TRANSFORMATION

REFLECTION

If we stand in front of a mirror, our images come closer to the mirror and vice versa, it is known as reflection. In reflection, the mirror is represented by a line, which is called the axis of reflection. The properties of reflection are:

1. Lateral inversion of each other
2. Equidistant from the mirror line
3. Congruent to each other

Reflection using Co-ordinates

By using the coordinates, we can reflect a given object about the x-axis, y-axis, line y = x, line y= x etc.

Reflection in X-axis: When we reflect a point across the x-axis, the x co-ordinate remains the same, but y co-ordinate is transformed into negative.
The reflection of the point (x, y) across the x-axis is the point (x,−y).
$P(x, y) \rightarrow P'(x, -y)$
or, x-axis (x, y) = (x,−y)

Reflection in Y-axis: When we reflect a point across the y-axis, then y co-ordinator remains the same, but the x co-ordinate is transformed into negative.
The reflection of the point (x, y) across the y-axis is the point (−x, y).
$P(x, y) \rightarrow P'(-x, y)$
or, y-axis (x, y) = (−x, y)

Reflecting in the line y = x: When we reflect a point across the line y = x, the x co-ordinate and then y co-ordinate change place.
The reflection of the point (x, y) across the line y = x is the point (y, x).
$P(x, y) \rightarrow P'(y, x)$
or, y = x (x, y) = (y, x)

Reflection in line y = −x: When we reflect a point across the line y = −x, the x co-ordinate and then y co-ordinate change places and are negated or the signs are changes.
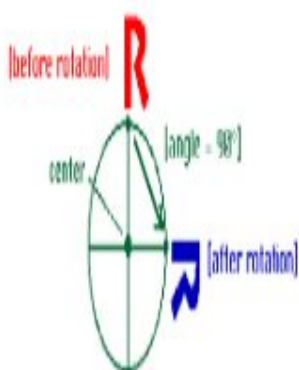The reflection point (x, y) across the line y = −x is the point (−y,−x)
$P(x, y) \rightarrow P'(-y,-x)$

ROTATION

Rotation

Rotation is a circular movement that has a central point that stays fixed and everything else moves around that point in a circle. A full rotation is 360°. The fixed point about which an object is rotated is called the centre of rotation and the angle through which every point of the object is rotated is called the angle of rotation.

The angle of rotation is positive is the rotation is made in an anti-clockwise direction and it is negative if the rotation is made in a clockwise direction.

Rotation using Co-ordinates

Rotation through 90° in an anti-clockwise direction about the centre at the origin(Positive Quater Turn): When we rotate the point along the 90°, the x-coordinate and y-coordinate changes the place and the signs are changed.
We write this as,
$P(x, y) \rightarrow P'(-y, x)$

Rotation through 90° in a clockwise direction about the centre at the origin (Negative Quarter Turn): When we rotate the point along the 90° the y-axis, then y-coordinates remain the same, but x-coordinator are transformed into its opposite.
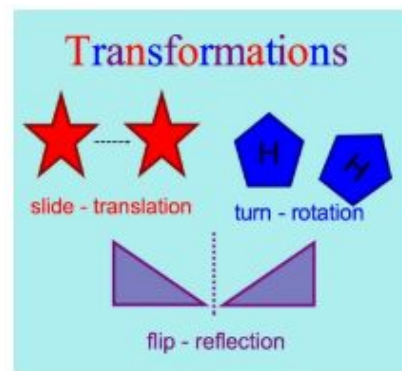We can write it as,
$P(x, y) \rightarrow P'(y, -x)$

Rotation through 180° about the centre at the origin (Half Turn): If the image is obtained by the rotation through 180° in an anti-clockwise direction about the centre at the origin is same or the image obtained by the rotation through 180° in clockwise direction.
We can write it as,
$P(x, y) \rightarrow P'(-x, -y)$

TRANSFORMATION

If the objects are changing either in position or in size or both then this process is known as transformation. It is also the process of changing the shape, size and position of geometric figures.
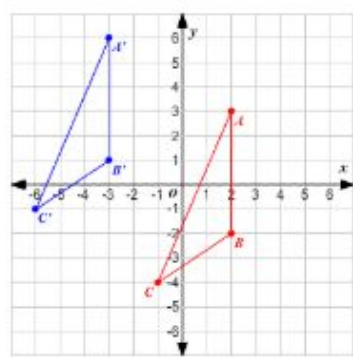
There are four types of transformation. They are:

1. Reflection
2. Rotation
3. Translation
4. Enlargement

Note: The shape and size of images remain same in reflection, rotation and translation. On the other hand, the size of the images is changed in enlargement or reduction.

TRANSLATION

Translation

Translation refers to moving an object without changing it in any other ways. In the other hand, it is a term used in geometry to describe a function that moves an object a certain distance in fixed direction and gives the congruent image. It is not rotated, reflected or re-sized.

Translation using Co-ordinates

The coordinator of the point which is translated forward and translated upward is the translation by using co-ordinates.
It can be written as,
$P(x, y) \rightarrow P'(x+a, y+b)$