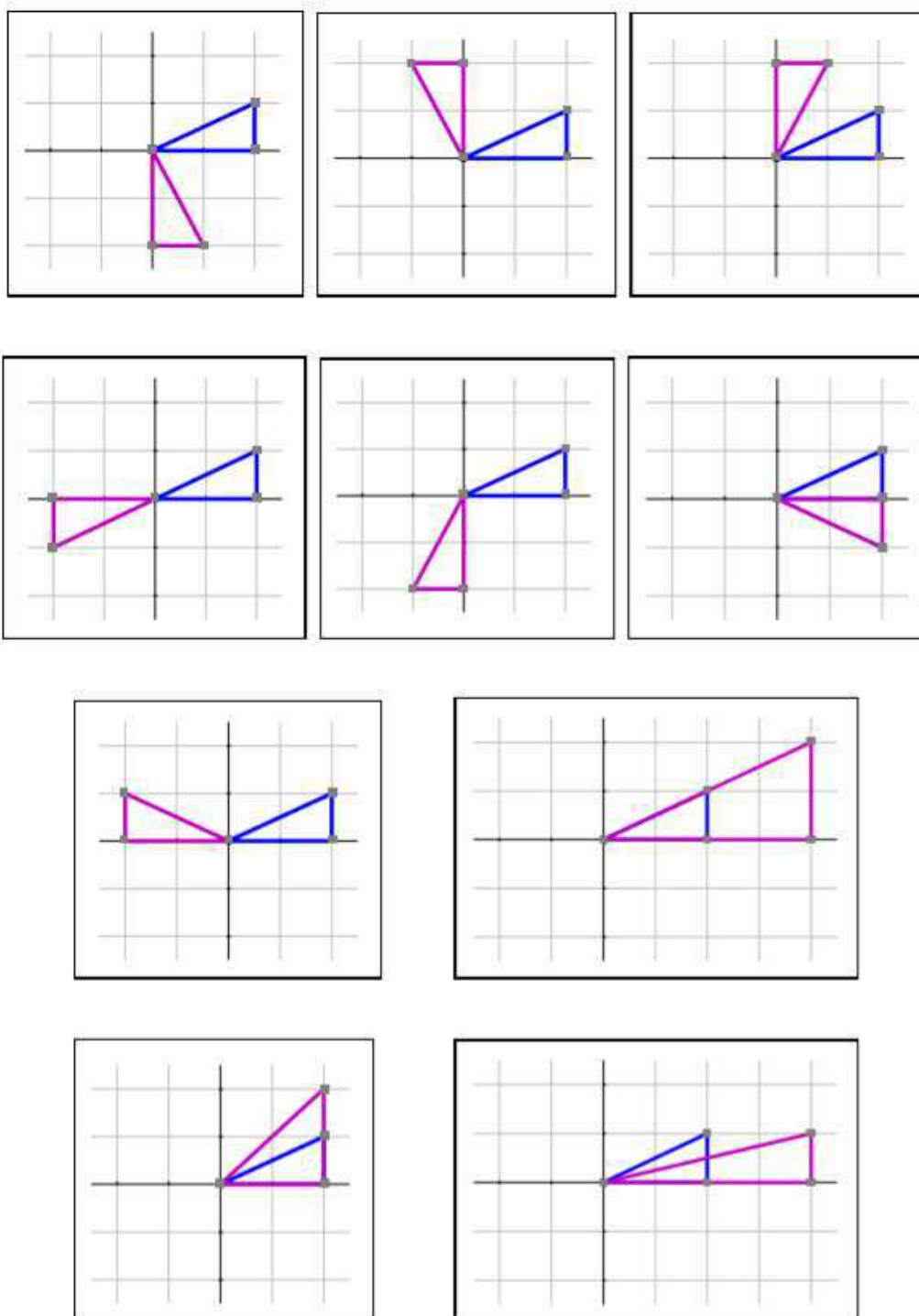


## Matrix Matchings

Cut out the diagrams, descriptions of transformations and matrices and match up each diagram with the appropriate transformation and the matrix which describes it.



Rotation by $90^\circ$ clockwise	$\begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix}$
Rotation by $90^\circ$ anticlockwise	$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$
Reflection in $y$ -axis	$\begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix}$
Reflection in $x$ -axis	$\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$
Reflection in the line $y = x$	$\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$
Reflection in the line $y = -x$	$\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$
Rotation by $180^\circ$	$\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$
Enlargement with scale factor 2, centre the origin	$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$
Stretch with scale factor 2, in the direction of the $x$ -axis	$\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$
Stretch with scale factor 2, in the direction of the $y$ -axis	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$

## Categorising complex numbers

Think about pairs of complex numbers  $z$  and  $w$  and the three properties:

A:  $z \times w$  is real

B:  $z + z^* + w$  is imaginary

C:  $|z| = |w|$

Can you find a pair of complex numbers which satisfies all three properties A, B and C?

If so write this pair in the central region where the three circles overlap.

How about a pair which doesn't satisfy any of the requirements?  
Fill this in the region outside the three circles.

**The task:** To find one example for each of the other six regions.

Is it possible to find an example for every region?

