

C4.3 Scale drawings

Name: _____ Class: _____ Date: _____

Total: 20 marks

KEY WORDS scale drawing 比例图 • bearing 方位角 • clockwise 顺时针 • edge 棱
• segment 弓形

Objective

Use scale drawings to solve Core IGCSE Mathematics problems.

You must be able to:

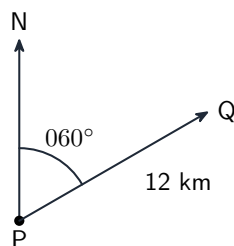
- Convert real and drawing lengths with a stated scale
- Measure three-figure bearings clockwise from north
- Find reverse bearings and check compass directions

1 Key knowledge and worked examples

■ Key knowledge: Scale drawings

Write the scale with matching units. If 1 cm represents 4 km, multiply drawing cm by 4 for km, or divide real km by 4 for drawing cm. A ratio scale 1 : 500 means every drawing length is $1/500$ of its real length in the same units. Bearings are three figures, measured clockwise from north. For the reverse bearing, add or subtract 180° to stay within a full turn.

■ Worked example: Scale drawings



At 1 cm to 3 km, a 4.5 cm map line represents $D = 4.5 \times 3 = 13.5$ km. A real 18 km route is $l = 18/3 = 6$ cm.

- Bearing 065° means turn clockwise 65 degrees from north.
- Its reverse is $b = 65 + 180 = 245^\circ$.
- Due east is 090° ; south 180° ; west 270° .

■ **Method check**

Bearings are measured clockwise from north at the point named after the word from.
A reverse bearing differs by 180 degrees, reduced to the interval 000–359.

2 Practice

2.1 A map scale is 1 cm to 5 km. Find the real length of a 3.6 cm line. [2]

2.2 At scale 1 : 200, find the drawing length for 14 m. [2]

2.3 Write the three-figure bearings for east and south. [2]

2.4 The bearing of B from A is 230° . Find the bearing of A from B. [2]

3 Exam-style questions

3.1 Apply the scale drawings methods below. Show working and include units where appropriate.

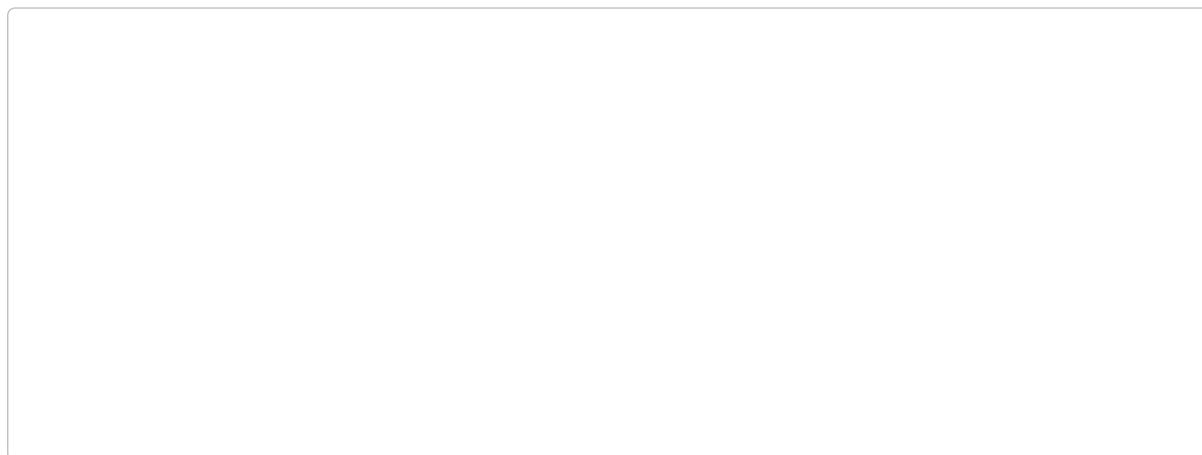
(a) A ship travels 12 km from P on bearing 060° . At 1 cm to 2 km, find the drawing length. [2]

(b) Make a scale drawing showing north at P and the ship at Q. [2]

(c) Find the bearing of P from Q. [2]

3.2 At a scale of 1 cm to 4 km, Q is 20 km from P on bearing 135° .

(a) Draw PQ to scale, with a north arrow at P. Find the bearing of P from Q. [3]



(b) A second map shows the same PQ distance using a 2.5 cm line. Find its scale in km per cm and explain which map is more enlarged. [3]

Solutions

Award method and answer marks as indicated; accept equivalent correct methods.

2.1

- $D = 3.6(5) = \mathbf{18}$ km.

2.2

- Convert 14 m = 1400 cm; $l = 1400/200 = \mathbf{7}$ cm.

2.3

- Clockwise from north gives 090° and 180° .

2.4

- Subtract a half-turn: $b = 230 - 180 = \mathbf{050^\circ}$.

3.1

(a)

- $l = D/s = 12/2 = \mathbf{6}$ cm.

(b)

- North ray at P; **6 cm ruled segment PQ clockwise 60° from north.**

(c)

- Reverse bearing: $b = 60 + 180 = \mathbf{240^\circ}$.

3.2

(a)

- Drawing length $l = 20/4 = \mathbf{5}$ cm.
- Draw this at **135° clockwise from north.**
- Reverse bearing $b = 135 + 180 = \mathbf{315^\circ}$.

(b)

- Scale value $s = D/l = 20/2.5 = \mathbf{8}$ km per cm.
- The **first map** is more enlarged: the same real distance has a longer drawn line, or fewer km per cm.