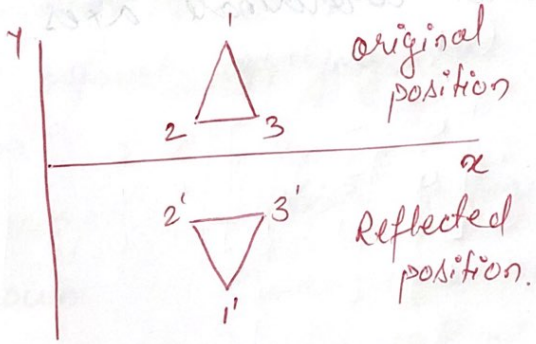
Reflection :-

- A reflection is a transformation that produces a mirror image of an object.
- The mirror image for a two-dimensional reflection is generated relative to an axis of reflection by rotating the object 180° about reflection axis.
- Reflection gives image based on position of axis of reflection. Transformation matrix for few positions are discussed here.

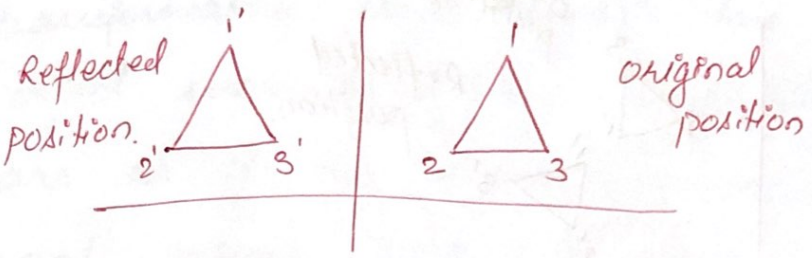
Reflection about x-axis



This transformation keeps x values ~~are~~ same but flips y value of co-ordinate positions.

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

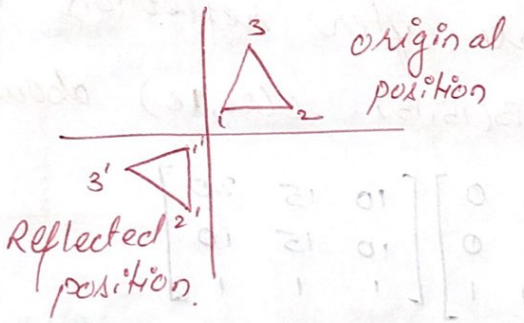
Reflection about y-axis.



This transformation keeps y values same but flips x values of co-ordinate positions.

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

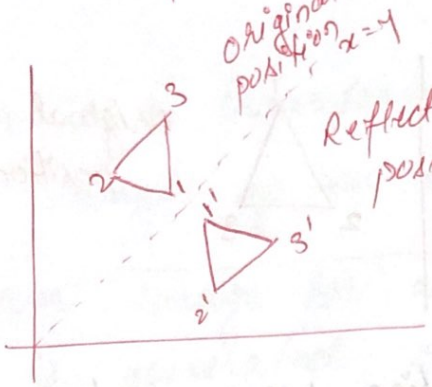
Reflection about origin.



This transformation flips x & y both values of co-ordinate positions.

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

Reflection about $x=y$ line



This transformation interchange x & y value of co-ordinate positions.

$$\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

Example:-

Q. Find the co-ordinate after reflection of the traingle A(10,10) B(15,15) C(20,10) about x-axis.

$$P' = \begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 10 & 15 & 20 \\ 10 & 15 & 10 \\ 1 & 1 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 10 & 15 & 20 \\ -10 & -15 & -10 \\ 1 & 1 & 1 \end{bmatrix}$$

Final co-ordinate after reflection are

A' (10, -10)

B' (15, -15)

C' (20, -10) //.