

Get maths fit

Tasks & diagnostics for freshers for Maths courses

This year has been very difficult. Hopefully your maths studies will not have suffered too much, but you have probably missed out some materials and revision time. We feel that revision is a vitally important part of your learning: revision is where you move from being taught, to making the ideas and techniques your own. Understanding and fluency then follow. So, although not as good as regular revision under the guidance of your excellent teachers, we hope the tasks below will go some way to compensate and enable you to start university with confidence and knowledge.

The topics chosen here are listed in **two categories**: the **first** category represents **topics that we'll be visited in the first few weeks**. The **second** category represents **topics that you have been taught at A-Level that will be used later in Year 1**. **It would be useful that you refresh your skills about the first category**. If you feel very confident in that first category, you can move to the topics of the second category. We will not start assuming that you know well those skills and ideas, but by refreshing those skills, you will be able to concentrate on new or more difficult material.

Each topic below gives you a selection of questions, each with full feedback, that is designed to help you to prepare for your maths course. The questions are randomised each time you run the code, so you get a new version each time, but with the same underlying structure and algebra.

Some questions may feature topics you may not have seen before or have forgotten. So, don't worry if you can't do all the questions now. You will have the opportunity to learn this material later when you get to university, and we are not expecting you to be able to do everything (although some of you may be able to). You will also see that there are questions at GCSE and undergraduate levels. This will help you, either to go further back if you need to, or go further ahead.

It's best to use Chrome, Firefox or Safari on a PC/Mac, but MS Edge and IE also work, as do phones.

There are two parts to this activity: part a) learning material and part b) diagnostic tests.

a) **LEARNING MATERIAL**

Clear out the cobwebs by doing **some** of the questions in the following links. You should do **one or two**, but if you are then ok with the topic, leave it there; otherwise do a few more and study at the feedback. Your details and **marks will not be recorded** – this is just for your own preparation for part b) which will comprise similar questions from each of the topics below.

CATEGORY ONE (THE VERY USEFUL NOW)

ALGEBRA

- Surds <http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=615>
- Complete the square
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=25>
- Expanding brackets (higher order)
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=1160>
- Factorisation
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=1049>
- Rearranging equations
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=35>
- Roots and factors of polynomials
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=52>
- Polynomial long division
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=1045>
- Partial fractions
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=44>
- Factorisation of cubics
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=1050>
- Inequalities
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=1041>

CALCULUS

- Differentiation of polynomials
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=144>
- Chain rule logs <http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=114>
- Chain rule exps <http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=112>
- Product rule binomials
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=146>
- Product rule trig
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=152>
- Quotient rule combinations
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=155>
- Binomial expansion
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=165>
- Integration by parts exps
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=308>

ELEMENTARY FUNCTIONS

- Logs <http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=440>
- Trig degrees & radians
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=443>
- Trig special values
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=449>
- Trig Pythagoras
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=451>
- Trig adding angles
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=1210>
- Trig properties <http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=446>
- Function composition
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=419>
- Domain & Range quadratics
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=418>

MISCELLANEOUS

- Scientific notation
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=613>
- Prime factorisation
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=1037>

CATEGORY TWO (THE USEFUL LATER, YOU'LL GO BACK TO THOSE TOPICS LATER IN THE FIRST YEAR)

ALGEBRA

- Quadratic simultaneous equations
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=55>
- Sigma notation
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=58>
- Understanding expressions
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=40>

CALCULUS

- Integration by substitution polynomials
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=316>
- Integration by substitution algebraic
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=312>
- Integration log form
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=321>
- Integration using partial fractions
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=322>
- First-order ODEs separable
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=660>
- Higher-order ODEs homogeneous
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=665>

MISCELLANEOUS

- Logic applications
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=1116>

- Modular arithmetic
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=609>

PROBABILITY & STATS

- Combinations <http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=1142>
- Permutations <http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=1002>
- Multiplication rule
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=680>
- Addition rule General
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=673>
- Addition rule Independent
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=674>
- Addition rule Mutually exclusive
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=675>
- Discrete random variables Cumulative
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=676>
- Stats Data type & display
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=812>
- Stats Median <http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=829>
- Stats summation notation
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=807>
- Stats Regression
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=806>
- Stats Standard Normal distribution Two bounds
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=843>
- Stats Standard Normal distribution Contextual
<http://www.mathcentre.ac.uk:8081/mathseg/topic.jsp?pid=840>

b) DIAGNOSTIC TESTS

The following tests take one or two questions from each of the above tasks, so if you have done these and studied the feedback, you should be able to tackle the following diagnostic tests:

Post Maths A-level test in algebra <http://www.mathscen-tre.ac.uk:8081/mathsegteacher/mytest.jsp?tid=979&rt=2b33d152-b363-4bf7-afcd-5bf780d1d3a3>

Post Maths A-level test in calculus <http://www.mathscen-tre.ac.uk:8081/mathsegteacher/mytest.jsp?tid=980&rt=ed28ac0e-c77b-4534-9bed-489b5365de9c>

Post Maths A-level test in numbers & functions <http://www.mathscen-tre.ac.uk:8081/mathsegteacher/mytest.jsp?tid=981&rt=8fcc5098-1732-4d62-a6df-a6f0d3e1e2ba>

Post Maths A-level test in Probability & Stats <http://www.mathscen-tre.ac.uk:8081/mathsegteacher/mytest.jsp?tid=982&rt=620034d2-220d-4d08-a903-65d7c86713cd>

Here marks will be recorded, so long as you **FINISH THE TEST** and **close only the Results screen (not before)**. At the start, please input your **first name** and **surname**, don't worry about a student number yet (you'll get one when you register at university) and input '**School**' for your email address. You may do the tests as often as you like.

Finally, the following should be useful in organising your studies which will be very different from school. Although written pre-Covid, most of it is about self-directed learning and hence still valid. See <https://www.mathscareers.org.uk/article/study-skills-in-mathematics-introduction/>