

Bearings and scale drawings

Pearson Edexcel GCSE Mathematics 1MA1 • L031
Foundation and Higher • 60 minutes • Lesson resources

REACH FOR THE STAR | GCSE MATHEMATICS

Interpret three-figure bearings and construct scale drawings with accurate distance and direction.

Optional numerical check for A3 only: $\sqrt{6^2+4^2}$ is about 7.21 km; this Pythagoras method is taught later. Use drawing as the core method. Numeric retrieval accepts 90 for 090; the teacher checks three-figure bearing notation.

Follow the task-specific calculator guidance below. Write on the lines or replace them with typed answers. Attempt before reading intentional practice feedback.

Connect & Check

Bearing: clockwise angle from north at the starting point, written with three digits. Reverse bearing: direction back along the same route. Scale: relationship between drawing and real lengths.

R1

Convert 1 km to metres.

R2

At 1 cm:2 km, what real distance is 3 cm?

R3

Find $180+65$.

Share | In pairs, predict the first step for this problem: Parallel north lines mean reversing a route changes the bearing by 180° , wrapping within 000° to 359° . A bearing of 060° is clockwise from north, not from east. At scale 1 cm:2 km, Compare your reasons before using the worked model.

Present through worked examples

Parallel north lines mean reversing a route changes the bearing by 180° , wrapping within 000° to 359° . A bearing of 060° is clockwise from north, not from east. At scale 1 cm:2 km, a 6 km route is drawn 3 cm long. Use the same units when writing a ratio scale.

D1

Model: east is bearing 090° . State bearings of south and west.

D2

Model: forward 060° reverses to 240° . Reverse bearing 125° .

D3

Model: forward 230° reverses to 050° . Reverse bearing 310° .

D4

Model: scale 1 cm:2 km makes 6 km into 3 cm. Draw an 8 km route at bearing 060° using this scale.

Apply with less support

Mark the start, north arrow and clockwise bearing. Convert distance to drawing length. Draw and label the endpoint. To reverse, add or subtract 180° . Check quadrant and real-distance conversion.

A1

At 1 cm:2 km, find paper lengths for 4, 6 and 10 km.

A2

At scale 1:50 000, a route measures 7.2 cm. Find its real length in kilometres.

A3

A boat travels 6 km on bearing 090° , then 4 km on bearing 000° . Draw at 1 cm:2 km; estimate direct distance and bearing from start.

Optional support: Label units.

Optional numerical check for A3 only: $\sqrt{6^2+4^2}$ is about 7.21 km; this Pythagoras method is taught later. Use drawing as the core method. Numeric retrieval accepts 90 for 090 ; the teacher checks three-figure bearing notation.

Apply and extend reasoning

C1

A learner gives $360 - 70 = 290^\circ$ as the reverse of 070° . Explain using compass directions.

C2

Two pupils use 1 cm:1 km and 1 cm:2 km for the same route. Should the measured bearing change? Explain.

Intentional practice feedback — read after attempting

A1: 2, 3 and 5 cm.

A2: 3.6 km.

A3: About 7.2 km and 056° .

C1: 070° points north-east; its return is south-west at 250° . 290° is north-west, not opposite.

C2: No; uniform scaling preserves angles. Length on first drawing is twice the second.

Correct one response and explain your change. Stretch is available to either tier; temporary support needs do not determine entry tier.

Recall & Review through retrieval

Work without notes. Six retrieval points; this attempt does not establish mastery. Equivalent exact numeric forms are accepted. Where accuracy is requested, also state the requested form in your written work.

Q1 Bearing of east, numeric degrees

Q2 Reverse of 070° , numeric degrees

Q3 Reverse of 310° , numeric degrees

Q4 km represented by 4 cm at 1 cm:2 km

Q5 cm for 10 km at 1 cm:2 km

Q6 Metres in 2.5 km

Intentional retrieval feedback

Q1 90; Q2 250; Q3 130; Q4 8; Q5 5; Q6 2500. Correct and retry tomorrow, then in one week.

Prove independently and improve

P1–P2: five minutes without notes; 4 marks. Your teacher reviews explanations and method marks.
P3 has no mark.

P1

The bearing from A to B is 245° . Find B to A and explain. [2]

P2

A scale 1:25 000 route is 8 cm. Find its real length in km, showing conversion. [2]

P3

Explain one corrected error. Record a fresh question and a date to check it without support.

Teacher feedback: _____

Fresh question and retry date: _____

Delayed independent evidence: _____

Prepare for the next lesson

L032: Geometry checkpoint and feedback

F1

Tomorrow reverse 035° and convert 4 cm at 1:50 000 to km.

F2

Before L032, reflect (3,2) in $x=0$ and find the supplement of 76° .

Read and prepare

The geometry checkpoint mixes angle reasoning, construction, transformations and scale. Use errors to choose a repair, then answer a fresh question without copying a model.

Digital workbook: save locally where available; export a JSON backup before closing or moving the file. Restore only this lesson/version. Printing records answers, not mastery. Live browser checks remain pending; use Word/PDF if required.

Optional extension activities

Allow 10–15 minutes for learners who have secured the main practice. Show a method, explain a check and justify your conclusion.

Stretch

A map scale is 1 cm:4 km. Two points are 7.5 cm apart. Find actual distance.

Deep challenge

The bearing of B from A is 065° . Find the bearing of A from B.

Recall & Review: feedback and extension integration

Lesson L031: Bearings and scale drawings

Objective: Interpret three-figure bearings and construct scale drawings with accurate distance and direction.

Timing for a 60-minute lesson

0-7 Connect & Check; 7-14 Share; 14-25 Present/model; 25-44 Apply route choice/practice; 44-52 independent exam-style check; 52-60 Recall & Review, WWW/EBI and next step.

Recall & Review evidence

At the end of the lesson, solve a fresh question without prompts, explain one check, correct one error and record the next practice step.

What Went Well (WWW)

I selected the correct geometric fact, theorem, formula or transformation and used a clear diagram with appropriate labels and units.

Even Better If (EBI)

I will name the fact or theorem, show the substitution or construction step and check whether the size, direction and units of the result are reasonable.

Integrated stretch and deep challenge

Stretch: A map scale is 1 cm:4 km. Two points are 7.5 cm apart. Find actual distance.

Deep challenge: The bearing of B from A is 065° . Find the bearing of A from B.

My next-step response
