

Linear equations

Pearson Edexcel GCSE Mathematics 1MA1 • L019
Foundation and Higher • 60 minutes • Lesson resources

REACH FOR THE STAR | GCSE MATHEMATICS

Solve linear equations while preserving equality. Check solutions in the original equation, including unknowns on both sides.

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

Solution: value making an equation true. Inverse: operation that undoes another. Balance: both sides represent equal values. Linear: unknown occurs to power one after simplification.

R1

Simplify $3x+2x$.

R2

Expand $2(x+3)$.

R3

Evaluate $3x-2$ for $x=4$.

Share | In pairs, predict the first step for this problem: Equality is preserved when the same amount is added to or subtracted from both sides. Multiplying or dividing both sides by the same non-zero number also preserves equality. Undo o Compare your reasons before using the worked model.

Present through worked examples

Equality is preserved when the same amount is added to or subtracted from both sides. Multiplying or dividing both sides by the same non-zero number also preserves equality. Undo operations in reverse order; moving terms is shorthand for these balanced operations.

D1

Model: $x+5=12$ gives $x=7$ by subtracting 5 on both sides. Now solve $x-4=9$.

D2

Model: $3x+2=14$ gives $3x=12$ then $x=4$. Now solve $4x-3=17$.

D3

Model: $2(x+3)=14$ gives $x+3=7$ then $x=4$. Now solve $3(x-2)=15$.

D4

Model: $5x+1=3x+9$ gives $2x=8$, so $x=4$. Now solve $7x-2=4x+13$.

Apply with less support

Simplify brackets first. Subtract an unknown term from both sides if needed. Undo addition or subtraction, then multiplication or division. Substitute into the original equation and compare both sides.

A1

Solve $2x+3=11$; $2x-3=11$; $3-2x=11$. Explain why the solutions differ.

A2

Solve $4(x+2)=3x+13$ and check in the original equation.

A3

A number is tripled and then 7 is added, giving 31. Form an equation and find the number.

Optional support: Write the balanced operation each time.

Optional check after A2: enter $4 \times (5+2)$ and $3 \times 5 + 13$. Both give 28. Checking does not replace showing the balanced solving steps.

Apply and extend reasoning

C1

A learner solves $2x+6=14$ as $x+6=7$. Explain the mistake and give the solution.

C2

Compare $2(x+3)=2x+6$ with $2(x+3)=2x+7$. How many solutions does each have?

Intentional practice feedback — read after attempting

A1: $x=4$; $x=7$; $x=-4$.

A2: $x=5$; both sides equal 28.

A3: $3x+7=31$; $x=8$.

C1: Dividing by 2 must divide every term: $x+3=7$, so $x=4$.

C2: First: all real x . Second: none, since 6 cannot equal 7.

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 Solve $x+5=12$

Q2 Solve $3x=18$

Q3 Solve $2x-3=11$

Q4 Solve $3-2x=11$

Q5 Solve $5x+1=3x+9$

Q6 $\frac{3}{4}$ of 28

Intentional retrieval feedback

Q1 7; Q2 6; Q3 7; Q4 -4 ; Q5 4; Q6 21. 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

Solve $5x - 4 = 16$. Show balanced steps. [2]

P2

Solve $6x + 1 = 4x + 13$. Show a method. [2]

P3

Explain one corrected error. Set 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

L020: Equations in contexts

F1

Tomorrow solve $3x+4=19$ and check.

F2

Before L020, write an expression for the cost of n tickets at £4 each plus a £3 booking fee.

Read and prepare

Translate the situation before solving. Define the unknown and its units, form the equation, solve it, then decide whether the answer makes sense in the context.

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

Solve $5(2x-1)=3x+16$ and check.

Deep challenge

Explain why dividing $3x+6=12$ by 3 gives $x+6=4$ incorrectly.

Recall & Review: feedback and extension integration

Lesson L019: Linear equations

Objective: Solve linear equations while preserving equality. Check solutions in the original equation, including unknowns on both sides.

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: Solve $5(2x-1)=3x+16$ and check.

Deep challenge: Explain why dividing $3x+6=12$ by 3 gives $x+6=4$ incorrectly.

My next-step response
