# Year 12 & 13 Regular Problem Solving Classes
## Newcastle Upon Tyne

**26th January 2022**

## Overview

A series of maths problem-solving sessions designed to give students the confidence to apply for university courses that require or take into consideration achievement in an admissions test.

These regular classes offer students the opportunity to develop mathematical problem-solving skills through discussion and collaboration. They are designed to help students to develop strategies and confidence when tackling unfamiliar problems in maths and will help with preparations for taking advanced papers such as the MAT, TMUA and STEP examinations.

At the same time, the problems used in the course are fun and rewarding. Attending the sessions will greatly enrich students' mathematical experience and help them to develop a better understanding of A level Mathematics.

## Aims

- To develop initial strategies when dealing with maths problems
- To develop confidence when dealing with maths problems
- To develop resilience when dealing with maths problems
- To provide some initial information about the problem solving involved in university admissions tests
- To provide a platform on which to build secure problem solving techniques

## Who will benefit from attending?

The course is designed for any A level Mathematics students who have an enquiring mind and wish to develop their problem solving ability for their A level studies and beyond.

It is particularly useful for those students who wish to make the first steps in preparing for university admissions tests such as the MAT, TMUA and STEP examinations.

# Content

The course covers a wide range of mathematical disciplines with problems. These can include

- Algebra: the difference between two squares and other identities
- Geometry: angles, triangle and circles
- Number: digits and divisibility
- Algebra: forming and solving equations
- Combinatorics: systematic counting
- Number: prime factorisation, fractions and irrationals
- Algebra: sequences and series
- Number: indices and logarithms
- Algebra: quadratics, cubics and other polynomials
- Geometry: trigonometry
- Combinatorics: further systematic counting and placement
- Geometry: coordinates and vectors
- Calculus: curve sketching and differentiation
- Calculus: integration
- Combinatorics: the binomial expansion

# Materials and Equipment

If the classes are being held online, you will need access to suitable equipment. You are advised to use a headset or headphones with an inline microphone to provide the best sound quality and to prevent audio issues for other users. A laptop with a built-in webcam and microphone may be sufficient if you're in a quiet area but please take the time to check this before the session. BBB is designed to be used on a variety of platforms but you will get the best experience via a desktop or laptop computer, running either Google Chrome or Mozilla Firefox as the browser.

Note: Internet Explorer and Edge are not suitable currently.

Access to GeoGebra or desmos will also be useful.

# Other Information

The following problems provide a taste of the sort of problem solving that will be encountered in the classes:

**Problem 1:** How many primes greater than two can be found that are one less than a square number?

**Problem 2:** How many pairs of integers can you find that satisfy the equation $x^2 - y^2 = 45$?

# Study Schedule

face-to-face course at the Royal Grammar School in Newcastle on Wednesday evenings from 4:15-5:45, beginning on 26th January. Here you will have the choice of joining one of two groups:

- STEP Preparation - mostly aimed at Year 13s, this group will work with Michael Gibson and Sam James on questions from the STEP Mathematics papers. These are undoubtedly the most challenging questions that school age mathematicians are ever expected to attempt in formal examinations so, for students sitting the exams, extensive preparation is essential. They can also very rewarding questions to complete, often teaching you fascinating things about maths, and so are also a worthwhile pursuit for any student who is ready to access them, even if not sitting the actual exams this summer.
- General Problem Solving - mostly aimed at Year 12s, this group will work with Sarah Sharp on a range of interesting and challenging mathematical problems. One of the aims of this group is to develop students' problem solving skills so that they are better prepared to start working on MAT/TMUA/STEP questions in the following year. Is is also a worthwhile activity for any student who enjoys maths, particularly if considering studying maths or similar subjects at university.

The course dates are as follows:

26/1, 2/2, 9/2, 16/2

[half term]

2/3, 9/3, 16/3, 23/3, 30/3, 6/4

[Easter]

27/4, 4/5, 11/5, 18/5

# Key Facts

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| **Event ref:** | #8834 |
| **Audience:** | Students |
| **Target year:** | Year 12 & 13 |
| **Curriculum focus:** | University admissions tests, A level Mathematics, A level Further Mathematics |
| **Mathematical focus:** | Pure, Problem solving |
| **Event format:** | Student course |
| **Event length:** | 20 hours |
| **Region:** | North East |
| **Venue:** | Royal Grammar School,<br>Eskdale Terrace,<br>Jesmond,<br>Newcastle upon Tyne,<br>NE2 4DX |
| **Date:** | Wed 26th Jan 2022 |
| **Course times:** | 16:15 - 17:45 |

# Registration

For more information, or to register for this event, please visit https://amsp.org.uk/events/details/8834