RhGMC
MSPW

Arloesi a Chreadigrwydd mewn Addysgu Mathemateg VII

Cynhadledd undydd
ar gyfer athrawon Mathemateg

11eg Gorffennaf 2025
Prifysgol Caerdydd

Rhaglen, Crynodebau a Siaradwyr

Innovation and Creativity in Mathematics Teaching VII

One-day conference
for Mathematics teachers

11th July 2025
Cardiff University

Programme, Abstracts and Speakers

version 0.97

ICMT 2025 Programme

09:15-09:45	Registration; Housekeeping				
09:45-10:00	*Welcome: Sofya Lyakhova*				
10:00 -10:50	SESSION 1	**Modelling with maths** *James Lewis-Coll* **11-16; 16+**	**Addressing mathematics anxiety through developing mathematical resilience** *Rosemary Russell & Sue Johnston-Wilder* **all**	**Dialogic mathematics teaching** *Theresa Hendy* **all**	**Flight, projectiles, SHM & damping** *Susan Thomas* **16+**
10:55 -11:45	SESSION 2	**Maths as a team game (pt 1)** *Tricia Lunel & Carol Gainlall* **7-11; 11-14**	**Partnering with parents: empowering families to support maths learning at home** *Theresa Hendy & Ifor J. Jones* **all**	**Panel discussion: Is maths the Art of Avoiding Calculations?** *Dominic Oakes & Francis Hunt* **all**	**Using Geogebra to help introduce the concept of differentiation and obtain many of the basic results** *Paul Sanders* **16+**
11:45 -12:10	Coffee				
12:10 -13:00	SESSION 3	**Maths as a team game (pt 2)** *Tricia Lunel & Carol Gainlall* **7-11; 11-14**	**Problem solving in a mixed-ability primary class** *Emily Mountain & Laura Hosking* **5-11**	**Maths to music** *Dominic Oakes* **all**	**The MSPW bank of Geogebra apps** *Paul Sanders & Ifor J. Jones* **all**
13:00 -13:55	Lunch				
14:00 -15:00	*Keynote: Katie Steckles* **The Mathematics of Paper**				
15:00-15:15	*Overview: Francis Hunt* **Mathŵyl Cymru Maths Week Wales 2025**				
15:15-15:35	Coffee				
15:35-16:25	SESSION 4	**The mathematics of horology and navigation** *Elian Rhind* **11-16; 16+**	**Mathŵyl Cymru Maths Week Wales 2025 workshop** *Francis Hunt* **all**	**Strategies for successful problem solving** *Stephen Earles* **11-16; 16+**	**Getting into knots with Geogebra** *Ifor J. Jones* **11-16; 16+**
16:30 -17:00	*Closing address: Dominic Oakes and the MSPW Team* **WG M&N PL Project (and Music!)**				

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Rhaglen ACAM 2025

09:15-09:45	Cofrestru; Trefniadau				
09:45-10:00	*Croeso: Sofya Lyakhova*				
10:00 -10:50	Sesiwn 1	**Modelu gyda mathemateg** *James Lewis-Coll* **11-16; 16+**	**Mynd i'r afael â phryder am fathemateg drwy ddatblygu gwytnwch mathemategol** *Rosemary Russell & Sue Johnston-Wilder* **pawb**	**Addysgu mathemateg drwy ddeialog** *Theresa Hendy* **pawb**	**Hedfan, taflegrau, MHS & gwanychiad** *Susan Thomas* **16+**
10:55 -11:45	Sesiwn 2	**Mathemateg fel gêm tîm (rh1)** *Tricia Lunel & Carol Gainlall* **7-11; 11-14**	**Ymgysylltu â rhieni i helpu plant i ddod yn fathemategwyr** *Theresa Hendy & Ifor J. Jones* **pawb**	**Trafodaeth panel: Ai Osgoi Cyfrifiadau yw mathemateg?** *Dominic Oakes & Francis Hunt* **16+**	**Defnyddio Geogebra i helpu i gyflwyno'r cysyniad o ddifferu a chael llawer o'r canlyniadau sylfaenol** *Paul Sanders* **16+**
11:45 -12:10	Coffi				
12:10 -13:00	Sesiwn 3	**Mathemateg fel gêm tîm (rh2)** *Tricia Lunel & Carol Gainlall* **7-11; 11-14**	**Datrys problemau mewn dosbarth cynradd gallu cymysg** *Emily Mountain & Laura Hosking* **5-11**	**Mathemateg i gerddoriaeth** *Dominic Oakes* **pawb**	**Cronfa RhGMC o apiau Geogebra** *Paul Sanders & Ifor J. Jones* **pawb**
13:00 -13:55	Cinio				
14:00 -15:00	*Siaradwr Gwadd : Katie Steckles* **Mathemateg Papur**				
15:00-15:15	*Trosolwg: Francis Hunt* **Mathŵyl Cymru Maths Week Wales 2025**				
15:15-15:35	Coffi				
15:35-16:25	Sesiwn 4	**Mathemateg horoleg a llywio** *Elian Rhind* **11-16; 16+**	**Gweithdy Mathŵyl Cymru Maths Week Wales 2025** *Francis Hunt* **pawb**	**Strategaethau ar gyfer datrys problemau llwyddiannus** *Stephen Earles* **11-16; 16+**	**Mynd yn glymau gyda Geogebra** *Ifor J. Jones* **11-16; 16+**
16:30 -17:00	*I gloi: Dominic Oakes a thîm RhGMC* **Prosiect LlC M&Rh DP (a Cherddoriaeth!)**				

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Crynodebau

Sesiwn 1

Modelu gyda mathemateg

James Lewis-Coll

Bydd y sesiwn yn ystyried ychydig o weithgareddau ar gyfer cymhwyso sgiliau mathemateg cyffredin mewn cyd-destunau. Bydd agweddau ar fodelu gyda mathemateg gan ddefnyddio sgiliau o'r maes llafur TGAU a Safon Uwch. Mae model mathemategol yn gynrychiolaeth allanol o agwedd ddiddorol ar y broblem sy'n cael ei datrys, a gellir ei lunio gan ddefnyddio mynegiadau rhifiadol neu fformwlâu, diagramau, graffiau neu gynrychioliadau geometrig, hafaliadau algebraidd, tablau, ac ati. Pa agweddau sy'n anodd i fyfyrwyr? A yw'r anhawster yn fathemategol neu a yw'n briodoleddau eraill fel dyfalbarhad? Efallai y bydd y cyd-destunau a ystyriwn yn y sesiwn yn rhoi syniad!

Geiriau allweddol: *Cymhwyso, modelu, cyd-destunau, meddwl mathemategol, mathemateg, modelu, cyfnod allweddol 4, cyfnod allweddol 5, ymarferol, cymwysiadau, TGAU, Safon Uwch, trawsgwricwlaidd, bywyd go iawn.*

Mynd i'r afael â phryder am fathemateg drwy ddatblygu gwytnwch mathemategol: ateb syml i broblem hirhoedlog a chyffredin?

Rosemary Russell a Sue Johnston-Wilder

Yn y gweithdy hwn, bydd Rosemary a Sue yn tywys cyfranogwyr i ddechrau archwilio sut i ddatblygu gwytnwch mathemategol i fynd i'r afael â phryder mathemateg mewn dysgwyr, staff cymorth a rhieni.

Geiriau allweddol: *pryder mathemateg, gwytnwch mathemategol*.

Addysgu mathemateg drwy ddeialog

Theresa Hendy

Sut ydych chi'n gwybod a yw eich myfyrwyr wedi deall y cysyniad rydych chi wedi bod yn ei addysgu? Sut mae defnyddio trafodaeth strwythuredig mewn mathemateg yn newid profiad y myfyrwyr yn yr ystafell ddosbarth?

Mae ymchwil flaenorol wedi pwysleisio pwysigrwydd siarad fel ffactor allweddol yng nghyfoeth profiad dysgu'r myfyriwr ond yn aml mae diffyg cyfle i hyn ddigwydd yn enwedig gyda myfyrwyr uwchradd. Mae sgwrs ystyrlon yn yr ystafell ddosbarth

Abstracts

Session 1

Modelling with maths

James Lewis-Coll

The session will consider a few activities for applying common mathematics skills in contexts. There will be aspects of modelling with mathematics using skills from the GCSE and A-level syllabus. A mathematical model is an external representation of an interesting aspect of the problem being solved, and can be formulated using numerical expressions or formulas, diagrams, graphs or geometric representations, algebraic equations, tables, etc. What aspects do students find difficult? Is the difficulty mathematical or is it other attributes such as perseverance? Perhaps the contexts we consider in the session may give an indication!

Key words*: Applying, modelling, contexts, mathematical thinking, mathematics, modelling, key stage 4, key stage 5, practical, applications, GCSE, A-level, cross-curricular, real-life.*

Addressing mathematics anxiety through developing mathematical resilience: a simple solution to a longstanding and prevalent problem?

Rosemary Russell & Sue Johnston-Wilder

In this workshop, Rosemary and Sue will guide participants to begin to explore how to develop mathematical resilience to address maths anxiety in the learners, support staff and parents.

Key words: *maths anxiety, mathematical resilience.*

Dialogic mathematics teaching

Theresa Hendy

How do you know if your students have understood the concept you have been teaching? How does the use of structured discussion in mathematics change the students' experience in the classroom?

Previous research has emphasised the importance of talk as a pivotal factor in the richness of the student learning experience but often there is a lack of opportunity for this to take place particularly with secondary students. Meaningful talk in the

yn helpu myfyrwyr i fynegi eu dealltwriaeth, mireinio eu rhesymu, a datblygu sgiliau cyfathrebu gwerthfawr - rhan allweddol o Gwricwlwm i Gymru.

Geiriau allweddol: *trafodaeth mewn dull addysgu, mathemateg ar draws pob lefel gan gynnwys cynradd*.

Hedfan, taflegrau, SHM a gwanychiad

Susan Thomas

Bydd y sesiwn hon yn edrych ar bethau hwyliog a diddorol sy'n cynnig ffyrdd o ymgysylltu ac ysbrydoli myfyrwyr gyda mathemateg. Byddwn yn ymchwilio i hedfan gan ddefnyddio awyrennau papur ac aeroffoilau; yna'n ystyried taflegrau a gwrthdrawiadau; ac yn olaf SHM a gwanychiad.

Geiriau allweddol: *hedfan, taflegrau, SHM, hwyl.*

Sesiwn 2

Mathemateg fel gêm tîm (rhannau 1 a 2)

Tricia Lunel a Carol Gainlall

Byddwn yn dangos gyda chyfranogiad gweithredol y deunyddiau y mae UKMT wedi'u datblygu ar gyfer ei Heriau Tîm Mathemateg llwyddiannus ar lefel gynradd ac uwchradd. Gofynnir i gyfranogwyr ffurfio timau a rhoi cynnig ar rai o'r deunyddiau. Mae'n debygol y bydd datrys problemau a gwaith tîm yn dod yn bwysicach fyth yn y dyfodol. Y bwriad yw y bydd y sesiwn yn dangos sut y gellir annog datrys problemau mewn timau yn yr ystafell ddosbarth. Yr hyn a ddysgwn o'r sesiwn hon yw'r profiad o gynnal gweithgareddau datrys problemau tîm ac enghreifftiau o rai o'r deunyddiau hyn.

Geiriau allweddol: *gweithio mewn tîm, datrys problemau, rhesymeg, egluro*.

Partneru â rhieni: grymuso teuluoedd i gefnogi dysgu mathemateg gartref

Theresa Hendy & Ifor J. Jones

Mae rhieni'n chwarae rhan hanfodol wrth lunio agweddau a hyder myfyrwyr tuag at fathemateg, ond mae llawer yn teimlo nad ydynt wedi'u paratoi i ddarparu cefnogaeth effeithiol. Mae'r gweithdy hwn yn seiliedig ar fenter RhGMC i gefnogi ysgolion sy'n gweithio gyda rhieni. Byddwn yn edrych ar faterion fel:

- Sut allwn ni roi hyder i rieni gefnogi eu plant heb wybodaeth o reidrwydd o'r cwricwlwm mathemateg.

classroom helps students articulate their understanding, refine their reasoning, and develop valuable communication skills – a key part of Curriculum for Wales.

Key words: *discussion in teaching approach, mathematics across all levels including primary.*

Flight, projectiles, SHM & damping

Susan Thomas

This session will look at fun and interesting things which offer ways to engage and inspire students with mathematics. We will investigate flight using paper aeroplanes and aerofoils; then consider projectiles and collisions; and finally SHM and damping.

Key words: *flight, projectiles, SHM, fun.*

Session 2

Maths as a team game (pts 1 and 2)

Tricia Lunel & Carol Gainlall

We will demonstrate with active participation the materials the UKMT has developed for its successful Team Maths Challenges at primary and secondary level. Participants will be asked to form teams and try out some of materials. Problem solving and team work are likely to become even more important in future. The intention is that the session will show how problem solving in teams can be encouraged in the classroom. The take away from this session is the experience of running team solving activities and examples of some of these materials.

Key words: *team working, problem solving, logic, explaining.*

Partnering with parents: empowering families to support maths learning at home

Theresa Hendy & Ifor J. Jones

Parents play a crucial role in shaping students' attitudes and confidence towards mathematics, yet many feel unequipped to provide effective support. This workshop is based on the MSPW initiative in supporting schools working with parents. We will look at issues such as:

- How can we give parents confidence to support their children without necessarily knowledge of the mathematics curriculum.

- Ymdrin â phryder am fathemateg posibl gan rieni a'u helpu i greu amgylchedd cadarnhaol gartref o amgylch mathemateg.
- y diriaethol, y delweddol a'r haniaethol – sut gall rhieni gefnogi hyn gartref.

Bydd y sesiwn yn darparu offer ac ysbrydoliaeth i helpu rhieni i ddod yn gynghreiriaid hyderus yn nhaith fathemategol eu plentyn.

Geiriau allweddol: *cynradd, uwchradd, trinolion, gemau, rhieni, y diriaethol, y delweddol, y haniaethol, hyder.*

- Dealing with possible maths anxiety in parents and helping them create a positive environment at home around mathematics.
- Concrete Pictorial Abstract – how can parents support this at home.

The session will provide tools and inspiration to help parents become a confident ally in their child's mathematical journey.

Key words: *primary, secondary, manipulatives, games, parents, concrete, pictorial, abstract, confidence.*

Trafodaeth panel: Ai osgoi cyfrifiadau yw mathemateg?

Dominic Oakes a Francis Hunt

Cafodd y drafodaeth panel hon ei hysgogi gan erthygl gan Conrad Wolfram, Cefnogi'r Addysg Mathemateg Uwch Gywir, Peidiwch â'i Thorri I Ffwrdd. Mae nifer o themâu pwysig yn y darn hwn (rhai'n ddadleuol) ond y ddadl hanfodol yw bod mathemateg Safon Uwch cyfredol o oes cyn-gyfrifiaduron ac felly maent wedi dyddio: fel y mae Wolfram yn ei roi, maent, 'ychydig fel cael eich hyfforddi i yrru ceffyl a cherbyd fel y gallwch yrru Tesla'.

Bydd rhai o fynychwyr ACAM yn ymddeol yn fuan iawn, ond efallai y bydd eraill yn gweithio am sawl degawd i ddod. Byddwn yn defnyddio gwaith Wolfram i ysgogi trafodaeth ar beth allai/ddylai fod cyfeiriad addysg mathemateg uwch.

Geiriau allweddol: *Mathemateg Uwch, Deallusrwydd Artiffisial, meddwl cyfrifiadurol, mathemateg Safon Uwch, dysgu peirianyddol, mathemateg seiliedig ar gyfrifiadur, diwygio addysg, meddwl mathemategol, toriadau cyllid, addysg elitaidd*.

Panel discussion: Is maths the Art of Avoiding Calculations?

Dominic Oakes & Francis Hunt

This panel discussion was motivated by an article by Conrad Wolfram, Support The Right Advanced Mathematics Education, Don't Cut It Off. There are a number of important themes in this piece (some controversial) but the essential argument is that the current maths A-levels are from a pre-computer era and are hence out-of-date: as Wolfram puts it, they are a, 'little like being trained to drive a horse and carriage so you can drive a Tesla'.

Some attendees at ICMT will be hanging up their chalk fairly soon, but others may be wielding it for several decades to come. We will use Wolfram's thought to motivate a discussion on what might/could/should be the direction of advanced maths education.

Key words: *Advanced Mathematics, AI, computational thinking, A-level maths, machine learning, computer-based maths, education reform, mathematical thinking, funding cuts, elite education.*

Defnyddio Geogebra i helpu i gyflwyno'r cysyniad o ddifferu a chael llawer o'r canlyniadau sylfaenol

Paul Sanders

Nod y sesiwn yw dangos sut y gall Geogebra ddarparu'r delweddu angenrheidiol a fydd yn galluogi myfyrwyr i

- symud o syniadau cychwynnol bod graddiant cromlin mewn pwynt yn raddiant y tangiad i'r gromlin yn y pwynt hwnnw i ddealltwriaeth o'r diffiniad bod

$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

a hefyd

Using Geogebra to help introduce the concept of differentiation and obtain many of the basic results

Paul Sanders

The session aims to show how Geogebra can provides the visualisation necessary which will enable students to

- to move from initial ideas that the gradient of a curve at a point is the gradient of the tangent to the curve at that point to an understanding of the definition that

$$f'(\mathrm{a}) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

and also

- defnyddio "ffwythiant amcangyfrif graddiant" fel

$$g(x) = \operatorname*{terf}_{h\to 0}\frac{f(x+0.01)-f(x)}{0.01}$$

i gael dyfaliadau gwerthfawr am ddeilliadau ffwythiannau polynomial, esbonyddol a thrigonometrig.

Geiriau allweddol: Geogebra, differiad, ffwythiannau esbonyddol, ffwythiannau trigonometrig.

- to use a "gradient estimator function" such as

$$g(x) = \lim_{h\to 0}\frac{f(x+0.01)-f(x)}{0.01}$$

to obtain valuable conjectures about the derivatives of polynomial, exponential and trigonometric functions.

Key words: *Geogebra, differentiation, exponential functions, trigonometric functions*

Sesiwn 3

Mathemateg fel gêm tîm (rhannau 1 a 2)

Tricia Lunel a Carol Gainlall

(Gweler crynodeb o dan sesiwn 2)

Datrys problemau mewn dosbarth cynradd gallu cymysg

Emily Mountain a Laura Hosking

Yn ystafelloedd dosbarth cynradd amrywiol heddiw, mae hyrwyddo datrys problemau yn gofyn am fwy na dim ond cyflwyno posau i blant, mae'n galw am feithrin diwylliant ystafell ddosbarth lle mae chwilfrydedd, cydweithio a gwydnwch yn ffynnu. Gan dynnu ar Gwricwlwm Cymru a'r pum hyfedredd, mae'r sesiwn hon yn archwilio strategaethau ymarferol i ymgorffori tasgau datrys problemau cyfoethog, agored mewn addysgu bob dydd, gan sicrhau hygyrchedd a her i bob dysgwr.

Geiriau allweddol: *Datrys problemau, strategaethau, dull, systematig, gwytnwch, cydweithredol, nenfwd uchel trothwy isel, Cwricwlwm i Gymru, pum hyfedredd*

Mathemateg i gerddoriaeth

Dominic Oakes

Gan fenthyca o weithgaredd sy'n digwydd yng Nghynulliadau MathsJam [https://www.mathsjam.com/gathering/uk/whats-on/activities/#jamjam], mae hwn yn gyfle i ddod at ein gilydd gydag offerynnau (neu beidio) ac, yn bwysicaf oll, lleisiau ar gyfer canu gyda'n gilydd o ganeuon poblogaidd sydd wedi'u gwella trwy eu hailysgrifennu i fod yn ymwneud â mathemateg. Efallai y bydd cyn-fynychwyr ACAM a digwyddiadau RhGMC eraill yn cofio perfformiadau o *For Cosine, Tan and Sine* - dyna'r math o beth y byddwn ni'n ei wneud.

Session 3

Maths as a team game (pts 1 and 2)

Tricia Lunel & Carol Gainlall

(See abstract under session 2)

Problem solving in a mixed-ability primary class

Emily Mountain & Laura Hosking

In today's diverse primary classrooms, promoting problem solving requires more than simply presenting children with puzzles, it demands the cultivation of a classroom culture where curiosity, collaboration, and resilience thrive. Drawing on the Curriculum for Wales and the five proficiencies, this session explores practical strategies to embed rich, open-ended problem-solving tasks into everyday teaching, ensuring accessibility and challenge for all learners.

Key words: *Problem-solving, strategies, approach, systematic, resilience, collaborative, low-threshold high ceiling, Curriculum for Wales, five proficiencies.*

Maths to music

Dominic Oakes

Borrowing from an activity that takes place at MathsJam Gatherings [https://www.mathsjam.com/gathering/uk/whats-on/activities/#jamjam], this is a chance to get together with instruments (or not) and, most importantly, voices for a singalong of popular songs that have been improved by rewriting them to be about maths. Veterans of ICMT and other MSPW events may remember performances of *For Cosine, Tan and Sine* – that's the sort of thing we'll be doing.

Bydd yna hefyd ychydig o gysylltiad mathemateg/cerddoriaeth, gyda golwg fer ar timbre a harmoni. Yn eithaf uchelgeisiol, byddwn ni hefyd yn ceisio ysgrifennu cân Fathemateg newydd!!

Geiriau allweddol: *cyfoethogi, llawenydd, sganio, amlen sbectrol*.

Cronfa RHGMC o apiau Geogebra

Paul Sanders ac Ifor J. Jones

Mae Geogebra yn darparu cyfleoedd gwych

- i gysyniadau Mathemategol cymhleth gael eu darlunio mewn ffordd a all wella dealltwriaeth myfyrwyr
- i ddarparu "dechreuwyr gwersi" byr i athrawon y gellir eu defnyddio i adolygu neu asesu dealltwriaeth o gysyniadau

Yn ystod y flwyddyn ddiwethaf rydym wedi gweithio gyda'n gilydd i gynhyrchu cronfa o apiau Geogebra yr ydym yn gobeithio y byddant yn ddefnyddiol i athrawon a myfyrwyr. Mae'r holl apiau ar gael yn y Gymraeg a'r Saesneg. Mae nifer dda wedi defnyddio'r apiau yng Nghymru ….. ac mae rhai wedi cael eu defnyddio yn Guatemala hefyd!

Bydd sesiwn y gynhadledd yn egluro'r rhesymeg y tu ôl i greu'r gronfa a byddwn yn edrych ar ychydig o'r apiau yn fanwl. Rydym yn gobeithio cael adborth gan athrawon sydd eisoes yn defnyddio'r apiau ond rydym hefyd yn gobeithio y bydd athrawon sydd â diddordeb mewn cymryd y camau cyntaf wrth ddefnyddio Geogebra yn dod i'r sesiwn. Bydd eich adborth a'ch awgrymiadau yn sicr o arwain datblygiad y rhaglen datblygu apiau yn y dyfodol.

Geiriau allweddol: *Geogebra fel cymorth addysgu yn yr ystafell ddosbarth*.

Prif Anerchiad: Mathemateg Papur

Katie Steckles

Mae gan y ddalen bapur ostyngedig botensial mathemategol diddiwedd bron. Ymunwch â'r mathemategydd Katie Steckles wrth iddi ddangos rhai o'i hoff gysyniadau mathemategol a rhannu posau gan ddefnyddio darnau papur go iawn a dychmygol. Darperir deunyddiau i ymuno o'ch sedd, wrth i Katie ddatgelu'r cyfrinachau mathemategol sy'n cuddio mewn deunydd ysgrifennu cartref.

Geiriau allweddol: *plygu papur, geometreg, chwarae, ymarferol*.

There will also be a bit of maths/music connection, with a brief look at timbre and harmony. Somewhat ambitiously, we are also going to attempt to write a new Maths song!!

Key words: *enrichment, joy, scansion, spectral envelope.*

The MSPW bank of Geogebra apps

Paul Sanders & Ifor J. Jones

Geogebra provides wonderful opportunities

- for complex Mathematical concepts to be illustrated in a way that can enhance student understanding
- to provide teachers with short "lesson starters" which can be used to review or assess the understanding of concepts

During the last year we have worked together to produce a bank of Geogebra apps that we hope will be useful to teachers and students. All the apps are available in both Welsh and English. There has been a good uptake of the apps in Wales ….. and a few have been used in Guatemala as well as!

The conference session will explain the reasoning behind the creation of the bank and we will look at just a few of the apps in detail. We are hoping to get feedback from teachers already using the apps but we also hope that teachers who are interested in taking the first steps in using Geogebra will come to the session. Your feedback and wish lists will certainly guide the future development of the programme of app development.

Key words: *Geogebra as a teaching aid in the classroom.*

Keynote: The Mathematics of Paper

Katie Steckles

The humble sheet of paper has almost infinite mathematical potential. Join mathematician Katie Steckles as she demonstrates some of her favourite mathematical concepts and shares some puzzles using both real and imaginary pieces of paper. Materials will be provided to join in from your seat, as Katie reveals the mathematical secrets hiding in household stationery.

Key words: *paper folding, geometry, play, hands-on*.

Trosolwg: Mathŵyl Cymru Maths Week Wales 2025

Francis Hunt

Cynhelir Wythnos Fathemateg Mathŵyl Cymru 2025 rhwng 29 Tachwedd a 7 Rhagfyr eleni. Fe'i cefnogir gan dros 20 o sefydliadau a chyfraniadau gan Nrich, y Brifysgol Agored, y Sefydliad Brenhinol, UKMT, sefydliadau addysgu mathemateg, prifysgolion Cymru, awdurdodau addysg Cymru, ymhlith eraill. Bydd y sgwrs fer hon yn rhoi trosolwg o'r hyn sydd ar gael ar hyn o bryd. Os hoffech archwilio'r hyn y gallai eich ysgol ei wneud yn fanylach, yna efallai yr hoffech fynychu gweithdy sesiwn 4 sy'n dilyn.

Geiriau allweddol: *Wythnos Fathemateg Mathŵyl Cymru; mathemateg ar gyfer ffyniant dynol.*

Overview: Mathŵyl Cymru Maths Week Wales 2025

Francis Hunt

Mathŵyl Cymru Maths Week Wales 2025 is taking place 29th November – 7th December this year. It is supported by over 20 organisations and contributions from Nrich, the Open University, the Royal Institution, UKMT, maths teaching organisations, Welsh universities, Welsh education authorities, amongst others. This brief talk will give an overview of what is currently available. If you wish to explore what your school might do in more detail, then you may wish to attend the session 4 workshop that follows.

Key words: *Mathŵyl Cymru Maths Week Wales; maths for human flourishing*.

Sesiwn 4

Mathemateg horoleg a llywio

Elian Rhind

Ochr yn ochr â'i hastudiaeth fel pwnc, mae mathemateg yn cario cyd-destun ac arwyddocâd mawr mewn hanes. Stori ddiddorol yw stori John Harrison o Swydd Efrog, saer coed o'r 18fed ganrif, y profodd ei waith yn hanfodol i ddatrys problemau mordwyo cywir. Yn y sesiwn hon, rydym yn archwilio'r hanes hwn gyda ffocws ar y mathemateg gysylltiedig, gan gynnwys ymarferion ymarferol i ategu'r dysgu.

Geiriau allweddol: *amser, hydred, ongl, pellter*.

Gweithdy Mathŵyl Cymru Maths Week Wales 2025

Francis Hunt

Mae Wythnos Fathemateg Mathŵyl Cymru 2025 yn digwydd rhwng 29 Tachwedd a 7 Rhagfyr eleni. Fe'i cefnogir gan dros 20 o sefydliadau a chyfraniadau gan Nrich, y Brifysgol Agored, y Sefydliad Brenhinol, UKMT, sefydliadau addysgu mathemateg, prifysgolion Cymru, awdurdodau addysg Cymru, ymhlith eraill. Yn y sesiwn hon, byddwn yn trafod yr adnoddau sydd ar gael ar hyn o bryd; yn archwilio pa bethau ychwanegol fyddai'n ddymunol; ac yn cynllunio sut y gall eich ysgol ymgysylltu.

Geiriau allweddol: *Wythnos Fathemateg Mathŵyl Cymru; mathemateg ar gyfer ffyniant dynol; cyfleoedd i ymgysylltu*.

Session 4

The mathematics of horology and navigation

Elian Rhind

Alongside its study as a subject, mathematics carries great context and significance in history. A fascinating story is that of Yorkshireman John Harrison, a carpenter from the 18th century, whose work proved crucial to solving accurate navigation. In this session we explore this history with focus on the associated mathematics, including practical exercises to complement the learning.

Key words: t*ime, longitude, angle, distance.*

Mathŵyl Cymru Maths Week Wales 2025 workshop

Francis Hunt

Mathŵyl Cymru Maths Week Wales 2025 is taking place 29th November – 7th December this year. It is supported by over 20 organisations and contributions from Nrich, the Open University, the Royal Institution, UKMT, maths teaching organisations, Welsh universities, Welsh education authorities, amongst others. In this session we will talk through the resources currently available; explore what additional things would be desirable; and plan how your school can engage.

Key words: *Mathŵyl Cymru Maths Week Wales; maths for human flourishing; opportunities to engage.*

Strategaethau datrys problemau ar gyfer ysgolion uwchradd

Stephen Earles

Gyda'r newid yn y cwricwlwm i ddull mwy o ddatrys problemau , byddwn yn edrych ar amrywiaeth o ffyrdd y gallwn alluogi'r myfyrwyr i fod yn llwyddiannus wrth gwblhau'r mathau hyn o gwestiynau.

Byddwn yn edrych ar sut i ddatblygu gwytnwch y myfyrwyr tuag at ddatrys "cwestiynau anoddach a chaletach". Byddwn yn defnyddio'r dulliau hyn gydag ychydig o broblemau er mwyn cael 'teimlad' ynghylch pa fath o ddull y dylem ei gymhwyso i gwestiwn penodol.

Geiriau allweddol: *Datrys problemau*.

Mynd yn glymau gyda Geogebra

Ifor J. Jones

Mae'r sesiwn hon yn parhau â'm harchwiliad o Fathemateg gan ddefnyddio Geogebra. Yng nghynhadledd ar-lein y llynedd, dangosais ap Geogebra o forgrug yn cerdded ar Stribed Moebius ac estynnais yr ap i gwmpasu stribedi â throelliadau lluosog. Yna mae'r ap troelliadau lluosog, gyda'r morgrug wedi'i dynnu, yn arwain yn eithaf naturiol, trwy edrych ar ymylon y stribedi, i'r syniad o glymau a chysylltiadau.

Bydd sesiwn eleni yn cyfuno clymu clymau mathemategol ymarferol a chynrychioliadau Geogebra o glymau gan ddefnyddio hafaliadau parametrig. Bydd cyflwyniad hefyd i ddulliau o wahaniaethu clymau mewn gofod tri dimensiwn.

Geiriau allweddol: *Geogebra, modelau rhithwir 3D, torws, cylchdro, cyfieithiad, fectorau, fectorau orthogonal, gorchymyn arwyneb, clymau, awyrennau.*

I gloi: Prosiect LlC M&Rh DP (a Cherddoriaeth!)

Dominic Oakes

Mae rhai o bobl RhGMC, ac eraill, wedi bod yn gweithio ar brosiect LlC, Cynllun Mathemateg a Rhifedd - Cynnig Dysgu Proffesiynol. Rydym wedi gwneud llawer o'r gwaith hwn, a fydd yn cael ei gyflwyno dros y 9 mis nesaf. Mae'r sesiwn hon yn cynnig trosolwg o'r meddylfryd y tu ôl i'r gwaith, y gwaith ei hun a'r hyn y bydd yn ei gynnig i adrannau, athrawon a dysgwyr. Bydd y sesiwn yn gorffen gyda rhywfaint o ganu calonog (gobeithio!).

Geiriau allweddol: *Cwricwlwm i Gymru, dysgu proffesiynol.*

Strategies for successful problem solving

Stephen Earles

With the change in the curriculum to a more problem-solving approach, we will be looking at a variety of ways that we can enable the students to be successful in completing these types of questions.

We will look at how to develop the resilience of the students towards solving "more difficult and harder questions". We will apply these approaches to some problems to get a 'feel' as to which type of method we should apply to a given question.

Key words: *Problem solving.*

Getting into knots with Geogebra

Ifor J. Jones

This session continues my exploration of Mathematics using Geogebra. In last year's online conference I showed the Geogebra app of an ant walking on a Moebius Strip and extended the app to cover strips with multiple twists. The multiple twist app, with ant removed, then leads quite naturally, by looking at the edges of the strips, into the idea of knots and links.

This year's session will combine practical mathematical knot tying and Geogebra representations of knots using parametric equations. There will also be an introduction to methods of distinguishing knots in three-dimensional space.

Key words: *Geogebra, 3D virtual models, torus, rotation, translation, vectors, orthogonal vectors, surface command, knots, planes.*

Close: WG M&N PL Project (and Music!)

Dominic Oakes

Some MSPW folk, and others, have been working on a WG project, *Maths and Numeracy Plan - Professional Learning Offer.* We are a good way through this work, which will be rolled out over the next 9 months. This session offers an overview of the thinking behind the work, the work itself and what it will offer to departments, teachers and learners. The session will end with some hearty (we hope!) singing.

Key words: *Curriculum for Wales, professional learning.*

Siaradwyr

Stephen Earles – RhGMC

Dechreuais addysgu mewn addysg bellach yn Llundain yna symudais i Orllewin Cymru. Gweithiais fel athro dosbarth ac yna dod yn Bennaeth Adran, swydd a ddaliais am 19 mlynedd cyn ymddeol yn gynnar. Rwyf wedi gweithio fel Cydlynydd Ardal i RhGMB Cymru (RhGMC bellach) ers bron i 8 mlynedd ac mae gen i gyfrifoldeb am yr hyfforddiant a gynigir gan RhGMC.

Carol Gainlall – UKMT

Mae Carol wedi bod yn athrawes Mathemateg uwchradd ers dros 30 mlynedd mewn ysgolion gwladol ac annibynnol. Mae hi wedi gwirfoddoli i UKMT ers bron i 20 mlynedd ac mae hefyd yn cyflwyno Dosbarthiadau Meistr cynradd i'r RI.

Theresa Hendy – RhGMC

Dechreuodd Theresa addysgu mathemateg mewn ysgol uwchradd ac yna addysgu mathemateg Safon Uwch am fwy nag ugain mlynedd mewn Addysg Bellach. Ymunodd â thîm RhGMC yn 2023.

Laura Hosking – RhGMC

Mae Laura yn athrawes brofiadol gyda chefndir eang ar draws amrywiaeth o wledydd a lleoliadau, gan arbenigo mewn mathemateg o Flwyddyn 3 i Flwyddyn 9. Mae hi wedi gweithio gyda gwahanol gwricwla, gan gyfrannu'n fwyaf diweddar at ddatblygu deunyddiau dysgu proffesiynol ar gyfer Cwricwlwm Cymru; mae'r gwaith hwn yn archwilio sut y gellir ymgorffori egwyddorion addysgeg yn effeithiol o fewn y cwricwlwm mathemateg o Gamau Cynnydd 1 i 5.

Mae Laura wedi dal sawl rôl arweinyddiaeth mewn ysgolion, gan gynnwys Pennaeth Mathemateg ac arweinydd pwnc ar draws sawl disgyblaeth. Mae hi hefyd wedi cyfrannu at raglen Lluosi Llywodraeth y DU, gan ddylunio a chyflwyno sesiynau dysgu teuluol mewn ysgolion cynradd, yn ogystal â sesiynau i oedolion yn unig gyda'r nod o feithrin hyder dysgwyr a'u paratoi ar gyfer cymwysterau pellach. Ar hyn o bryd, mae Laura yn ymwneud â phrosiect RhGMC, lle mae hi'n paratoi ac yn cyflwyno sesiynau dysgu proffesiynol ac ymgysylltu â rhieni mewn ysgolion, gan gefnogi athrawon a theuluoedd i wella dealltwriaeth a hyder mathemategol.

Speakers

Stephen Earles – MSPW

Started teaching in FE in London then moved to West Wales. I worked as a classroom teacher and then became a Head of Department, a post I held for 19 years before taking early retirement. I have worked as an Area Coordinator for the FMSP Wales (now the MSPW) for almost 8 years and I have responsibility for the tuition that is offered by MSPW.

Carol Gainlall – UKMT

Carol has been a secondary Maths teacher for 30+ years in both state and independent schools. She has volunteered for the UKMT for almost 20 years and also delivers primary Masterclasses for the RI.

Theresa Hendy – MSPW

Theresa started teaching mathematics in a secondary school and then taught A level mathematics for more than twenty years in Further Education. She joined the MSPW team in 2023.

Laura Hosking – MSPW

Laura is an experienced teacher with a broad background across a range of countries and settings, specialising in mathematics from Year 3 to Year 9. She has worked with various curricula, most recently contributing to the development of professional learning materials for the Curriculum for Wales; this work explores how pedagogical principles can be effectively embedded within the mathematics curriculum from Progression Steps 1 to 5.

Laura has held several leadership roles in schools, including Head of Maths and subject lead across multiple disciplines. She has also contributed to the UK Government's Multiply programme, designing and delivering family learning sessions in primary schools, as well as adult-only sessions aimed at building learners' confidence and preparing them for further qualifications. Currently, Laura is involved with the MSPW project, where she prepares and delivers professional learning and parental engagement sessions in schools, supporting teachers and families in enhancing mathematical understanding and confidence.

Francis Hunt – RhGMC

Astudiodd Francis fathemateg ym Mhrifysgol Caergrawnt cyn gweithio fel peiriannydd meddalwedd, ac yna addysgu ac ymchwilio yn Adran Beirianneg y Brifysgol. Gweithiodd fel darlithydd mathemateg ym Mhrifysgol De Cymru (USW) rhwng 2006 a 2019, cyn ymuno â RhGMBC yn 2020. Mae wedi rhoi Dosbarthiadau Meistr Mathemateg Sefydliad Brenhinol ar lefel CA3 a Chynradd, wedi tiwtora mathemateg Safon Uwch a TGAU, ac wedi mentora ar gyfer y UKMT. Mae bellach yn cydlynu'r cyfoethogi ôl-16 gyda RhGMC, ac mae'n gydlynydd ardal ar gyfer Canol De a De-ddwyrain Cymru.

Sue Johnston-Wilder – Prifysgol Warwick

Mae Sue yn athro cysylltiol Addysg Fathemateg ac yn Hyfforddwr Gwytnwch Mathemategol. Mae ei chefndir mewn addysgu mathemateg uwchradd, datblygu athrawon, mentora a hyfforddi. Dros y 15 mlynedd diwethaf, mae hi wedi arbenigo mewn mynd i'r afael â phryder am fathemateg ac mae wedi cyd-ddatblygu'r fframwaith Gwydnwch Mathemategol. Mae hi'n gyd-sylfaenydd y Rhwydwaith Gwydnwch Mathemategol Rhyngwladol.

Ifor J. Jones – RhGMC

B.Sc. (Cyfunol Anrh.) (Mathemateg a Chyfrifiadureg), M.Ed. (Addysg Gyfrifiadurol ac Astudiaethau Cwricwlwm) Athro Mathemateg a TG wedi ymddeol gyda phrofiad o weithio yng Nghymru (cyfrwng Cymraeg a Saesneg), Zambia a Phapua Gini Newydd – addysgu (Mathemateg a TG) a rheoli ysgolion. Wedi gweithio i RhGMBC ers 2018 mewn amrywiol rolau, yn enwedig mewn meddalwedd ddeinamig a chyfoethogi.

James Lewis-Coll – Consortiwm Canolbarth y De

Gweithiodd yn system addysg yr Alban, Lloegr a nawr yn system addysg Cymru.

Mewn ysgol flaenorol, datblygais a chynhaliais gyrsiau TAR ar gyfer mathemateg uwchradd ac ar gyfer myfyrwyr cynradd. Rwyf wedi gweithio i GSC fel arbenigwr mathemateg ers tua 10 mlynedd yn cefnogi ysgolion gyda datblygiadau mewn mathemateg. Rwy'n mwynhau mynychu cynadleddau mathemateg.

Francis Hunt – MSPW

Francis studied maths at Cambridge University before working as a software engineer, and then teaching and researching at the University Engineering Department. He worked as a maths lecturer at the University of South Wales (USW) between 2006 and 2019, before joining the FMSPW in 2020. He has given Royal Institution Maths Masterclasses at KS3 and Primary level, has tutored A-level and GCSE mathematics, and mentored for the UKMT. He now coordinates the post-16 enrichment at the MSPW, and is area coordinator for Central South and South East Wales.

Sue Johnston-Wilder – University of Warwick

Sue is an associate professor of Maths Education and a Coach for Mathematical Resilience. Her background is in secondary maths teaching, teacher-development, mentoring and coaching. Over the last 15 years, she specialised in addressing maths anxiety and has co-developed the Mathematical Resilience framework. She is co-founder of the International Mathematical Resilience Network.

Ifor J. Jones – MSPW

B.Sc. (Jt. Hons) (Maths & Computer Science), M.Ed.(Computer Education & Curriculum Studies) Retired Maths & IT teacher with experience of working in Wales (both Welsh & English medium), Zambia and Papua New Guinea – both teaching (Maths & IT) and school management. Has worked for FMSPW since 2018 in various roles, particularly in dynamic software and enrichment.

James Lewis-Coll – Central South Consortium

Worked in the Scottish, English and now in the Welsh education system.

In a previous school I developed and ran PGCE courses for secondary mathematics and for primary students. Have worked for CSC as a mathematics specialist for about 10 years supporting schools with developments in mathematics. I enjoy attending mathematics conferences.

Tricia Lunel – UKMT

Mae Tricia wedi bod yn addysgu yn Ysgol Blessed George Napier yn Banbury ers 2005. Mae hi wedi bod yn wirfoddolwr gydag UKMT bron yr un mor hir, gan ymwneud â'r Her Mathemateg Tîm a Her Mathemateg Tîm Cynradd yn benodol.

Sofya Lyakhova – RhGMC

Mae Sofya yn athro cysylltiol mewn mathemateg ym Mhrifysgol Abertawe ac yn Arweinydd Rhaglen RhGMC. Mae hi wedi gweithio ar amrywiaeth o brosiectau ymchwil yn y lle cyntaf mewn mathemateg bur, ac yn ddiweddarach mewn addysg fathemateg a dysgu wedi'i wella gan dechnoleg yng nghyd-destun Cymru. Mae gan Sofya PhD mewn Mathemateg Bur o Brifysgol Bryste. Cyn ymuno â RhGMBC yn 2010, bu'n gweithio mewn cwmnïau technoleg feddygol. Mae Sofya yn ymddiriedolwr cyfetholedig Cyngor Mathemategol ar y Cyd y DU ac yn aelod o fwrdd cynghori Academi'r Gwyddorau Mathemategol.

Emily Mountain – RhGMC

Mae Emily yn ymarferydd addysgol ymroddedig ac arloesol gyda dros 15 mlynedd o brofiad ar draws pob grŵp oedran cynradd. Gyda gwybodaeth helaeth am y cwricwlwm cynradd a chefndir cryf mewn arweinyddiaeth rhifedd, mae hi wedi hyrwyddo arferion addysgu effeithiol yn gyson i ddisgyblion, rhieni a gweithwyr proffesiynol. Fel Ymarferydd Rhifedd Dysgu Oedolion Uwch ar gyfer y prosiect Multiply, arweiniodd Emily sesiynau dysgu teuluol ledled Abertawe, gan gefnogi rhieni i feithrin hyder mewn rhifedd ac ymgysylltu ag addysg eu plant. Ar hyn o bryd mae hi'n ymwneud â Rhaglen Gymorth Mathemateg Cymru (RhGMC), gan ddarparu dysgu proffesiynol sy'n canolbwyntio ar ddulliau trin a datrys problemau. Mae Emily hefyd yn cyfrannu at brosiect Dysgu Proffesiynol Mathemateg a Rhifedd Llywodraeth Cymru, gan gyd-ddatblygu adnoddau cenedlaethol i wella addysgu mathemateg o 3 i 16 oed.

Tricia Lunel – UKMT

Tricia has been teaching at Blessed George Napier School in Banbury since 2005. She has been a volunteer with UKMT for almost as long, involved with the Team Maths Challenge and Primary Team Maths Challenge in particular.

Sofya Lyakhova – MSPW

Sofya is an associate professor of mathematics at Swansea University and MSPW Programme Leader. She has worked on a range of research projects initially in pure mathematics, and later in mathematics education and technology-enhanced learning within the Wales context. Sofya holds a PhD in Pure Mathematics from Bristol University. Prior to joining FMSPW in 2010, she worked in medical technology companies. Sofya is a co-opted trustee of the Joint Mathematical Council of the UK and a member of the advisory board of the Academy for the Mathematical Sciences.

Emily Mountain – MSPW

Emily is a dedicated and innovative educational practitioner with over 15 years' experience across all primary age groups. With extensive knowledge of the primary curriculum and a strong background in numeracy leadership, she has consistently promoted effective teaching practices to pupils, parents, and professionals. As a Senior Adult Learning Numeracy Practitioner for the Multiply project, Emily led family learning sessions across Swansea, supporting parents to build confidence in numeracy and engage with their children's education. She is currently involved in the Maths Support Programme Wales (MSPW), delivering professional learning focused on manipulatives and problem-solving. Emily also contributes to the Welsh Government's Maths and Numeracy Professional Learning project, co-developing national resources to enhance mathematics teaching from ages 3 to 16.

Dominic Oakes – RhGMC

Arweinydd Adnoddau ac Ymchwil RhGMBC, Cydlynydd Ardal Gogledd Cymru

Cymhwysodd fel athro Mathemateg ym 1992. Addysgodd mewn amrywiaeth o ysgolion – canol dinas, maestrefi, gwledig. Pennaeth Mathemateg. TAU.

Ymgynghoriaeth: CfEM, Tribal, YDP Gwlad Pwyl, TES, MAT Cynradd, Pearsons. Ymgynghorydd i MPD Mathemateg a Rhifedd.

Diddordebau ymchwil: Cysylltiadau mewn dylunio cwricwlwm Mathemateg, Dull Ystafell Ddosbarth Wyneb i Waered.

Elian Rhind – RhGMC

Astudiodd Elian Fathemateg fel myfyriwr israddedig ac ôl-raddedig ym Mhrifysgol Abertawe, gan gwblhau PhD mewn Mathemateg yn 2018. Yn yr un flwyddyn, roedd yn diwtor tymor penodol i'r Adran Fathemateg ym Mhrifysgol Abertawe. Gweithiodd gyda RhGMC fel cynorthwyydd myfyrwyr am flynyddoedd lawer ond ymunodd â'r rhaglen yn gweithio mewn capasiti llawnach yn 2018.

Rosemary Russell – AR & RR Education Ltd

Bu Rosemary Russell yn dysgu mathemateg am flynyddoedd lawer; ei harbenigedd yw ymgysylltiad rhieni â mathemateg. Archwiliodd ei PhD, *Rhieni yn Helpu eu Plant Gyda Mathemateg* (Prifysgol Bryste, 2002) sut mae rhieni'n effeithio ar ddysgu mathemategol eu plant. Mae ganddi sawl llyfr ac erthygl wedi'u cyhoeddi ar y pwnc hwn. Mae Rosemary yn helpu rhieni i feithrin gwytnwch mathemategol yn eu plant; mae hi hefyd yn hyfforddi athrawon ar sut i gefnogi rhieni wrth iddynt wneud hyn. Mae ei llyfr diweddaraf, *Helpwch eich Plentyn i Wneud Mathemateg hyd yn oed os nad ydych chi*, wedi'i gyfieithu i'r Gymraeg, Portiwgaleg, Ffrangeg a Sbaeneg.

Paul Sanders – RhGMC

Ar ôl 35 mlynedd yn addysgu Mathemateg mewn ysgolion 11-18 oed yn Swydd Gaerhirfryn a Sir Fynwy, rwyf bellach yn fy unfed flwyddyn ar ddeg yn gweithio gyda RhGMBC/RhGMC ac wedi bod yn ymwneud yn weithredol â datblygu'r rhaglen ddysgu broffesiynol a llawer o'r adnoddau fideo ar gyfer cyrsiau Mathemateg Safon Uwch a Mathemateg Bellach.

Dominic Oakes – MSPW

FMSPW Resources and Research Lead, North Wales Area Coordinator

Qualified as Mathematics teacher in 1992. Taught in a range of schools – inner city, suburban, rural. Head of Mathematics. SLT.

Consultancy: CfEM, Tribal, YDP Poland, TES, Primary MAT, Pearsons. Advisor to Mathematics and Numeracy AoLE.

Research interests: Connections in Mathematics curriculum design, Flipped Classroom Approach.

Elian Rhind – MSPW

Elian studied Mathematics as both an undergraduate and postgraduate student at Swansea University, completing a PhD in Mathematics in 2018. In the same year, was a fixed-term tutor for the Mathematics Department at Swansea University. Worked with MSPW as a student helper for many years but joined the programme working in a fuller capacity in 2018.

Rosemary Russell – AR & RR Education Ltd

Rosemary Russell taught mathematics for many years; her expertise is parental engagement with mathematics. Her PhD, *Parents Helping Their Children With Mathematics* (University of Bristol, 2002) explored how parents impact their children's mathematical learning. She has had several books and articles published on this subject. Rosemary helps parents nurture mathematical resilience in their children; she also trains teachers on how to support parents as they do this. Her latest book, *Help Your Child Do Maths Even If You Don't*, has been translated into Welsh, Portuguese, French and Spanish.

Paul Sanders – MSPW

After 35 years teaching Maths in 11-18 schools in Lancashire and Monmouthshire, I am now in my eleventh year working with FMSPW/MSPW and have been actively involved with the development of the professional learning programme and many of the video resources for A level Maths and Further Maths courses.

Katie Steckles – llawrydd a Phrifysgol Fetropolitan Manceinion

Mae Katie Steckles yn fathemategydd sy'n byw ym Manceinion, sy'n rhoi sgyrsiau a gweithdai ac yn ysgrifennu am fathemateg. Gorffennodd ei PhD yn 2011, ac ers hynny mae wedi siarad am fathemateg mewn ysgolion a phrifysgolion, mewn gwyliau gwyddoniaeth a cherddoriaeth, ar radio a theledu'r BBC, fel rhan o sioeau theatr, mewn llyfrau ac ar y rhyngrwyd. (katiesteckles.co.uk)

Susan Thomas – RhGMC

Pennaeth Mathemateg yn Llanhari (Ion 1992-Medi 1996), yn Ystalyfera (1996-2010). RhGMB Cymru ers 2011. Tîm Cynllun Gwaith RhGMBC.

Katie Steckles – freelance & Manchester Metropolitan University

Katie Steckles is a mathematician based in Manchester, who gives talks and workshops and writes about mathematics. She finished her PhD in 2011, and since then has talked about maths in schools and universities, at science and music festivals, on BBC radio and TV, as part of theatre shows, in books and on the internet. (katiesteckles.co.uk)

Susan Thomas – MSPW

Head of Maths at Llanhari (Jan 1992-Sept'96), at Ystalyfera (1996-2010). FMSP Wales since 2011. FMSPW SoW Team.