

Teacher guide and workbook answers

Pearson Edexcel GCSE Mathematics 1MA1 • L021

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

REACH FOR THE STAR | GCSE MATHEMATICS

Purpose and prerequisites

Substitute into formulae and change the subject by inverse operations. State necessary restrictions and check with values.

L017 substitution; L018 factorising; L019 equations; L020 forming models.

Selected specification content: A2 A5. 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. Use ratio tables, algebra tiles, balance diagrams and number lines as appropriate. 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.

Make x the subject of $y=3x+4$: A $y-4/3$, B $(y-4)/3$, C $(y+4)/3$. Answer B.

Recall and guided-practice answers

R1

$x=5$. Subtract 4 then divide by 3.

R2

11. Substitute then calculate.

R3

$2x+10$. Both terms are multiplied.

D1

$a=b+7$. Add 7 on both sides.

D2

$n=(C-2)/5$. Subtract 2 then divide the whole difference.

D3

$w=(P-2l)/2$ or $P/2-l$. Subtract $2l$ then divide by 2.

D4

$t=d/v$. $vt=d$, then divide by v ; original $t \neq 0$.

Application and challenge answers

A1

$(y-3)/2$; $y/2-3$; $2(y-3)$. Read the complete operation chain.

A2

$h=2A/b$; $h=12$. Multiply by 2 then divide by b .

A3

$d=(C-4)/3$; 7 km. Remove the fixed cost before finding distance.

C1

Yes: divide both terms of $P-2w$ by 2. Distribution of division over a sum/difference.

C2

At $y=10$ it gives $-2/3$, but $x=2$ is correct. Use $x=(y-4)/3$. Subtract before dividing.

Calculator guidance: Optional check: choose $x=2$ in $y=3x+4$ to give $y=10$. Enter $(10-4)\div 3$ to recover 2. Parentheses must reflect the written numerator.

Independent evidence and next steps

P1

$y+3=4x$ M1; $x=(y+3)/4$ A1. Keep whole numerator grouped.

P2

$2A=bh$ M1; $h=2A/b$ A1. Accept equivalent forms.

P3

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

F1

$x=(y-6)/5$. Check with $x=2, y=16$.

F2

Equality gives one value; inequality gives every real value above 3. 3 itself is excluded by $>$.

Retrieval answers: 5, 12, 6, 3, 7, 4. 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 brackets are omitted, compare $(y-4)/3$ with $y-4/3$ at $y=10$. If the same letter is on both sides, use the separate Higher route after common-factor work. Recheck $y=2x+6$ as $x=(y-6)/2$.

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

Rearrange $A = \pi r^2$ for positive r , then find r when $A = 49\pi \text{ cm}^2$.

Answer and reasoning: $r = \sqrt{A/\pi}$, so $r = 7 \text{ cm}$.

Deep challenge

Rearrange $v = u + at$ for t and identify when the rearrangement is invalid.

Answer and reasoning: $t = (v - u)/a$, provided $a \neq 0$.

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 L021: Formulae and rearranging

Objective: Substitute into formulae and change the subject by inverse operations. State necessary restrictions and check with values.

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 represented the algebraic structure accurately, kept each transformation valid and checked the result by substitution, graph or equivalent reasoning.

Even Better If (EBI)

I will show the missing inverse operation or algebraic step, keep signs and brackets accurate and test the result in the original relationship.

Integrated stretch and deep challenge

Stretch: Rearrange $A = \pi r^2$ for positive r , then find r when $A = 49\pi \text{ cm}^2$.

Deep challenge: Rearrange $v = u + at$ for t and identify when the rearrangement is invalid.

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. Non-calculator core; optional calculator check.