Transformations Notes and Examples

1. **Reflection of a Shape in a Straight Line**

   A reflection transforms a shape by flipping it over a straight line, known as the **line of reflection**. Each point on the shape is mirrored across this line, maintaining the same distance from the line but in the opposite direction.

   Example:

   - Reflect the point $A(3, 4)$ over the line $y = x$.
     The reflected point A' will be $(4, 3)$, swapping the x and y coordinates.

2. **Rotation of a Shape About a Centre Through Multiples of 90°**

   A rotation turns a shape around a fixed point (the **centre of rotation**) by a specified angle. Rotations are commonly in multiples of 90°, such as 90°, 180°, 270°, and 360°.

   Example:

   - Rotate the point $P(2, 3)$ 90° counterclockwise about the origin.
     After rotation, P' will be $(-3, 2)$.

3. **Enlargement of a Shape from a Centre by a Scale Factor**

   Enlargement increases or decreases the size of a shape while maintaining its proportions. The **centre of enlargement** is the point from which the shape is enlarged or reduced, and the **scale factor** determines how much the shape is stretched or compressed.

   Example:

   - For a scale factor of 2, the point $B(2, 3)$ will move to $B'(4, 6)$, doubling the coordinates.
   - For a negative scale factor (e.g., -2), the shape will be enlarged in the opposite direction from the centre of enlargement. If the scale factor is a fraction (e.g., $\frac{1}{2}$), the shape shrinks.

4. **Translation of a Shape by a Vector**

   A translation moves every point of a shape by the same amount in the same direction. This movement is defined by a **vector** (x, y), where x is the horizontal displacement and y is the vertical displacement.

   Example:

   - Translate the point $C(1, 2)$ by the vector $(3, -2)$.
     The new point after translation will be $C'(4, 0)$.

Combinations of Transformations

You may be asked to combine transformations, such as first reflecting a shape and then translating it. In such cases, perform each transformation step by step.

For example:

- Reflect a shape over the y-axis, then translate it by the vector $(2, 3)$.
  First, reflect each point of the shape over the y-axis, and then apply the translation to each reflected point.