

Number diagnostic and repair

Pearson Edexcel GCSE Mathematics 1MA1 • L004
Foundation and Higher • 60 minutes • Lesson resources

REACH FOR THE STAR | GCSE MATHEMATICS

Diagnose a number error, repair the method, and choose an independent check that tests the original calculation.

Work without a calculator except where a check is invited. Write on the lines or replace them with typed answers. Attempt before reading intentional practice feedback.

Connect & Check

Diagnostic: evidence used to choose what to reteach. Inverse: an operation that undoes another. Estimate: an approximate check of size. Counterexample: one case disproving an always claim. Evidence: working that supports a conclusion.

R1

Without notes, calculate (a) $-7 - (-5)$ (b) $(-4) \times (-3)$. Show one check.

R2

Calculate $18 \div 3 \times 2$ and $7 + 3 \times (-2)$. Name the first operation in each.

R3

Calculate 0.48×100 . Round 6.286 to 2 decimal places.

Wider prerequisite screen — ungraded

These questions identify support for later units. They do not assess this week's taught content and do not determine a grade or tier. Show your thinking; your teacher will plan support.

B1

Algebra prerequisite: if $x = 3$, find $2x + 1$.

B2

Geometry prerequisite: a rectangle is 5 cm long and 3 cm wide. Find its area and include units.

B3

Data prerequisite: find the mean of 2, 4 and 9.

Share | In pairs, predict the first step for this problem: A correct answer copied from feedback does not establish secure understanding. Use attempt → locate the first error → explain and repair → check independently → solve a fresh match Compare your reasons before using the worked model.

Present through worked examples

A correct answer copied from feedback does not establish secure understanding. Use attempt → locate the first error → explain and repair → check independently → solve a fresh matched problem after a delay. Match the check to the risk: inverse for an operation, place value for scale, estimate for magnitude, and substitution into the original expression for a missing number.

D1

A learner writes $-6 - (-4) = -10$. Repair: subtracting -4 adds 4, so -2 . Check $-2 + (-4) = -6$. Now repair $-8 - (-3) = -11$.

D2

A learner writes $6 + 2 \times (-5) = -40$. Repair: $6 + (-10) = -4$. Complete $9 + 2 \times (-4) = 9 + \underline{\quad} = \underline{\quad}$.

D3

A learner writes $0.36 \times 100 = 0.036$. Explain the error and calculate 0.72×100 .

D4

An estimate gives $19.7 \times 4.2 \approx 20 \times 4 = 80$. Can it prove that 82.74 is exactly correct? Explain.

Apply with less support

Keep the original calculation visible. Repeating the same incorrect method is not an independent check. A useful repair names the decision that went wrong and succeeds on a fresh question with the support removed.

A1

Fresh signed repair: calculate $-9 - (-6)$ and $-32 \div (-8)$. Give an inverse check for each.

A2

Fresh order repair: calculate $24 \div 4 \times 3$ and $5 + 2 \times (-6)$. Show the first step.

A3

Fresh scale repair: find 0.84×100 ; round 7.386 to 2 decimal places; estimate 19.7×4.2 to 1 significant figure per factor.

Optional support: explain the first decision aloud; use a matching worked example, then cover it.

Core work is non-calculator. After A3, a calculator may confirm $19.7 \times 4.2 = 82.74$. Estimate first: $20 \times 4 = 80$. A display can confirm arithmetic, but does not explain an error or prove understanding.

Apply and extend reasoning

C1

A learner repeats exactly the same steps and gets the same answer twice. Does this prove the method is correct? Give an example.

C2

Two proposed answers to 19.7×4.2 are 82.74 and 82.47. Both are near 80. Explain how to decide which is correct.

Intentional practice feedback — read after attempting

A1: -3 , checked by $-3 + (-6) = -9$; 4 , checked by $(-8) \times 4 = -32$.

A2: 18 ; -7 . First steps $24 \div 4 = 6$ and $2 \times (-6) = -12$.

A3: 84 ; 7.39 ; 80 .

C1: No. Repeating $2 + 3 \times 4$ as $(2 + 3) \times 4$ gives 20 twice; the correct value is 14.

C2: Use exact calculation: $19.7 \times 4 = 78.8$ and $19.7 \times 0.2 = 3.94$; sum 82.74.

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 $-8 - (-5)$

Q2 $(-3) \times (-7)$

Q3 $16 \div 4 \times 2$

Q4 $4 + 3 \times (-2)$

Q5 0.73×100

Q6 4.687 rounded to 2 decimal places

Intentional retrieval feedback

Q1 -3 ; Q2 21; Q3 8; Q4 -2 ; Q5 73; Q6 4.69. 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

Without prompts, repair $8 + 2 \times (-3) = -30$. State the first error and correct the answer. [2]

P2

A learner says $0.57 \times 100 = 5.7$. Correct the result and give an inverse check. [2]

P3

Choose one repair priority. Name your fresh question, support to remove and next reassessment date.

Teacher feedback: _____

Fresh question and retry date: _____

Delayed independent evidence: _____

Prepare for the next lesson

L005: factors, multiples and primes

F1

Tomorrow calculate $-11 - (-4)$, $18 \div 3 \times 2$ and 0.29×100 .

F2

Before L005, list the positive factors of 12. Which of 1, 2, 9 and 11 are prime?

Read and prepare

A factor divides a whole number exactly. The positive factors of 12 are 1, 2, 3, 4, 6 and 12. A prime is an integer greater than 1 with exactly two positive factors. Pair factors systematically to avoid missing one.

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

Stretch

A learner calculates $-7 - (-12) = -19$. Locate the first error and repair it.

Deep challenge

Create an independent check for $35 \times 0.8 = 28$ that does not simply repeat the multiplication.

Recall & Review: feedback and extension integration

Lesson L004: Number diagnostic and repair

Objective: Diagnose a number error, repair the method, and choose an independent check that tests the original calculation.

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 used my working and assessment evidence to identify the exact mathematical step that was secure and the specific misconception that needs attention.

Even Better If (EBI)

I will correct one precise step, explain why the correction works and complete a fresh delayed question without the original scaffold.

Integrated stretch and deep challenge

Stretch: A learner calculates $-7 - (-12) = -19$. Locate the first error and repair it.

Deep challenge: Create an independent check for $35 \times 0.8 = 28$ that does not simply repeat the multiplication.

My next-step response
