GCSE MATHEMATICS

FOUNDATION TIER
COMPREHENSIVE LESSON NOTEBOOK
UNIT 3 | ALGEBRA

TEACH-FROM-SCRATCH • PUBLICATION EDITION

10 detailed chapters • original diagrams • worked examples • guided practice • answers

INDEPENDENT PUBLICATION NOTICE

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COMPREHENSIVE LESSON NOTEBOOK

How to learn from this notebook

Meaning first. Method second. Practice third.

FIVE-PASS ROUTINE

1 Read the key idea without a calculator. 2 Cover each worked solution and reproduce it. 3 Complete practice independently. 4 Mark in a different colour and repair errors. 5 Retest after 2–7 days.

What a complete mathematics answer contains

- A clear model or calculation, not only a calculator display.
- Enough working for another person to follow the reasoning.
- Exact values until approximation is requested.
- Units and sensible rounding in context.
- A final statement when interpretation is required.

Error loop

REPAIR, DO NOT MERELY CORRECT

Label each error: concept, operation, arithmetic, calculator entry, accuracy, unit or interpretation. Write the corrected step and one sentence explaining the change.

Foundation does not mean superficial

OCR Foundation questions can combine familiar skills in unfamiliar contexts. Grade 4–5 success depends on selecting a method, connecting several steps and deciding whether the answer is reasonable.

COMPREHENSIVE LESSON NOTEBOOK

Unit 3 coverage map

OCR J560 Algebra content organised into a teachable sequence.

CH 01	OCR 6.01a; 6.02a	Algebraic language and forming expressions
CH 02	OCR 6.01b-6.01c	Collecting terms and simplifying products
CH 03	OCR 6.01d-6.01e	Expanding and factorising single brackets
CH 04	OCR 6.02b; 6.02d	Substitution and using formulae
CH 05	OCR 6.02c	Changing the subject of a formula
CH 06	OCR 6.03a	Solving linear equations
CH 07	OCR 6.03b-6.03c	Quadratic and simultaneous equations
CH 08	OCR 6.04a	Linear inequalities
CH 09	OCR 6.06a-6.06b	Sequences and nth terms
CH 10	OCR 6.02e; 6.05a; 6.01-6.06 synthe	Functions, formula use and mixed algebra

IMPORTANT TIER NOTE

This notebook covers OCR J560 section 6 at Foundation Tier: expressions, formulae, equations, inequalities and sequences. Specification references are identifiers, not copied specification wording.

COMPREHENSIVE LESSON NOTEBOOK

Fast-reference method bank

Understand each relationship before memorising it.

Like terms	same variable part; combine coefficients
Expand / factorise	a(b+c)=ab+ac; reverse with a common factor
Substitute	replace symbols; bracket negative values
Rearrange	same inverse operation on both sides
Equations	simplify, isolate, substitute to check
Inequality	reverse sign after × or ÷ by a negative
Arithmetic nth term	difference × n, then adjust
Function	input x is mapped to one output f(x)
Kinematics	$v=u+at$; $s=ut+\frac{1}{2}at^2$
Formula policy	use the formula supplied for the current exam series

CURRENT ASSESSMENT NOTE

OCR has announced Foundation and Higher formula sheets for GCSE Mathematics examinations in 2025, 2026 and 2027. Use the current official OCR sheet alongside this learning bank and check OCR for later exam-series arrangements.

COMPREHENSIVE LESSON NOTEBOOK

Algebraic language and forming expressions

Translate relationships into precise algebra.

SPECIFICATION FOCUS

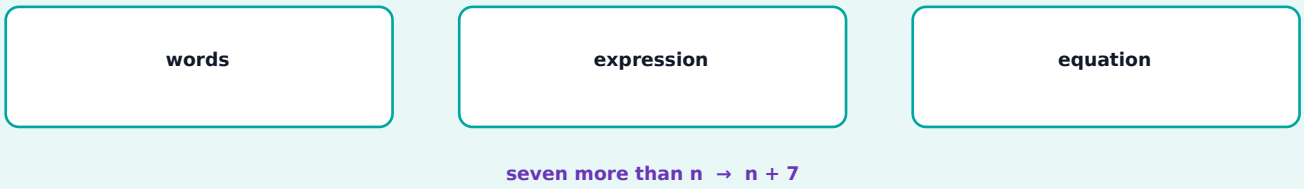
OCR reference OCR 6.01a; 6.02a. This lesson develops representation, accurate calculation, reasoning and interpretation within Foundation Tier.

Understand the idea

Algebra represents general relationships. A letter can stand for an unknown or a changing quantity. An expression has no equals sign; an equation claims two expressions are equal; a formula links quantities; an identity is true for every permitted value.

KEY VOCABULARY

variable • coefficient • term • expression • equation • identity • formula



Why the method works

- Letters allow one rule to describe many numerical cases.
- Operation order and brackets preserve the intended relationship.
- Precise terminology tells you what kind of task is possible.

CHECK BEFORE MOVING ON

Answer mentally: Write an expression for 7 more than n. Then define one key word from this page in your own words.

COMPREHENSIVE LESSON NOTEBOOK

Algebraic language and forming expressions — method and examples

Follow the reasoning; do not copy steps mechanically.

Reliable method

- Identify the unknown and choose a letter.
- Translate operations in their spoken order.
- Keep expressions, equations, identities and formulae distinct.

WORKED EXAMPLE 1

Write an expression for 7 more than n.

SOLUTION

1. “More than” means add 7 to n.

ANSWER: n + 7

WORKED EXAMPLE 2

Write an expression for the cost of x tickets at £6 each plus a £2 booking fee.

SOLUTION

1. x tickets cost 6x pounds.
2. Add the fixed £2 fee.

ANSWER: 6x + 2

SELF-CHECK QUESTION

Which step carries the mathematical reason, and which step carries only arithmetic? Being able to distinguish them makes a solution easier to repair.

COMPREHENSIVE LESSON NOTEBOOK

Algebraic language and forming expressions — apply and reason

Connect the method to decisions and common errors.

Where this mathematics appears

Pricing rules, perimeters, age relationships and computer formulas all translate words into algebra.

Common misconceptions

- Reversing “less than” phrases.
- Omitting brackets around a total.
- Treating an expression as if it can be solved.

GUIDED TRY

State whether 3x+5 is an expression or equation. First predict the form or approximate size of the answer. Then show the complete method.

REASONING PROMPT

Explain why 5(a+2) is not the same as 5a+2. Explain why each condition or operation you use is valid.

EXAM COMMUNICATION

Use one mathematical statement per line. Label units and restrictions. If the result is approximate, show the unrounded value before the final rounded answer.

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

Algebraic language and forming expressions

Complete without notes. Show all working, then use the answer section to diagnose and repair errors.

1. **Write an expression for 7 more than n.** **[1]**

2. **Write an expression for the cost of x tickets at £6 each plus a £2 booking fee.** **[2]**

3. **State whether 3x+5 is an expression or equation.** **[1]**

4. **Write an equation: three times a number, increased by 4, equals 25.** **[2]**

5. **A rectangle has width w and length w+3. Write its perimeter.** **[3]**

6. **Write an expression for half of the total of y and 8.** **[2]**

7. **The nth odd number is 2n-1. Find the 20th odd number.** **[2]**

8. **Explain why 5(a+2) is not the same as 5a+2.** **[2]**

REFLECTION

Circle one: secure / almost / reteach. Record the question number of your most useful error and the rule that repairs it.

COMPREHENSIVE LESSON NOTEBOOK

Collecting terms and simplifying products

Simplify without changing the value of an expression.

SPECIFICATION FOCUS

OCR reference OCR 6.01b-6.01c. This lesson develops representation, accurate calculation, reasoning and interpretation within Foundation Tier.

Understand the idea

Simplification changes the appearance of an expression without changing its value. Like terms have exactly the same variable part. Products combine numerical and variable factors; quotients remove common factors.

KEY VOCABULARY

like terms • coefficient • constant • product • quotient • power

$$7x + 4x - 3x = 8x$$

combine coefficients only when the variable part matches

Why the method works

- The distributive law justifies adding coefficients of like terms.
- Repeated variable factors are written with powers.
- Cancellation is division by a common non-zero factor.

CHECK BEFORE MOVING ON

Answer mentally: Simplify 7x+4x-3x. Then define one key word from this page in your own words.

COMPREHENSIVE LESSON NOTEBOOK

Collecting terms and simplifying products — method and examples

Follow the reasoning; do not copy steps mechanically.

Reliable method

- Collect only terms with identical variable parts.
- Multiply numerical coefficients and write variable factors compactly.
- For division, cancel common numerical and variable factors.

WORKED EXAMPLE 1

Simplify $7x+4x-3x$.

SOLUTION

1. Combine coefficients: $7+4-3=8$.
2. Keep the common x.

ANSWER: $8x$

WORKED EXAMPLE 2

Simplify $5a+3b-2a+b$.

SOLUTION

1. a terms: $5a-2a=3a$.
2. b terms: $3b+b=4b$.

ANSWER: $3a + 4b$

SELF-CHECK QUESTION

Which step carries the mathematical reason, and which step carries only arithmetic? Being able to distinguish them makes a solution easier to repair.

COMPREHENSIVE LESSON NOTEBOOK

Collecting terms and simplifying products — apply and reason

Connect the method to decisions and common errors.

Where this mathematics appears

Compact expressions make later substitution, equation solving and modelling more reliable.

Common misconceptions

- Collecting unlike terms.
- Adding powers when terms are added rather than multiplied.
- Losing a negative coefficient.

GUIDED TRY

Simplify 4p × 3q. First predict the form or approximate size of the answer. Then show the complete method.

REASONING PROMPT

Explain why 3x+4 cannot be simplified to 7x. Explain why each condition or operation you use is valid.

EXAM COMMUNICATION

Use one mathematical statement per line. Label units and restrictions. If the result is approximate, show the unrounded value before the final rounded answer.

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

Collecting terms and simplifying products

Complete without notes. Show all working, then use the answer section to diagnose and repair errors.

1. **Simplify 7x+4x-3x.** **[2]**

2. **Simplify 5a+3b-2a+b.** **[2]**

3. **Simplify 4p × 3q.** **[2]**

4. **Simplify $18x^2 \div 6x$.** **[2]**

5. **Simplify 2a × 5a × 3b.** **[3]**

6. **Simplify 9m+2n-4m-7n.** **[2]**

7. **Find the value of 3x+2x when x=6.** **[2]**

8. **Explain why 3x+4 cannot be simplified to 7x.** **[2]**

REFLECTION

Circle one: secure / almost / reteach. Record the question number of your most useful error and the rule that repairs it.

COMPREHENSIVE LESSON NOTEBOOK

Expanding and factorising single brackets

Use the distributive law in both directions.

SPECIFICATION FOCUS

OCR reference OCR 6.01d-6.01e. This lesson develops representation, accurate calculation, reasoning and interpretation within Foundation Tier.

Understand the idea

Expansion distributes a factor across every term in a bracket. Factorisation reverses this process by extracting a common factor. The two forms are equivalent and useful for different purposes.

KEY VOCABULARY

expand • factorise • bracket • common factor • distributive law

Why the method works

- a(b+c)=ab+ac follows from area or repeated addition.
- A common factor divides every term exactly.
- Expanding the result provides a direct check.

CHECK BEFORE MOVING ON

Answer mentally: Expand 5(x+3). Then define one key word from this page in your own words.

COMPREHENSIVE LESSON NOTEBOOK

Expanding and factorising single brackets — method and examples

Follow the reasoning; do not copy steps mechanically.

Reliable method

- To expand, multiply every term in the bracket by the outside factor.
- To factorise, find the highest common factor of all terms.
- Check by expanding the factorised answer.

WORKED EXAMPLE 1

Expand 5(x+3).

SOLUTION

1. 5×x=5x.
2. 5×3=15.

ANSWER: 5x + 15

WORKED EXAMPLE 2

Expand 4(2y-5).

SOLUTION

1. 4×2y=8y.
2. 4×(-5)=-20.

ANSWER: 8y - 20

SELF-CHECK QUESTION

Which step carries the mathematical reason, and which step carries only arithmetic? Being able to distinguish them makes a solution easier to repair.

COMPREHENSIVE LESSON NOTEBOOK

Expanding and factorising single brackets — apply and reason

Connect the method to decisions and common errors.

Where this mathematics appears

Area expressions, equation solving and later quadratic work all rely on moving between expanded and factorised forms.

Common misconceptions

- Multiplying only the first bracket term.
- Dropping a negative sign.
- Taking a factor that is not common to every term.

GUIDED TRY

Factorise 6x+18. First predict the form or approximate size of the answer. Then show the complete method.

REASONING PROMPT

Explain how expansion checks factorisation. Explain why each condition or operation you use is valid.

EXAM COMMUNICATION

Use one mathematical statement per line. Label units and restrictions. If the result is approximate, show the unrounded value before the final rounded answer.

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

Expanding and factorising single brackets

Complete without notes. Show all working, then use the answer section to diagnose and repair errors.

1. **Expand 5(x+3).** **[2]**

2. **Expand 4(2y-5).** **[2]**

3. **Factorise 6x+18.** **[2]**

4. **Factorise 15a-20.** **[2]**

5. **Expand and simplify 3(x+4)+2x.** **[3]**

6. **Factorise $12p^2+8p$.** **[3]**

7. **Find x if 3(x+2)=21.** **[3]**

8. **Explain how expansion checks factorisation.** **[2]**

REFLECTION

Circle one: secure / almost / reteach. Record the question number of your most useful error and the rule that repairs it.

COMPREHENSIVE LESSON NOTEBOOK

Substitution and using formulae

Replace symbols accurately and preserve operation order.

SPECIFICATION FOCUS

OCR reference OCR 6.02b; 6.02d. This lesson develops representation, accurate calculation, reasoning and interpretation within Foundation Tier.

Understand the idea

Substitution replaces each symbol with its stated value. The original structure must remain intact, especially with negative numbers and powers. A formula then becomes a numerical calculation with units.

KEY VOCABULARY

substitute • evaluate • formula • input • output • unit

x	x^2	2y	total
-3	9	10	19

Why the method works

- Brackets show the substituted value is one complete number.
- Order of operations preserves the meaning of the formula.
- Units help test whether the output represents the intended quantity.

CHECK BEFORE MOVING ON

Answer mentally: Find 4a-3 when a=6. Then define one key word from this page in your own words.

COMPREHENSIVE LESSON NOTEBOOK

Substitution and using formulae — method and examples

Follow the reasoning; do not copy steps mechanically.

Reliable method

- Write the formula first and identify each value.
- Substitute using brackets for negative values.
- Follow the order of operations and include units.

WORKED EXAMPLE 1

Find $4a-3$ when $a=6$.

SOLUTION

1. Substitute: $4(6)-3$.
2. $24-3=21$.

ANSWER: 21

WORKED EXAMPLE 2

Find x^2+2y when $x=-3$ and $y=5$.

SOLUTION

1. Use brackets: $(-3)^2+2(5)$.
2. $9+10=19$.

ANSWER: 19

SELF-CHECK QUESTION

Which step carries the mathematical reason, and which step carries only arithmetic? Being able to distinguish them makes a solution easier to repair.

COMPREHENSIVE LESSON NOTEBOOK

Substitution and using formulae — apply and reason

Connect the method to decisions and common errors.

Where this mathematics appears

Science formulas, measurement, finance and spreadsheet models all depend on accurate substitution.

Common misconceptions

- Squaring only the digit and losing the sign.
- Ignoring multiplication between a coefficient and a value.
- Rounding too early.

GUIDED TRY

Use A=lw to find A when l=8 cm and w=3.5 cm. First predict the form or approximate size of the answer. Then show the complete method.

REASONING PROMPT

Explain why brackets matter when substituting x=-2 into x^2. Explain why each condition or operation you use is valid.

EXAM COMMUNICATION

Use one mathematical statement per line. Label units and restrictions. If the result is approximate, show the unrounded value before the final rounded answer.

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

Substitution and using formulae

Complete without notes. Show all working, then use the answer section to diagnose and repair errors.

1. **Find 4a-3 when a=6.** **[2]**

2. **Find x^2+2y when x=-3 and y=5.** **[3]**

3. **Use A=lw to find A when l=8 cm and w=3.5 cm.** **[2]**

4. **Use v=u+at when u=4, a=3 and t=5.** **[2]**

5. **Find $2p^2-q$ when p=-4 and q=7.** **[3]**

6. **Use $C=2\pi r$ to find C for r=6 cm, to 1 decimal place.** **[3]**

7. **Use s=(u+v)t/2 when u=3, v=11, t=4.** **[3]**

8. **Explain why brackets matter when substituting $x=-2$ into x^2.** **[2]**

REFLECTION

Circle one: secure / almost / reteach. Record the question number of your most useful error and the rule that repairs it.

COMPREHENSIVE LESSON NOTEBOOK

Changing the subject of a formula

Use inverse operations to isolate a chosen variable.

SPECIFICATION FOCUS

OCR reference OCR 6.02c. This lesson develops representation, accurate calculation, reasoning and interpretation within Foundation Tier.

Understand the idea

The subject is the variable written alone on one side. Rearranging uses inverse operations while maintaining equality. The order of reversal matters because the most recent outer operation is normally undone first.

KEY VOCABULARY

subject • inverse operation • isolate • rearrange • equivalent formula

$$y = 3x - 5$$

+5 both sides → $y+5 = 3x$ → ÷3 → $x=(y+5)/3$

Why the method works

- Doing the same valid operation to both sides preserves equality.
- Inverse operations reverse the construction of the formula.
- Equivalent forms describe the same relationship from different viewpoints.

CHECK BEFORE MOVING ON

Answer mentally: Make x the subject of y=x+7. Then define one key word from this page in your own words.

COMPREHENSIVE LESSON NOTEBOOK

Changing the subject of a formula — method and examples

Follow the reasoning; do not copy steps mechanically.

Reliable method

- Treat the formula like an equation and do the same operation to both sides.
- Undo additions or subtractions before multiplications or divisions.
- Check by substituting simple values into both forms.

WORKED EXAMPLE 1

Make x the subject of y=x+7.

SOLUTION

1. Subtract 7 from both sides.

ANSWER: x = y - 7

WORKED EXAMPLE 2

Make a the subject of v=u+at.

SOLUTION

1. Subtract u: v-u=at.
2. Divide by t.

ANSWER: a = (v-u)/t

SELF-CHECK QUESTION

Which step carries the mathematical reason, and which step carries only arithmetic? Being able to distinguish them makes a solution easier to repair.

COMPREHENSIVE LESSON NOTEBOOK

Changing the subject of a formula — apply and reason

Connect the method to decisions and common errors.

Where this mathematics appears

Rearranged formulas let scientists and engineers calculate whichever quantity is unknown.

Common misconceptions

- Moving a term without changing its operation.
- Dividing only one term of a sum.
- Forgetting brackets in a numerator.

GUIDED TRY

Make w the subject of A=lw. First predict the form or approximate size of the answer. Then show the complete method.

REASONING PROMPT

Explain how to check a rearranged formula. Explain why each condition or operation you use is valid.

EXAM COMMUNICATION

Use one mathematical statement per line. Label units and restrictions. If the result is approximate, show the unrounded value before the final rounded answer.

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

Changing the subject of a formula

Complete without notes. Show all working, then use the answer section to diagnose and repair errors.

1. **Make x the subject of y=x+7.** **[2]**

2. **Make a the subject of v=u+at.** **[3]**

3. **Make w the subject of A=lw.** **[2]**

4. **Make r the subject of C=2πr.** **[2]**

5. **Make x the subject of y=3x-5.** **[3]**

6. **Make h the subject of A=(b+h)/2.** **[3]**

7. **Make p the subject of q=(p-4)/5.** **[3]**

8. **Explain how to check a rearranged formula.** **[2]**

REFLECTION

Circle one: secure / almost / reteach. Record the question number of your most useful error and the rule that repairs it.

COMPREHENSIVE LESSON NOTEBOOK

Solving linear equations

Preserve equality while isolating the unknown.

SPECIFICATION FOCUS

OCR reference OCR 6.03a. This lesson develops representation, accurate calculation, reasoning and interpretation within Foundation Tier.

Understand the idea

A solution is a value that makes the original equation true. Think of an equation as a balance: every operation must affect both sides equally until the unknown is isolated.

KEY VOCABULARY

equation • solution • balance • inverse operation • check

$$4x + 3 = 27$$

subtract 3 from both sides • divide both sides by 4

Why the method works

- Equality is preserved by the same operation on both sides.
- Inverse operations undo the steps applied to the unknown.
- Substitution confirms the final value.

CHECK BEFORE MOVING ON

Answer mentally: Solve 4x+3=27. Then define one key word from this page in your own words.

COMPREHENSIVE LESSON NOTEBOOK

Solving linear equations — method and examples

Follow the reasoning; do not copy steps mechanically.

Reliable method

- Simplify each side first when helpful.
- Use inverse operations on both sides.
- Check by substituting the solution into the original equation.

WORKED EXAMPLE 1

Solve $4x+3=27$.

SOLUTION

1. Subtract 3: $4x=24$.
2. Divide by 4: $x=6$.

ANSWER: $x = 6$

WORKED EXAMPLE 2

Solve $7x-9=3x+19$.

SOLUTION

1. Subtract $3x$: $4x-9=19$.
2. Add 9: $4x=28$.
3. Divide by 4.

ANSWER: $x = 7$

SELF-CHECK QUESTION

Which step carries the mathematical reason, and which step carries only arithmetic? Being able to distinguish them makes a solution easier to repair.

COMPREHENSIVE LESSON NOTEBOOK

Solving linear equations — apply and reason

Connect the method to decisions and common errors.

Where this mathematics appears

Unknown costs, lengths, ages and rates are often found by setting up and solving linear equations.

Common misconceptions

- Changing a sign without applying an operation.
- Operating on only one side.
- Stopping before the variable is isolated.

GUIDED TRY

Solve 5(x-2)=35. First predict the form or approximate size of the answer. Then show the complete method.

REASONING PROMPT

Explain why doing the same operation to both sides preserves equality. Explain why each condition or operation you use is valid.

EXAM COMMUNICATION

Use one mathematical statement per line. Label units and restrictions. If the result is approximate, show the unrounded value before the final rounded answer.

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

Solving linear equations

Complete without notes. Show all working, then use the answer section to diagnose and repair errors.

1. **Solve 4x+3=27.** **[3]**

2. **Solve 7x-9=3x+19.** **[4]**

3. **Solve 5(x-2)=35.** **[3]**

4. **Solve 3(2x+1)=27.** **[3]**

5. **Solve (x+5)/4=6.** **[3]**

6. **A taxi costs £3 plus £2 per mile. The fare is £19. Find miles.** **[3]**

7. **Solve 8-2x=20.** **[3]**

8. **Explain why doing the same operation to both sides preserves equality.** **[2]**

REFLECTION

Circle one: secure / almost / reteach. Record the question number of your most useful error and the rule that repairs it.

COMPREHENSIVE LESSON NOTEBOOK

Quadratic and simultaneous equations

Solve accessible Foundation equations and interpret both values.

SPECIFICATION FOCUS

OCR reference OCR 6.03b-6.03c. This lesson develops representation, accurate calculation, reasoning and interpretation within Foundation Tier.

Understand the idea

A quadratic may have two roots because two factor values can make a product zero. Simultaneous equations describe two conditions that must both hold, so their shared solution satisfies each equation.

KEY VOCABULARY

quadratic • root • factor • simultaneous • eliminate • substitute

$$(x - 3)(x - 4) = 0$$

$x - 3 = 0$ or $x - 4 = 0$ → $x = 3$ or 4

Why the method works

- If AB=0, then A=0 or B=0.
- Factor pairs encode the required sum and product.
- Elimination or substitution reduces two unknowns to one.

CHECK BEFORE MOVING ON

Answer mentally: Solve $x^2-7x+12=0$. Then define one key word from this page in your own words.

COMPREHENSIVE LESSON NOTEBOOK

Quadratic and simultaneous equations — method and examples

Follow the reasoning; do not copy steps mechanically.

Reliable method

- For monic quadratics, find two numbers with the required product and sum.
- Use the zero-product rule after factorising.
- For simultaneous equations, substitute or eliminate one variable.

WORKED EXAMPLE 1

Solve $x^2-7x+12=0$.

SOLUTION

1. Factorise: $(x-3)(x-4)=0$.
2. Each bracket may equal zero.

ANSWER: $x = 3$ or $x = 4$

WORKED EXAMPLE 2

Solve $x^2+5x+6=0$.

SOLUTION

1. Factorise: $(x+2)(x+3)=0$.
2. Set each factor to zero.

ANSWER: $x = -2$ or $x = -3$

SELF-CHECK QUESTION

Which step carries the mathematical reason, and which step carries only arithmetic? Being able to distinguish them makes a solution easier to repair.

COMPREHENSIVE LESSON NOTEBOOK

Quadratic and simultaneous equations — apply and reason

Connect the method to decisions and common errors.

Where this mathematics appears

Areas, intersecting constraints, ticket totals and mixture conditions can produce quadratic or simultaneous models.

Common misconceptions

- Giving only one quadratic root.
- Forgetting to reject an impossible length.
- Solving one simultaneous equation but not checking the other.

GUIDED TRY

Solve simultaneously x+y=11 and x-y=3. First predict the form or approximate size of the answer. Then show the complete method.

REASONING PROMPT

Why can a quadratic equation have two solutions? Explain why each condition or operation you use is valid.

EXAM COMMUNICATION

Use one mathematical statement per line. Label units and restrictions. If the result is approximate, show the unrounded value before the final rounded answer.

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

Quadratic and simultaneous equations

Complete without notes. Show all working, then use the answer section to diagnose and repair errors.

1. **Solve $x^2-7x+12=0$.** **[3]**

2. **Solve $x^2+5x+6=0$.** **[3]**

3. **Solve simultaneously $x+y=11$ and $x-y=3$.** **[3]**

4. **Solve $y=2x+1$ and $x+y=10$.** **[4]**

5. **A rectangle has sides x and $x+3$, area 40. Find x.** **[4]**

6. **Solve $x^2=49$.** **[2]**

7. **The sum of two numbers is 18 and their difference is 4. Find them.** **[3]**

8. **Why can a quadratic equation have two solutions?** **[2]**

REFLECTION

Circle one: secure / almost / reteach. Record the question number of your most useful error and the rule that repairs it.

COMPREHENSIVE LESSON NOTEBOOK

Linear inequalities

Describe a range of values using symbols and number lines.

SPECIFICATION FOCUS

OCR reference OCR 6.04a. This lesson develops representation, accurate calculation, reasoning and interpretation within Foundation Tier.

Understand the idea

An inequality describes a range rather than one value. Its symbol records which side of a boundary is allowed. Multiplication or division by a negative reverses order, so the inequality sign must reverse.

KEY VOCABULARY

inequality • boundary • solution set • strict • inclusive • number line

x > -1: open boundary, values to the right

Why the method works

- Number-line direction makes greater and smaller values visible.
- Open and filled circles distinguish excluded and included boundaries.
- Negative scaling reflects positions across zero and reverses order.

CHECK BEFORE MOVING ON

Answer mentally: Solve x+5<12. Then define one key word from this page in your own words.

COMPREHENSIVE LESSON NOTEBOOK

Linear inequalities — method and examples

Follow the reasoning; do not copy steps mechanically.

Reliable method

- Solve like an equation while preserving the inequality.
- Reverse the sign when multiplying or dividing by a negative number.
- Use an open circle for < or > and a filled circle for ≤ or ≥.

WORKED EXAMPLE 1

Solve $x+5<12$.

SOLUTION

1. Subtract 5 from both sides.

ANSWER: $x < 7$

WORKED EXAMPLE 2

Solve $3x \geq 18$.

SOLUTION

1. Divide both sides by positive 3; sign stays the same.

ANSWER: $x \geq 6$

SELF-CHECK QUESTION

Which step carries the mathematical reason, and which step carries only arithmetic? Being able to distinguish them makes a solution easier to repair.

COMPREHENSIVE LESSON NOTEBOOK

Linear inequalities — apply and reason

Connect the method to decisions and common errors.

Where this mathematics appears

Capacity limits, budgets, minimum ages and tolerance ranges are naturally expressed as inequalities.

Common misconceptions

- Using a filled circle for a strict inequality.
- Forgetting to reverse the sign after negative division.
- Listing values outside an inclusive boundary.

GUIDED TRY

Solve -2x<10. First predict the form or approximate size of the answer. Then show the complete method.

REASONING PROMPT

Explain why the sign reverses when dividing by a negative. Explain why each condition or operation you use is valid.

EXAM COMMUNICATION

Use one mathematical statement per line. Label units and restrictions. If the result is approximate, show the unrounded value before the final rounded answer.

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

Linear inequalities

Complete without notes. Show all working, then use the answer section to diagnose and repair errors.

1. **Solve $x+5<12$.** **[2]**

2. **Solve $3x\geq 18$.** **[2]**

3. **Solve $-2x<10$.** **[3]**

4. **Solve $4x-3\leq 13$.** **[3]**

5. **List the integer solutions of $-2<x\leq 3$.** **[2]**

6. **A lift holds at most 600 kg. Four people total 312 kg. Write and solve an inequality for boxes of 24 kg.** **[4]**

7. **Represent $x>-1$ on a number line.** **[2]**

8. **Explain why the sign reverses when dividing by a negative.** **[2]**

REFLECTION

Circle one: secure / almost / reteach. Record the question number of your most useful error and the rule that repairs it.

COMPREHENSIVE LESSON NOTEBOOK

Sequences and nth terms

Generate, describe and continue structured number patterns.

SPECIFICATION FOCUS

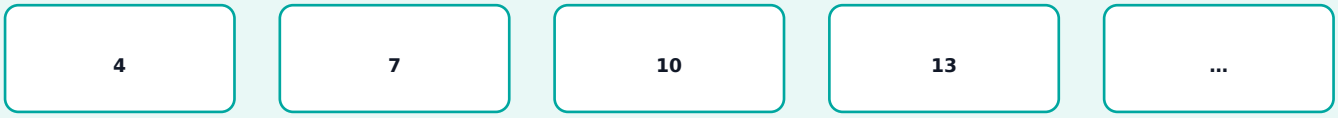
OCR reference OCR 6.06a-6.06b. This lesson develops representation, accurate calculation, reasoning and interpretation within Foundation Tier.

Understand the idea

A sequence is an ordered list generated by a rule. Arithmetic sequences change by a constant amount and have linear nth terms. Recurrence rules use earlier terms to generate later ones.

KEY VOCABULARY

sequence • term • position • common difference • nth term • recurrence



common difference +3 → nth term 3n + 1

Why the method works

- A constant first difference creates a linear position-to-term relationship.
- The coefficient of n equals the common difference.
- An adjustment aligns the rule with the first term.

CHECK BEFORE MOVING ON

Answer mentally: Write the next two terms: 5, 9, 13, 17, ... Then define one key word from this page in your own words.

COMPREHENSIVE LESSON NOTEBOOK

Sequences and nth terms — method and examples

Follow the reasoning; do not copy steps mechanically.

Reliable method

- Find first differences for an arithmetic sequence.
- Use difference × n, then adjust to match a known term.
- Check the rule for at least two positions.

WORKED EXAMPLE 1

Write the next two terms: 5, 9, 13, 17, ...

SOLUTION

1. The common difference is +4.
2. Add 4 twice.

ANSWER: 21, 25

WORKED EXAMPLE 2

Find the nth term of 4, 7, 10, 13, ...

SOLUTION

1. Difference is 3, so start with 3n.
2. At n=1, 3n gives 3; add 1.

ANSWER: 3n + 1

SELF-CHECK QUESTION

Which step carries the mathematical reason, and which step carries only arithmetic? Being able to distinguish them makes a solution easier to repair.

COMPREHENSIVE LESSON NOTEBOOK

Sequences and nth terms — apply and reason

Connect the method to decisions and common errors.

Where this mathematics appears

Savings plans, tile patterns, seating rows and repeated processes can be modelled by sequences.

Common misconceptions

- Using the term value instead of its position.
- Assuming every sequence is arithmetic.
- Checking the rule for only one term.

GUIDED TRY

Find the 20th term of 3n-2. First predict the form or approximate size of the answer. Then show the complete method.

REASONING PROMPT

Explain how to check an nth-term rule. Explain why each condition or operation you use is valid.

EXAM COMMUNICATION

Use one mathematical statement per line. Label units and restrictions. If the result is approximate, show the unrounded value before the final rounded answer.

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

Sequences and nth terms

Complete without notes. Show all working, then use the answer section to diagnose and repair errors.

1. **Write the next two terms: 5, 9, 13, 17, ...** **[2]**

2. **Find the nth term of 4, 7, 10, 13, ...** **[3]**

3. **Find the 20th term of 3n-2.** **[2]**

4. **Is 47 in the sequence 5n+2?** **[3]**

5. **Find the nth term of 12, 9, 6, 3, ...** **[3]**

6. **Continue the Fibonacci-type sequence 2, 3, 5, 8, 13, ...** **[2]**

7. **The nth term is 4n-7. Find the first positive term.** **[3]**

8. **Explain how to check an nth-term rule.** **[2]**

REFLECTION

Circle one: secure / almost / reteach. Record the question number of your most useful error and the rule that repairs it.

COMPREHENSIVE LESSON NOTEBOOK

Functions, formula use and mixed algebra

Use functions and supplied formulae, then connect algebraic skills.

SPECIFICATION FOCUS

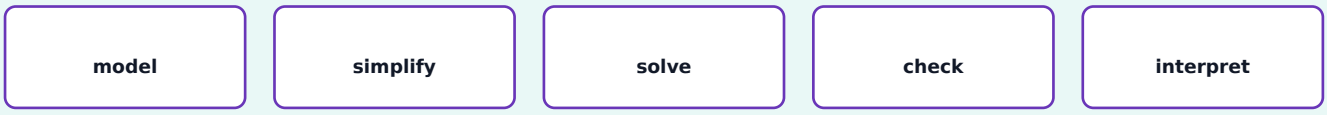
OCR reference OCR 6.02e; 6.05a; 6.01-6.06 synthesis. This lesson develops representation, accurate calculation, reasoning and interpretation within Foundation Tier.

Understand the idea

Mixed algebra requires choosing the representation before calculating. Algebra can solve a particular unknown or prove a statement for every integer. A valid proof uses a general variable and a logically equivalent conclusion.

KEY VOCABULARY

model • proof • conjecture • counterexample • restriction • validation



a complete algebraic argument has a logical chain

Why the method works

- A variable captures all cases rather than selected examples.
- Simplification exposes structure such as a common factor.
- Substitution and contextual checks validate solutions.

CHECK BEFORE MOVING ON

Answer mentally: A function is defined by f(x)=3x-2. Find f(5). Then define one key word from this page in your own words.

COMPREHENSIVE LESSON NOTEBOOK

Functions, formula use and mixed algebra — method and examples

Follow the reasoning; do not copy steps mechanically.

Reliable method

- A function maps each permitted input to one output.
- Substitute into a supplied formula with brackets and units.
- Verify results by substitution or inverse operations.

WORKED EXAMPLE 1

A function is defined by f(x)=3x-2. Find f(5).

SOLUTION

1. Substitute x=5.
2. f(5)=3×5-2=13.

ANSWER: 13

WORKED EXAMPLE 2

The function g maps x to x^2+1. Find g(-4).

SOLUTION

1. Use brackets: $(-4)^2+1$.
2. 16+1=17.

ANSWER: 17

SELF-CHECK QUESTION

Which step carries the mathematical reason, and which step carries only arithmetic? Being able to distinguish them makes a solution easier to repair.

COMPREHENSIVE LESSON NOTEBOOK

Functions, formula use and mixed algebra — apply and reason

Connect the method to decisions and common errors.

Where this mathematics appears

Planning, optimisation, pattern justification and financial modelling combine several algebraic skills.

Common misconceptions

- Testing a few examples and calling it proof.
- Ignoring restrictions such as positive lengths.
- Selecting a method from a keyword alone.

GUIDED TRY

A function machine multiplies by 4 then subtracts 7. Its output is 25. Find the input. First predict the form or approximate size of the answer. Then show the complete method.

REASONING PROMPT

State two checks for an algebraic or function answer. Explain why each condition or operation you use is valid.

EXAM COMMUNICATION

Use one mathematical statement per line. Label units and restrictions. If the result is approximate, show the unrounded value before the final rounded answer.

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

Functions, formula use and mixed algebra

Complete without notes. Show all working, then use the answer section to diagnose and repair errors.

1. **A function is defined by f(x)=3x-2. Find f(5).** **[2]**

2. **The function g maps x to x^2+1. Find g(-4).** **[2]**

3. **A function machine multiplies by 4 then subtracts 7. Its output is 25. Find the input.** **[3]**

4. **Using v=u+at, find v when u=6 m/s, a=2.5 m/s² and t=8 s.** **[3]**

5. **Using $s=ut+\frac{1}{2}at^2$, find s when u=3, a=2 and t=4.** **[3]**

6. **Solve 4(2x+1)=3x+29.** **[4]**

7. **Prove the sum of three consecutive integers is a multiple of 3.** **[4]**

8. **State two checks for an algebraic or function answer.** **[2]**

REFLECTION

Circle one: secure / almost / reteach. Record the question number of your most useful error and the rule that repairs it.

COMPREHENSIVE LESSON NOTEBOOK

Practice answers and repair notes

Algebraic language and forming expressions

Use only after a genuine attempt. Rework incorrect questions from a blank line rather than copying the final value.

1. Write an expression for 7 more than n.

ANSWER: n + 7

Method cue: “More than” means add 7 to n. Check sign, size, accuracy and units.

2. Write an expression for the cost of x tickets at £6 each plus a £2 booking fee.

ANSWER: 6x + 2

Method cue: x tickets cost 6x pounds. Check sign, size, accuracy and units.

3. State whether 3x+5 is an expression or equation.

ANSWER: Expression

Method cue: It has no equals sign. Check sign, size, accuracy and units.

4. Write an equation: three times a number, increased by 4, equals 25.

ANSWER: 3x + 4 = 25

Method cue: Three times the number is 3x. Check sign, size, accuracy and units.

5. A rectangle has width w and length w+3. Write its perimeter.

ANSWER: 4w + 6

Method cue: Perimeter=2w+2(w+3). Check sign, size, accuracy and units.

6. Write an expression for half of the total of y and 8.

ANSWER: (y + 8)/2

Method cue: “Total of y and 8” is y+8. Check sign, size, accuracy and units.

7. The nth odd number is 2n-1. Find the 20th odd number.

ANSWER: 39

Method cue: Substitute n=20. Check sign, size, accuracy and units.

8. Explain why 5(a+2) is not the same as 5a+2.

ANSWER: The 5 multiplies both terms inside the bracket.

Method cue: 5(a+2)=5a+10. Check sign, size, accuracy and units.

COMPREHENSIVE LESSON NOTEBOOK

Practice answers and repair notes

Collecting terms and simplifying products

Use only after a genuine attempt. Rework incorrect questions from a blank line rather than copying the final value.

1. Simplify 7x+4x-3x.

ANSWER: 8x

Method cue: Combine coefficients: 7+4-3=8. Check sign, size, accuracy and units.

2. Simplify 5a+3b-2a+b.

ANSWER: 3a + 4b

Method cue: a terms: 5a-2a=3a. Check sign, size, accuracy and units.

3. Simplify 4p × 3q.

ANSWER: 12pq

Method cue: Multiply coefficients 4×3=12. Check sign, size, accuracy and units.

4. Simplify $18x^2 \div 6x$.

ANSWER: 3x

Method cue: 18÷6=3. Check sign, size, accuracy and units.

5. Simplify 2a × 5a × 3b.

ANSWER: $30a^2b$

Method cue: 2×5×3=30. Check sign, size, accuracy and units.

6. Simplify 9m+2n-4m-7n.

ANSWER: 5m - 5n

Method cue: m terms give 5m. Check sign, size, accuracy and units.

7. Find the value of 3x+2x when x=6.

ANSWER: 30

Method cue: First simplify to 5x. Check sign, size, accuracy and units.

8. Explain why 3x+4 cannot be simplified to 7x.

ANSWER: 3x and 4 are unlike terms.

Method cue: One term depends on x; the constant does not. Check sign, size, accuracy and units.

COMPREHENSIVE LESSON NOTEBOOK

Practice answers and repair notes

Expanding and factorising single brackets

Use only after a genuine attempt. Rework incorrect questions from a blank line rather than copying the final value.

1. Expand 5(x+3).

ANSWER: 5x + 15

Method cue: 5×x=5x. Check sign, size, accuracy and units.

2. Expand 4(2y-5).

ANSWER: 8y - 20

Method cue: 4×2y=8y. Check sign, size, accuracy and units.

3. Factorise 6x+18.

ANSWER: 6(x + 3)

Method cue: HCF of 6x and 18 is 6. Check sign, size, accuracy and units.

4. Factorise 15a-20.

ANSWER: 5(3a - 4)

Method cue: HCF is 5. Check sign, size, accuracy and units.

5. Expand and simplify 3(x+4)+2x.

ANSWER: 5x + 12

Method cue: Expand to 3x+12+2x. Check sign, size, accuracy and units.

6. Factorise $12p^2+8p$.

ANSWER: 4p(3p + 2)

Method cue: Common factor is 4p. Check sign, size, accuracy and units.

7. Find x if 3(x+2)=21.

ANSWER: 5

Method cue: Divide by 3: x+2=7. Check sign, size, accuracy and units.

8. Explain how expansion checks factorisation.

ANSWER: Expanding should reproduce the original expression.

Method cue: Multiply the outside factor by every bracket term. Check sign, size, accuracy and units.

COMPREHENSIVE LESSON NOTEBOOK

Practice answers and repair notes

Substitution and using formulae

Use only after a genuine attempt. Rework incorrect questions from a blank line rather than copying the final value.

1. Find 4a-3 when a=6.

ANSWER: 21

Method cue: Substitute: 4(6)-3. Check sign, size, accuracy and units.

2. Find x^2+2y when x=-3 and y=5.

ANSWER: 19

Method cue: Use brackets: $(-3)^2+2(5)$. Check sign, size, accuracy and units.

3. Use A=lw to find A when l=8 cm and w=3.5 cm.

ANSWER: 28 cm^2

Method cue: A=8×3.5. Check sign, size, accuracy and units.

4. Use v=u+at when u=4, a=3 and t=5.

ANSWER: 19

Method cue: v=4+3×5. Check sign, size, accuracy and units.

5. Find $2p^2-q$ when p=-4 and q=7.

ANSWER: 25

Method cue: $2(-4)^2-7$. Check sign, size, accuracy and units.

6. Use $C=2\pi r$ to find C for r=6 cm, to 1 decimal place.

ANSWER: 37.7 cm

Method cue: $C=2\pi\times6=12\pi$. Check sign, size, accuracy and units.

7. Use s=(u+v)t/2 when u=3, v=11, t=4.

ANSWER: 28

Method cue: s=(3+11)×4÷2. Check sign, size, accuracy and units.

8. Explain why brackets matter when substituting $x=-2$ into x^2.

ANSWER: They show the whole negative number is squared.

Method cue: $x^2=(-2)^2=4$. Check sign, size, accuracy and units.

COMPREHENSIVE LESSON NOTEBOOK

Practice answers and repair notes

Changing the subject of a formula

Use only after a genuine attempt. Rework incorrect questions from a blank line rather than copying the final value.

1. Make x the subject of y=x+7.

ANSWER: x = y - 7

Method cue: Subtract 7 from both sides. Check sign, size, accuracy and units.

2. Make a the subject of v=u+at.

ANSWER: a = (v-u)/t

Method cue: Subtract u: v-u=at. Check sign, size, accuracy and units.

3. Make w the subject of A=lw.

ANSWER: w = A/l

Method cue: Divide both sides by l. Check sign, size, accuracy and units.

4. Make r the subject of C=2πr.

ANSWER: r = C/(2π)

Method cue: Divide by 2π. Check sign, size, accuracy and units.

5. Make x the subject of y=3x-5.

ANSWER: x = (y+5)/3

Method cue: Add 5: y+5=3x. Check sign, size, accuracy and units.

6. Make h the subject of A=(b+h)/2.

ANSWER: h = 2A - b

Method cue: Multiply by 2: 2A=b+h. Check sign, size, accuracy and units.

7. Make p the subject of q=(p-4)/5.

ANSWER: p = 5q + 4

Method cue: Multiply by 5: 5q=p-4. Check sign, size, accuracy and units.

8. Explain how to check a rearranged formula.

ANSWER: Substitute the same numerical values into both forms.

Method cue: Both forms should produce a consistent relationship. Check sign, size, accuracy and units.

COMPREHENSIVE LESSON NOTEBOOK

Practice answers and repair notes

Solving linear equations

Use only after a genuine attempt. Rework incorrect questions from a blank line rather than copying the final value.

1. Solve 4x+3=27.

ANSWER: x = 6

Method cue: Subtract 3: 4x=24. Check sign, size, accuracy and units.

2. Solve 7x-9=3x+19.

ANSWER: x = 7

Method cue: Subtract 3x: 4x-9=19. Check sign, size, accuracy and units.

3. Solve 5(x-2)=35.

ANSWER: x = 9

Method cue: Divide by 5: x-2=7. Check sign, size, accuracy and units.

4. Solve 3(2x+1)=27.

ANSWER: x = 4

Method cue: Divide by 3: 2x+1=9. Check sign, size, accuracy and units.

5. Solve (x+5)/4=6.

ANSWER: x = 19

Method cue: Multiply by 4: x+5=24. Check sign, size, accuracy and units.

6. A taxi costs £3 plus £2 per mile. The fare is £19. Find miles.

ANSWER: 8 miles

Method cue: Equation: 3+2m=19. Check sign, size, accuracy and units.

7. Solve 8-2x=20.

ANSWER: x = -6

Method cue: Subtract 8: -2x=12. Check sign, size, accuracy and units.

8. Explain why doing the same operation to both sides preserves equality.

ANSWER: Equal quantities remain equal after the same change.

Method cue: If left=right, then left+k=right+k and similarly for valid multiplication/division. Check sign, size, accuracy and units.

COMPREHENSIVE LESSON NOTEBOOK

Practice answers and repair notes

Quadratic and simultaneous equations

Use only after a genuine attempt. Rework incorrect questions from a blank line rather than copying the final value.

1. Solve $x^2-7x+12=0$.

ANSWER: x = 3 or x = 4

Method cue: Factorise: (x-3)(x-4)=0. Check sign, size, accuracy and units.

2. Solve $x^2+5x+6=0$.

ANSWER: x = -2 or x = -3

Method cue: Factorise: (x+2)(x+3)=0. Check sign, size, accuracy and units.

3. Solve simultaneously x+y=11 and x-y=3.

ANSWER: x = 7, y = 4

Method cue: Add equations: 2x=14, so x=7. Check sign, size, accuracy and units.

4. Solve y=2x+1 and x+y=10.

ANSWER: x = 3, y = 7

Method cue: Substitute: x+2x+1=10. Check sign, size, accuracy and units.

5. A rectangle has sides x and x+3, area 40. Find x.

ANSWER: x = 5

Method cue: $x(x+3)=40$, so $x^2+3x-40=0$. Check sign, size, accuracy and units.

6. Solve $x^2=49$.

ANSWER: x = 7 or x = -7

Method cue: Both 7^2 and $(-7)^2$ equal 49. Check sign, size, accuracy and units.

7. The sum of two numbers is 18 and their difference is 4. Find them.

ANSWER: 11 and 7

Method cue: Let x+y=18 and x-y=4. Check sign, size, accuracy and units.

8. Why can a quadratic equation have two solutions?

ANSWER: Two different inputs can produce the same squared relationship.

Method cue: After factorising, either factor may be zero. Check sign, size, accuracy and units.

COMPREHENSIVE LESSON NOTEBOOK

Practice answers and repair notes

Linear inequalities

Use only after a genuine attempt. Rework incorrect questions from a blank line rather than copying the final value.

1. Solve $x+5<12$.

ANSWER: $x < 7$

Method cue: Subtract 5 from both sides. Check sign, size, accuracy and units.

2. Solve $3x\geq18$.

ANSWER: $x \geq 6$

Method cue: Divide both sides by positive 3; sign stays the same. Check sign, size, accuracy and units.

3. Solve $-2x<10$.

ANSWER: $x > -5$

Method cue: Divide by -2. Check sign, size, accuracy and units.

4. Solve $4x-3\leq13$.

ANSWER: $x \leq 4$

Method cue: Add 3: $4x\leq16$. Check sign, size, accuracy and units.

5. List the integer solutions of $-2<x\leq3$.

ANSWER: -1, 0, 1, 2, 3

Method cue: Values must be greater than -2 and at most 3. Check sign, size, accuracy and units.

6. A lift holds at most 600 kg. Four people total 312 kg. Write and solve an inequality for...

ANSWER: $b \leq 12$

Method cue: $312+24b\leq600$. Check sign, size, accuracy and units.

7. Represent $x>-1$ on a number line.

ANSWER: Open circle at -1, arrow to the right

Method cue: Strict > excludes -1. Check sign, size, accuracy and units.

8. Explain why the sign reverses when dividing by a negative.

ANSWER: A negative multiplication reverses order on the number line.

Method cue: For example $2<5$ but $-2>-5$. Check sign, size, accuracy and units.

COMPREHENSIVE LESSON NOTEBOOK

Practice answers and repair notes

Sequences and nth terms

Use only after a genuine attempt. Rework incorrect questions from a blank line rather than copying the final value.

1. Write the next two terms: 5, 9, 13, 17, ...

ANSWER: 21, 25

Method cue: The common difference is +4. Check sign, size, accuracy and units.

2. Find the nth term of 4, 7, 10, 13, ...

ANSWER: 3n + 1

Method cue: Difference is 3, so start with 3n. Check sign, size, accuracy and units.

3. Find the 20th term of 3n-2.

ANSWER: 58

Method cue: Substitute n=20. Check sign, size, accuracy and units.

4. Is 47 in the sequence 5n+2?

ANSWER: Yes, it is the 9th term

Method cue: Solve 5n+2=47. Check sign, size, accuracy and units.

5. Find the nth term of 12, 9, 6, 3, ...

ANSWER: 15 - 3n

Method cue: Difference is -3, so begin -3n. Check sign, size, accuracy and units.

6. Continue the Fibonacci-type sequence 2, 3, 5, 8, 13, ...

ANSWER: 21, 34

Method cue: Each term is the sum of the previous two. Check sign, size, accuracy and units.

7. The nth term is 4n-7. Find the first positive term.

ANSWER: 1, when n = 2

Method cue: At n=1, term=-3. Check sign, size, accuracy and units.

8. Explain how to check an nth-term rule.

ANSWER: Substitute several position numbers and compare with the sequence.

Method cue: Check n=1 and at least one later term. Check sign, size, accuracy and units.

COMPREHENSIVE LESSON NOTEBOOK

Practice answers and repair notes

Functions, formula use and mixed algebra

Use only after a genuine attempt. Rework incorrect questions from a blank line rather than copying the final value.

1. A function is defined by f(x)=3x-2. Find f(5).

ANSWER: 13

Method cue: Substitute x=5. Check sign, size, accuracy and units.

2. The function g maps x to x^2+1. Find g(-4).

ANSWER: 17

Method cue: Use brackets: $(-4)^2+1$. Check sign, size, accuracy and units.

3. A function machine multiplies by 4 then subtracts 7. Its output is 25. Find the input.

ANSWER: 8

Method cue: Reverse the operations: add 7, then divide by 4. Check sign, size, accuracy and units.

4. Using v=u+at, find v when u=6 m/s, a=2.5 m/s² and t=8 s.

ANSWER: 26 m/s

Method cue: Substitute the supplied values. Check sign, size, accuracy and units.

5. Using $s=ut+1/2at^2$, find s when u=3, a=2 and t=4.

ANSWER: 28

Method cue: $s=3\times4+1/2\times2\times4^2$. Check sign, size, accuracy and units.

6. Solve 4(2x+1)=3x+29.

ANSWER: x = 5

Method cue: Expand: 8x+4=3x+29. Check sign, size, accuracy and units.

7. Prove the sum of three consecutive integers is a multiple of 3.

ANSWER: 3(n+1), so it is a multiple of 3

Method cue: Let integers be n, n+1, n+2. Check sign, size, accuracy and units.

8. State two checks for an algebraic or function answer.

ANSWER: Substitute into the original rule and check context or restrictions.

Method cue: Check signs and operations. Check sign, size, accuracy and units.

COMPREHENSIVE LESSON NOTEBOOK

Independent authorship and release check

OCR Foundation Mathematics • Unit 3 Algebra

ORIGINAL-CONTENT STATEMENT

This publication contains independently written teaching explanations, examples, practice questions, numerical data, diagrams and solutions. OCR is referenced solely to identify the J560 qualification. No OCR logo, official assessment question, mark scheme, examiner-report text or protected assessment layout is reproduced.

Release checklist

- 10 publisher-organised chapters mapped to OCR J560 section 6.
- Every chapter begins on a new page and contains conceptual explanation.
- Original vector diagrams and two worked examples appear in every chapter.
- Applications, misconceptions, guided reasoning and independent practice are included.
- Answers are collected at the end with method cues.
- Copyright, trademark and non-endorsement wording included.

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