IGCSE MATHEMATICS • EXERCISE SHEET

E7.1 Transformations

Name: _____ Class: _____ Date: _____ **Total: 11 marks**

Objective

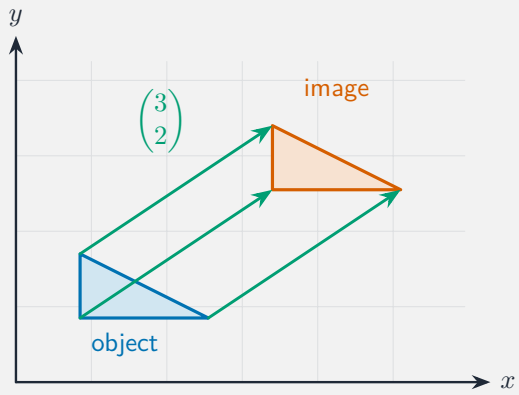
Build the skills to answer Extended exam questions on **transformations** 变换—**reflection, rotation, enlargement and translation** 反射、旋转、放大、平移—and describing them fully.

You must be able to:

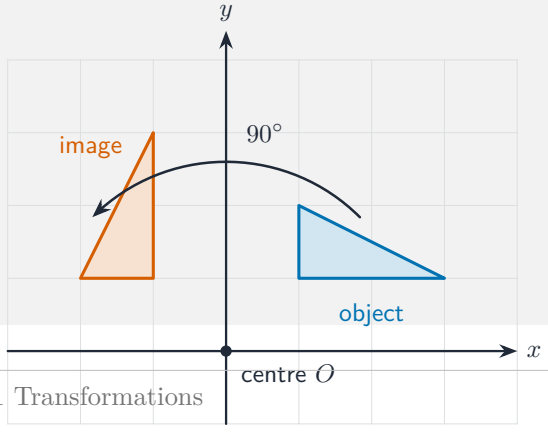
- find the image of a point under each transformation
- describe a transformation with all the required details
- use a column vector for a translation

1 Worked examples

■ The four transformations



Describe fully: name the type + all its details



Rotation is one of the four transformations

- **Reflection** 反射: give the mirror line. $(3, 2)$ in the y-axis $\to (-3, 2)$.
- **Rotation** 旋转: give centre, angle, direction. $(3, 1)$, $90°$ anticlockwise about $O \to (-1, 3)$.
- **Enlargement** 放大: give centre and scale factor k. $(1, 2)$ from O, $k = 2 \to (2, 4)$.
- **Translation** 平移: give the column vector. $(5, 3)$ by $\begin{pmatrix} -2 \\ 4 \end{pmatrix} \to (3, 7)$.

Answer shapes: **M1** a correct method, **A1** the correct answer.

2 Practice

2.1 Reflect the point $(4, 3)$ in the x-axis. [1]

2.2 Translate the point $(2, 1)$ by the vector $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$. [1]

2.3 Enlarge the point $(2, 3)$ from the origin by scale factor 2. [1]

3 Exam-style questions

3.1 The point $(4, 1)$ is rotated $90°$ anticlockwise about the origin. Find the image. [2]

3.2 Describe fully the single transformation that maps the point $(2, 5)$ onto $(2, -5)$. [2]

3.3 A shape is enlarged from the origin by scale factor $\frac{1}{2}$. The point $(6, 4)$ is on the shape. Find its image. [2]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **E7.1 Transformations** past-paper sheet in the Library, or try these in **Practice mode**:

- 0580/21 N25 —Q5 (transformations)
- 0580/42 N25 —Q8 (describe a transformation)

Solutions

Marking: **M1** a correct method, **A1** the correct answer.

2.1 $(4, -3)$.

2.2 $(2+3,\ 1-2) = (5, -1)$.

2.3 $(2\times 2,\ 3\times 2) = (4, 6)$.

3.1 the rule is $(x, y) \to (-y, x)$, so $(4, 1) \to (-1, 4)$.

3.2 a reflection in the x-axis (the y-coordinate changes sign).

3.3 $\left(6\times \frac{1}{2},\ 4\times \frac{1}{2}\right) = (3, 2)$.