

Transformations

Quick revision notes [Open it online](#)

Name: _____

Date: _____

At a glance

Reflections, rotations, translations and enlargements: drawing, describing and combining them.

1. Reflection
2. Rotation
3. Translation
4. Enlargement
5. Describing and combining

1. Reflection

☐ I revised this

- Every point moves to the same distance on the other side of the mirror line.
- Describe it with the **equation of the mirror line**: $x = 2$, $y = -1$, $y = x$, $y = -x$.
- In the x-axis: $(x, y) \rightarrow (x, -y)$. In the y-axis: $(x, y) \rightarrow (-x, y)$. In $y = x$: $(x, y) \rightarrow (y, x)$.

Worked example

Reflect the point $(2, 7)$ in the line $y = x$.

1. Swap the coordinates.

$(7, 2)$

2. Rotation

☐ I revised this

- Describe with **centre**, **angle** and **direction** (180° needs no direction).
- Use tracing paper: hold the centre with your pencil and turn.
- About the origin: 90° anticlockwise $(x, y) \rightarrow (-y, x)$; 90° clockwise $(x, y) \rightarrow (y, -x)$; 180° $(x, y) \rightarrow (-x, -y)$.

Worked example

Rotate $(4, 1)$ through 90° anticlockwise about the origin.

1. $(x, y) \rightarrow (-y, x)$.

$(-1, 4)$

3. Translation

☐ I revised this

- Every point moves the same distance in the same direction.
- Describe with a **column vector**: top number = right (+) / left (-); bottom number = up (+) / down (-).

Worked example

Translate $(-2, 3)$ by the vector with top 5 and bottom -4 .

1. $x: -2 + 5 = 3$.

2. $y: 3 - 4 = -1$.

$(3, -1)$

4. Enlargement

☐ I revised this

- Describe with **centre** and **scale factor**.
- Distance from the centre $\times$ scale factor gives the new position.
- Scale factor between 0 and 1 makes it smaller; negative puts the image on the other side of the centre, upside down.
- Find the centre: join matching corners of the shape and image and extend the lines to where they meet.

How to do it

1. Find the vector from the centre to a corner.
2. Multiply it by the scale factor.
3. Add the result to the centre.
4. Repeat for each corner.

Worked example

Triangle A has vertices (1, 1), (2, 1), (1, 3). Triangle B has (3, 3), (5, 3), (3, 7). Describe the transformation.

1. Lengths double: scale factor 2.
2. Joining matching corners meets at $(-1, -1)$.

Enlargement, scale factor 2, centre $(-1, -1)$

5. Describing and combining

☐ I revised this

- Name only **one** single transformation when asked — two answers score nothing.
- Use the exact words: reflection, rotation, translation, enlargement.
- Combinations: do the first, then the second, then describe the single transformation that does both.
- Reflection in the x-axis then the y-axis = rotation of 180° about the origin.

Transformation	You must give
Reflection	mirror line equation
Rotation	centre, angle, direction
Translation	column vector
Enlargement	centre, scale factor

Worked example

Reflect in $x = 1$, then in $x = 4$. What single transformation is this?

1. A point at $x = 0 \rightarrow x = 2 \rightarrow x = 6$: it moved 6 right; every point moves the same.

Translation by the vector with top 6 and bottom 0

Common mistakes

Don't write	Write instead
✗ 'Turn' or 'move' as the name	✓ Use rotation, translation, reflection, enlargement
✗ Reflecting in $y = x$ by changing the signs	✓ Swap the coordinates
✗ Enlarging from the origin when the centre is elsewhere	✓ Measure every distance from the given centre
✗ Giving two transformations when asked for one	✓ Find the single transformation

In the exam

- Check your image with tracing paper.
- Label images as instructed (A, B, C) — unlabelled shapes can lose marks.
- For enlargements, check the image size: every length $\times$ scale factor.

My notes