

Place value and estimation

Pearson Edexcel GCSE Mathematics 1MA1 • L003
Foundation and Higher • 60 minutes • Lesson resources

REACH FOR THE STAR | GCSE MATHEMATICS

Use place value to scale and compare decimals, round to stated accuracy, and judge whether a calculation is reasonable.

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

Decimal place: position after the decimal point. Significant figure: a digit counted from the first non-zero digit. Estimate: an approximate calculation. Approximately equal: $\approx$. Placeholder zero: a zero that preserves position or stated accuracy.

R1

Calculate $-8 - (-3)$ and $18 \div 3 \times 2$.

R2

What is the value of 7 in 5,072? Write $300 + 40 + 6$ as one number.

R3

Which is greater: 0.6 or 0.56? Explain without a calculator.

Share | In pairs, predict the first step for this problem: In 4.063, the digits represent 4 ones, 0 tenths, 6 hundredths and 3 thousandths. Multiplying by ten makes each digit's value ten times as large; the decimal point marks the boundary Compare your reasons before using the worked model.

Present through worked examples

In 4.063, the digits represent 4 ones, 0 tenths, 6 hundredths and 3 thousandths. Multiplying by ten makes each digit's value ten times as large; the decimal point marks the boundary between ones and tenths. Pad decimals with trailing zeros to compare equal places: $0.6 = 0.60 > 0.56$.

D1

Worked example: $4.063 = 4 + 0.06 + 0.003$. Write 2.507 in expanded form and state the value of 5.

D2

Worked example: $0.47 \times 100 = 47$. Complete $3.06 \times 10 = \underline{\hspace{1cm}}$ and $3.06 \div 100 = \underline{\hspace{1cm}}$.

D3

Worked example: 6.284 to 2 decimal places is 6.28. Round 6.286 to 2 decimal places. Explain the changed decision.

D4

Worked example: 0.004762 to 2 significant figures is 0.0048. Round 0.007341 to 2 significant figures.

Apply with less support

For rounding, identify the retained place and inspect the next digit. At 5 or above, increase the retained digit; otherwise keep it. Carry where needed. For significant figures, begin at the first non-zero digit. Estimate by replacing awkward numbers with convenient approximations, then compare the scale and units of the result.

A1

Calculate (a) 0.52×10 (b) 0.52×100 (c) $0.52 \div 10$ (d) $0.52 \div 100$.

A2

Round (a) 9.976 to 2 decimal places (b) 0.00684 to 2 significant figures (c) 4.7 to 2 decimal places.

A3

Estimate 19.8×4.9 by rounding each factor to 1 significant figure. Then calculate exactly. Would 970.2 be reasonable?

Optional support: Use a place-value chart, then cover it.

After estimating A3, enter 19.8×4.9 . Expect 97.02. Compare with $20 \times 5 = 100$. Read the whole display; do not round intermediate values in a multi-step calculation unless instructed.

Apply and extend reasoning

C1

Round 2.449 directly to 1 decimal place. Compare with rounding to 2 decimal places first, then to 1. Explain why you should round once at the end.

C2

A length is 1.96 m. Round it to the nearest 0.1 m, then express that rounded value in cm. Compare with rounding 196 cm to the nearest 10 cm.

Intentional practice feedback — read after attempting

A1: 5.2; 52; 0.052; 0.0052.

A2: 9.98; 0.0068; 4.70.

A3: $20 \times 5 = 100$; exact 97.02. No: 970.2 is about ten times the estimate.

C1: Direct: 2.4. In stages: 2.45 then 2.5. The intermediate rounding changes the final result.

C2: 2.0 m = 200 cm; 196 cm to the nearest 10 cm is also 200 cm.

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 0.38×100

Q2 $52 \div 100$

Q3 Value of 7 in 3.074

Q4 8.476 rounded to 2 decimal places

Q5 0.00684 rounded to 2 significant figures

Q6 Estimate 29.7×3.2 : use 1 significant figure per factor

Intentional retrieval feedback

Q1 38; Q2 0.52; Q3 0.07; Q4 8.48; Q5 0.0068; Q6 90. 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

Round 7.386 to 2 decimal places. Identify the decision digit. [2]

P2

Estimate 39.6×2.1 using 1 significant figure for each factor. A display says 831.6. Explain whether it is reasonable. [2]

P3

Record one place-value or rounding error, your correction and a fresh check for tomorrow.

Teacher feedback: _____

Fresh question and retry date: _____

Delayed independent evidence: _____

Prepare for the next lesson

L004: number diagnostic and repair

F1

Tomorrow find 0.63×100 and round 5.278 to 2 decimal places.

F2

Before L004, estimate 18.9×3.1 . Explain what an estimate can and cannot check.

Read and prepare

A useful check must test the original calculation. An inverse check undoes an operation; an estimate checks size. For 18.9×3.1 , $20 \times 3 = 60$ suggests an answer near 60, not 6 or 600.

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

Round 0.004976 to two significant figures and estimate 397×0.049 .

Deep challenge

A number rounds to 3.50 to two decimal places. Give its interval and explain the excluded endpoint.

Recall & Review: feedback and extension integration

Lesson L003: Place value, decimals and estimation

Objective: Use place value to scale and compare decimals, round to stated accuracy, and judge whether a calculation is reasonable.

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 an efficient numerical method, showed the key steps clearly and checked the sign, size or accuracy of my answer.

Even Better If (EBI)

I will make the place-value, sign or operation decision explicit and use estimation or an inverse calculation to check a fresh question.

Integrated stretch and deep challenge

Stretch: Round 0.004976 to two significant figures and estimate 397×0.049 .

Deep challenge: A number rounds to 3.50 to two decimal places. Give its interval and explain the excluded endpoint.

My next-step response
