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| **UNIT 9: Algebra: Solving quadratic equations and inequalities, solving simultaneous equations algebraically** |

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**SPECIFICATION REFERENCES**

N1 order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥

N8 calculate exactly with … **surds**; … **simplify surd expressions involving squares   
(e.g. √12 = √(4 × 3) = √4 × √3 = 2√3)**

A4 simplify and manipulate algebraic expressions (including those involving surds …) by: … **factorising quadratic expressions of the form *ax*2 + *bx* + *c***

A5 understand and use standard mathematical formulae; rearrange formulae to change the subject

A9 … find the equation of the line through two given points, or through one point with a given gradient

A11 identify and interpret roots … of quadratic functions algebraically …

A18 solve quadratic equations **(including those that require rearrangement)** algebraically by factorising, **by completing the square and by using the quadratic formula**; …

A19 solve two simultaneous equations in two variables (linear/linear **or linear/quadratic**) algebraically; find approximate solutions using a graph

A21 … derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution.

A22 solve linear inequalities in one **or two** variable**(s)**, **and quadratic inequalities in one variable**; represent the solution set on a number line, **using set notation and on a graph**

**PRIOR KNOWLEDGE**

Students should understand the ≥ and ≤ symbols.

Students can substitute into, solve and rearrange linear equations.

Students should be able to factorise simple quadratic expressions.

Students should be able to recognise the equation of a circle.

**KEYWORDS**

Quadratic, solution, root, linear, solve, simultaneous, inequality, completing the square, factorise, rearrange, surd, function, solve, circle, sets, union, intersection

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| **9b. Inequalities**  (N1, A22) | **Teaching time**  5–7 hours |

**OBJECTIVES**

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

* Show inequalities on number lines;
* Write down whole number values that satisfy an inequality;
* Solve simple linear inequalities in one variable, and represent the solution set on a number line;
* Solve two linear inequalities in *x*, find the solution sets and compare them to see which value of *x* satisfies both solve linear inequalities in two variables algebraically;
* Use the correct notation to show inclusive and exclusive inequalities.

**POSSIBLE SUCCESS CRITERIA**

Use inequality symbols to compare numbers.

Given a list of numbers, represent them on a number line using the correct notation.

Solve equations involving inequalities.

**OPPORTUNITIES FOR REASONING/PROBLEM SOLVING**

Problems that require student to justify why certain values in a solution can be ignored.

**COMMON MISCONCEPTIONS**

When solving inequalities students often state their final answer as a number quantity, and exclude the inequality or change it to =.

Some students believe that –6 is greater than –3.

**NOTES**

Emphasise the importance of leaving their answer as an inequality (and not changing it to =).

Link to units 2 and 9a, where quadratics and simultaneous equations were solved.

Students can leave their answers in fractional form where appropriate.

Ensure that correct language is used to avoid reinforcing misconceptions: for example, 0.15 should never be read as ‘zero point fifteen’, and 5 > 3 should be read as ‘five is greater than 3’, not ‘5 is bigger than 3’.