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 $4\times2=8$, 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: $r\leq L/2$

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.