


## #mathscpdchat 27 June 2023

**A level 'Taster Days' for Y11 students: do you run them?**

**If so, what do you do?**

Hosted by [Jenny Hill-Parker](#)

*This is a summary of the discussion – to see all the tweets, follow the hashtag #mathscpdchat in Twitter*



The graphic features a dark teal background with a large, stylized green hashtag symbol on the left. The text '#mathscpdchat' is written in white, with 'Today' in a yellow box to its right. Below this, 'Tuesday, 27 June, 7-8pm' is written in white. Two circular images show students in a classroom setting, one group of boys and one girl, both focused on their work. Below the images, the text 'A level 'Taster Days' for Y11 students: do you run them? If so, what do you do??' is written in white. At the bottom, it says 'Hosted by Jenny Hill-Parker @JennyHillParker' and 'ncetm.org.uk/mathscpdchat'. The NCETM logo is in the bottom right corner.

**The links shared during this discussion were:**

[Taster lessons to give you a flavour of studying maths beyond GCSE](#) which is resource material for students from the Advanced Mathematics Support Programme (AMSP). The lessons provide opportunities for students to try out some of the topics they will meet on a Level 3 Maths course. There are two lessons for each of A level Mathematics, A level Further Mathematics, and Core Maths. It was shared by [Jenny Hill-Parker](#) and [Jerome Foley](#)

[Transition to A level Mathematics: Essential Skills](#) which is resource material for students and teachers from the AMSP. These resources were designed for students to complete independently, and will develop fluency in the fundamental techniques and key mathematical concepts that underpin A level Mathematics. It was shared by [Rachel Beddoes](#) and [Jerome Foley](#)

[Supporting your students transition to level 3 maths](#) which is resource material for teachers from the AMSP. It contains links to their [Essential Skills materials](#) (described above) and their *Transition to A level Mathematics* course, and relevant notes for teachers. There are also brief descriptions of, and links to, other associated relevant AMSP resources. It was shared by [Rachel Beddoes](#) and [Hannah](#)

[Taster Lessons](#) which is a page on [Colleen Young's](#) *Mathematics, Learning and Technology* website. Colleen suggests, describes, and provides links to, some mathematical tasks for students to explore on 'taster days as part of a Sixth Form Welcome Event'. The tasks presented include some that involve exploring the graphs of functions using the WolframAlpha plot application, and various [Underground Mathematics](#) tasks. It was shared by [Jenny Hill-Parker](#)

[Bridging the Gap... Revisited](#) which is a blog by [@mathsjem](#) on her *Resourceaholic* website. It is about testing students when they are about to start on A level Maths courses in order 'to allow for (early) highly targeted intervention' where necessary. It was shared by [Jenny Hill-Parker](#)

[Free videos to assist the transition from GCSE to A level maths](#) which is a resource on the Pearson UK website. Ten 'chapters' are provided. They focus on activities 'which help students to master the key skills that are needed in both AS and A level Mathematics. Each chapter contains between 10 and 15 videos for students to watch and 'a downloadable PDF of example questions, practice questions and ... exam questions for consolidation'. It was shared by [Jenny Hill-Parker](#)

[Powerful quadratics](#) which is a problem on the [Underground Mathematics](#) website. It is based on this [NRICH resource](#). The challenge is to find all the solutions to an equation in which a quadratic expression in  $x$ , raised to a power which is a different quadratic expression in  $x$ , is equal to 1. It was shared by [Rob Southern](#)

[Teddy bear](#) which is also a problem on the [Underground Mathematics](#) website. Learners are invited to match some circles (that are shown on a Cartesian grid) with given equations. But, although the circles are drawn to scale, so their relative sizes are true, the axes are not labelled. Comprehensive 'teacher support' notes are provided. It was shared by [Sheena](#)

[Picture the process](#) which is an ordered sequence of connected tasks on the [Underground Mathematics](#) website. The learner 'travels' through 'environments', starting from 'processes' (such as the cooling of a cup of tea as time passes), through graphs representing processes, to the equations of graphs, and finally to seeing process/graph/equation examples as a whole. It was shared by [Hannah](#)

[Transition from GCSE to A level Mathematics](#) which is a blog from OCR by Steven Walker, OCR's Maths Subject Advisor. It was shared by [Jenny Hill-Parker](#)

[Getting a taste](#) which is a blog by [Mo Ladak](#) on his [MathedUp](#) website, in which he shares what he has done in A level taster sessions over several years. It was shared by [Jenny Hill-Parker](#)

[Free GCSE to A level Transition Booklet](#) which is a downloadable booklet from [Sparx Maths](#). The authors have 'selected over 120 questions from within Sparx Maths to help any student transitioning from GCSE to A level'. It was shared by [Jenny Hill-Parker](#)

[A level taster task booklets](#) which are four 'booklets' created by [Ben Sinclair](#) and available to download as PDF files. The booklet headings are 'Differentiation Taster', 'Logarithms Taster', 'Proof' and 'What is infinity? What is a limit?'. Each booklet consists of a variety of attractively presented tasks. It was shared by [Ben Sinclair](#)

[A/AS level Maths Preparation](#) which is from where you can download a document written by [Paddy MacMahon](#) for students at Latymer Upper School in order to prepare them for A level Maths. The students are instructed to 'work through all the questions on the sheet, answering the questions on squared paper. They are not meant to be as straightforward as GCSE questions, but should only require GCSE knowledge, together with a willingness to think'. It was shared by [Paddy MacMahon](#)

[GCSE to A level](#) which is a collection of material, gathered and/or created by [Adam Creen](#). There is a list of online resources (with links to them), 'baseline assessments to use with Year 12, video playlists, and a list of physical books'. It was shared by [Adam Creen](#), known on Twitter as [RobotMaths](#)

[Key Ideas in Teaching Mathematics: Research-Based Guidance For Ages 9-19](#) which is a book by Anne Watson, Keith Jones and Dave Pratt. They provide research-based guidance, explanations and examples of the ideas that really matter for students from age 9 to 19, and that can be obstacles to future learning. It was shared by [Mary Pardoe](#)

[Ideas for Sixth Form Mathematics: Pure Mathematics and Statistics](#) which is a book by [Colin Foster](#) from the Association of Teachers of Mathematics (ATM). It offers a wealth of innovative lesson ideas for important areas of post-16 mathematics teaching, bringing variety to the Pure Mathematics and Statistics curriculum areas within AS/A2 Mathematics and IB. It was shared by [Mary Pardoe](#)

[Ideas for Sixth Form Mathematics: Further Pure Mathematics and Mechanics](#) which is another book by [Colin Foster](#) from the Association of Teachers of Mathematics (ATM). It offers a wealth of innovative lesson ideas for important areas of post-16 mathematics teaching, bringing variety to the Further Mathematics and Mechanics curriculum areas. It was shared by [Mary Pardoe](#)

**An illustrated summary of the discussions in this #mathsCPDchat follows.**

The host's opening message ...



**Jenny Hill-Parker** @JennyHillParker · 15h

Good evening! First a bit of context, I teach in an 11-16 school. We teach GCSE Maths and Further Maths. I was an examiner for the 9MA0 Pure Maths A level paper last year and am currently an examiner for GCSE Higher Tier Statistics. Please introduce yourself! [#mathscpdchat](#)

... prompted this 'introduction' ...



**RobotMaths** @robotmaths · 15h

I'm Head of Maths in an 11-18 school. We have 280 students in Year 11, 100 of whom carry on to do Maths A Level, joined by 20 from local 11-16 schools. Numbers for Further Maths range between 10 and 20. [#mathscpdchat](#)



**Jenny Hill-Parker** @JennyHillParker · 15h

Huge numbers going on to do A level! Do you offer just Maths, or Further Maths/Core as well? [#mathscpdchat](#)

... and this:



**Paddy MacMahon** @paddymac\_maths · 15h

I'm HoD at a selective 11-18 school. 200 per year in 6th form, with ~85 single maths and ~45 further maths in each year. 10 or so opt for AS (over 2 years), keen to explore Core Maths as an option...

[#mathscpdchat](#)



**Paddy MacMahon** @paddymac\_maths · 15h

...

We don't do taster sessions per se, but have lots of extension in our y10 and 11 curriculum - think a hybrid of FSMQ and AQA level 2 FM

[#mathscpdchat](#)



**Jenny Hill-Parker** @JennyHillParker · 15h

Nice to 'meet' you Paddy. Thanks for joining in! [#mathscpdchat](#)



**Cat van Saarloos** @CoreMathsCat · 1h

Hi Paddy, if you need any info on Core Maths please get in touch. There is lots of information on my pinned tweet.

It also prompted the following comments which recalled the #mathsCPDchat of the previous week, and informed teachers about a free new resource ...



**Economist Foundation**  @Econ\_Foundation · 16h ...

This is a great summary highlighting the importance of maths skills and numerical literacy beyond the classroom! Thank you @Maryse for hosting & @mathscpdchat for sharing these insightful resources. We're excited to join the #mathscpdchat today in celebration of #MathsWeekLDN!... [Show more](#)

 **mathscpdchat** @mathscpdchat · Jun 23

This week's #mathsCPDchat asked 'Which topics in GCSE maths are students most likely to find useful in adult life?' There's a summary, including links mentioned, at [ncetm.org.uk/media/slpeydxv](http://ncetm.org.uk/media/slpeydxv). Thanks @Maryse for hosting!



**Economist Foundation**  @Econ\_Foundation · 16h ...

Our recent Special Edition is a free 6-hour scheme of work which helps students develop their critical thinking skills, maths confidence and understanding of how numeracy can be used to make sense of the world. Download for free to help build #MathsConfidence in your classroom... [Show more](#)

... and to which the host responded at the end of the chat:



**Jenny Hill-Parker** @JennyHillParker · 15h ...

I hope you found today's chat useful! #mathscpdchat

Jenny's first main question ...



**Jenny Hill-Parker** @JennyHillParker · 16h

Q1 - Does your school run A level taster days/sessions for year 11 students, and if so what activities do you do with them? [#mathscpdchat](#)

... generated approximately 40 responses. Many of these replies included links to, and comments about, resources that teachers had used, and had found to interest, and help to prepare effectively, Y11 students who were about to embark on A level Mathematics courses. For example, there was this short discussion ...

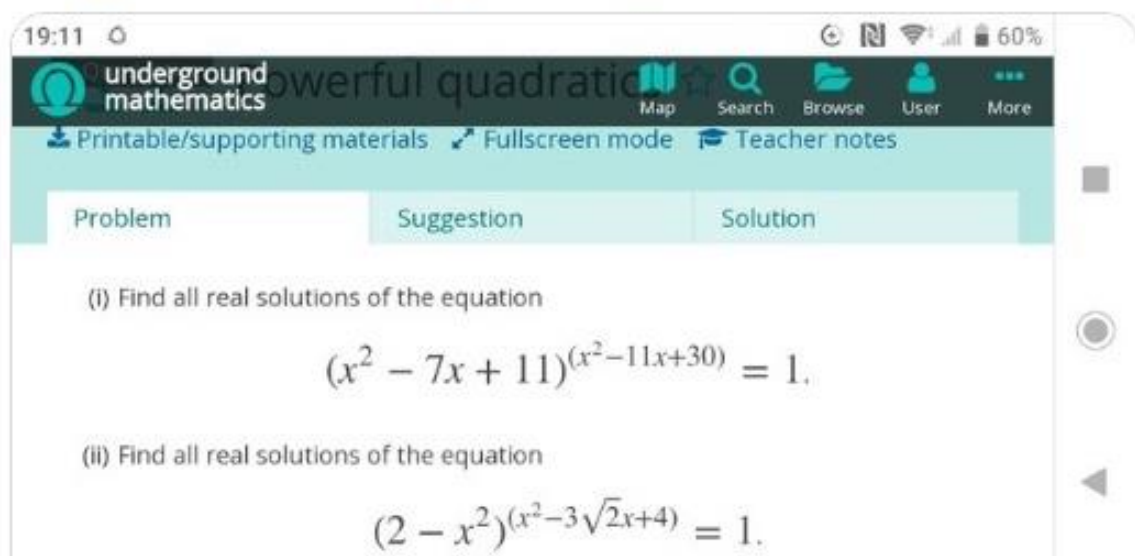


**Rob Southern** @mrsouthernmaths · 16h

I like using Powerful Quadratic from Underground Maths. It's nice because it uses familiar maths in an unfamiliar context. A nice extension is to write their own question with 6 unique solutions (Q1 here has 5)

[#mathscpdchat](#)

[undergroundmathematics.org/quadratics/pow...](http://undergroundmathematics.org/quadratics/pow...)



19:11

underground mathematics

powerful quadratic

Map Search Browse User More

Printable/supporting materials Fullscreen mode Teacher notes

Problem	Suggestion	Solution
(i) Find all real solutions of the equation		
		$(x^2 - 7x + 11)^{(x^2 - 11x + 30)} = 1.$
(ii) Find all real solutions of the equation		
		$(2 - x^2)^{(x^2 - 3\sqrt{2}x + 4)} = 1.$



**Jenny Hill-Parker** @JennyHillParker · 16h

Hi Rob! I was hoping you would join in!  
These resources look amazing [#mathscpdchat](#)



**Sam Blatherwick** @blatherwick\_sam · 16h

Love this task and it blew my mind when I first saw it, v creative



**Sheena** @Sheena2907 · 16h


It's a great question




**Jenny Hill-Parker** @JennyHillParker · 16h

I am just doing it now! Lovely question! [#mathscpdchat](#)


... and other teachers mentioned the same website ... as a source of useful, appropriate and interesting material:

- 

**Hannah** @LorHRL · 17h ...

We do Underground Maths - Picture the Process. We don't know the students coming in so this works for all levels.  
[undergroundmathematics.org/thinking-about..](https://undergroundmathematics.org/thinking-about..)
- 

**Jenny Hill-Parker** @JennyHillParker · 17h ...

Another vote for Underground Maths! I need to go down a rabbit hole looking through the site... Looks great! [#mathscpdchat](#)
- 

**Susie Parkin** @susiecp123 · 13h ...

We use Picture the Process too, it's really accessible and can lead to great discussion even between students who've never met before.

The next reply prompted the host to link to another great source of effective and engaging material for 'about-to-be' A level Maths students:

- 

**Fox** @MFx15 · 16h ...

Sequences, series & sum to infinity with chocolate!
- 


**Jenny Hill-Parker** @JennyHillParker · 16h ...

There's a lovely sum to infinity activity here;  
[amsp.org.uk/resource/8b9e0...](https://amsp.org.uk/resource/8b9e0...)


I need to know about the chocolate activity!

		<a href="https://amsp.org.uk">amsp.org.uk</a> Resource - AMSP
--	---	--


The following reply conveys a teacher's own idea, which does not necessarily depend on a particular published resource:

- 

**Mr Richards** ■ @Simon\_Richards8 · 16h ...

Were going to to use suvat to work out tall the school building by dropping a water balloon off of it.
- 


**Jenny Hill-Parker** @JennyHillParker · 16h ...


What a brilliant activity! [#mathscpdchat](#)
- 


**Amina Y A** @AminaAhmed25 · 16h ...

Could you please share any resources? Thank you

Some replies were about topics that teachers have found engage potential A level students, rather than about the exact tasks or questions used. For example, there was this short conversation ...

 **Little Miss Maths** @littlemaths · 17h ...  
Polynomial division - it's something they haven't seen before and they enjoy it! Have used partial fractions before as well.

 **Jenny Hill-Parker** @JennyHillParker · 17h ...  
Polynomial division is so satisfying! I love teaching it. Partial fractions are great too, but require some serious algebraic skill - do you cover prerequisite knowledge as part of the session? [#mathscpdchat](#)

 **Little Miss Maths** @littlemaths · 17h ...  
I normally just start with adding algebraic fractions and go from there. We only get the basics covered but it's nice as something new to them.


... and this ...

 **Hannah** 🤓 @missradders · 17h ...  
We do Pascal's triangle and all its applications.


 **Joanna Hill** @JoannaH52111534 · 15h ...  
We do that too!

 **Jenny Hill-Parker** @JennyHillParker · 17h ...  
I LOVE Pascal's triangle! [#mathscpdchat](#)

... and a carefully worked-out plan:


 **RobotMaths** @robotmaths · 17h ...  
Yes  
Year 10 in Summer: Maths - discriminant, FM - complex numbers  
Year 11 in Spring: Maths - factor theorem, FM - sums of series  
Year 10 is to show them relevance to GCSE  
Year 11 is to show them hard algebra and put some off!  
[#mathscpdchat](#)


 **Jenny Hill-Parker** @JennyHillParker · 17h ...  
Good to know! How do you choose the cohort for the taster sessions? How long are they? Your students are lucky to have such great provision!  
[#mathscpdchat](#)


 **RobotMaths** @robotmaths · 17h ...  
50 minutes (a single lesson, though all our Sixth Form lessons are doubles).  
Students choose which Taster Day sessions to go to  
Some know they will be doing Maths so don't bother investigating, and some Foundation students put down Maths but we welcome them anyway  
[#mathscpdchat](#)





Another *Underground Maths* task is used on A level ‘Taster Days’ by some teachers ...

- 


**Sheena** @Sheena2907 · 17h ...  
Underground maths teddy bear!
- 

**Kersten Watkins** @kersten\_watkins · 14h ...  
❤️ teddy bear task
- 


**Jenny Hill-Parker** @JennyHillParker · 17h ...  
What does this mean?! 😊
- 

**Mary Pardoe** @PardoeMary · 17h ...  
Look here ... [undergroundmathematics.org/circles/teddy-...](https://undergroundmathematics.org/circles/teddy-...)  
[#mathscpdchat](#)
- 

**Sheena** @Sheena2907 · 17h ...  
I did a thread on this here. The teddy bear task is in the thread as well

 **Sheena** @Sheena2907 · Jun 12  
6th form induction days will fast be here  
What are people doing for Maths, Further Maths or Core Maths?  
For Maths I like using the Underground Maths Teddy bear task  
Further maths either an intro to complex numbers or decision maths  
It would be good to get everyone's ideas 😊

[\[Sheena's thread\]](#)

- 

**Jenny Hill-Parker** @JennyHillParker · 17h ...  
Oh fab I'll read through it later!  
I was lost for a minute there! [#mathscpdchat](#)

... and the link to a further source of suitable engaging tasks was shared:

- 

**Mary Pardoe** @PardoeMary · 18h ...  
This book by [@colinfooster77](#) has some lovely tasks that would be great to use as a basis for Y11 A level taster sessions: [atm.org.uk/Shop/Ideas-for-...](https://atm.org.uk/Shop/Ideas-for-...)  
[#mathscpdchat](#) this is an extract from his introduction to the book ...

But the same reasons why younger learners might benefit from exploratory and open-ended styles of mathematics lesson also apply to sixth formers. Working in more genuinely mathematical ways, in which students exercise choice and make decisions to solve problems, will be much more satisfying and worthwhile than merely completing dull routine exercises. There are huge opportunities for interesting and varied mathematics lessons in the sixth form, yet it has always been harder to find good quality materials for these classes. Although they may enjoy the mathematical content, many mathematics teachers would say that their sixth-form lessons are often less creative, less imaginative, less practical, less open-ended and less varied than their lessons with younger learners.



**Mary Pardoe** @PardoeMary · 18h

These are some 'shots' of the start of one of the (extended) tasks in this book ... [#mathscpdchat](#)

...

## 2 × 2 Matrices

- Explore the effect of operating with each of the matrices below on any vectors of your choice.
- What transformations do the matrices produce? Why?

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}, \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}, \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}, \\ \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}, \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}, \begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}, \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}, \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}, \text{ etc.}$$

- Try to find matrices that will cause *other* transformations, such as a rotation 60° anticlockwise about the origin or a reflection in the line  $y = 3x$ .
- Find the *determinant* of each matrix and relate your answers to the transformations.

## 2D transformations

- Draw a simple (non-symmetrical) shape with integer coordinates for its vertices. (Make it simple, but not too simple!)
- Rotate it 90° anticlockwise about the origin.
- Look at the new coordinates of the vertices and describe how they relate to the starting coordinates.
- Try other rotations, such as 90° clockwise, 180°, etc. – always about the origin.
- Try reflections in the  $x$  and  $y$  axes and in the lines  $y = x$  and  $y = -x$ .
- What happens to the coordinates in each case? Why?

One way to describe the results of these transformations is to use  $2 \times 2$  matrices.

These are (in order): identity (the 'boring matrix' – no change), reflection in the  $y$ -axis, reflection in the  $x$ -axis, rotation 180° about the origin, reflection in the line  $y = x$ , rotation 90° anticlockwise about the origin, rotation 90° clockwise about the origin, reflection in the line  $y = -x$ , reduction to the line  $y = x$  and enlargement with scale factor 2 centred on the origin.

In general, a rotation of  $\theta$  anticlockwise about the origin is performed by the matrix  $\begin{pmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{pmatrix}$ . Since  $\begin{pmatrix} a & c \\ b & d \end{pmatrix} \begin{pmatrix} 1 \\ 0 \end{pmatrix} = \begin{pmatrix} a \\ b \end{pmatrix}$  and  $\begin{pmatrix} a & c \\ b & d \end{pmatrix} \begin{pmatrix} 0 \\ 1 \end{pmatrix} = \begin{pmatrix} c \\ d \end{pmatrix}$ , it is possible to

see the two columns of the matrix  $\begin{pmatrix} a & c \\ b & d \end{pmatrix}$  as describing what happens to the  $\mathbf{i}$  and  $\mathbf{j}$  vectors respectively under transformation by the matrix. Thinking this way, it is not too hard to work out mentally the effect of each of the matrices above.

In general, a reflection in the line  $y = mx$  is performed by the matrix  $\frac{1}{1+m^2} \begin{pmatrix} 1-m^2 & 2m \\ 2m & m^2-1 \end{pmatrix}$ .

Alternatively, you could express the matrix in terms of the angle  $\theta$  that the mirror makes with the positive  $x$ -axis, so that  $m = \tan \theta$ , in which case the matrix would be  $\begin{pmatrix} \cos 2\theta & \sin 2\theta \\ \sin 2\theta & -\cos 2\theta \end{pmatrix}$ .

There were four 'single' replies to Jenny's first main question (which is repeated here as a reminder) ...



**Jenny Hill-Parker** @JennyHillParker · 16h

...

Q1 - Does your school run A level taster days/sessions for year 11 students, and if so what activities do you do with them? [#mathscpdchat](#)

... which were:



**Adam Goodridge** @AdamGoodridge18 · 18h

...

Partial fractions is a nice stand alone topic.



**Ben L Sinclair** @mathsacharya · 14h

...

I made these taster booklets to use with them:  
[drive.google.com/drive/u/0/mobi](https://drive.google.com/drive/u/0/mobi)



**Matt Man** @mr\_man\_maths · 16h

...

Yes

Year 10 - introduction to differentiation from first principles

Year 11 - pure -> polynomial division, Statistics -> binomial expansion and linking to introduction to binomial distribution, mechanics -> conservation of momentum (technically FM1) [#mathscpdchat](#)



**James Brough** @jbrough13 · 18h

...

We're delivering an introduction to differentiation this year on our Y11 Transition Day. (Sixth Form College)

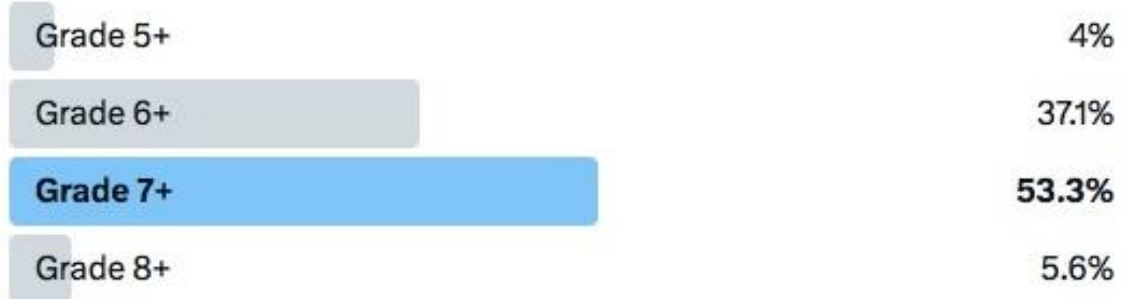
Jenny's second main question ...



**Jenny Hill-Parker** @JennyHillParker · Jun 27

...

What is the entry requirement for A level Maths at your school or closest sixth form? [#mathscpdchat](#)



908 votes · Final results

prompted a teacher to share a similar poll from 2021:



**RobotMaths** @robotmaths · 20h

...

Here is a similar poll from 2021 with 1278 votes:  
[#mathscpdchat](#)



**Jo Morgan**  
@mathsjem

...

I know this has been asked before, but I'd appreciate some up-to-date info on entry requirements for A Level Maths (not FM).

What GCSE Maths grade is required to do A Level Maths at your school/college? Thanks!



1,278 votes · Final results

8:18 PM · Nov 30, 2021

There were two other replies that in turn prompted more comments, and one single reply. This was a conversation about low (or no) entry requirements ...



**Maths Squirrel** @iammaths · 19h

...

In previous 2 schools you just needed a pulse.



**Jenny Hill-Parker** @JennyHillParker · 19h

...

Oh gosh! How were the results? [#mathscpdchat](#)



**Maths Squirrel** @iammaths · 19h

...

By some miracle no one has actually failed but nothing above a B either. Our just finished year 13's had 2 that only did the foundation paper



**LTT** @Long\_Tailed\_Tit · 15h

...

That's impressive to get two foundation students that far!

... whereas these thoughts were about raising the required GCSE attainment level ...



**Michael Slavinsky** @michaelslav · 19h

...

We just changed from 6+ to 7+. Really good reasoning on it from @domwilliamsinic & @JamesMacNaughto to prompt the switch



**Jenny Hill-Parker** @JennyHillParker · 19h

...

What were the reasons? #mathscpdchat



**Michael Slavinsky** @michaelslav · 19h

...

V v few if any previous students on 6 @ GCSE succeeded in the past. Bear in mind that a majority of our y11s applying to 6F also do FM GCSE, we reasoned if they only got a 6 (while also doing extra maths) they'd struggle with A level demands. Not best choice for their future.



**James MacNaughton** @JamesMacNaughto · 18h

...

There's also pretty strong national data (admittedly from a few years ago)



**Jenny Hill-Parker** @JennyHillParker · 18h

...

Is there a link you can post? #mathscpdchat

... and this was the single comment:



**Sarah Chancellor** @SChancellor11 · 7h

...

There isn't a specific grade for Maths but there is for their overall grades. I only taught one kid with a level 7 last year, the rest were 8s and 9s.

To Jenny's third question ...



**Jenny Hill-Parker** @JennyHillParker · 20h

Q3 - If you run taster sessions for A level Maths, what topic(s) do you cover? #mathscpdchat

... (probably because replies to her first question addressed this) there was just one response:



**Mary Pardoe** @PardoeMary · 20h

This is another book by @colinfoster77 that is likely to be helpful [atm.org.uk/Shop/Ideas-for...](http://atm.org.uk/Shop/Ideas-for...) ... and these examples from it might provide appropriate ideas on which to focus? #mathscpdchat

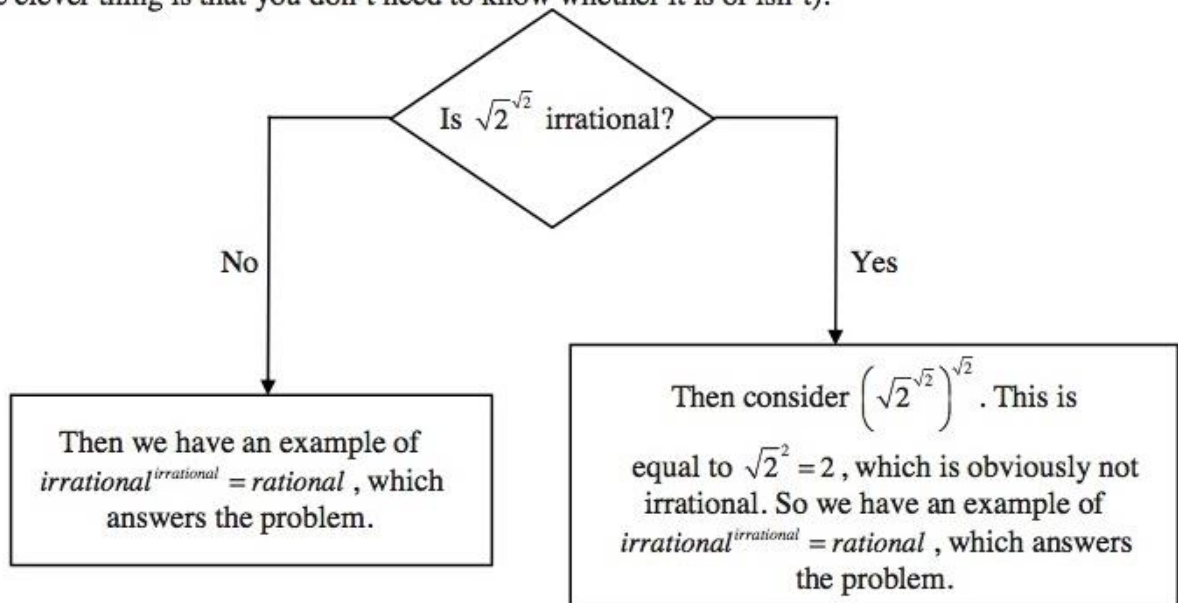
Pure Mathematics

$$\sqrt{2}^{\sqrt{2}}$$

- Do you think that it is possible to raise an irrational number to an irrational power and get a rational answer?

It is possible.

Suppose for example that  $a = \sqrt{2}^{\sqrt{2}}$  and  $b = \sqrt{2}$ . Perhaps  $\sqrt{2}^{\sqrt{2}}$  is irrational (in fact it is, but the clever thing is that you don't need to know whether it is or isn't).

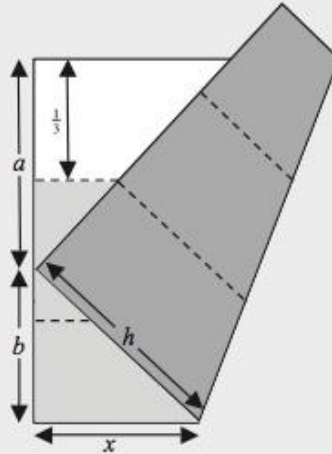


So either way the statement is proved.

This clever line of reasoning is an example of a 'non-constructive proof'. Often proving that numbers are irrational is very difficult. No-one knows whether  $\pi^\pi$ ,  $e^e$  or  $\frac{e}{\pi}$ , for instance, are irrational.

## Folding a cube root

- Fold a square piece of paper into three equal strips, parallel to the edge.  
(There are proper origami ways of doing this – find out about *Haga's Theorem*.)
- Then make the fold shown  
(the dashed lines show the folds into thirds.)
- Now show that  $\frac{a}{b} = \sqrt[3]{2}$ .



**Jenny Hill-Parker** @JennyHillParker · 20h  
They're lovely examples! #mathscpdchat

...

Jenny's next question ...



**Jenny Hill-Parker** @JennyHillParker · 20h  
Q4 - What are the key topics from GCSE that students need to successfully study A level Maths? Do you highlight this to them throughout the GCSE course? #mathscpdchat

...

... prompted two conversations, and several single replies. Students' ability (or not) to use and apply competently 'GCSE-level' algebraic skills and understanding is an issue ... as mentioned here ...



**Hannah** @LorHRL · 20h  
All the algebraic manipulation! Quadratics, algebraic fractions, simultaneous equations etc #mathscpdchat

...



**Jenny Hill-Parker** @JennyHillParker · 20h  
Yes! And it begs the question of what to do with a student who has made the entry requirement for A level but doesn't have great algebraic skills #mathscpdchat

...





**Hannah** @LorHRL · 20h  
We advise them it's a bad idea to continue with poor GCSE algebra skills but it's their choice so then just extra support to try and catch them up


...

... and here the focus was on checking students' existing understanding, rather than on providing glimpses of some of the kinds of interesting thinking in which they will soon be engaging:

 **Sam Blatherwick** @blatherwick\_sam · 20h ...  
Algebraic manipulation, function notation #mathscpdchat


 **Sam Blatherwick** @blatherwick\_sam · 20h ...  
Gradient, coordinates, shapes of functions #mathscpdchat


 **Jenny Hill-Parker** @JennyHillParker · 20h ...  
Definitely! Do you give your students any gateway tasks to do upon starting year 12 to check understanding? #mathscpdchat


 **Sam Blatherwick** @blatherwick\_sam · 20h ...  
We're changing where we're starting. I think the yr 12 group I've got next year is starting with logarithms. Will probably start with lots of negative + fractional indices work, then show how they fit onto a continuous scale and how logs unlock that #mathscpdchat

 **Sam Blatherwick** @blatherwick\_sam · 20h ...  
Will also show logarithm as an inverse function to an exponent and play around with that understanding

 **Jenny Hill-Parker** @JennyHillParker · 20h ...  
Do you show them this relationship graphically? #mathscpdchat

 **Sam Blatherwick** @blatherwick\_sam · 20h ...  
I think I'd go back to this in the next module when we see graph transformations? #mathscpdchat

 **Paddy MacMahon** @paddymac\_maths · 20h ...  
Ours are given some holiday work to complete. #mathscpdchat

 **Paddy MacMahon** @paddymac\_maths · 20h ...  
Yes, it's mandatory, and forms the basis of the first few lessons. Available here: [paddymacmahon.com/resources/pre-...](https://paddymacmahon.com/resources/pre-...)

#mathscpdchat



[paddymacmahon.com](https://paddymacmahon.com)

paddy macmahon - pre-a level

Problems and resources that I've used with years 7-11.

 **Jenny Hill-Parker** @JennyHillParker · 20h ...  
Thank you Paddy, that's so generous of you #mathscpdchat





**Rachel Beddoes** @GirlsCount\_2 · 1h

[amsp.org.uk/teachers/11-16..](https://amsp.org.uk/teachers/11-16..)

We created these 'essential skills' resources for Transition to A level which have been super popular! You can see how teachers have used them and also discover our free online summer course for students here 🙌

[amsp.org.uk/teachers/11-16..](https://amsp.org.uk/teachers/11-16..) #mathscpdchat



[amsp.org.uk](https://amsp.org.uk)

Transition to level 3 maths - AMSP

This was another suggestion ...



**Mary Pardoe** @PardoeMary · 20h

Chapter 6 from 'Key Ideas in Teaching Mathematics' by Anne Watson, Keith Jones and Dave Pratt provides very useful guidance about necessary previously acquired understandings ... link to book id on this page

[nuffieldfoundation.org/students-teach..](https://nuffieldfoundation.org/students-teach..) #mathscpdchat



[nuffieldfoundation.org](https://nuffieldfoundation.org)

Key Ideas in Teaching Mathematics | Resources | Nuffield Foundation

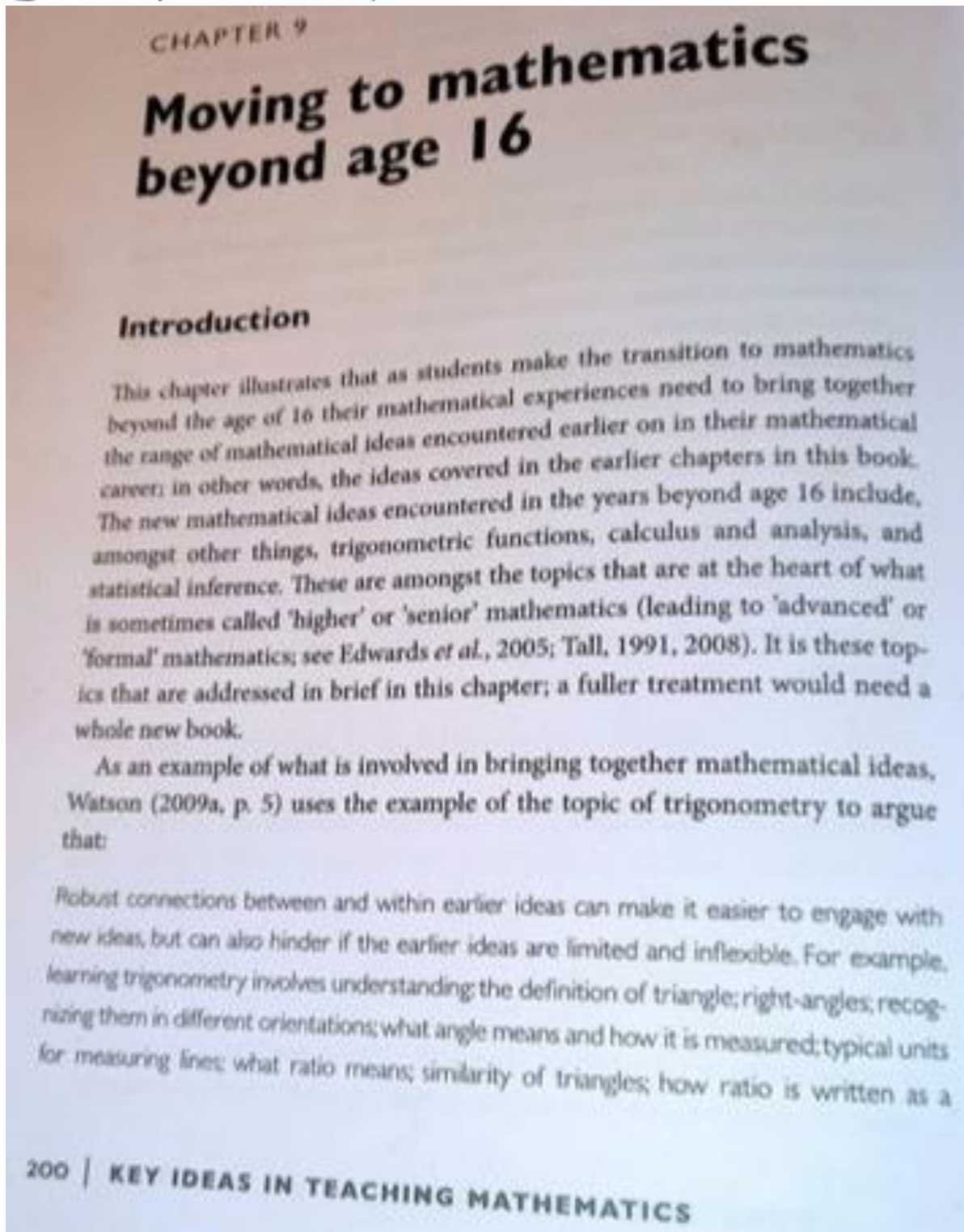
These online resources accompany the book Key Ideas in Teaching Mathematics. Organised around seven key mathematical 'ideas', with...



Mary Pardoe @PardoeMary · 20h

... Chapter 6 ... #mathscpdchat

...



... as was the following reference to original material (also in response to Jenny's Q4 ...repeated below):



**Jenny Hill-Parker** @JennyHillParker · 20h

...

Q4 - What are the key topics from GCSE that students need to successfully study A level Maths? Do you highlight this to them throughout the GCSE course? [#mathscpdchat](#)



**Matt Man** @mr\_man\_maths · 17h

...

Refer to my transition to A Level topics! [#mathscpdchat](#)



**Matt Man** @mr\_man\_maths · Jun 27

...

Here you go @JennyHillParker regarding Q4 [#mathscpdchat](#)



**Matt Man** @mr\_man\_maths · Jun 25, 2022

Quite a few people were asking about the "Crossover" between GCSE and A Level.

Here are the topics that I shared at both [#MathsConf28](#) and [#MathsConf29](#).

Can anyone else think of any topics that cross over between GCSE and A Level?

The images in Matt's [quoted tweet](#) have been enlarged for clarity:

### CROSSOVER!

Topic No	Topic	A Level spec	GCSE spec
	<b>Year 12</b>		
1	Proof (by deduction and counterexample)	A1	A6
2	Laws of indices	B1	N7
3	Simplifying surds	B2	N8
4	Surds (Four operations)	B2	N8
5	Rationalising the denominator	B2	N8
6	Factorising quadratics	B3	A4
7	Solving quadratic equations (Factorising)	B3	A4
8	Completing the square	B3	A4
9	Quadratic formula	B3	A4
10	Quadratic graphs	B3	A11
11	Simultaneous equations (linear)	B4	A19
12	Simultaneous equations (linear and quadratic)	B4	A19
13	Simultaneous equations (graphs)	B4	A19
14	Solving linear inequalities	B5	A22
15	Solving quadratic inequalities	B5	A22



@mr\_man\_maths

Preparing GCSE Pupils for A Level Maths



**CROSSOVER!**

Topic No	Topic	A Level spec	GCSE spec
	<b>Year 12</b>		
16	Inequality regions	B5	A22
17	Expanding triple brackets	B6	A4
18	Sketching cubic graphs	B7	A12
19	Sketching reciprocal graphs	B7	A12
20	Transformations of graphs (Translation)	B9	A13
21	Transformations of graphs (Reflection)	B9	A13
←	Equation of a straight line	C1	A10
	Parallel and perpendicular lines	C1	A9
24	Equation of a circle and equation of tangent to a circle at a given point	C2	A16
25	Sine rule	E1	G22
26	Cosine rule	E1	G22
27	Area of a triangle (non right angled)	E1	G23
28	Trigonometric graphs	E3	A12
29	Solving trigonometric equations using graphs	E7	A12
30	Sketching exponential graphs	F1	A12



@mr\_man\_maths

**Preparing GCSE Pupils for A Level Maths**

**CROSSOVER!**

Topic No	Topic	A Level spec	GCSE spec
	<b>Year 12</b>		
31	Estimating gradient of graphs	G1	A15
32	Vector notation and arithmetic	J3	G25
33	Vector geometry proof	J5	G25
34	Sampling	K1	S1
35	Histograms	L1	S3
36	Scatter diagrams	L2	S6
←	Averages and range from list of data (Mean, median, mode, LQ, UQ, IQR)	L3	S4
	Averages from tables	L3	S4
39	Cumulative frequency curves and box plots	L1	S4
40	Mutually exclusive and independent events	M1	P8
41	Venn diagrams	M2	P9
42	Tree diagrams	M2	P9
43	Kinematics formulae (link to rearranging formulae?)	Q3	R11
44	Displacement time graphs	Q2	A15
45	Velocity time graphs	Q2	A15



@mr\_man\_maths

**Preparing GCSE Pupils for A Level Maths**

**CROSSOVER!**

Topic No	Topic	A Level spec	GCSE spec
	<b>Year 13</b>		
46	Simplifying algebraic fractions	B6	A4
47	Algebraic fractions - four operations	B6	A4
48	Composite functions	B8	A7
49	Inverse functions	B8	A7
50	Nth term of arithmetic sequence	D4	A25
51	Locating roots of equations such as $f(x) = 0$	I1	A20
←	Conditional probability (Two way tables, Venn, tree diagrams)	M2	P9



@mr\_man\_maths

**Preparing GCSE Pupils for A Level Maths**

There was also this single reply to Q4:



**Paddy MacMahon** @paddymac\_maths · 20h

...

Coordinate geometry, vectors, all the algebra.

[#mathscpdchat](#)

In response to Jenny's fifth question ...



**Jenny Hill-Parker** @JennyHillParker · 21h

...

Q5 - Do you run taster sessions for A level Further Maths and Core Maths? What advice do you give students in terms of which course to apply for?

[#mathscpdchat](#)

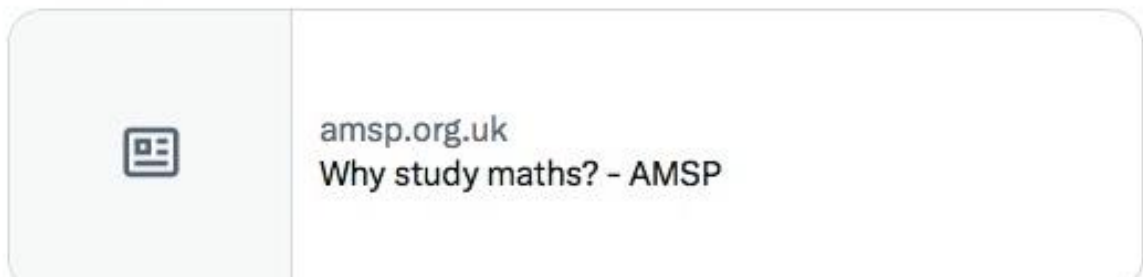
... there were two single replies ...



**Jerome.Foley** @JeromeFoley9 · 2h

...

Yes, used to do them every year and they were always good fun... trying not to sound like a broken record but the AMSP also do some of these funnily enough :)



**Matt Man** @mr\_man\_maths · 18h

...

Further Maths - either introduction to matrices or complex numbers and Argand diagrams [#mathscpdchat](#)

... and this conversation:



**Rob Southern** @mrsouthernmaths · 21h

...

For Further Maths, I start by asking them why the Romans never went to the moon...

[#mathscpdchat](#)



**Jenny Hill-Parker** @JennyHillParker · 21h

...

I love this already... what's the answer?! [#mathscpdchat](#)



**Chris #FE** @ChrisFMaths · 21h

...

There is no zero in Roman numerals, so could never finish the countdown.



**Rob Southern** @mrsouthernmaths · 21h ...

We do a countdown from ten in Roman numerals. I really big it up and make them chant with me.

The problem is, the Romans didn't have a symbol for zero, so the rocket could never take off.

[#mathscpdchat](#)



**Paddy MacMahon** @paddymac\_maths · 21h ...

They had all the rest of the technology though. Just that one stumbling block...



**Rob Southern** @mrsouthernmaths · 21h ...

That's what I always say to the students! "One of the greatest civilisations in human history, they conquered half the known world, you think they couldn't build a rocket?!?"



**Rob Southern** @mrsouthernmaths · 21h ...

So, first we extend the number line to include negative numbers, then we rotate it to include complex numbers. Then we go from there.

[#mathscpdchat](#)

Jenny's sixth and last question ...



**Jenny Hill-Parker** @JennyHillParker · 21h ...

Q6 - What strategies do you have in place to support students over the transition period from GCSE Maths to A level? Do you have a transition booklet, or know of good ones that are available? [#mathscpdchat](#)

... prompted these suggestions ...



**Hannah @LorHRL** · 21h



[amsp.org.uk](http://amsp.org.uk)  
Transition to level 3 maths - AMSP







**Rachel.Beddoes @GirlsCount\_2** · 3h



Sorry - have mentioned this already [amsp.org.uk/teachers/11-16..](http://amsp.org.uk/teachers/11-16..) but didn't say that there is a printable version... [#mathscpdchat](#)



[amsp.org.uk](http://amsp.org.uk)  
Transition to A level Mathematics: Essential Skills - AMSP

-  **Hannah** @LorHRL · 21h ...  
We advise them to do the AMSP transition material. As a sixth form we can't actually set it as work unfortunately! [#mathscpdchat](#)
-  **Little Miss Maths** @littlemaths · 21h ...  
Alpha workbooks do a great Preparation for A level Maths booklet. We ask all pupils to complete it as a requirement of starting the course in September.
-  **Jenny Hill-Parker** @JennyHillParker · 21h ...  
Thanks for this I'll take a look! [#mathscpdchat](#)
-  **Matt Man** @mr\_man\_maths · 19h ...  
Revision books such as CGP's Head start to A Level Maths [#mathscpdchat](#)
- ... and this notice about a project in progress:
-  **Matt Man** @mr\_man\_maths · 18h ...  
Though I'm involved in a project with [@Just\\_Maths](#) tackling this very question. Hopefully will get this done in the next 12 months or so - not quite an immediate answer to your question. [#mathscpdchat](#)
-  **Jenny Hill-Parker** @JennyHillParker · 18h ...  
Wow. Huge project! Will keep a lookout
-  **JustMaths** @Just\_Maths · 18h ...  
What we have so far is looking good though ... if it was easy there'd be a great resource already out there ... working full time doesn't aid the cause but makes it so much better in the end. It's just the end gets further away cos of teaching - it's a vicious cycle 😊 [#mathscpdchat](#)

Towards the end of the chat, the host, Jenny, posted the following thread of tweets. It contains links to a variety of useful resources for exploration by those teachers who are planning to provide A level Maths 'Taster Days':





**Jenny Hill-Parker** @JennyHillParker · Jun 27

The last ten minutes are a resource thread of activities/resources to support the transition from GCSE Maths to A level.

Please add to it/retweet it!

I'll start;

[eur01.safelinks.protection.outlook.com/?url=https%3A%3A](https://eur01.safelinks.protection.outlook.com/?url=https%3A%3A)

[#mathscpdchat](#)



[amsp.org.uk](http://amsp.org.uk)  
Resource - AMSP



**Jenny Hill-Parker** @JennyHillParker · Jun 27

A page of advice and resources from [@MathedUp](#)



[mathedup.co.uk](http://mathedup.co.uk)

Getting a taste - MathedUp!

This post was prompted by a tweet from [@rufuswilliam](#) who asked about A-level taster sessions for year 11s in today's [#mathsTLP](#) chat ...



**Jenny Hill-Parker** @JennyHillParker · Jun 27

A set of transition videos from [@PearsonSchools](#)

[pearson.com/uk/educators/s](http://pearson.com/uk/educators/s).



**Jenny Hill-Parker** @JennyHillParker · Jun 27

A blog post with links by [@mathsjem](#)

[resourceaholic.com/2017/07/bridgi...](http://resourceaholic.com/2017/07/bridgi...)




**Jenny Hill-Parker** @JennyHillParker · Jun 27



A lovely task taken from one of @mathsjem's Maths Gems on her brilliant [resourceaholic.com](http://resourceaholic.com)

[drive.google.com/file/d/0B9L2IY...](https://drive.google.com/file/d/0B9L2IY...) #mathscpdchat

	<p>drive.google.com Find the coordinates.pdf</p>
---	--



**Jenny Hill-Parker** @JennyHillParker · Jun 27





@ColleenYoung has some brilliant resources on her page here;

# 11

My own Maths teacher  
(thank you Mr Hind) taught me the  
11<sup>th</sup> commandment...

Thou shalt not divide by zero.

colleenyoung.org  
Taster Lessons  
Around this time of year, many UK schools will have taster sessions as part of a Sixth Form Welcome Event. What to do for such lessons? I ca...



**Jenny Hill-Parker** @JennyHillParker · Jun 27



Advice from @OCR\_Maths

[ocr.org.uk/blog/transitio...](http://ocr.org.uk/blog/transitio...) #mathscpdchat

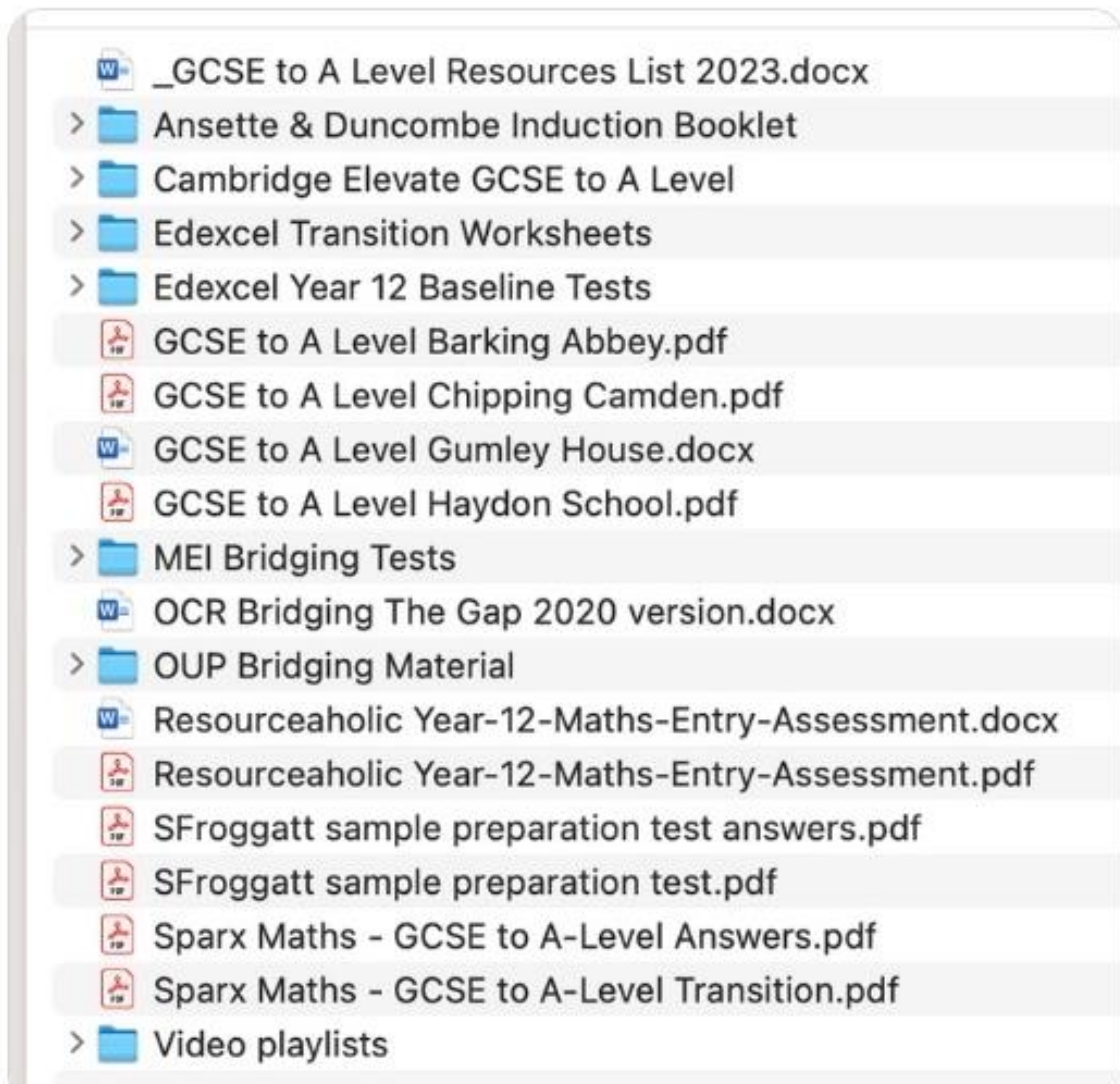
This thread was extended when a contributor provided the link to his large collection of links to very useful relevant and interesting resources (some of which other people shared separately):



**RobotMaths** @robotmaths · Jun 27



Download all these files and more from [b.link/gcsetoalevel](https://b.link/gcsetoalevel)



- \_GCSE to A Level Resources List 2023.docx
- > Ansette & Duncombe Induction Booklet
- > Cambridge Elevate GCSE to A Level
- > Edexcel Transition Worksheets
- > Edexcel Year 12 Baseline Tests
- GCSE to A Level Barking Abbey.pdf
- GCSE to A Level Chipping Camden.pdf
- GCSE to A Level Gumley House.docx
- GCSE to A Level Haydon School.pdf
- > MEI Bridging Tests
- OCR Bridging The Gap 2020 version.docx
- > OUP Bridging Material
- Resourceaholic Year-12-Maths-Entry-Assessment.docx
- Resourceaholic Year-12-Maths-Entry-Assessment.pdf
- SFroggatt sample preparation test answers.pdf
- SFroggatt sample preparation test.pdf
- Sparx Maths - GCSE to A-Level Answers.pdf
- Sparx Maths - GCSE to A-Level Transition.pdf
- > Video playlists




**RobotMaths** @robotmaths · Jun 27



The resources list at the top of the Dropbox has got lists of resources, links to online-only Summer prep work, baseline assessments to use with Year 12, video playlists, and a list of physical books you can to give to students

[b.link/gcsetoalevel](https://b.link/gcsetoalevel)

[#mathscpdchat](#)



dropbox.com  
GCSE to A Level  
Shared with Dropbox



**Jenny Hill-Parker** @JennyHillParker · Jun 27



Wow! Thank you very much, very generous of you!

[#mathscpdchat](#)

This was the host's closing message:



**Jenny Hill-Parker** @JennyHillParker · Jun 27



That's it! 4 minutes over but I didn't want to leave out any content. I have a few more resources for the GCSE - A level Maths megathread, so check back for a few more.

Thanks for coming everyone!