

Equations, formulae and identities – supported focus

4MA1 supported native-lesson focus only; qualification gaps remain

1. Supported teaching and tier boundary

Supported teaching and tier boundary

4MA1: Equations, formulae and identities. Version: Issue 2, November 2017; first assessment June 2018; linear Mathematics A.

2. Supported teaching and tier boundary

Supported teaching and tier boundary

Foundation teaching and Higher additions are labelled below. This reference packages the existing native-lesson crosswalk. It does not certify unreviewed specification rows or a whole qualification. Original diagnostics are separate and are not reproduced.

3. Equations, identities and rearrangement · Foundation

Equations, identities and rearrangement · Foundation

An equation asks which inputs satisfy an equality; an identity holds for all allowed inputs. Preserve equality by applying the same operation to both sides. State restrictions before dividing by a variable.

4. Equations, identities and rearrangement · Foundation

Equations, identities and rearrangement · Foundation

$$C_1 = 20 + 3x, \quad C_2 = 44 + x, \quad C_1 = C_2$$

5. Equations, identities and rearrangement · Foundation

Equations, identities and rearrangement · Foundation

$20+3x=44+x$ gives $2x=24$ and $x=12$. Both plans then cost 56. In $A=\pi r^2$, divide by π and take the positive square root to obtain $r=\sqrt{(A/\pi)}$, because r is a length.

6. Equations, identities and rearrangement · Foundation

Equations, identities and rearrangement · Foundation

Cancelling a term is not the same as cancelling a factor. In $(x^2+2x)/x$, factor the numerator and retain $x \neq 0$. Check a rearrangement by substitution.

7. Equations, identities and rearrangement · Foundation

Equations, identities and rearrangement · Foundation

Define the unknown and set up a linear equation. Check the answer by substitution.
Restrict this Foundation/Core lesson to simple expressions and equations.

8. Equations, identities and rearrangement · Higher

Equations, identities and rearrangement · Higher

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9. Equations, identities and rearrangement · Higher

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10. Equations, identities and rearrangement · Higher

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11. Equations, identities and rearrangement · Higher

Equations, identities and rearrangement · Higher

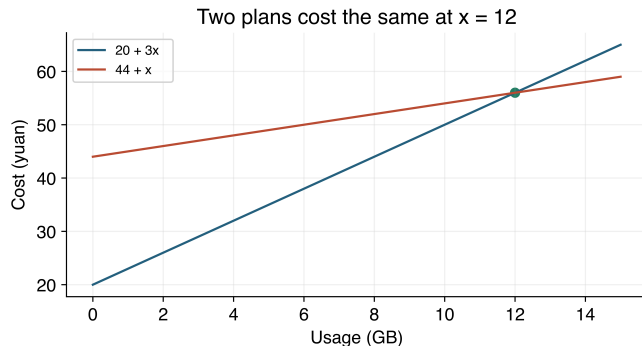
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12. Equations, identities and rearrangement · Higher

Equations, identities and rearrangement · Higher

Set up the equation from units and the meaning of the unknown. A negative or fractional solution may be algebraically correct but impossible for a count.

Figure 13: Equations, identities



Check the labelled values and conditions.

14. Factorising and solving simple quadratics · Foundation

Factorising and solving simple quadratics · Foundation

Expand brackets and factorise simple quadratics. Solve by setting each factor equal to zero, and use a graph to interpret the roots.

15. Factorising and solving simple quadratics · Foundation

Factorising and solving simple quadratics · Foundation

$$(x - 3)(x - 7) = 0$$

16. Factorising and solving simple quadratics · Foundation

Factorising and solving simple quadratics · Foundation

$x^2 - 10x + 21 = (x - 3)(x - 7)$. Hence the equation $x^2 - 10x + 21 = 0$ has roots 3 and 7. Check each root by substitution and mark both intercepts on the graph.

17. Factorising and solving simple quadratics · Foundation

Factorising and solving simple quadratics · Foundation

Multiplying an inequality by a negative number reverses its direction. A sketch must show which side of each root satisfies the inequality. Geometry may restrict x further.

18. Factorising and solving simple quadratics · Foundation

Factorising and solving simple quadratics · Foundation

This Foundation/Core lesson uses factorisation and graphical roots; the discriminant, quadratic formula and quadratic inequalities are reserved for the advanced tier.

19. Quadratics and inequalities · Higher

Quadratics and inequalities · Higher

Factor where possible; otherwise complete the square or use the quadratic formula. A quadratic inequality needs the sign on intervals, not only the roots. The discriminant identifies repeated or missing real roots.

20. Quadratics and inequalities · Higher

Quadratics and inequalities · Higher

$$ax^2 + bx + c = 0, \quad \Delta = b^2 - 4ac$$

21. Quadratics and inequalities · Higher

Quadratics and inequalities · Higher

The condition is $x(10-x) \geq 21$, so $x^2 - 10x + 21 \leq 0$. Factor $(x-3)(x-7) \leq 0$. The upward parabola is nonpositive between its roots, giving $3 \leq x \leq 7$. The maximum area is 25 at $x=5$.

22. Quadratics and inequalities · Higher

Quadratics and inequalities · Higher

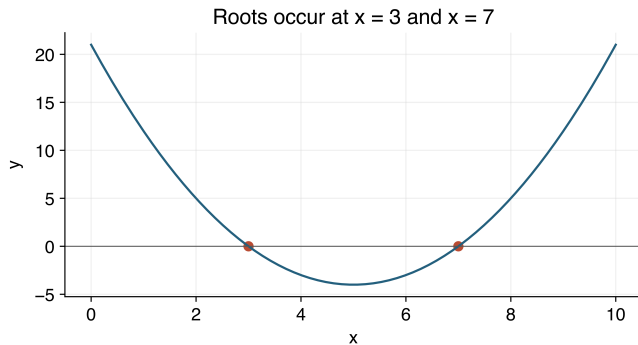
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23. Quadratics and inequalities · Higher

Quadratics and inequalities · Higher

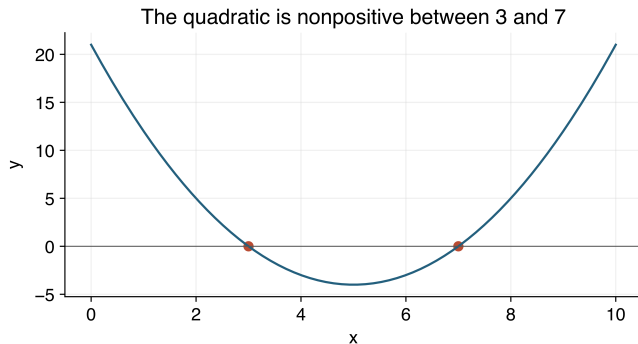
Use the vertex to interpret an optimum. Check an endpoint and a point between the roots; the algebra and graph should tell the same story.

Figure 24: Quadratics and inequalities



Check the labelled values and conditions.

Figure 25: Quadratics and inequalities



Check the labelled values and conditions.

26. Simultaneous equations and feasible regions · Foundation

Simultaneous equations and feasible regions · Foundation

For two linear equations, use elimination or substitution and check both equations. For a line and a quadratic, substitute the linear relation first; then solve the resulting quadratic. For inequalities, shade the region satisfying every condition.

27. Simultaneous equations and feasible regions · Foundation

Simultaneous equations and feasible regions · Foundation

$$x + y = 12, \quad 3x + 2y = 31$$

28. Simultaneous equations and feasible regions · Foundation

Simultaneous equations and feasible regions · Foundation

If $x+y=12$ and $3x+2y=31$, subtract twice the first equation from the second to obtain $x=7$, then $y=5$. For $y=x+1$ and $y=x^2-1$, $x^2-x-2=0$ gives $x=2$ or -1 , with $y=3$ or 0 .

29. Simultaneous equations and feasible regions · Foundation

Simultaneous equations and feasible regions · Foundation

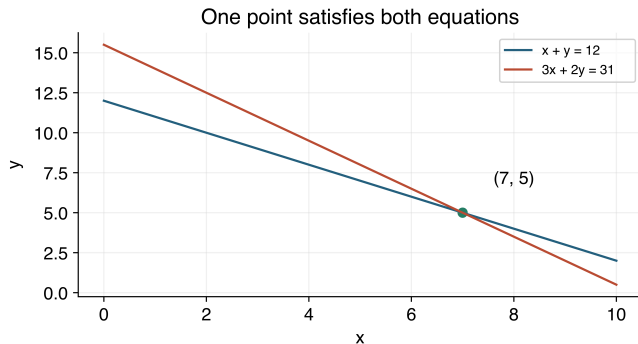
One equation checked is not enough. A line can meet a quadratic twice, so retain both solutions unless the context removes one. Inequality boundaries may be included or excluded according to the sign.

30. Simultaneous equations and feasible regions · Foundation

Simultaneous equations and feasible regions · Foundation

Define the variables and their units. If they count objects, both must be nonnegative integers. For a feasible region, test one point on the required side of each boundary and then take the intersection.

Figure 31: Simultaneous equations



Check the labelled values and conditions.

32. Remaining qualification limits

Remaining qualification limits

Official question-bank boundaries, scheme alignment and all objective-level teaching coverage require the recorded review; no practice registry promotion.

33. Remaining qualification limits

Remaining qualification limits

The authored diagnostic assessments are not full-length qualification mocks.

34. Remaining qualification limits

Remaining qualification limits

Only the mapped native skills are supplied here. Objective rows marked formula-review-required are not promoted to complete coverage by these print companions.

35. Terms

Terms	
identity	.

36. Terms

Terms
discriminant

.

37. Terms

Terms
elimination .

Check yourself

Reconstruct the method without looking back

Decide whether this claim is true. Give a concrete calculation or counterexample:
Cancelling x from $(x+3)/x$ leaves 3 for every nonzero x .