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| **UNIT 16: A****lgebra: quadratic equations and graphs** |

[Return to Overview](#Overview)

**SPECIFICATION REFERENCES**

A4 simplify and manipulate algebraic expressions by: … expanding products of two binomials; factorising quadratic expressions of the form *x*2 + *bx* + *c*, including the difference of two squares; …

A11 identify and interpret roots, intercepts, turning points of quadratic functions graphically; deduce roots algebraically

A12 recognise, sketch and interpret graphs of … quadratic functions; …

A14 plot and interpret graphs (including reciprocal graphs) and graphs of non-standard functions in real contexts to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration

A18 solve quadratic equations algebraically by factorising; find approximate solutions using a graph

**PRIOR KNOWLEDGE**

Students should be able to square negative numbers.

Students should be able to substitute into formulae.

Students should be able to plot points on a coordinate grid.

Students should be able to expand single brackets and collect ‘like’ terms.

**KEYWORDS**

Quadratic, function, solve, expand, factorise, simplify, expression, graph, curve, factor, coefficient, bracket

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| **16b. Quadratic equations: graphs**(A11, A12, A14, A18) | **Teaching time**3–5 hours |

**OBJECTIVES**

By the end of the sub-unit, students should be able to:

* Generate points and plot graphs of simple quadratic functions, then more general quadratic functions;
* Identify the line of symmetry of a quadratic graph;
* Find approximate solutions to quadratic equations using a graph;
* Interpret graphs of quadratic functions from real-life problems;
* Identify and interpret roots, intercepts and turning points of quadratic graphs.

**POSSIBLE SUCCESS CRITERIA**

Recognise a quadratic graph from its shape.

**OPPORTUNITIES FOR REASONING/PROBLEM SOLVING**

Matching graphs with their respective functions.

**COMMON MISCONCEPTIONS**

Squaring negative numbers can be a problem.

**NOTES**

The graphs should be drawn freehand and in pencil, joining points using a smooth curve.

Encourage efficient use of the calculator.

Extension work can be through plotting cubic and reciprocal graphs, solving simultaneous equations graphically.