0 – How to be successful at A Level Maths

Success at A level is impossible without hard work right from the start. Get your study habits sorted now!

Your success in the first few weeks of the course will depend upon your willingness to maintain and perfect a range of skills, many of which you should have already met at GCSE. Please ensure you work through this document and the attached files to ensure you are fully confident in all the underlying material studied at GCSE.

Use this preparation material to get yourself into the right frame of mind. To succeed in the course you should:

- Be well organised.
- Keep your file in order.
- Take good notes for future reference. Read them through at the end of every lesson and annotate them as necessary. Highlight important points.
- Be precise and accurate with your notation and working.
- Make notes of what you still need to work on.
- Mark your work and ensure you understand why you went wrong.
- Plan your study time effectively - one hour's independent work for each hour's lesson.
- Revise regularly and ensure you do lots of practice questions. Don't just read your notes!
- Pay full attention in lesson and ask when you're not sure. We won't think less of you if you do.
- Always do the homework set and try to do it well in advance of the deadline, this way you can ask for help before the work is submitted. Your teacher may well give you a lot of questions but it is important that you practise questions requiring multiple skills.
- No one ever gets better at Maths by sticking with the easy stuff. Persevere!
- Show curiosity – there are loads of places you can find extra questions and teachers will always been keen to help you.

1a – Equipment

Folders - You will probably find that you use lots of sheets and bits of paper in Maths. In sixth form you are expected to provide your own paper. We would like to you to provide yourselves with a folder to keep your resources neat and you should endeavour to keep notes separate or clearly highlighted. Please ensure that you have an A4 folder, ring binder type, with dividers labelled for each of your teachers (you will have 2), Pure, Stats and Mechanics, Past Papers, Revision.

The department will provide you with an exercise book to be used solely for independent work you do outside of lessons, it is not to be used for homework or classwork. This will be open in front of you throughout your Maths lesson so teachers can check you are using your time at home and in studies wisely. You will need to bring this to every lesson with your folders.

Calculators – are allowed on all papers. We recommend the Casio fx –991 EX Classwiz, as it has all the necessary functions, though it does not draw graphs. All teachers will be using this and it is the minimum you need for lessons and tests. We will be buying these calculators in bulk and will be able to sell them onto you next term at a reduced cost – so don't dash out and buy one yet! They will be approximately £20 in school.

1b – Useful Websites

The following websites are all used regularly at A Level Mathematics and in many cases are an excellent source of further questions.

Graphing

Desmos.com

Geogebra.org

Self study/questions/resources

Drfrostmaths.com – your teacher will set up a class but you can use for extra work

Integralmaths.org – you will be issued with a password in September

Additional questions

Physicsandmathstutor.com

Naikermaths.com – questions by topic

Mathsmadeeasy.co.uk – exam papers

sites.google.com/view/sxpmaths/home

alevelmathsrevision.com

mathsgenie.co.uk

Pre-September Work

2a - GCSE Topics needed for A level: Algebra and Shape

You need to be confident in all of the topics below to start the A level course successfully:

1. Use the checklist below to identify any topics you might need further work on.
2. Use https://www.mathsgenie.co.uk/gcse.html and work through the grade 6 onwards topics: this site contains videos and exam question booklets to help you. Mark your work and tick the topics off when you're confident.
3. Attempt the attached exam papers (2a.1 – 2a.4). You should work through the questions, mark them and then use your results to identify any topics that requ
4. ire further work.
5. Please bring your work on these topics to your first week of lessons in September.

Algebra and number		Paper 2	Paper 3
◯ Solving linear equations	Multiple x terms, including fractional equations	Q2, Q15	
◯ Surds	All operations, including expanding brackets, rationalising denominator		Q14, Q16
◯ Solving linear inequalities		Q9	Q7, Q12
◯ Algebraic fractions	All operations, simplifying, solving		Q16
◯ Indices	Evaluating, manipulating, solving	Q1	Q1
◯ Simultaneous equations	Linear, quadratic		Q11
◯ Rearranging formulae		Q6, Q11	Q10
◯ Quadratics – manipulating	Factorising, expanding, completing square	Q5, Q8	Q3, Q6, Q8, Q19
◯ Quadratics – solving	Factorising, completing square, quadratic formula		Q9, Q14
◯ Quadratics - graphs	Sketching showing all intercepts and finding vertex	Q10, Q16	
◯ Quadratic inequalities			Q12
◯ Linear graphs	Midpoint, gradient, sketching, finding and using equation in form y = mx + c and ax + by = c Parallel and perpendicular lines	Q3, Q7, Q14	Q5
◯ Graph transformations	f(x) + a, f(x + a), -f(x), f(-x), [f(ax), af(x)]		Q18
◯ Other graphs	Equation of a circle, exponential, reciprocal		Q2, Q4, Q13
◯ Functions	Inverse, composite		
◯ Proof			
◯ Nth term of a sequence	Linear, quadratic, geometric	Q4	Q15

Shape		Paper 2	Paper 3
◯ Trigonometry - triangles	2D, 3D, sine rule, cosine rule, area of any triangle, sector area, arc length		
◯ Trigonometry – graphs	Exact values, graphs, solving equations with multiple solutions		
◯ Vectors			
◯ Speed-time and distance-time graphs	Gradient, area under graph	Q13	Q17, Q20
◯ Speed, velocity, displacement, acceleration	Units and definitions	Q13	Q17

2b – GCSE Topics needed for A level: Statistics

1. Use the checklist below to identify any topics you might need further work on.
2. Use https://www.mathsgenie.co.uk/gcse.html and work through the grade 6 onwards topics: this site contains videos and exam question booklets to help you. Mark your work and tick the topics off when you're confident.
3. Please bring your work on these topics to your first week of lessons in September.

If you did not study GCSE Statistics, and you did not complete the GCSE Mathematics course in Year 11 you will not have covered the data display and averages content listed below, in which case please ensure you learn this content! To do so you can make use of the statistics notes on the school open drive.

Please bring your work on these topics to your first week of lessons in September.

Probability and Data	
◯ Probability	Venn diagrams and notation, tree diagrams, sample space diagrams, mutually exclusive, independent
◯ Data display	Box plots, cumulative frequency diagrams, histograms, scatter diagrams
◯ Averages	Averages and range from raw data and frequency tables

3 – Further Preparation Work for middle/end of August

Once you feel you are confident on the GCSE content in sections 2a and 2b, please work through the questions on the 3. OCR Bridging Exercises. The full notes and solutions can be found in 3a.

NB This document, and other work, will form part of your independent work in September. You will be issued with an exercise book which will be checked at the start of each lesson for completion of this work (see section 1)

4 – Additional Tasks – Optional but Enjoyable!

The following tasks are suggestions of things you can do to extend your Mathematical knowledge. These are optional but will enrich your understanding of Mathematics

Points		Link
3	Watch a numberphile video	Search numberphile on youtube
5	Sign up for a Maths magazine and read an article	https://ima.org.uk/support/student/e16plus-newsletter/ https://plus.maths.org/content/
5	Find an interesting graph	https://informationisbeautiful.net/
5	Look at some stats	https://www.worldometers.info/
7	Sign up for brilliant.org and do a puzzle	https://brilliant.org/
10	Find out what Wikipedia has and get lost in a Mathematical rabbit hole	https://en.wikipedia.org/wiki/Portal:Mathematics
10	Investigate desmos	www.desmos.com
15	Investigate geogebra	www.geogebra.org
20	Find out about some living mathematicians and some current research areas in Maths	Andrew Wiles Timothy Gowers Roger Penrose John Horton Conway….
25	Do a maths challenge paper	https://www.ukmt.org.uk/sites/default/files/ukmt/senior-mathematical-challenge/SMC_2019_Paper.pdf https://www.ukmt.org.uk/sites/default/files/ukmt/senior-mathematical-challenge/SMC_2019_Solutions.pdf https://www.ukmt.org.uk/sites/default/files/ukmt/senior-mathematical-challenge/SMC_2019_Extended_Solutions.pdf
50	Read a book	If you go on Amazon you can find lots of books, some of which will be very cheap on Kindle. A popular one at the moment is Humble Pi by Matt Parker.

Suggested reading list -

Alex's Adventures in Numberland by Alex Bellos
Cabinet of Mathematical Curiosities by Ian Stewart
The Num8er My5teries by Marcus du Sautoy
How Many Socks Make a Pair?: Surprisingly Interesting Maths by Rob Eastway
The Curious Incident of the Dog in the Night-time by Mark Haddon
The Penguin Dictionary of Curious & Interesting Numbers by David Wells
The Calculus Wars by Jason Socrates Bardi
The Code Book by Simon Singh
50 Mathematical Ideas You Really Need to Know by Tony Crilly