

Exercise walk-through

C4.3

Scale drawings

IGCSE Mathematics

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

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The method

Method — 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.

Exercises 2.1-2.3

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]

Exercises 2.1·2.3

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

2.1

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

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

2.2

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

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

2.3

- Clockwise from north gives 090° and 180° .

Exercise 2.4

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

[2]

3 Exam-style questions

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

3 Exam-style questions

2.4

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

Exercise 3.1 (a)

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]

Exercise 3.1 (a)

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]

(a)

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

Exercise 3.1 (b)

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

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

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

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

(b)

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

Exercise 3.1 (c)

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

(c) Find the bearing of P from Q.

[2]

Exercise 3.1 (c)

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

(c) Find the bearing of P from Q.

[2]

(c)

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

Exercise 3.2 (a)

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]

Exercise 3.2 (a)

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]

(a)

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

Exercise 3.2 (b)

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

(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]

Exercise 3.2 (b)

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

(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]

(b)

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