



# British Algorithmic Olympiad

# SYLLABUS

## DETAILS

This document contains the syllabus for the British Algorithmic Olympiad. This has been updated for the **November 2023** series.



# SYLLABUS

The British Algorithmic Olympiad will contain questions based off some the following topics and techniques. This list is not exhaustive.

## 1 Mathematics

- 1.1 **Cartesian Coordinate System:** Two and three-dimensional. Equations of lines (linear and non-linear).
- 1.2 **Functions:** Function notation. Composite and piecewise functions.
- 1.3 **Recurrence Relations:** Notation. Periodic sequences.
- 1.4 **Arithmetic and Geometric Sequences:** Sigma notation. Sums of sequences.
- 1.5 **Proof:** Contradiction, deduction, counterexample, exhaustion.
- 1.6 **Combinatorics:** Counting. Factorials.
- 1.7 **Set Notation:** Special sets of numbers (e.g.  $\mathbb{Z}^+$ ). Subsets.

## 2 Computer Science

- 2.1 **Logic:** Understanding of sequence, selection and iteration in programming.
- 2.2 **Programming:** Familiarity with a language. Use of a range of data types. Functions, inter-function communication.
- 2.3 **Data Structures:** A wide range of data structures.
- 2.4 **Advanced Programming Techniques & Searching Algorithms:** Techniques which require more thought than simple programming, for example, recursion. Different searching and traversal algorithms. Ability to recognise problems which require such algorithms.
- 2.5 **Time Complexity:** Understanding how input constraints can affect required solution efficiency. Time complexity analysis of a simple program.
- 2.6 **Two and Three-dimensional Representations:** Using data structures to represent, for example, grids or boxes.
- 2.7 **Number Systems:** Binary. Number systems with different bases to 10.