

Teacher guide and workbook answers

Pearson Edexcel GCSE Mathematics 1MA1 • L028

60 minutes • Foundation and Higher • Teacher use only • Lesson resources

REACH FOR THE STAR | GCSE MATHEMATICS

Purpose and prerequisites

Use ruler and compass constructions and interpret loci as sets of points satisfying distance conditions.

L027 congruence and equal distances; L025 perpendicular angles; accurate ruler use.

Selected specification content: G1 G2 G15. These lessons revisit shared content; they do not complete every aspect of those statements.

Preparation and support

Prepare mini-whiteboards, printed fallbacks and a teacher calculator. Prepare rulers, compasses, protractors, tracing paper and the practical drawing sheets. Drawings and constructions require teacher review. Confirm save/export/restore in the intended environment; browser QA remains pending. Distribute only the learner package.

Access: pre-teach vocabulary and read symbols aloud. Scaffold: model the first decision, offer a worked-example or inverse-check frame. Core: remove prompts for A2 and P1–P2. Stretch: C1–C2 deepen reasoning for either tier. Record the support used, not a fixed ability label.

Evidence and pacing

The delivery map totals 60 minutes. Use the recall and hinge to select a repair; the suggested one-third error trigger is a planning judgement, not a validated threshold. If errors are widespread, use two minutes from independent practice and defer C2. P1–P2 need teacher marking. The mini-test and exam practice are delayed/additional activities, not extra tasks squeezed into the hour.

Points exactly 3 cm from O form A a disc, B a circle circumference, C a line. Answer B: every point has the same radius.

Recall and guided-practice answers

R1

90°. Right angle.

R2

4 cm. Midpoint distance.

R3

Equal distances to the two points. The common distance may vary.

D1

Line through midpoint at 4 cm, perpendicular to AB, with intersecting arcs. Equal-distance intersections determine the bisector.

D2

Two 35° angles; construction arcs retained. Protractor makes the starting angle, not the bisector.

D3

Circle centre P, radius 3 cm. Only circumference; no interior shading.

D4

Strip between parallel lines 1 cm each side, including boundaries. Distance measured perpendicular.

Application and challenge answers

A1

Arc from P cuts l at X,Y; bisect XY and draw through P to l . The constructed line is at 90° .

A2

Two intersections of radius-4 circles centred A and B. Both conditions must hold.

A3

Intersect the closed radius-3 disc with the perpendicular bisector of AB. May be a segment, point or empty, depending on positions.

C1

One equidistant point is insufficient to locate the bisector line; use two intersections, or one and the known midpoint. Joining A is generally wrong. A is not equidistant from itself and B.

C2

None; the two circles are separated since $3+3 < 8$. Maximum total reach is 6 cm.

Calculator guidance: No calculator needed. Practical construction quality is teacher reviewed. Use a ruler to check distances and a protractor to check right angles after constructing; they do not replace compass evidence.

Independent evidence and next steps

P1

Perpendicular to AB B1; passes through midpoint B1. A whole line, not just midpoint.

P2

One B1; circles touch at midpoint because radii sum to separation B1. Teacher reviews reasoning.

P3

Individual reflection. Record support and delayed evidence; completion is not mastery.

F1

Equal-radius arcs give equal-distance points and congruent triangles. Teacher inspects arcs.

F2

y-axis, $x=0$. Same y, opposite x.

Retrieval answers: 5, 40, 6, 90, 2, 0. Exact signed decimals/fractions/mixed numbers are accepted; unsupported notation goes to review. No automatic method marks. For rounding, equivalent numerical values may pass retrieval; the teacher checks stated accuracy and required trailing zeros in written work.

Reteaching and release

If a midpoint is guessed, demand two pairs of arcs. If distance to a line is slanted, compare it with a perpendicular. If a circle is shaded for exactly 3 cm, distinguish boundary from region. Recheck with the practical sheet.

Practice feedback is intentionally visible. Full assessment answers, this guide and delivery notes are teacher-only. Local saving is browser dependent; no account service is included. Completed resources enter Review; human approval and outstanding browser checks remain 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

Construct the perpendicular bisector of an 8 cm segment. How far is its midpoint from either endpoint?

Answer and reasoning: 4 cm; every point on the bisector is equidistant from endpoints.

Deep challenge

A point is 3 cm from A and 4 cm from B. Describe the intersection of its loci.

Answer and reasoning: Intersections of circles centred A radius 3 cm and B radius 4 cm, if the circles meet; up to two points.

Ask for a fresh independent explanation before deciding that the method is secure.

Activate Learning lesson cycle

Connect & Check: state the objective and diagnose prior knowledge. Share: pairs predict and compare methods. Present: explain or uncover the model. Apply: fade support for independent practice and optional stretch. Recall & Review: use a fresh question and feedback to decide the next step.

Recall & Review: feedback and extension integration

Lesson L028: Constructions and loci

Objective: Use ruler and compass constructions and interpret loci as sets of points satisfying distance conditions.

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: Construct the perpendicular bisector of an 8 cm segment. How far is its midpoint from either endpoint?

Deep challenge: A point is 3 cm from A and 4 cm from B. Describe the intersection of its loci.

Teacher use

Use the What Went Well (WWW) and Even Better If (EBI) prompts to write mathematics-specific feedback linked to the objective. Do not accept generic praise: identify the method, representation, reasoning or checking step that improved, then set a fresh next-step question.

Assessment evidence to inspect: Check the formative mini-test and independent workbook response against the objective. Use the teacher answers or mark guidance; group errors for reteaching. No calculator needed. Practical construction quality is teacher reviewed. Use a ruler to check distances and a protractor to check right angles after constructing; they do not replace compass evidence..