

Equations, formulae and identities – supported focus

Pearson Edexcel · International GCSE · Mathematics A

Supported teaching and tier boundary

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

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.

■ 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.

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

$20+3x=44+x$ 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.

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.

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

■ Equations, identities and rearrangement · Higher

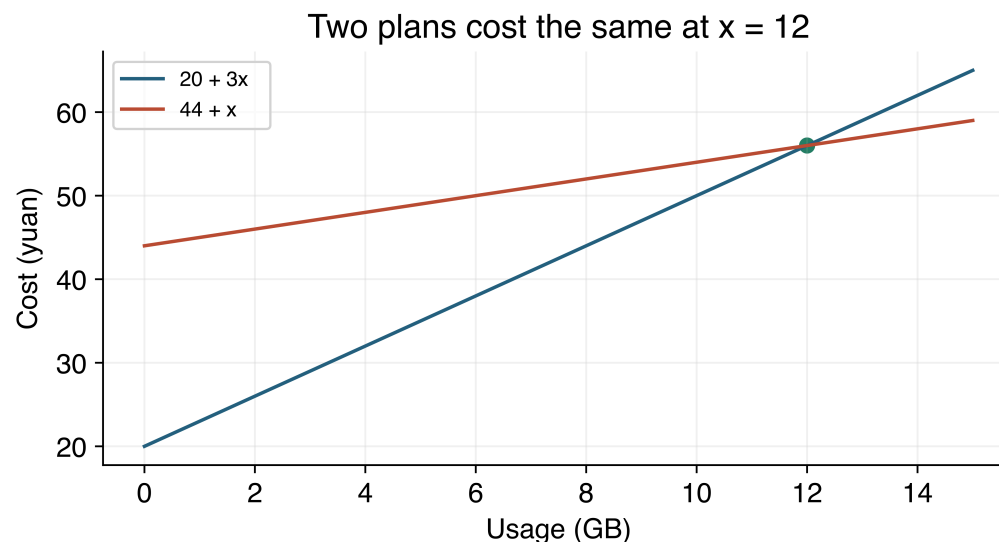
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Set up the equation from units and the meaning of the unknown. A negative or fractional solution may be algebraically correct but impossible for a count.



Original native-lesson illustration; labels belong to its worked example.

■ 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.

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

$x^2-10x+21=(x-3)(x-7)$. 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.

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

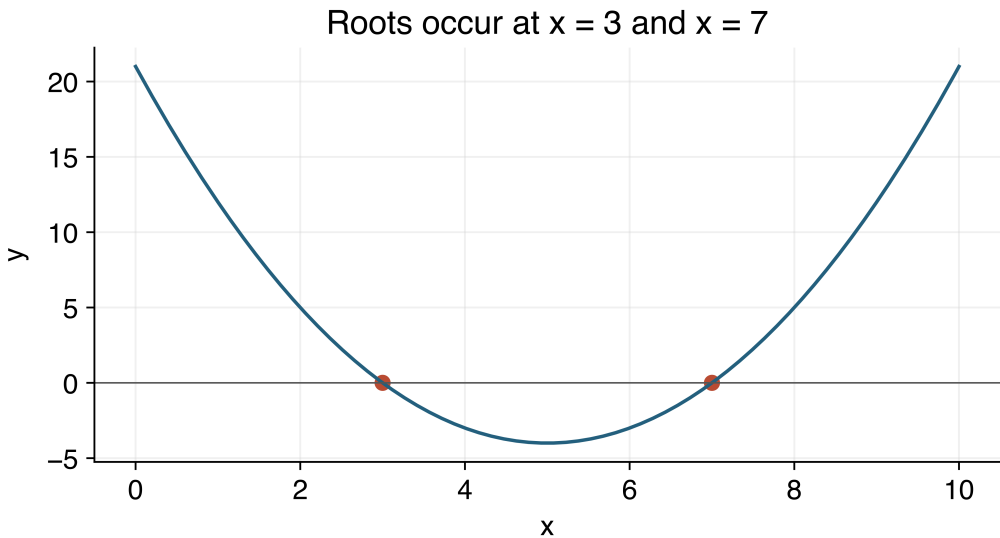
■ Quadratics and inequalities · Higher

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.

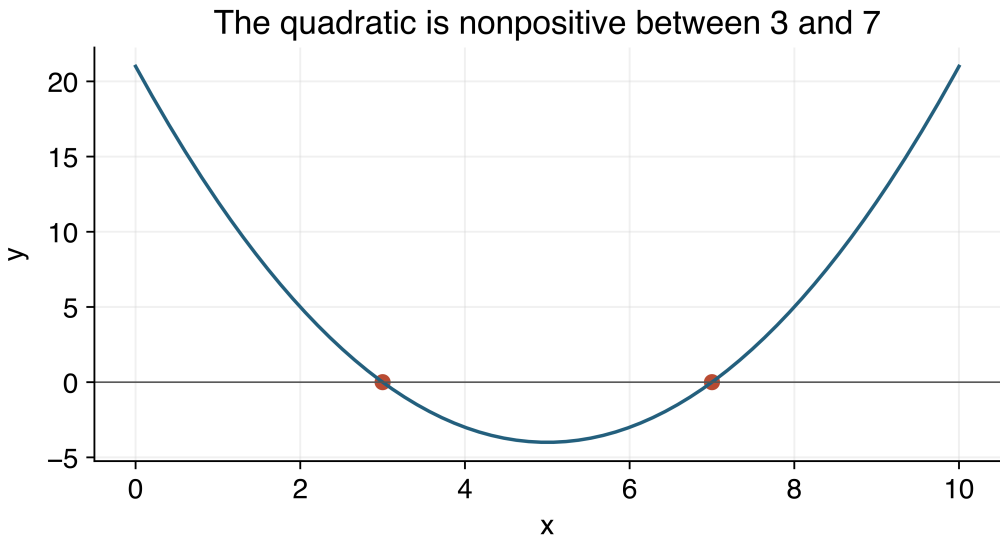
$$ax^2 + bx + c = 0, \quad \Delta = b^2 - 4ac$$

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 $x=5$.

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. 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.



Original native-lesson illustration; labels belong to its worked example.



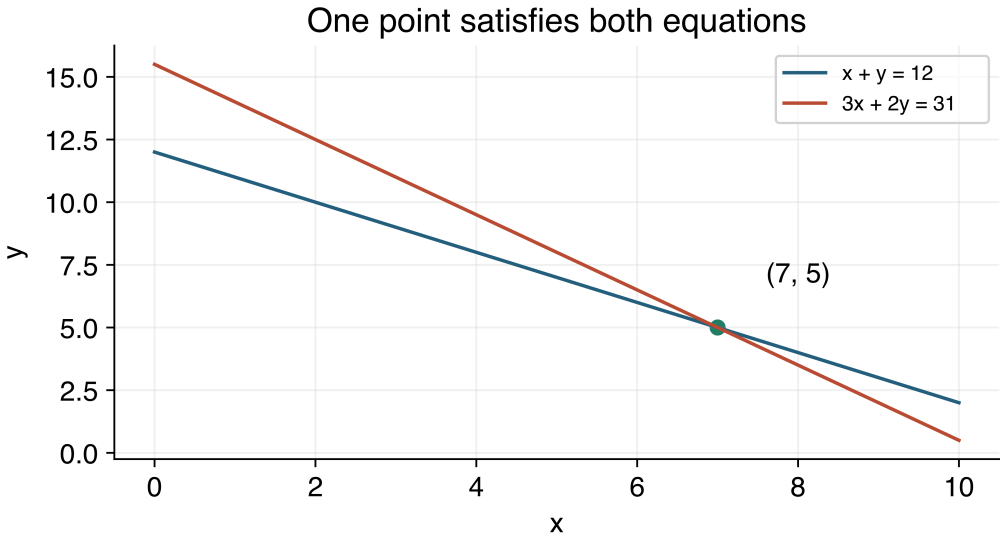
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■ Simultaneous equations and feasible regions · Foundation

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.

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

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 . 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. 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.



Original native-lesson illustration; labels belong to its worked example.

Remaining qualification limits

Official question-bank boundaries, scheme alignment and all objective-level teaching coverage require the recorded review; no practice registry promotion. The authored diagnostic assessments are not full-length qualification mocks. Only the mapped native skills are supplied here. Objective rows marked formula-review-required are not promoted to complete coverage by these print companions.

Terms

identity .

discriminant .

elimination .