



# Sixth Form Preparation for Success

## Welcome to Mathematics

AQA Mathematics A Level 7357

### Introduction

Mathematics is a stimulating and challenging course which will increase your knowledge of Mathematical techniques and their applications. It will greatly support the study of other A Levels and will develop key employability skills such as problem solving, logical reasoning, communication and resilience. This course will be an excellent preparation for a wide range of courses at University and will lead to versatile qualification which is well-respected by employers and higher education.



## Part I – Y11 into 12 Mathematics Specific Bridging Work

### To be completed May – Sept

Remember that prizes will be awarded for 'exceptional' work that demonstrates effort above expected! It would be a good idea to write all work that you do on lined file paper, keep it all in a file and bring it to school for your first lesson in September.

- a) **Investigate places of interest** - Given the circumstances at the moment, you may not be able to physically visit the places suggested below so try the websites – many have virtual tours and mini lectures - and email their customer services with any questions; people love to hear from young people who show an interest in their line of work!
  - You could visit the Diamond, which is the University of Sheffield's brand new, state-of-the-art engineering facility. You have to visit <https://www.sheffield.ac.uk/diamond/visits> and fill in the online form, after which someone will get back to you within three days to arrange your own bespoke visit – brilliant! A must for anyone who might consider a career in engineering. If you've got friends who are also doing A-level maths, perhaps you could go together.

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- Look out for other places where you can see maths applied in a science/technology/engineering context: how about Magna in Rotherham or the National Space Centre in Leicester?
  - Looking further afield you could visit Bletchley Park (near Milton Keynes): see for yourself how some of the country's best mathematicians made a decisive contribution in World War II by cracking the German Enigma code, which was previously considered unbreakable.

## b) Wider reading

- I would highly recommend a book called '1089 and All That: A Journey Into Mathematics' by David Acheson. It's short, easy to read and introduces a number of fundamental A level concepts in a really engaging way. Available for £6.73 on Amazon.
- The Numberphile videos are excellent (<http://www.numberphile.com/>): tricky mathematical concepts explained in a really engaging and accessible way.
- Marcus du Sautoy's 'A Brief History of Mathematics' on Radio 4 was excellent: informative and engaging. You can access all ten episodes on BBC iPlayer radio or as a podcast. If you're interested in mathematicians of the past there's also an excellent archive here (<http://www-history.mcs.st-and.ac.uk/>)
- Choose an article from the Guardian's data blog (<https://www.theguardian.com/data>) which looks interesting to you. How does the use of statistics help the reader make sense of the real-world issues being discussed? If you're interested in analysing the use of statistics (for good or ill!) try the 'More or Less' podcast by the BBC's Tim Harford.
- <http://www.mathscareers.org.uk/> is an excellent website about maths careers with plenty of detailed information about the value of maths in all sorts of different jobs.
- The Royal Institution has an excellent YouTube channel (<https://www.youtube.com/user/TheRoyalInstitution> - scroll down to the maths playlist, under 'Browse talks by subject) – interesting lectures about all sorts of topics (and a useful insight into university-style learning too).
- <https://freakonomics.com/archive/> The co-creation by an economist and a journalist. Freakonomics is an engaging and interesting book about a real mixture of topics and answers questions such as: what do teachers and sumo wrestlers have in common? Did tv cause a rise in crime? Can eating kangaroos save the planet? If you think statistics is boring, this book may convince you otherwise.
- How is Maths our real sixth sense? In this engaging talk, high school math teacher and YouTube star Eddie Woo shares his passion for mathematics, calling it an extra sense that we can all access.  
[https://www.ted.com/talks/eddie\\_woo\\_how\\_math\\_is\\_our\\_real\\_sixth\\_sense?language=en](https://www.ted.com/talks/eddie_woo_how_math_is_our_real_sixth_sense?language=en)

**....and for the film buffs, here are 13 maths movies based on true events that will make you think about maths and mathematicians in a different way. Visit the link for a summary of each and see as many as you can:**

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<https://medium.com/@Alikayaspor/13-must-see-mathematics-movies-inspired-by-true-events-1beda86255cd>

The Man Who Knew Infinity, Pi, A Beautiful Mind, Stand and Deliver, X + Y, Good Will Hunting, The Imitation Game, Codebreaker, A Brief History of Time, N is a Number: A portrait of Paul Erdos, Travelling Salesman, Fermat's Room, The Oxford Murders.

### c) Compulsory task

As you probably know, A-level Maths is a very challenging (but also very rewarding) subject in which success depends on being confident – from the outset – with a number of GCSE topics which are fundamentally important at A level. For this reason, there will be a 'Bridging the Gap' test shortly after you return to school in September, which will cover the following topics:

- Expanding, factorising (including difference of two squares) and simplifying algebraic expressions
- Working with algebraic fractions (including simplifying and solving equations)
- Rearranging formulae
- Indices
- Surds
- Solving quadratic equations by a) factorising and b) completing the square
- Solving simultaneous equations (by substitution, not just elimination)
- Using function notation
- ...and a little bit of GCSE-level problem solving.

There will be a pass mark for this test and anybody who does not pass first time will be required to attend intervention sessions after school and to re-sit until they have passed it. This is because time is very tight in A-level Maths as it is, and we need to spend as much lesson time as possible getting you up to speed with the new topics, rather than revisiting GCSE content which you've been taught before.

Until you have achieved confident fluency with these fundamental GCSE skills, you will find it difficult to access the rest of the course so it is really important that everybody arrives in September ready to hit the ground running. With this in mind, you **do need to spend a few hours of your summer holiday making sure you are confident with these topics**. Here are a few resources that will help, and they have been placed in order of recommendation (top ones most recommended/essential!)

- Mr Hegarty of HegartyMaths has 26 YouTube lessons on bridging the gap topics which I highly recommend and personally would prioritise over other resources mentioned. The videos are 20-30 minutes long and include: examples which you should make notes on; an example for you to then complete; and finally, a review exercise for you to complete. Please see link below

[https://www.youtube.com/c/HEGARTYMATHS/videos?view=0&sort=dd&shelf\\_id=0](https://www.youtube.com/c/HEGARTYMATHS/videos?view=0&sort=dd&shelf_id=0)

- The A Level Maths revision website has excellent bridging worksheets, written solutions and videos by a Maths and Further Maths teacher in the UK. The activities are extensive and you are given substantial support with this work. The

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topics are clearly organised for you to work on weak areas or even better complete the whole thing. Please see link below

<https://alevelmathsrevision.com/bridging-the-gap/>

- MyMaths has an entire bridging the gap section. These tasks will have been set for you already (for current McAuley students on your current account). Click on A Level and the top tab is bridging the gap. Please complete all the quizzes once you have worked through the lessons.
- A **WONDERFUL** OCR resource, “Bridging the Gap between GCSE and A level mathematics”. We will use this a lot in September, and it is vital you start now. <https://colleenyoung.wordpress.com/2017/05/20/bridging-the-gap-student-guide/>  
Click on the “this should link straight to the file” and the word document will download

The ‘bridging the gap’ process is not designed to intimidate but to help you find your feet as quickly as possible in what is a very challenging A level. If you take a small proportion of your summer holiday to prepare as suggested, it really will stand you in good stead: those that do not do any preparation will find themselves at a disadvantage in September.

#### **d) Stretch!**

- UKMT Questions – individual and group <https://www.ukmt.org.uk/competitions>
- N rich – problem solving tasks <https://nrich.maths.org/secondary>
- Dr Frost <https://www.drfrostmaths.com/resourceexplorer.php>

Good luck!

## **Part II - Year 12 Head Start! for completion June – September**

### **Course Specification**

This is a new specification subject. The school’s policy is that students enrolling onto new specification courses will not be entered for external AS examinations at the end of Year 12.

However, the pupils will take very similar exams to the AS papers in June 2019 to assess their suitability to continue the course into Y13.

#### **Paper One**

*90 minutes, 80 marks, 50% of assessment*

Pure Maths including functions, coordinate geometry, sequences, trigonometry, exponentials and calculus. Mechanics: kinematics, forces and Newton’s Laws.

#### **Paper Two**

*90 minutes, 80 marks, 50% of assessment*

Pure Maths including functions, coordinate geometry, sequences, trigonometry, exponentials and calculus. Statistics: using large datasets, sampling, probability, distributions and hypothesis testing.

Please find below a link to the course specification:

### **What will I learn this Autumn term?**

You will notice that much of this you recognise, will have studied at GCSE and can prepare for if you follow our recommended task suggestions. Some of these topics are brand new to you and you may wish to read up about them online if intrigued.

- Laws of indices (Pure)
- Use and manipulate surds (Pure)
- Quadratics: solving, sketching, completing the square etc (Pure)
- Solving Simultaneous equations (Pure)
- Factorising and expands brackets including cubics (Pure)
- Solving and sketching inequalities (Pure)
- Sketching graphs including asymptotes and including in the form  $y = a / x$  and more (Pure)
- Transformations of graphs (Pure)
- Straight line Graphs (Pure)
- Equation of a circle and circle theorems (Pure)
- Binomial expansion (Pure)
- Differentiation (Pure)
- Integration (Pure)
- Interpreting statistical diagrams such as Box Plots and Histograms (Stats)
- Interpret Scatter Graphs and correlation (Stats)
- Mean and standard deviation (Stats)
- Outlier and critiquing data (Stats)
- Vectors (Pure)
- Kinematics (Mechanics)

### **Head Start to A Level Maths**

If you prefer to self-study and prepare for A Level Maths using a physical book then the following resource is designed for our AQA course:

[https://www.amazon.co.uk/Head-Start-Level-Maths-2017-2018-ebook/dp/B06XD29GX2/ref=sr\\_1\\_1?crd=2Q9MOZQTACCHA&dchild=1&keywords=head+start+to+a+level+maths&qid=1590059788&s=digital-text&prefix=head+start+to+A+%2Cdigital-text%2C189&sr=1-1](https://www.amazon.co.uk/Head-Start-Level-Maths-2017-2018-ebook/dp/B06XD29GX2/ref=sr_1_1?crd=2Q9MOZQTACCHA&dchild=1&keywords=head+start+to+a+level+maths&qid=1590059788&s=digital-text&prefix=head+start+to+A+%2Cdigital-text%2C189&sr=1-1)

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In its own words: “It’s a big step up from GCSE Maths to the new AS-Level and A-level Maths courses - which is why we’ve rustled up this brilliant Head Start book! It recaps all the crucial topics students will need to remember from GCSE, and gives them a taste of how they’re used at A-Level. Packed with study notes, examples and practice questions, it’s the perfect way for students to get off to a flying start in September.”

### **AS Level Maths textbook**

This is the textbook our staff use in class and the majority of students choose to purchase. It comes with an online code to allow you to use the resource digitally too. You may choose to purchase the textbook now but you will save a significant amount of money if you decide to purchase this through the mathematics department. Please email Mr Twitchell or Miss Darwin if you wish to do so. If you want to buy it personally then please find the link below (other websites may be cheaper):

In its own words: “This in-depth CGP Student Book for AS-Level (and Year 1 of the full A-Level) Maths covers all the Pure Maths, Statistics and Mechanics content needed to tackle the first year of the AQA Maths course starting in 2017 and beyond. It’s packed with no-nonsense theory and plenty of step-by-step examples - plus helpful tips to make the trickier bits easier to handle. We’ve also included a wide range of practice questions with fully worked answers. And to cover everything the examiners could ask for, there are modelling and problem solving questions and examples throughout the book.”

[https://www.amazon.co.uk/New-Level-Maths-AQA-2017-2018/dp/1782947191/ref=tmm\\_pap\\_swatch\\_0?\\_encoding=UTF8&qid=1590059997&sr=1-2](https://www.amazon.co.uk/New-Level-Maths-AQA-2017-2018/dp/1782947191/ref=tmm_pap_swatch_0?_encoding=UTF8&qid=1590059997&sr=1-2)

### **Other great resources**

These resources are designed to help you to make the transition from GCSE to AS and A level Mathematics.

Many students say that they find the initial transition from GCSE challenging. These resources focus on key skills that will be used across the whole spectrum of AS and A level Mathematics. Each section includes

There will be six sets of resources, released on a weekly basis, and each set should provide about 3 hours of work. If you really get engaged by the enrichment activities, you may want to spend longer than this. Each set includes either written worked solutions, video solutions or links to websites.

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We hope you find these resources useful, that they add depth to your understanding, and that they help you make a smooth and successful transition to AS and A level Mathematics.

<https://amsp.org.uk/resource/gcse-alevel-transition-resources>