**Y12 AS Mathematics**

**4 Equations and inequalities 1 week**

## Teaching objectives

**a** Recap key GCSE algebra skills including manipulating and solving: linear equations, quadratic equations, equations including algebraic fractions.

**b** Solve simultaneous equations in two variables by elimination and by substitution.

**c** Solve simultaneous equations with one linear and one quadratic equation.

**d** Solve linear and quadratic inequalities in a single variable.

**e** Interpret such inequalities graphically.

**f** Solve and graphically interpret inequalities with brackets and fractions.

**g** Express solutions through correct use of ‘and’ and ‘or’, or through set notation.

**h** Represent linear and quadratic inequalities such as y > x +1 and

y > ax2 + bx + c graphically.

**Resources for advance preparation:**

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|  | **Starter** | **Main teaching**Including key questions, key teaching points, models and resources | **Notes**Including Support and Extension | **Consolidation/Plenary**Including key questions and homework |
| **1** | [Multiple manipulations](https://undergroundmathematics.org/thinking-about-algebra/multiple-manipulations) | Recap of algebraic key skills from GCSE, involving multiplying out double brackets, factorising, quadratics. The later tasks includes inequalities. Students to spend the majority of the time working individually with whole class discussion and group work towards the end of the lesson.  | Key skills* Simplifying algebraic fractions
* Solving algebraic fractions
* Simplifying algebraic inequalities including fractions.
 | [Review Question: Can we simplify these algebraic fractions](https://undergroundmathematics.org/thinking-about-algebra/r5364)Homework, routine practice questions from text book or integral worksheet if available |
| **2** | Maths box or integral short question set, Algebraic manipulation from GCSE. Mini whiteboard activity? | [Real World Problems](https://undergroundmathematics.org/thinking-about-algebra/real-world-problems) Application of algebraic skills. Students to work in pairs, first filling in the blanks and solving their own questions, then swapping questions and solving each others.  | Key skills* Forming and solving algebraic equations
* Working backwards
 | [Review Question: Can we find the radii of two circles given two clues?](https://undergroundmathematics.org/thinking-about-algebra/r7032)Homework, routine practice questions from text book or integral worksheet if available |
| **3** | [Two way algebra](https://undergroundmathematics.org/thinking-about-algebra/two-way-algebra)Students to work in small groups. Print out the table large for students, 1 each. Encourage students to work in pencil and try lots of different variations.  | Students to describe their Colum titles and the reasons chosen. More than 1 correct solution so may trigger some interesting discussions and variations.  | Key skills* Solving equations
* Solving inequalities
* Solving simultaneous equations
 | [Review Question: When do these simultaneous equations have a positive solution?](https://undergroundmathematics.org/thinking-about-algebra/r8158)Homework, routine practice questions from text book or integral worksheet if available |
|  | **Starter** | **Main teaching**Including key questions, key teaching points, models and resources | **Notes**Including Support and Extension | **Consolidation/Plenary**Including key questions and homework |
| **4** | Maths box or integral short question set, Algebraic manipulation from GCSE. Mini whiteboard activity? | [Inequalities for some occasions](https://undergroundmathematics.org/quadratics/inequalities-for-some-occasions)Print and cut out the cards and a large copy of the Venn diagram. Students to sort the cards into the venn diagram. Encourage students to explain their reasoning to the class.  | Key skills* Solving linear and quadratic inequalities
 | [Review Question: When are these inequalities true together](https://undergroundmathematics.org/quadratics/r9989)Homework, routine practice questions from text book or integral worksheet if available |
| **(5)** | Mini whiteboard activity on identifying equations of graphs[Suggested activity on cubics](https://drive.google.com/file/d/0B9L2lYGRiK2bQ1BiZ0lhTzl5Y3M/edit) | [Inequality sets](https://undergroundmathematics.org/polynomials/inequalities)Group activity, maybe using mini whiteboards to try with different graphs/inequalities. The “taking it further” element would be a good extension for highest attaining pupils | Key skills* Solving linear and quadratic inequalities
* Graphing inequalities
 | Homework, revision for equations and inequalities assessment. |