Term: Autumn | Issue 3 | Date: 13 December 2021

NEWS FROM OUR SENIOR LEAD, ABHA MILLER

Dear All,

We are nearly there and what a resilient lot we are!

This year we have fully embraced online teaching and the wide range of free online platforms that make it so much easier to share our love of mathematics with our students. (Thank you, Demos, and GeoGebra!). We are now used to Living with Uncertainty, (some of you may remember this book!)

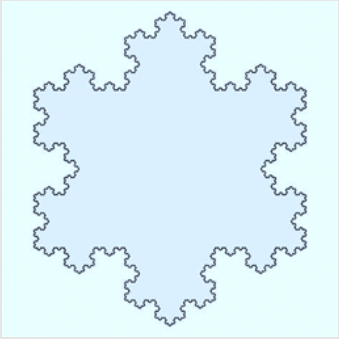
Living with Uncertainty (School Mathematics Project 16-19): Amazon.co.uk: School Mathematics Project: 9780521388467: Books

Whatever Jan 2022 brings, I am optimistic that we will collaborate and solve problems together, because it is embedded in our mathematical DNA. I wish you all a Happy Holidays and if you can, please take the time to listen and share The Royal Institution lecture from the much-loved Jonathan Van -Tam.

CHRISTMAS LECTURES 2021: Going viral: How Covid changed science forever | The Royal Institution: Science Lives Here (rigb.org)

Stay safe,

Abha Miller



Working with NCETM NATIONAL CENTRE FOR EXCELLENCE IN THE TEACHING OF MATHEMATICS

If you are having trouble opening the links in this newsletter in the online viewer please click on the book icon on the bottom right to disable page turn transitions

FROM THE CHAIR OF THE BBO STRATEGIC BOARD, PROFESSOR ANNE WATSON

As we get towards the end of the Autumn term there are new unknowns to face because of a new Covid variant. I often think of an adolescent pupil of mine who told me: 'Mathematics lessons are where I feel safe'. I hope that all our pupils feel 'safe' in mathematics. For me, the safety is not about always knowing what to do but lies in the secure roots of mathematics that do not change with changes of Covid rules, or changes of government, or changes of teacher. What's more, there is the safety of knowing that there is nearly always a way to find out whether you are right or not – not only by being told an answer but by working things out another way, drawing a diagram, testing with a number or example, working backwards, using a calculator and so on. So I hope all our pupils feel safe.

Also important is that teachers feel safe. I am constantly amazed by the commitment of teachers who engage with the Hub to maintain their professional learning and communities even when the going gets tough and the demands of the job overwhelm. I have heard of teachers who swap after school childcare so one or other of them can attend events, or departments watching video-d events together over a sumptuous bring-and-share lunch, or 'change one thing' contracts where teachers all agree to 'change the same thing' together and talk about it. There is strength in community.

One of the certainties we can hang onto right now is that Christmas happens, so here are a few 'certainties' to hang onto about sequences and series:

How many presents in total were given on the twelfth day of Christmas? How many presents were given over all the twelve days of Christmas?

How many legs? How many wings? (modelling)

And some uncertainties: How much space was needed? How much food was needed? (estimating; Fermi problems)

Here is something festive from @profsmudge. You can pose your own questions of course but comparing perimeters is his suggestion. The image can be purchased on:

https://mathsmed.co.uk/TREES-card-2021.html

All the best for the rest – and let me see: how does the sum of the factors of the sum of the prime factors of 2022 relate to the number of presents given on the twelfth day of Christmas?

Professor Anne Watson

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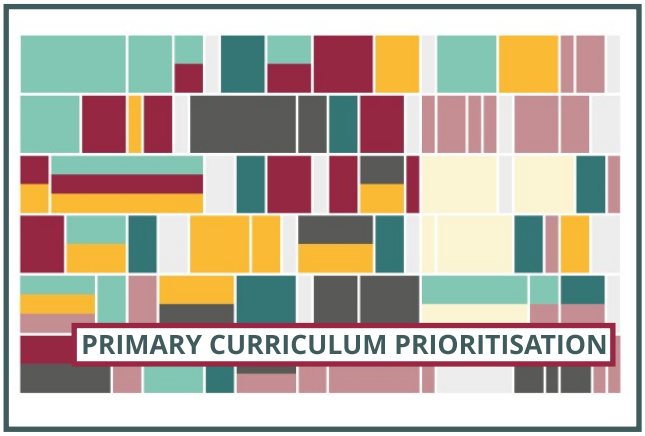
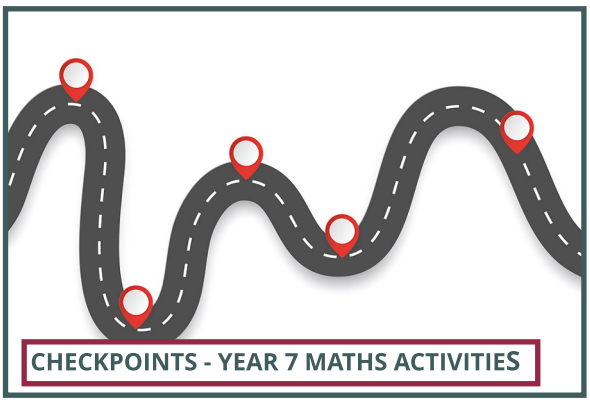
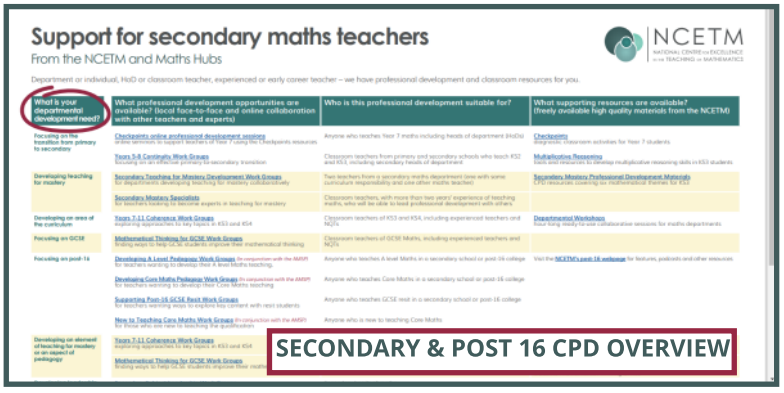
NCETM RESOURCES - PRIMARY AND SECONDARY







Mastering Number Programme

PRIMARY

Claire Shorrock, Primary Mastery Specialist, Ladygrove Park Primary School

When I heard about the new initiative from the NCETM, Mastering Number, I became very excited - number sense is what is missing in some of our children and the opportunity to support our children to develop this was too good to miss. Number sense is such an important part of developing a deep understanding of maths and becoming masters of mathematics. The ability of children to understand numbers and their composition at a deep level and to be flexible with numbers is key to progress and success in this subject.

The aims of this project (taken from the NCETM website) are to secure firm foundations in the development of good number sense for all children from Reception through to Year 1 and Year 2. The aim over time is that children will leave KS1 with fluency in calculation and confidence and flexibility with numbers. These outcomes matched our needs perfectly.

Since starting on this project, we have seen much excitement from the children, who are all able to access the learning - they love these daily sessions! The children are all making good progress with their ability to subitise. I observed a session in our foundation class this week and all children were successfully able to hold up 2 and 3 on their fingers without counting - successfully subitising. The class teacher told me, “The sessions are coherent, building the learning in small steps and the outcomes for each session are clear.” During the session, the teacher was using the key word, ‘subitise’ and children were clearly aware of what this meant and had developed the necessary language skills to explain this concept. The children played a game of ‘Who has more?’ The discussion and reasoning that followed was rich with key vocabulary: there was oral counting; there was language of comparison (including discussion and use of the word fewer!); and of course, there was the use of manipulatives to expose the structure of the maths and a link to **Numberblocks**.

I was also lucky enough to observe a session in a Year 1 class and noted many similarities to the foundation lesson - the children were all confidently using the words ‘fewer’, ‘more than’ and ‘equal to’ to compare quantities. Variation in the questions was apparent to help embed the learning and common misconceptions addressed in relation to conservation of number. The teacher was complementary about this project saying, “The resources are fantastic - small steps are used so that the learning is accessible for all and all the children are engaged and enjoy these short sessions.”

Neither class has progressed onto using the Rekenreks yet but it is clear that when they do so, they will be successful in pushing the required number of beads using subitising rather than counting. In conclusion, even though we have only been participating in this mastering number project for a term, it has already had a positive impact on the children’s learning and number sense. Children are confidently subitising and becoming more aware of the composition of numbers. This is a fantastic project supporting our children to develop number sense, which will give them the skills to develop a deep understanding of numbers.

The new Mastering Number programme has been hugely successful this year and although recruitment has now closed for the first cohort, we are considering a second cohort to commence in late summer and continue into the next academic year. If you would like to express an interest in participating, please register your interest now by clicking the button and completing the form.

MORE INFO REGISTER INTEREST

A Day in the Life of a Secondary Maths Classroom

SECONDARY

Jo Walker, Assistant Maths Hub Lead, Wycombe High School

There have been a lot of changes in my classroom over the last few years which have enhanced the learning that happens there alongside adopting the teaching for mastery pedagogy. This year I teach years 11, 12 and 13 and the boards which cover every wall in my room are invaluable in developing students thinking, fluency and mathematical literacy, as well as informing my AfL. I am trying to deepen the understanding of mathematics that all of the students I teach at all levels have so I plan and deliver my lessons accordingly. Although we are a grammar school we now have no setting except in year 11 and our school aims for 'quality first teaching' so although all students are learning about the same aim at the same time we are expected to differentiate the questions set. We do this in line with the AO's from the exam board and also via scaffolding for our less able and depth for our most able. The key learning questions are tackled as a class but the individual practice is fully differentiated. On top of this we use the five big ideas to ensure that every minute of students learning has an impact on their understanding of mathematics.

All the way through the lesson students are chosen to work on the boards, targeted to particular questions according to ability or they can choose to work on the boards if they wish. We generally get students to work in pairs so that they can discuss their thinking and support each other.

Year 13 Mechanics lesson focussing on Newton's Laws and Constant Acceleration Formulae in the context of objects in contact with each other such as two ice scatters or people in a lift.

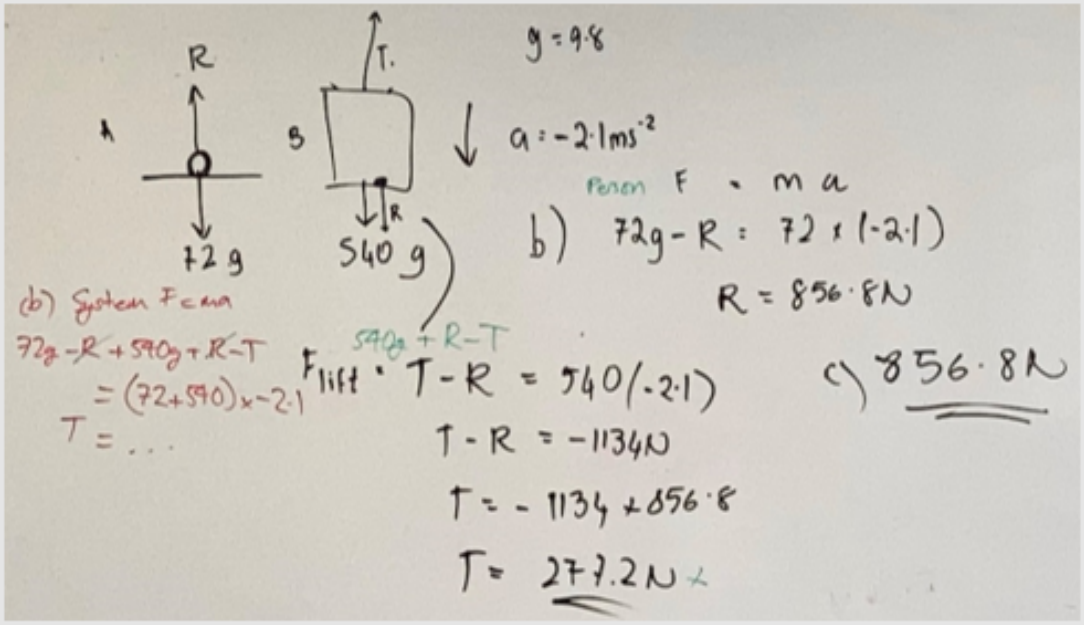
A person of mass 72 kg stands in a lift of mass 540 kg. The lift is supported by a cable that can be modelled as light and inextensible.

(a) Draw two diagrams showing all the forces acting on the person and the lift.

The lift is moving downwards and decelerating at 2.1 ms^{-2}.

(b) Find the tension in the cable.

(c) Find the magnitude of the normal reaction force exerted on the person by the floor of the lift.

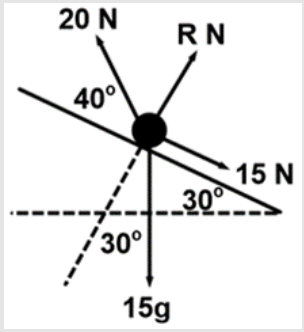


The black writing is what the students created, it shows their misconceptions which were reflected in some ways by some of the other students in the room – it was 3 weeks since we last drew force diagrams and found resultant forces, the work current to them was kinematics. Teacher led discussion then diagnosed, discussed and corrected these misconceptions and the green writing was added. However there is more than one way to tackle this question so this was also discussed including analysing the efficiency of each method to develop students mathematical fluency and thinking. This is the red writing you see added here.

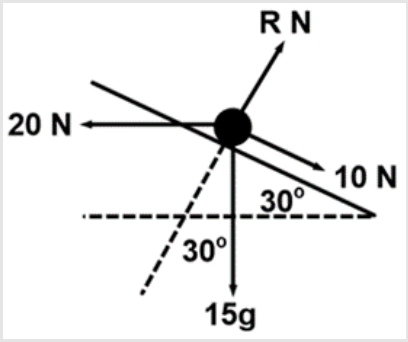
We also looked at using Newton's Laws and the Constant Acceleration Formulae with an object on a slope. For this question there were two options with the first question being less challenging than the second one.

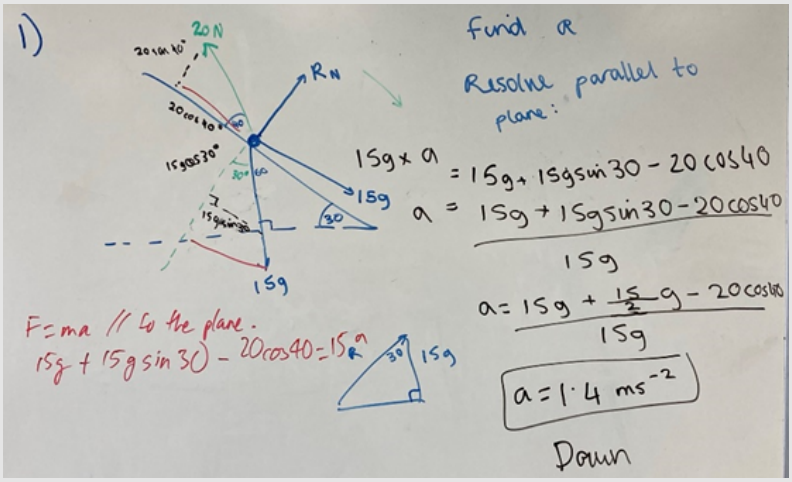
Determine if the following objects move up or down the plane, and calculate their acceleration.

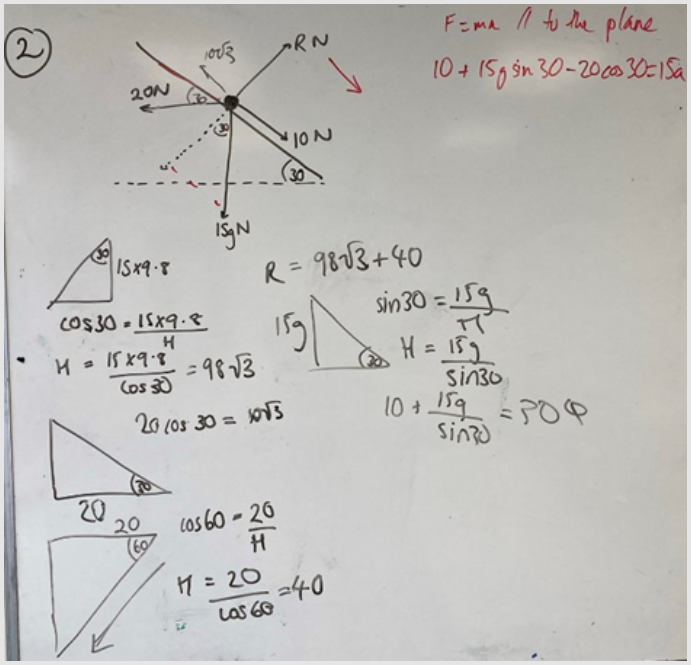
1)



2)





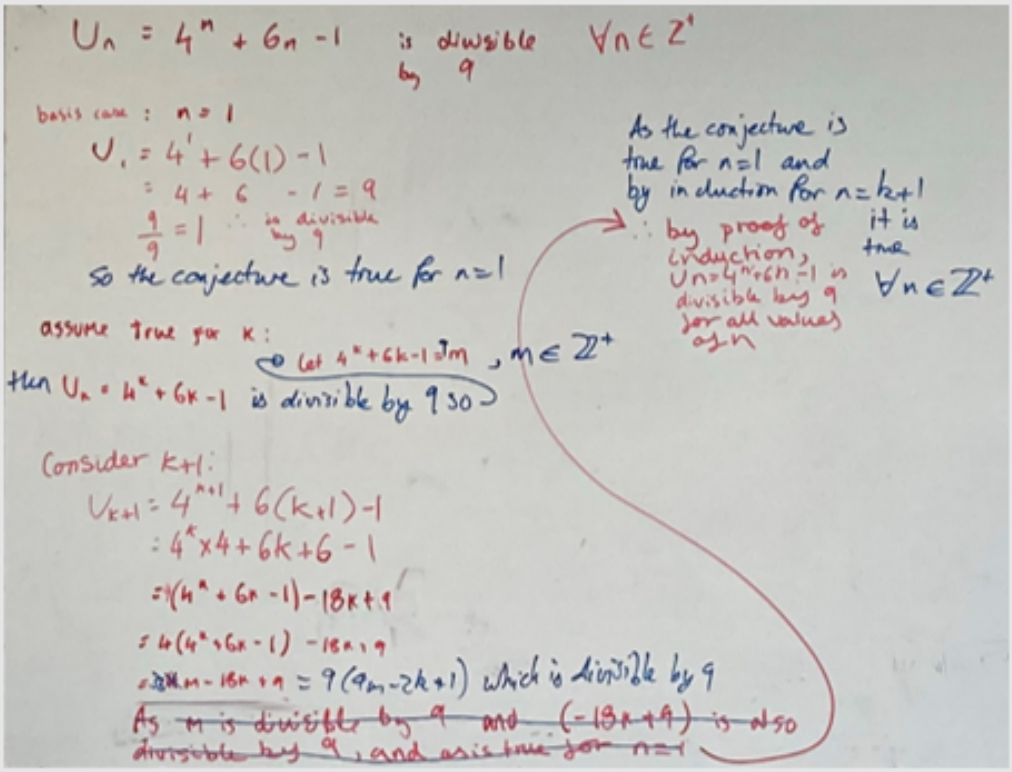


You can see that the students understand how to find the components of the force but they are not yet confident enough to just write them down in one go. This led to a discussion to reinforce the links made previously to speed the process and create the red writing in one go and a reminder that words are useful to make their working easier to follow. Students need to be able to answer questions like these in 3 minutes on an exam paper.

Year 12 Further Mathematics Proof by Induction with Sequences. Students had already met this type of proof so were familiar but not confident with the four steps :

1. Show the conjecture is true for a base value, usually $n = 1$
2. Assume the conjecture is true for $n = k$
3. Show that the conjecture works for $n = k + 1$
4. Write a conclusion

However post covid one of the skills that we have found our A level student have not fully developed is the ability to write using perfect mathematical literacy. They also struggle sometimes with the algebraic manipulation.



To start a refresher to find out about the way they are currently writing proofs.

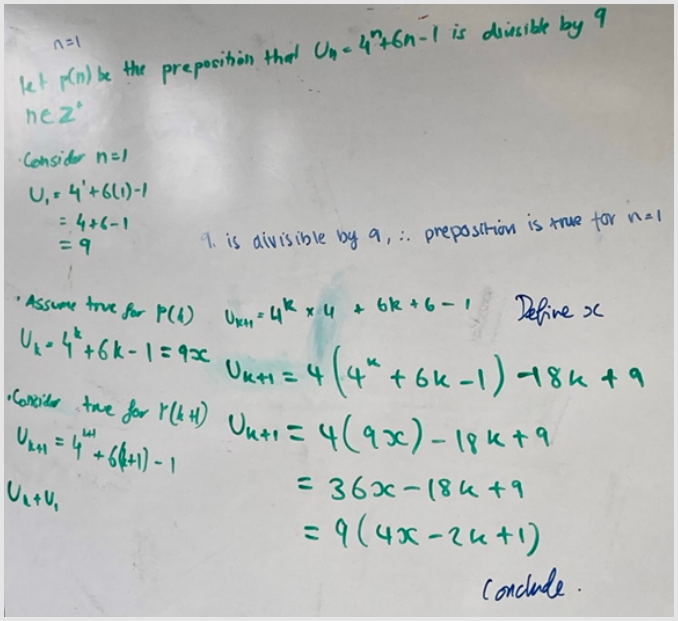
Prove by induction that $u_n = 4^n + 6n - 1$ is divisible by 9, $\forall n \in \mathbb{Z}^+$.

The red writing is the original student work. The class then discussed this and suggested improvements which were added by me in blue.

Note that the students do not mind this happening they know that I do not mind if they get things wrong, we just use it as a learning opportunity to develop the classes skills. The work is never referred to by the students names.

One of the big benefits of having so many boards is that you can leave work up for the lesson. This is what we did so that they could use annotated proofs from the entirety of the lesson to help improve their mathematical literacy.

This is the same question completed by a different pair on the opposite side of the room so that as a class we can compare and contrast their solutions. Note that the language they used was different which gave us a chance to discuss what they had written.



Also note that the hand writing of the section in green bottom right is different. This pair struggled with rearranging the algebra so a third student decided to join them. The class noticed this move and those who were also finding this a challenge listened to the third student as they explained their thought process to the class. They did this so well that when I asked if there were any follow up questions they wanted to ask the third student the class were all happy that they now understood.

As the lesson progressed the proofs that were created showed improved mathematical literacy. The questions were carefully chosen to both support and stretch according to the students abilities. The final bank looked like this (The hint was hidden) :

1) *A sequence is defined by $u_{n+1} = 3u_n + 2$, $u_1 = 2$. Prove by induction that $u_n = 3^n - 1$.*

2) *A sequence is defined by $u_{n+1} = 2u_n - 1$, $u_1 = 2$. Prove by induction that $u_n = 2^{n-1} + 1$.*

3) *A sequence is defined by $u_{n+1} = 4u_n - 6$, $u_1 = 3$. Prove by induction that $u_n = 4^{n-1} + 2$.*

4) A sequence is defined by $u_{n+1} = \frac{u_n}{u_n+1}$, $u_1 = 1$.

(i) Find the values of u_2, u_3 and u_4.

(ii) Suggest a general formula for u_n, and prove your conjecture by induction.

5) A sequence of integers $u_1, u_2, u_3, \ldots$ is defined by $u_1 = 5$ and $u_{n+1} = 3u_n - 2^n$ for $n \geq 1$.

(i) Use this definition to find u_2 and u_3

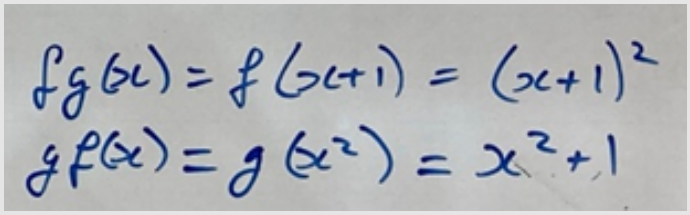
(ii) Prove by induction that $u_n = 2^n + 3^n$ for all positive integers n.

6) A sequence $u_1, u_2, u_3, \ldots$ is defined by $u_1 = \frac{7}{2}$ and $u_n = \frac{1}{2}u_{n-1} + n^2$ for $n \geq 2$. Prove by induction that $u_n = 2n^2 - 4n + 6 - \left(\frac{1}{2}\right)^n$ and for all positive integers n.

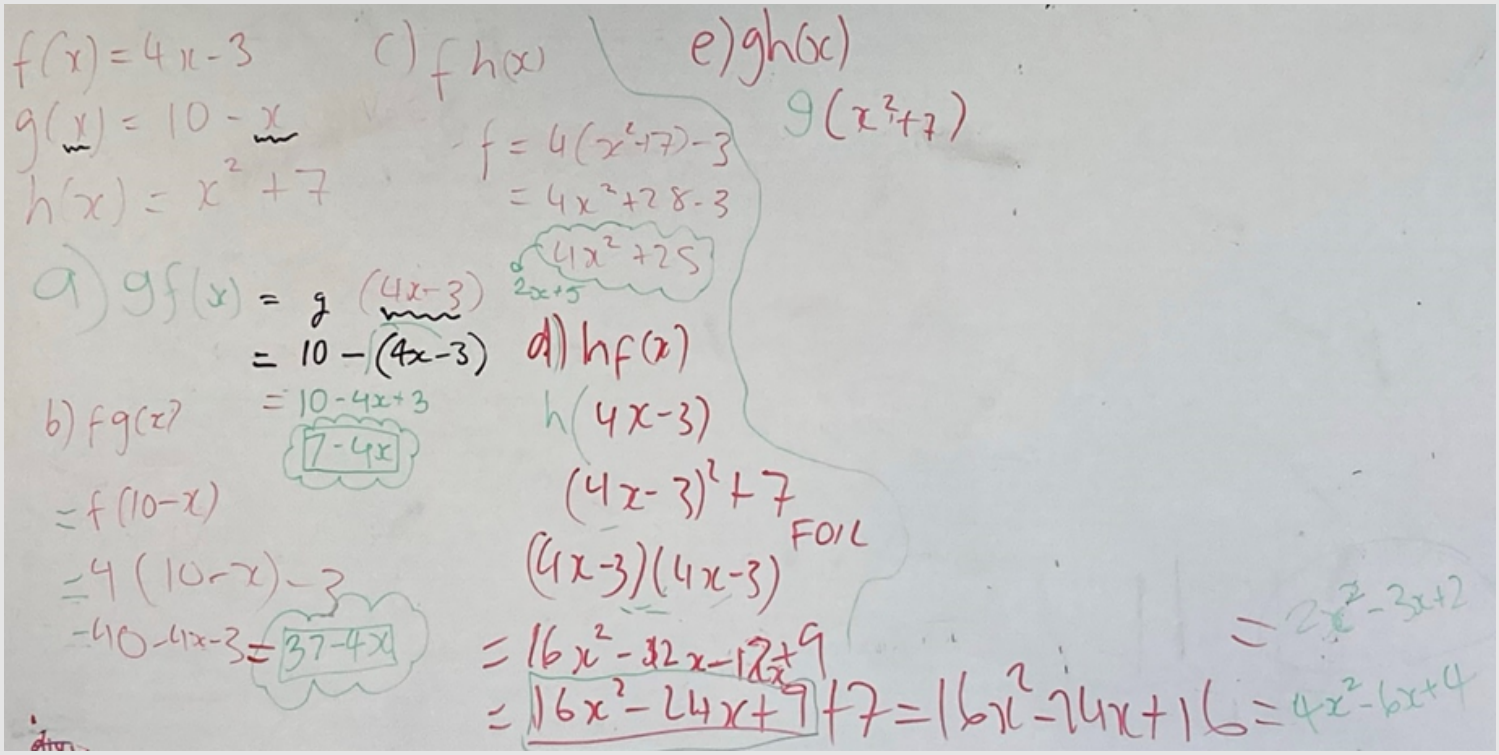
E7) The functions $T_n(x)$, for $n = 0, 1, 2, \ldots$, satisfy the recurrence relation
$T_{n+1}(x) - 2xT_n(x) + T_{n-1}(x) = 0 \quad (n \geq 1)$. (*)
Show by induction that $(T_n(x))^2 - T_{n-1}(x)T_{n+1}(x) = f(x)$, where
$f(x) = (T_1(x))^2 - T_0(x)T_2(x)$.
In the case $f(x) \equiv 0$, determine (with proof) an expression for $T_n(x)$ in terms of $T_0(x)$ (assumed the be non-zero) and $r(x)$, where $r(x) = \frac{T_1(x)}{T_0(x)}$. Find the two possible xpressions for $r(x)$ in terms of x.
[2008 STEP Mathematics 3 number 5]
Hint :
Show $[T_{n+1}(x)]^2 - T_n(x)T_{n+2}(x)$ by substituting $T_{n+2}(x)$ in terms of $T_{n+1}(x)$, $T_n(x)$ using (*).
Using the induction result to obtain $\frac{T_{n+1}(x)}{T_n(x)} = \frac{T_n(x)}{T_{n-1}(x)} = \cdots = r(x)$.
So $T_n(x) = T_0(x)[r(x)]^n$.
Now substitute into (*) to find $r(x)$.

Variation Theory was considered so that the misconceptions could be tested, both those in writing proofs but also in terms of manipulating the algebra. No two questions are the same and the questions get progressively more challenging to meet the abilities of all. Each question is there for a reason. No scaffolded questions at the beginning as the work around the room and the framework they already had for the four steps provided this. All students are working on the same aim – be able to apply proof by induction to sequences so the differentiation is via depth of understanding and complexity. The instructions given to students were if you are feeling wobbly then start at question 1, if you are feeling confident then start at question 4. You are not expected to do all questions. If you read one and you just know what to do then do not do it. There is an extension question if you are finding this easy. I know that this means that the students may not therefore try all questions however we have a set amount of lesson time to cover the syllabus to depth and this is compensated for by the home learning which is another bank of carefully chosen questions which they all have to complete except the extension ones which are for out A* students or any student who just wants to give them a try.

Year 11 Compound Functions they had already covered function notation and its meaning.



One of the boards at the front of the room is often kept as the teachers board and this is used for key learning points which stay up through the lesson as a reminder.In this case emphasising that the order of functions matters.

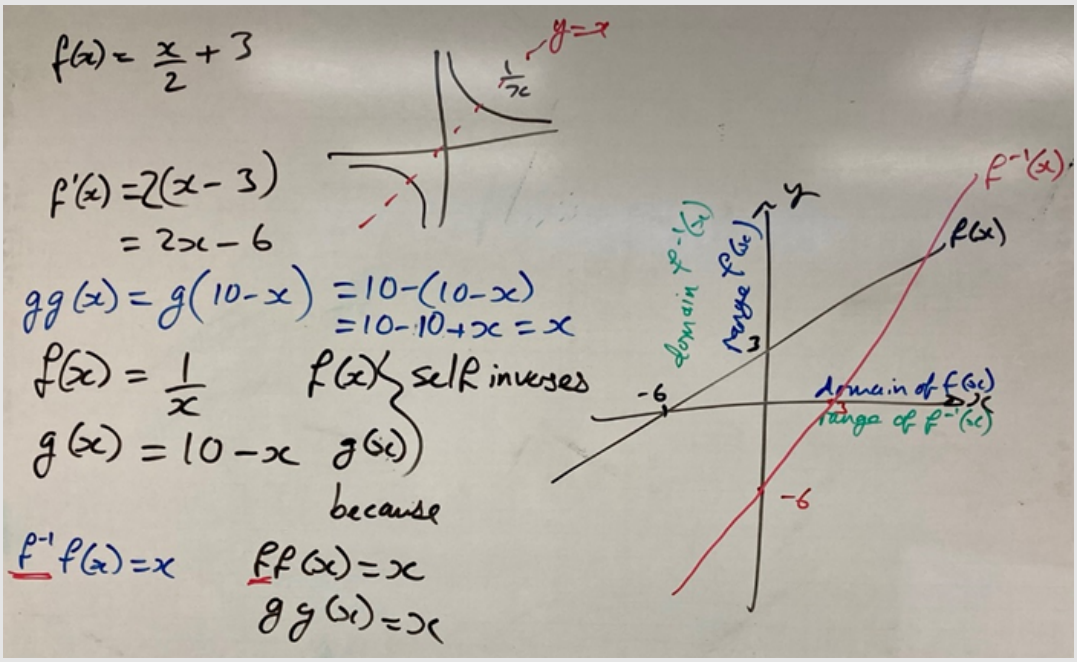


The image above shows the work carried out by a pair who chose to work on the boards along with some annotation in green added by another student who joined them.At one point they were stuck so sort my support which you can see in black, this also shows some work on developing their mathematical literacy.At this point in the lesson some of the other students also chose to listen in.

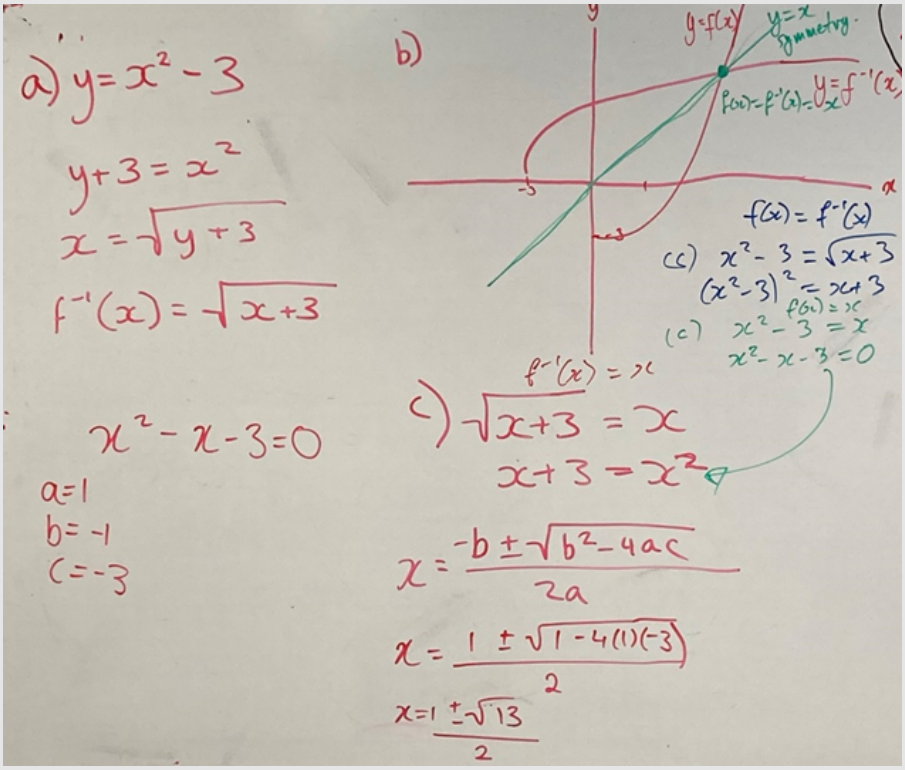
Although it is tempting for students to just copy from the boards, we rarely correct anything when they are working independently.Comments are added when we have stopped the class so students soon realise that their solution may be the correct one and not the one on the board.Students do discuss their solutions in their working pairs and compare the solution on the board and theirs to try to decide who is on the right track and why and during the feedback session I will often ask the class to point me in the direction of a question where they think there is a misconception and explain their reasoning to the group.This ensures that they think about different methods and the misconceptions which can occur.

Year 12 Inverse Functions looking at developing students GCSE understanding up to A level

This was the key points board at the end of the lesson, much of what was added was the result of class discussions to clarify thinking and eradicate misconceptions particularly regarding what we mean by a self inverse both in terms of notation, algebraic manipulation and graphical structure and linking that to the general inverse understanding that they had developed.



Setting the scene used the $f(x) = \frac{1}{x}$ and $g(x) = 10 - x$ and what ever number they thought of to do the function twice, what did they notice. We then looked at notation and how this could be proved algebraically, $gg(x)$ before thinking about what this means about the properties of the functions graphs and linking all these elements together.



Example: Do a) and b) then discuss c)

The function $f(x)$ is defined by

$f(x) = x^2 - 3, \quad \{x \in \mathbb{R}, x > 0\}$

(a) Find $f^{-1}(x)$, stating its domain.

(b) Sketch $f^{-1}(x)$.

(c) Find values of x such that

$f(x) = f^{-1}(x)$

You can see the annotation from the discussion regarding the different approaches to part (c), why they are all possible, notice that the last one, in green, that the class came up with is actually the most efficient. Questioning was used to help students for these links themselves and discuss the efficiency of the resulting techniques.

Jo Walker

Primary Work Groups

PRIMARY

The Maths Hub Programme has PD opportunities for all teachers at all stages in their careers and across all phases. Below is a summary of the FREE development opportunities that are still available for primary teachers in 2021/22. Follow the links for further details on the NCETM website or contact info@bbomathshub.org.uk to discuss the best programme for you and your department.

All of our Work Groups are free.

Specialist Knowledge for Teaching Mathematics - Early Years Teachers

This Work Group is designed to support Early Years teachers in developing specialist knowledge for teaching mathematics, thus enabling them to understand, teach and support pupils in maths in the classroom. These programmes are designed for individuals who would like to develop their specialist knowledge for teaching maths to three to five years olds. This may be particularly relevant for NQTs, teachers that have moved phases, or teachers that have not received maths-specific training.

MORE INFO

Buckinghamshire Cohort

Due to popular demand, we have now added an additional cohort in the programme based in Buckingamshire starting on 3 March (venue TBC). Book now to secure your place

BOOK NOW

Years 5-8 Continuity

Work Groups in this project aim to strengthen the transition from primary to secondary school by focusing on curriculum and pedagogical continuity over Years 5 to 8. Following the disruption to education caused by the Covid crisis, this transition is more crucial than ever.

A central aim is the promotion of cross phase communication between teachers to address issues of maths curriculum and pedagogical transition as distinct from pastoral considerations. A key feature will be understanding how best to prioritise key aspects of the curriculum to help ensure pupils have mastered the fundamental understanding and skills they need to underpin their progression through upper Key Stage 2 and into Key Stage 3. Participants should be teachers of Years 5 to 8 in primary, secondary, middle school and all-through schools with some responsibility for curriculum development, e.g. maths leads / heads of department. Linked 'families' of schools are encouraged to take part: ideally teachers from secondary schools and their associated primary schools will work together.

We are running 5 cohorts of this Work Group this year based around the BBO area. Please see the booking pages for dates, times and venue information.

MORE INFO

BOOK Vale of WH

BOOK West Oxon

BOOK South Bucks

BOOK North Bucks

BOOK Slough/Maidenhead

Primary Mathematical Oracy

Several reports have referenced that the pandemic has had a significant impact on talking and reasoning and opportunities for Oracy with the classroom. This work group seeks to explore how understanding of the impact that the specific pedagogy of Oracy can have on pupils securing mathematical thinking.

We will consider:

- How can Oracy deepen pupils' mathematical reasoning?
- How to use stem sentences to support and embed understanding
- How to teachers plan for pupil explanations

This group will be delivered online over six sessions.

BOOK NOW

SECONDARY

Secondary Work Groups

The Maths Hub Programme has PD opportunities for all teachers at all stages in their careers and across all phases. Below is a summary of the FREE development opportunities that are on offer for secondary teachers in 2021/22. Follow the links for further details on the NCETM website or contact info@bbomathshub.org.uk to discuss the best programme for you and your department.

All of our secondary Work Groups are open for booking. Please see below for details of all the programmes we are running this year where you will also find links to more info and to the relevant booking pages on our website.

All of our Work Groups are free.

Secondary Subject Leadership

This new project offers focused support to secondary heads of department/subject leaders, to enable them to better understand and implement teaching for mastery approaches across their department, and to develop in their role as leaders of both student learning and teacher professional development.

It provides an opportunity for participants to deepen their understanding of teaching for mastery approaches, of their wider roles, and of their capacity with their colleagues to transform secondary maths learning.The project is for secondary heads of department/subject leaders, and is open to heads of department in schools already involved with Maths Hubs and to those who are not yet involved. (Prospective HoDs/subject leaders are not eligible to participate.)

MORE INFO BOOK NOW

Years 7-11 Coherence

This project focuses on participant teachers working together to analyse, deconstruct and trace through the curriculum a selected key topic area, developing insight into effective teaching approaches, and considering the implications for longer term curriculum design. The project was previously known as Challenging Topics at GCSE, but its name has been amended to more accurately reflect the work undertaken as well as to convey the importance of curriculum coherence.

Participants should be secondary school teachers of GCSE Maths. Individuals or ideally pairs of teachers from a department participate, with an expectation that they will work with other members of their department at appropriate points. Schools that have participated in previous years may do so again, as developments often take place over time.

MORE INFO

BOOK NOW

Mathematical Thinking for GCSE

The Mathematical Thinking for GCSE project is for secondary maths teachers looking for practical and theoretical elements to address their students' GCSE attainment.

The stated aims of the KS4 Programme of Study are that, through working on the content, students should develop mathematical fluency, mathematical reasoning and problem solving. While mathematical thinking is a key feature of all of these, the focus of this Work Group is to support teachers in developing their understanding of mathematical thinking as it relates to problem-solving and reasoning, using practical task types to explore what it means for students to get better at mathematical thinking and what this looks like in the classroom.

This is for teachers of KS4 who want to further develop their pedagogical and theoretical understanding of developing mathematical thinking, and practical classroom strategies to explore these ideas. Lead participants will be expected to lead developments from the Work Group in their own department and so should have the opportunity and authority to do this effectively. Departments that have already engaged with the Work Group have the opportunity to continue with the Work Group structure in order to explore further and think more deeply about supporting mathematical thinking in the classroom by participating in a second 'deepening' year.

MORE INFO

BOOK NOW

Secondary Maths MAT Leads

This project offers focused support to those who lead mathematics across multiple schools within a MAT, to enable them to better understand and develop effective maths pedagogy approaches across those schools. It will also support participants to develop their role as a leader of system change, curriculum change, and teacher professional development.

Whilst those who lead maths across a MAT are often the subject lead for both primary and secondary, the key focus for this programme is their work with secondary teachers, although consideration will be given to transition and how the different phases relate to each other. Additionally, focusing on developing skills with one phase is likely to impact positively on work with other phases. Participants will engage with a centrally-led programme offered nationally, with the potential for regional provision dependent on numbers.

The project is for those who lead maths across multiple schools within a MAT, including at least one secondary school.

MORE INFO REGISTER INTEREST

Secondary Work Groups

SECONDARY

Years 5-8 Continuity

Work Groups in this project aim to strengthen the transition from primary to secondary school by focusing on curriculum and pedagogical continuity over Years 5 to 8. Following the disruption to education caused by the Covid crisis, this transition is more crucial than ever.

A central aim is the promotion of cross phase communication between teachers to address issues of maths curriculum and pedagogical transition as distinct from pastoral considerations. A key feature will be understanding how best to prioritise key aspects of the curriculum to help ensure pupils have mastered the fundamental understanding and skills they need to underpin their progression through upper Key Stage 2 and into Key Stage 3.

Participants should be teachers of Years 5 to 8 in primary, secondary, middle school and all-through schools with some responsibility for curriculum development, e.g. maths leads / heads of department.

Linked 'families' of schools are encouraged to take part: ideally teachers from secondary schools and their associated primary schools will work together.

MORE INFO

What are the benefits?

- Deepen your knowledge and understanding of the curriculum across KS2 and KS3 and the expectations of pupils at the end of each key stage.
- Understand the approaches which will support pupils as they move from KS2 to KS3.
- Make use of common ap-proaches, representations and language across phases.
- Develop collaboration between primary and secondary colleagues on issues of curriculum and pedagogy.
- Understand what each year group needs to be ready to progress.
- Consider the importance of, and how to achieve, consistent mathematical vocabulary.
- Consider, for primary teachers, the conceptual knowledge that will serve pupils well later on.
- Explore how to prioritise the maths curriculum in upper KS2 and KS3 to get pupils' maths education back on track.

Participation involves cross-phase communication between teachers, and a key feature will be understanding how best to prioritise key aspects of the curriculum to ensure pupils have mastered the fundamental understanding and skills they need to progress successfully through upper KS2 and into KS3.

BOOK Vale of WH

BOOK West Oxon

BOOK South Bucks

BOOK North Bucks

BOOK Slough/Maidenhead

Specialist Knowledge for Teaching Mathematics – Secondary Early Career Teachers

This project is designed to support secondary early career teachers (teachers in their first two years of teaching) in developing specialist knowledge for teaching mathematics, thus enabling them to understand, teach and support students in maths in the classroom.

This programme is designed for secondary early career teachers (those in their first or second year of teaching).

The SKTM Secondary Early Career Teachers Programme project is fully funded by the Maths Hubs Programme so is free to participating schools.

At a local level, Work Groups will explore one of the following themes, focusing on designing effective learning and teaching in maths: structure of the number system, operating on number, multiplicative reasoning, sequences and graphs, statistics and probability, geometry.

Participants will work deeply on one area of maths, drawing in the associated pedagogy, and activities will include lesson analysis and lesson design.

MORE INFO

BOOK NOW

Specialist Knowledge for Teaching Mathematics – Non Specialists

This programme is for non-specialist teachers of maths in state-funded schools who fit the following definition: A non-specialist teacher of mathematics is 'a teacher that is currently teaching some mathematics who has not undertaken initial teacher training (ITT) in mathematics'.

If there is sufficient space in the cohort, other teachers of maths who do not fit this definition but would benefit from this support may also participate.

The programme is aligned to the NCETM teaching for mastery pedagogy and is based on six key themes: Structure of the number system, Operating on number, Multiplicative reasoning, Sequences and graphs, Statistics and probability, Geometry.

Participants will explore these themes, supported by an experienced secondary practitioner.

The NCETM has produced a flyer which summarises the programme and its benefits.

MORE INFO

BOOK NOW

Post-16 Work Groups

POST-16

The Maths Hub Programme has PD opportunities for all teachers at all stages in their careers and across all phases. Below is a summary of the FREE development opportunities that are on offer for post-16 teachers in 2021/22. Follow the links for further details on the NCETM website or contact info@bbomathshub.org.uk to discuss the best programme for you and your department.

All of our post-16 Work Groups are now open for booking via our website. Please use the buttons below to access the registartion pages.

All of our Work Groups are free.

Developing A Level Pedagogy

This project provides national support for the effective development of pedagogy in the teaching of A level Mathematics to support Covid recovery, to enhance the quality of teaching and the conceptual understanding of students, and the development of participants as leaders of A level teaching professional development in their own school or college. It aims to develop and sustain local communities of practice involving collaboration between teachers in developing pedagogy in their teaching of A level Maths.

The project is aimed at teachers in schools/colleges/departments that want to develop one or more aspects of their A level pedagogy to support Covid recovery. It would be suitable for existing leaders of A level teaching or experienced teachers of A level Maths who wish to lead the development of pedagogy in A level teaching with other colleagues in their own or other schools. Teachers who will find this Work Group particularly useful include those who may have already completed other A level subject knowledge and pedagogy courses (such as Teaching A level Mathematics (TAM) or Preparing to Teach A level Mathematics), and who are able to work with other colleagues in their own or other schools.

MORE INFO BOOK NOW

Developing Core Maths Pedagogy

This Work Group give teachers opportunities, through collaboration and experimentation, to develop improved teaching approaches that support the open-ended problem-solving skills Core Maths students need to develop, and to share these with departmental colleagues. Participant departments will support the role of Core Maths in promoting contextualised problem-solving and links to teaching in other subject areas.

Participants in this Work Group will be experienced and developing teachers of Core Maths. These may be teachers in post-16 settings whose main subject is maths or whose main subject is not maths. This Work Group is for schools and colleges in at least their second year of teaching Core Maths. Participants will be expected, where appropriate, to work with colleagues in their own department.

MORE INFO
BOOK NOW

New to Teaching Core Maths

The purpose of this programme is to support teachers who are new to teaching Core Maths in developing specialist knowledge for teaching Core Maths and to increase their confidence in teaching the course. The programme has a primary focus on Core Maths subject knowledge and pedagogy and will be based on these six key themes which are common to all the Core Maths specifications:

Using contextualised problem-solving, Applying Fermi estimation and modelling, Developing critical analysis, Making sense of finance, Using the pre-release materials, Exploring statistics.

Technology and online teaching will be underlying themes throughout the programme, aimed at teachers who are new to teaching Core Maths for the first time and are teaching a Core Maths class during the Autumn and Spring terms of 2021 and 2022.

MORE INFO
BOOK NOW

Supporting Post-16 GCSE Resit

Whilst this Work Group is not being offered by the BBO Hub this year, we are pleased to say that it is being run by the Matrix Maths Hub. Please note that the booking link will take you to their website.

Particular foci that will be addressed in the sessions are:

improving awareness of key concepts required to achieve a Level 4 at GCSE

- developing teaching and learning approaches to promote engagement, help students make connections and promote mathematical resilience

- addressing common misconceptions and strategies to iron them out

Teachers will be expected to try out any new ideas in between sessions (school based activities) and share results with the other teachers in the Workgroup.

MORE INFO
BOOK NOW

Other Events and Opportunities

NETWORK MEETINGS (IN ASSOCIATION WITH THE AMSP)

AMSP South's online Professional Development sessions to support teachers in their delivery and subject knowledge for AS and A level Discrete and Decision Maths continue. Applications are invited for session 3 on 18th of January. There is no requirement to have attended previous sessions.

A selection of the following topics will be covered:

- Graph Theory
- Graphical Linear Programming
- Touring Algorithms
- Simplex
- Network Flows
- Game Theory

The links to register for session 3 is https://amsp.org.uk/events/details/8730.

A fourth session will take place early in 2022, which will cover Critical Path Analysis. This session will be advertised shortly.

Cross Curricular Work Group **Strengthening Partnerships with ITT Providers**

Providers and mentors from primary and secondary ITT routes are invited to participate in a Work Group at the BBO Maths Hub. The first meeting will be online on 3 November.

This online work group is creating a mentor-led cross-phase resource about working with trainees on the principles of teaching mathematics. It will consist of tasks that can be done by mentor and trainee together that put mathematics at the heart of learning to teach it. The resource relates to parts of the Common Core Framework for ITT, principles of teaching for mastery and other pedagogic approaches, teacher subject knowledge, and also takes into account research about the development of novice teachers.

We are looking for mentors and providers to contribute to this work through joining this interactive work group. The commitment will be 4 or 5 after-school online meetings throughout the school year and some interim tasks. It may be possible to have some visits between schools.

As well as contributing to the resource, participants so far have found it beneficial for their own practice as mentors and teacher educators in mathematics.

The programme will be led by Anne Watson (Emeritus Professor of Mathematics Education, University of Oxford)

Anne Watson is co-editor: Jaworski & Watson 'Mentoring in Mathematics Teaching' Falmer Press, 1994 and co-author of Watson & De Geest 'Communicating about Mathematics in School' e-book available from ATM.

To register your interest, please use the button to email us at the BBO Hub.

REGISTER INTEREST