

E4.2 Geometrical constructions

Name: _____ Class: _____ Date: _____ **Total: 23 marks**

KEY WORDS bearing 方位角 • scale drawing 比例图 • construct 作图 • compasses 圆规
• geometrical constructions 几何作图

Objective

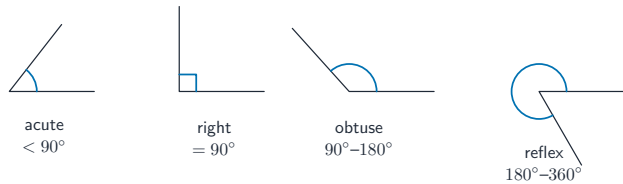
Build the skills to answer Extended exam questions on **geometrical constructions** 几何作图 — constructing triangles with **compasses** 圆规, **scale drawings** 比例图, and **bearings** 方位角.

You must be able to:

- describe how to construct a triangle from given sides
- use a scale to convert between drawing and real lengths
- work out a bearing and a back bearing

1 Worked examples

■ Constructions, scale and bearings



Leave construction arcs showing; measure bearings clockwise from north

- **Construct a triangle (3 sides):** draw the base, then mark each other side as a compass **arc**; the arcs cross at the third vertex.
- **Scale drawing** 比例图: e.g. 1 cm represents 5 m $\rightarrow$ a 6 cm line is 30 m.
- **Bearing** 方位角: three figures, clockwise from north. **Back bearing** differs by 180° .

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

2 Practice

2.1 A map uses a scale of 1 cm to 4 km. A road is 7 cm long on the map. Find its real length. [2]

2.2 The bearing of Q from P is 060° . Find the bearing of P from Q . [2]

2.3 Write down the three-figure bearing of due west. [1]

3 Exam-style questions

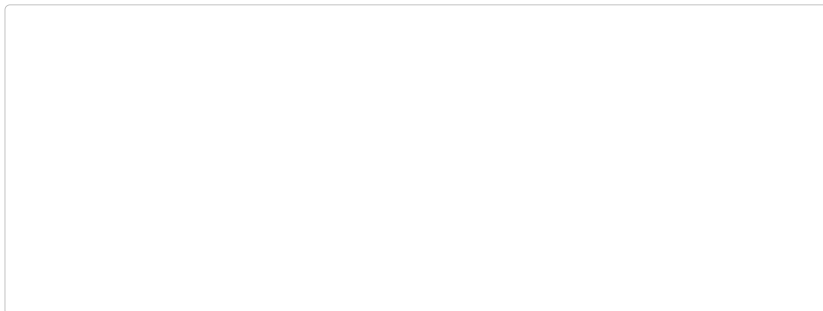
3.1 A scale drawing uses 1 cm to represent 20 m. A field is 250 m long. Find the length on the drawing. [2]

3.2 The bearing of B from A is 145° . Find the bearing of A from B . [2]

3.3 Describe how to construct a triangle with sides 6 cm, 5 cm and 4 cm. [2]

3.4 A triangular plot ABC has $AB = 8$ cm, $AC = 6$ cm and angle $BAC = 50^\circ$.

(a) Using ruler and compasses only, construct triangle ABC . Leave all construction arcs visible. [3]



(b) Construct the perpendicular bisector of BC , and the bisector of angle ABC . Label the point P where they cross. [4]



(c) State the two properties that make P special — one from each construction. [2]

(d) Shade the region inside the triangle that is **both** nearer to B than to C **and** less than 5 cm from A . [3]

Solutions

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

2.1 $7 \times 4 = 28$ km.

2.2 $060 + 180 = 240^\circ$.

2.3 270° .

3.1 $250 \div 20 = 12.5$ cm.

3.2 $145 + 180 = 325^\circ$.

3.3 draw the 6 cm base with a ruler; from one end set compasses to 5 cm and from the other end to 4 cm, draw two arcs that cross — the crossing point is the third vertex; join it to both ends.

3.4 (a) AB drawn accurately at 8 cm; angle 50° at A measured with a protractor and $AC = 6$ cm marked; BC joined and all arcs left visible.

(b) Perpendicular bisector: equal arcs drawn from B and from C , above and below BC , and the two crossings joined. Angle bisector at B : an arc from B cutting both arms, then equal arcs from those two points, joined to B . P labelled at the intersection.

(c) P is **equidistant from B and C** — every point on the perpendicular bisector of BC is; and P is **equidistant from BA and BC** — every point on the bisector of angle B is.

(d) Nearer to B than to C is the side of the perpendicular bisector of BC containing B ; less than 5 cm from A is inside a circle of radius 5 cm centred on A ; the required region is the overlap of those two, inside the triangle, correctly shaded.