Sequences of steps and decisions

6 questions | 15 marks

Equivalent correct methods earn the corresponding marks.

1. Start at $(-1, 2)$, translate by $(3, -1)$, then enlarge by factor 2 from the origin. [2 marks]

Translation gives $(2, 1)$.

Enlargement gives $(4, 2)$.

Answer: $(4, 2)$

2. From $(0, 0)$, repeat “move 2 units right” four times. Find the final point. [2 marks]

Four moves give horizontal change $4 \times 2 = 8$, with no vertical change.

Answer: $(8, 0)$

3. Complete the decision: for segment length L, increase radius r if ___. [2 marks]

The radius must be greater than half the segment to produce two arc crossings.

Answer: $r \leq \frac{L}{2}$

4. Enlarge $P(1, 1)$ by factor 3 from the origin, then translate by $(2, 0)$. Find the image. [2 marks]

Enlargement gives $(3, 3)$.

Translation gives $(5, 3)$.

Answer: $(5, 3)$

5. Describe a finite compass algorithm to mark a regular hexagon on a circle. [4 marks]

Keep the compass width equal to the radius.

Six equal chords close the hexagon.

Stop after six sides.

Answer: Choose a starting point, step the circle radius around the circumference six times, then join neighbouring vertices.

6. An algorithm says “if four sides are equal, the quadrilateral is a square”. Give a counterexample and repair the decision. [3 marks]

Equal sides alone do not force right angles.

A quadrilateral with all sides equal and a right angle is a square.

Answer: A non-square rhombus; also require a right angle.