Secondary Magazine Issue 78

National Centre for Excellence in the Teaching of Mathematics

Welcome to Issue 78 of the Secondary Magazine.

Contents

From the editor
Continuing Professional Development is just that – continuing!

It's in the News!
Did you see any of the Fish Season on Channel 4 in January? A group of chefs were joined by other celebrities to encourage people to think about the fish that they eat, the way that it's farmed or caught, and to consider other alternatives to their usual fish supper, as well as to raise awareness of the policy of 'discards' that fishermen must follow. This resource uses the programmes as a context for students to explore surveys and whether they are fair or biased. It is intended that this resource generates discussion and raises issues around fairness and bias in data.

The Interview – Elena Nardi
Elena is Reader in Mathematics Education at the University of East Anglia and editor-in-chief of *Research in Mathematics Education*. She believes that sometimes we end up doing mathematics because of certain teachers, sometimes in spite of them – and 'on the side' she writes film reviews and does interviews for the Greek press.

Focus on…spirolaterals
Professor Frank Odds, invented the concept of a *spirolateral* in 1962 – when he was 'doodling on graph paper during a not-very-interesting high school chemistry class'. Students usually enjoy creating their own spirolaterals, asking their own questions about them, and trying to reach some general conclusions.

The Teacher as Researcher: Personal Stories and Possible Structures
"I think I came here today expecting someone to say 'This is research – you do it like this'."

5 things to do
You have opportunities to apply for a £500 Royal Institution grant, or win a £250 prize for reporting an interview. There are reminders of a new NCETM microsite and a couple of ATM/MA meetings, as well as the most recent blogs from Secondary_Watch.

Subject Leadership Diary
It is part of a subject leader's role to try to help all members of the department develop professionally.

Contributors to this issue include: Mary Pardoe, Richard Perring, Elena Nardi and Peter Ransom.

EDITOR

From the editor

Welcome to this issue of the Secondary Magazine.

You may not have discovered that during January a new microsite, The Teacher as Researcher: Personal Stories and Possible Structures, appeared on the NCETM portal. It is a full report of a conference that took place in October, which includes more than three hours of video recordings, and which you may find helpful in your continuing professional development (CPD).

During a workshop at that conference teachers became very aware that continuing PD is just that – continuing! Professor Rosamund Sutherland and Dr Julie-Ann Edwards generated thoughtful discussion by sharing significant memories of how their insights into teaching and learning became clearer as a result of working together for three years on a Logo Mathematics research project. Their recollections prompted others to talk about their own professional development. Julie-Ann's description of how she began *"not to be afraid of what I didn't know"* because *"somebody else will know"* prompted a teacher to observe, *"I can't believe that I thought that everything had to be channelled through me…it's taken me a long time to let go. Why did it take me so long?"*

As Pete Griffin, SW Regional Coordinator of the NCETM, observed, *"Development is like that – it's life-long learning – it isn't implementation. I wonder if we've got a kind of mindset of how we move forward in our teaching which is based on the metaphor of implementing [pause] something – which is a very on/off 'switchy' thing – just do it! Rather than* ***development*** *which is a much more messy, risky, long, long job – it's a lifelong job!"*

In addition to a brief outline – with some more quotations – of The Teacher as Researcher conference, this issue includes an Interview with Elena Nardi in which she also refers to the long-term nature of development – *"They…showed me that striving bit by bit for 'change from within' is a viable, and potentially rewarding, way of being involved in…education!"*

The Focus is on Spirolaterals, which 'cry out' to be created using Logo!

Secondary Magazine
Issue 78

National Centre
for Excellence in the
Teaching of Mathematics

It's in the News!
Fish Fight

The fortnightly *It's in the News!* resources explore a range of mathematical themes in a topical context. The resource is not intended to be a set of instructions but as a framework which you can personalise to fit your classroom and your learners.

Did you see any of the *Fish Season* on Channel 4 in January? A group of chefs including Hugh Fearnley-Whittingstall, Jamie Oliver and Gordon Ramsay were joined by other celebrities to encourage people to think about the fish that they eat, the way that it's farmed or caught, and to consider other alternatives to their usual fish supper, as well as to raise awareness of the policy of 'discards' that fishermen must follow.

This resource uses The Big Fish Fight as a context for students to explore surveys and whether they are fair or biased. It is intended that this resource generates discussion and raises issues around fairness and bias in data.

If you are interested in exploring issues around data in the media further, websites such as Understanding Uncertainty run by Dr David Spiegelhalter, and Ben Goldacre's Bad Science; details about The Big Fish Fight campaign can be found on their website.

Download this *It's in the News!* resource - in PowerPoint format

Image Credits
Page header - Fish photograph by Jorge Andrade some rights reserved

The Interview

Name: Elena Nardi

About you: I studied mathematics in Thessaloniki, Greece, and came to England in 1991 to study mathematics education, first in Cambridge for my Masters with Alan Bishop and then Oxford for my doctorate with Barbara Jaworski. I completed my doctoral studies in 1996. After a short stint at teaching (A-level mathematics in Peers School, Oxford) and some post-doctoral research in Warwick and Oxford, I was appointed as a Lecturer in Mathematics Education at the University of East Anglia in Norwich. I have been living in Norwich since 1999 and I am now Reader in Mathematics Education.

I am also, with Tim Rowland and Jeremy Hodgen, editor-in-chief of Research in Mathematics Education, the official journal of BSRLM, the British Society for Research into the Learning of Mathematics, published by Routledge.

At UEA, I teach and supervise students on many of our undergraduate and postgraduate programmes. I teach mathematics education and research methods in education and I am co-directing the MA in Mathematics Education and the new MSc in Mathematics with Mathematics Education. With my doctoral students I am involved in several mathematics education projects at the moment, ranging from explorations of university students' learning experiences in mathematical topics such as Group Theory, to secondary students' first encounters with proof, and so on.

My research is mainly on the teaching and learning of mathematics at university level, but I am also involved with research into secondary students' engagement with mathematics, and research into secondary mathematics teachers' knowledge and beliefs. I have also had a long-standing interest in the representation of mathematics and mathematicians in popular culture. My book Amongst Mathematicians: Teaching and Learning Mathematics at University Level was published by Springer in 2008.

The most recent use of mathematics in your job was…
I use some basic statistics in my research and as the School's Director of Research. At the moment though I am reliving the experience of 'seeing proof for the first time' through a project with one of my doctoral students in which we examine secondary students' perceptions of proof in mathematics, just at the time when they are about to be introduced to it more formally. It's quite exciting to go back to some elemental proofs in Euclidean Geometry, and to some of the first encounters with manipulating algebraic expressions for simplification, factorisation, solving equations etc. To me, all these bring back crystal-clear memories of the excitement I felt when I was in Years 8, 9, 10… playing around with the axioms and theorems in Euclidean Geometry or with the rules in algebra. I know that for many kids these are (apparently) exactly the things that turn them away from mathematics. But for me, and quite a few of the people I know with a love for mathematics, these are exactly the things that drew me closer: proving, simplifying, solving, generalising. I think there is an intrinsic attraction to this type of activity and a lot of research in mathematics education is, or needs to be, about making this attraction visible and accessible to students.

At the moment I am also reliving the experience of 'the first encounter with groups in Abstract Algebra' through a project with one of my doctoral students in which we examine mathematics undergraduates learning experience in Group Theory – and it is exciting for similar reasons. Having done a lot of Geometry, Algebra and some Calculus in school, to realise in my first year at university that mathematics can also be about 'creatures' such as groups, rings and fields took my relationship with it to another level, literally! In fact I was applying for graduate studies in Abstract Algebra in France when I was side-tracked by the invitation to study mathematics education at the University of Cambridge. Up to that time, mathematics education was an intriguing diversion that I had experienced in a couple of optional courses we had at university and a couple of primary school-based small projects I had opted to do instead of sitting (yet another!) exam. Meeting Alan Bishop – or, more precisely, being dragged into one of his seminars as a last-minute interpreter by one of my professors who somehow trusted my knowledge of English at the time – was a turning point!

Some mathematics that amazed you is...

$e^{i\pi} + 1 = 0$ never ceases to amaze me, the way that five fundamental numbers in mathematics are linked in this startlingly elegant and concise way. And it seems I am not alone in this. Euler's identity seems to be winning several beauty contests in mathematics over recent years! In fact, I believe that school mathematics would lose much of its dreary image if it focused on making it possible for as many learners as possible to understand and appreciate the significance and beauty of results such as this one.

Why mathematics?

I have a distinct memory of the thrill I felt as a child with two things: one was literature, reading books, being totally immersed in them. The other was arithmetic, anything from calculations to solving word problems and puzzles of all sorts. I think because I liked it so much I spent quite a bit of time on it. And, surprise, I was quite good at it so I sailed through primary school never really sensing that mathematics can be truly challenging (!). Things of course changed as I moved to Algebra, Geometry etc. but this powerful first impression of mathematics as something that I can do somehow must have marked my ability to cope with its challenges later. Generally, as you may gather from what I have said so far, I fell early on for the intrinsic pleasure of doing mathematics. Later on, I rationalised my choice in more pragmatic ways but the trigger has always been pleasure!

A significant mathematics-related incident in your life was…

I also remember clearly the thrill and suspense of my first teaching experience in mathematics: trying to teach my younger sister, who was a totally disaffected, self-declared enemy of mathematics, when I was about 11. She is now a successful professional but back then was in search of a quick and definite answer that would shorten her homework time to the absolute minimum. I still remember feeling cross about her treatment of mathematics (and me!) as an 'answer machine', and she still remembers her despair at hearing me saying 'you need to know not just the answer but why this is so. And you need to know this for other similar problems'. And since she was completely indifferent to 'why this is so etc.' I had to resort to the slightly cheaper shot 'she [the teacher] will ask you why. And you need to know this for the exams'. Or even worse: 'I can't tell you the answer because mum and dad said I shouldn't'! Finding ways to reign in her indifference and help her understand and do well was, I guess, a first crash course in mathematics pedagogy! For the record, she still emails me percentages and statistics questions that she needs for her job but she no longer fears mathematics and she (at least appears) to want to know a little about 'why this is so'. I guess with a start like this it is no surprise that mathematics education won me over eventually!

A mathematics joke that makes you laugh is…

Not exactly a joke, but in Year 12 I had a horrid, bigoted teacher (that was the mid-80s, he would probably be out of a job today…) who used to challenge us with hard questions on the board, turn to the boys in the class and say 'these are too hard for the girls, come on, show them what men are made of'! I simply cannot stop smiling every time I remember the stunned expression on his (very red) face when, on one particular occasion, he eventually turned to the 'girls' side' of the classroom and realised that three of us had been keeping our hands up, with the answer at the tip of our tongues, patiently waiting for his prejudiced tirade to end. Sometimes we end up doing mathematics *because of* certain teachers, sometimes *in spite of* them…

The best book you have ever read is…

I'm reading David Mitchell's Cloud Atlas at the moment, and I am totally fascinated with its multiply-running narratives. But, closer to home and mathematics, a most fascinating book I read recently is Amir Alexander's Duel at Dawn: Heroes, Martyrs, and the Rise of Modern Mathematics. It revisits the commonly held image of mathematicians as eccentric, anti-sociable even sociopathic geniuses, and places its appearance roundabout the same time that *modern* mathematics was coming to be. It re-introduces known and extensively 'biographed' figures such as Galois, Abel and others more like romantic heroes, and almost as part of the wider romantic movement of the 19th century!

Who inspired you?

I guess I was more easily 'inspired by' as a child and a teenager than as an adult. I had three teachers (one in mathematics and one in Modern Greek in Year 9 and another teacher of Modern Greek in Year 12) whose impact on me was huge. They were very different people but they had a few things in common. They were totally passionate for their subject – contagiously so! – and taught me that, to be happy, I *must* do something that I am passionate about. They were demanding because they respected the intellectual capacity of their students – and the integrity of their subjects – and were building their students' confidence through this respect. And they were unconventional, both in their professional and personal lives, and kind of showed me that striving bit by bit for 'change from within' is a viable, and potentially rewarding, way of being involved in often innately conservative public institutions such as education!

If you weren't doing this job you would…

I have loved reading and writing from a very young age and, as I was growing up and loving mathematics more and more, I was a bit concerned that working in mathematics would imply staying away from words, and sentences and all the beautiful things you can do with them. For a period, I considered history, literature and film studies as an option – I have been a film buff since my early teens – but then the idea of staying away from mathematics was not easy to accept. But, there we go, in mathematics education I get to read and write a lot, and never stay away from mathematics either! Oh, and I keep a little second 'almost-job' on the side with writing film reviews and sometimes doing interviews for the Greek press! So, I guess turning to some kind of film-related writing job would be a (fiscally risky) Plan B? Or, given my interest in how mathematics and mathematicians are represented in popular culture, I could at last write that film script – with characters who love mathematics but do not end up being revealed as disturbed serial killers or have to sacrifice personal happiness and sanity for the sake of mathematics! On a totally different note, and if fed up with all the above, I admit that some friends and I have been fantasising for years about participating in the culinary revolution that's been happening in Britain recently with the first ever '(grand)parents'-recipes-only' Mediterranean eatery on these isles!

Focus on…spirolaterals

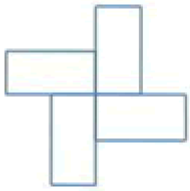
It seems that Professor Frank Odds, a microbiologist in the Institute of Medical Sciences at the University of Aberdeen, invented the concept of a *spirolateral* in 1962 – when he was 'doodling on graph paper during a not-very-interesting high school chemistry class'.

Therefore he is probably the best person to introduce you to this very simple idea, which has rich and fascinating manifestations. Here is part of an email sent from Frank Odds to Robert Krawczyk in 2003:

> *I drew a 1-2-3 square spiral and wondered what happened if I kept on turning and repeating. It soon became apparent that this 'rule' approach for repeating square spiral elements generated an infinite set of 90-degree figures. None of my mathematics teachers had ever heard of such things when I showed them what neat figures could be generated from square spirals. I put the figures on my mental back burner and moved on to university, to graduate in biochemistry.*
>
> *From 1970 till 1972 I was a postdoctoral research fellow at the Centers for Disease Control in Atlanta. In my desk I inherited a pad of triangular graph paper and returned to the spirolateral idea - I had not thought of using angles other than 90° before. To my delight I discovered you can do spirolaterals at 60° too.*
>
> *The name "spirolateral" and the notion of rules with left and right turns and the use of any angle that's an integral divisor of 360° followed swiftly.*
>
> *I couldn't sit on my discovery any longer. It seemed to me that the obvious person to write to about spirolaterals was Martin Gardner, whose remarkable "Mathematical Games" column had already run for many years in Scientific American. He was keen to write a column about the figures, but - to ensure I received due credit for something that was entirely my own brainchild - he generously advised me first to write up a formal publication and suggested Mathematics Teacher as an ideal journal. My paper on spirolaterals is a wonderfully obscure publication, and it was Gardner's column in Scientific American (and its republication in the book Knotted Doughnuts) that brought the figures to general attention.*
>
> *For the record, I had never heard of or seen Abelson's book, nor did I realize my figures were related to 'worm paths' till I saw Gardner's published column. My first (high school) spiros were drawn in 1962, and my correspondence with Martin Gardner was in 1971. My career has moved away from pure biochemistry - I'm now pretty well known internationally as an expert on fungal infections! [Click on his name at the bottom of the programme – editor] I've never completely lost interest in spirolaterals, however (to be honest, I'm more proud of those figures than of any of my other possible achievements).*

Robert Krawczyk is an Associate Professor in the College of Architecture at Illinois Institute of Technology. His interests include 'combining art, mathematics, and scientific concepts in an algorithmic approach to the generation of images, sculpture, and interactive art pieces'. Professor Krawczyk's excellent website BitArtWorks is about the Art of Spirolaterals, Strange Attractors, Spiral Mandalas, and Metallic Lace! From that site you can reach his Art of Spirolaterals pages, and then go to What is a Spirolateral?.

Many British mathematics teachers first came across spirolaterals, as activity 62, Worms, in Points of Departure 1, which was published by the ATM in 1986. The example is Frank Odds' first school-boy doodle – this 90˚, 1, 2, 3, 'worm track'…

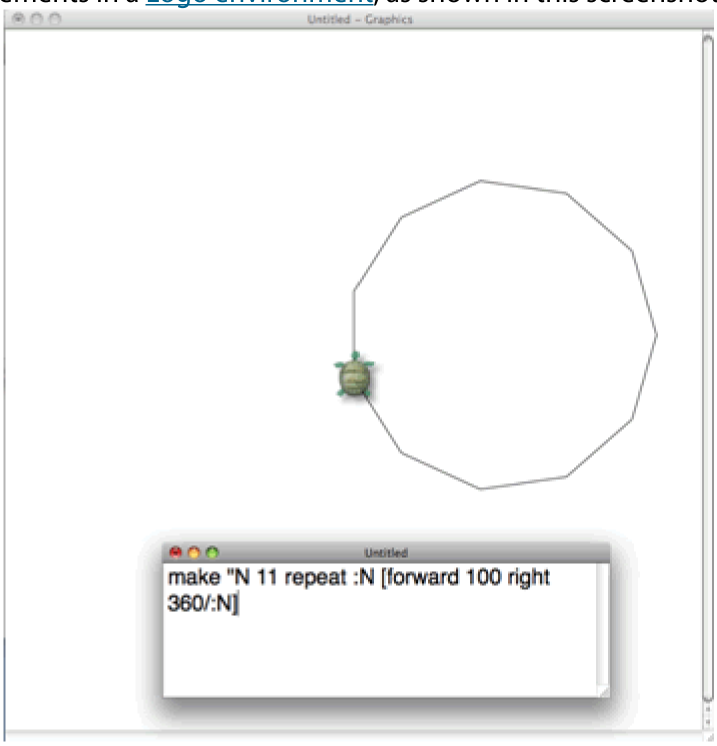


Students usually very much enjoy creating their own spirolaterals, asking their own questions about them, and trying to reach some general conclusions. Mathematical symmetry is likely to feature in at least some of their questions.

Notation

You could encourage students to devise their own notation to represent particular spirolateral patterns. The WolframMathworld entry Spirolateral describes a particular notation, such that the notation for this spirolateral pattern…

… is 336…to indicate that the pattern is formed by a series of steps of length 1, 2, 3 with a 36˚ turn after each step. This notation incorporates what seems to be a confusing way to specify the angle – because an imaginary worm that travels so as to leave this track turns through an angle of 144˚ = (180 – 36)˚, not 36˚, each time it turns. The notation might irritate or confuse students – it is not consistent with conventional ways of describing movements in a Logo environment, as shown in this screenshot:



…and in this video of a spirolateral Logo program. Robert Krawczyk uses the WolframMathworld notation in BitArtWorks - and implies that Frank Odds and Martin Gardner also used it. Fortunately the Wolfram Spirolateral Demonstration does not involve any notation!

Students' explorations

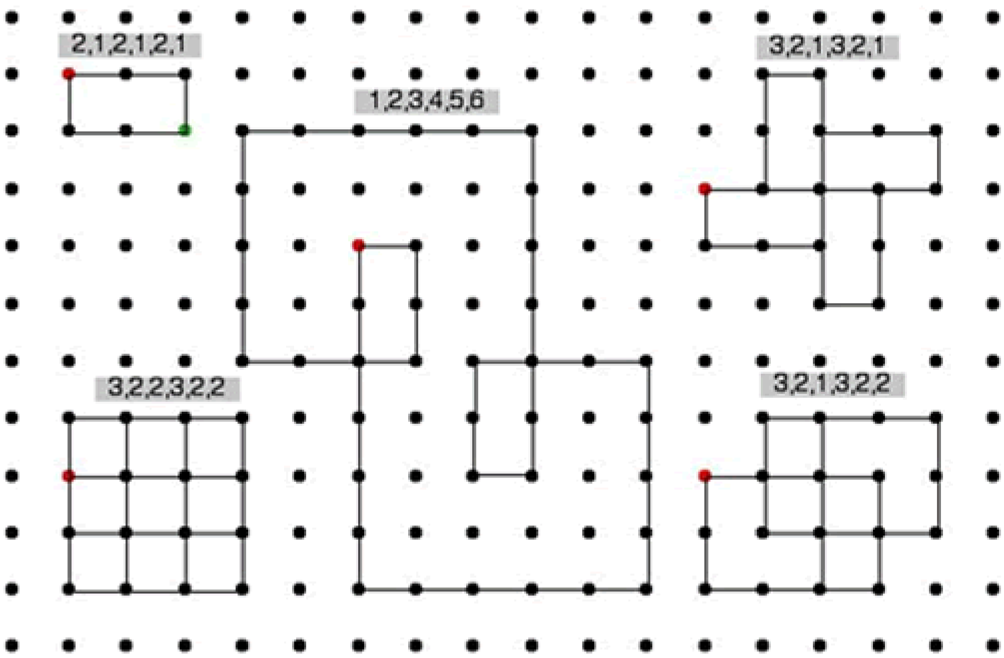
If your learners too often wait to be told what to do in mathematics lessons, encouraging them to explore spirolaterals will provide many opportunities for them to pose their own problems. For example, one teacher, while students were working on transformations and symmetry, introduced the students to spirolaterals, knowing, from experience, that students naturally try to answer their own questions when exploring these creations.

To create a spirolateral on a grid a student first chooses:

- a grid type, such as square or triangular
- a point on the grid to be the starting point
- an angle of turn, such as 45˚, 90˚, or 60˚
- the direction of turn, left or right
- a finite sequence of numbers to determine the length of each 'step' of the 'spirolateral'.

Having chosen the conditions, that the student can later vary, the student draws the 'spirolateral' determined by them.

For example, a student who had chosen to explore, on a square grid, spirolaterals created by sequences of six numbers, always turning right through 90˚ after each step, at first created these spirolaterals, in which each starting point is shown by a red dot:

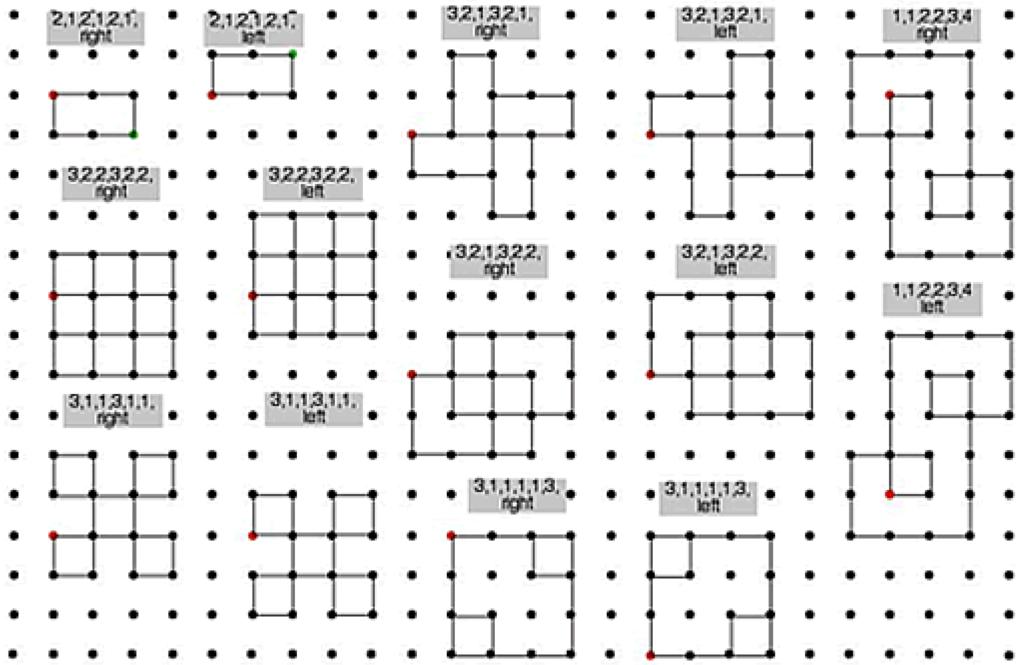


Creating these spirolaterals prompted the student to ask herself questions such as:

- what kinds of symmetry do these shapes have?
- can I predict, from the numbers in the sequence, the kind of symmetry of a spirolateral?

- can I predict, from the numbers in the sequence, the number of times the sequence is repeated before returning to the starting point?
- what will happen if I use the same sequence, but always turn left instead of right?

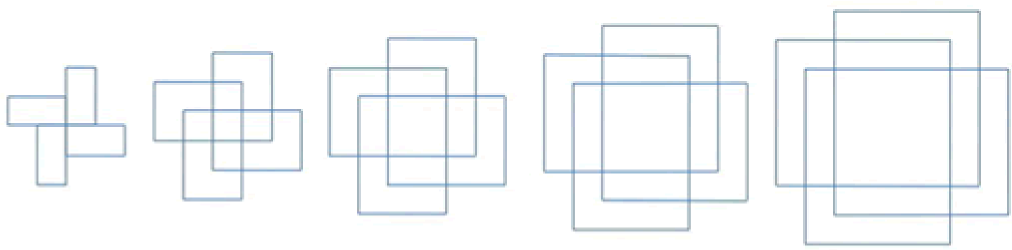
In order to try to answer her last question about turning left rather than right, this student then created these spirolaterals:



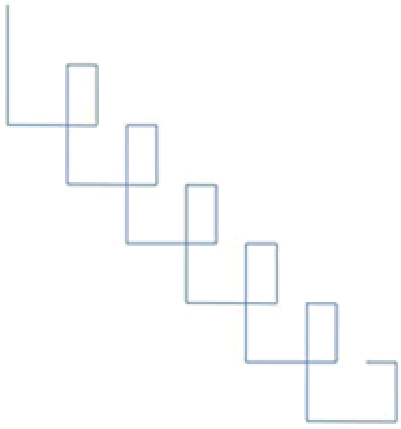
The student pondered for some time about the relationship between each spirolateral and its 'twin' when the turns were in the other direction; was each spirolateral a reflection of the other in a 'vertical' line or was it a reflection in a 'horizontal' line? Or was one the image of the other after a 90˚ rotation? This was an opportunity to generalise. And so the student was motivated to try other 'strings' of six numbers in order to test her conjectures.

Other students might follow different lines of enquiry.

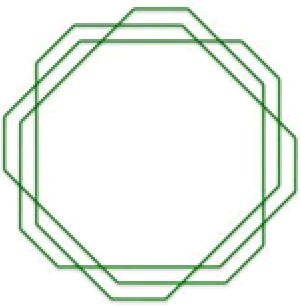
For example, what happens with 90˚ turns and sequences of three consecutive numbers, 1, 2, 3, and then 2, 3, 4, and then 3, 4, 5, and so on…?



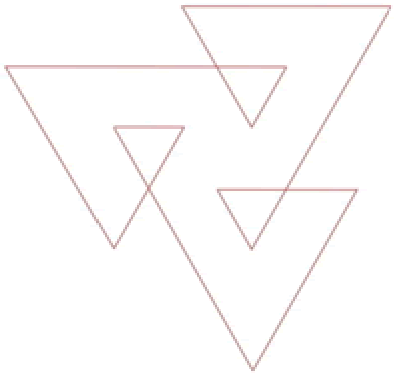
What combinations of number sequence and angle of turn create non-terminating patterns?



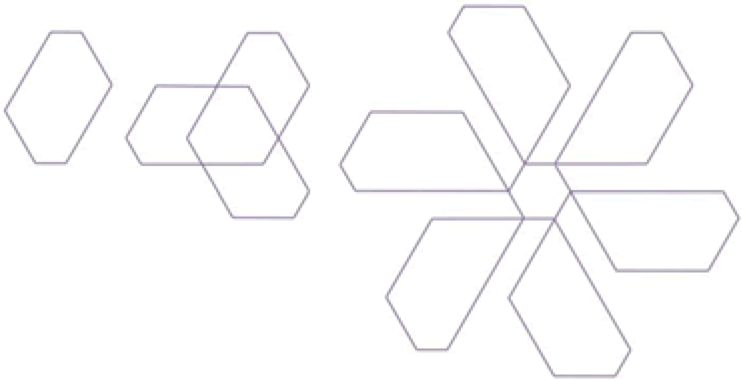
What happens if I use the sequence 1, 2, 3 with various different angles of turn?



If the angle of turn is 120˚, what number sequences give closed patterns?



What happens with 60˚ turns and sequences of three consecutive numbers, 1, 2, 3, and then 2, 3, 4, and then 3, 4, 5, and so on…?



Students may enjoy creating spirolaterals using this New Frontiers of Science program.

Paterson's Worms

Paterson's Worms were devised in 1971 by Mike Paterson, Emeritus Professor in the Department of Computer Science at the University of Warwick, and John Conway, John Von Neumann Professor in Applied and Computational Mathematics and Professor of Mathematics at Princeton University, and publicised alongside *Spirolaterals* in Knotted Doughnuts and Other Mathematical Entertainments by Martin Gardner. These worm tracks originated, in much the same way as spirolaterals – as doodles for worms eating from an isometric grid – and they were also determined by sets of rules. At least two people, Mike Beeler and Sven Kahrkling, studied Paterson's Worms in some depth.

"Teacher as Researcher" conference
The Teacher as Researcher: Personal Stories and Possible Structures

To do the right thing is not enough;
to be competent one must also know what one is doing and why it is right.

Pete Griffin, SW Regional Coordinator of the NCETM, reminded participants at a recent NCETM conference that this statement, made by Ernst von Glasersfeld as true about mathematics teachers as it is about all learners.

What does it mean to develop as a teacher?

This question was thoughtfully addressed in eight workshops – in which stories about research projects were told and discussed, concepts such as professional learning, teacher enquiry, and teacher research were examined, and different ways of working were explored.

During Pete's introduction to the day he acknowledged that *"we know that CPD is not events – but events can be triggers for professional development"*.

Three of the workshops were filmed, each of which drew on a very different classroom research project.

Caleb Gattegno taught me maths

> *"I want to get down to what has emerged for me as the key principles of my teaching – that children need to write maths for themselves – completely from the very first contact with maths – not just be on the receiving end of someone else's maths."*
>
> Caroline Ainsworth's opening statement was a compelling introduction to her workshop. Discussion developed from Caroline's reflections on ways of working with Cuisenaire materials prompted by her appreciation of Madeleine Goutard's achievements. A report of her recently-completed NCETM funded project is available on the portal.

The MiGen system: a review of the research dilemmas and positive outcomes

> Helen Humble, a mathematics teacher at Amery Hill School, and Eirini Geraniou, a research officer at the London Knowledge Lab, described how they have been carrying out classroom research together, and asking themselves questions about their interactions with the students. For example, when and how should they intervene while students are engaged with computer programs?

Parallel Paths

> Julie-Ann Edwards and Rosamund Sutherland described how they had worked together within the Logo Mathematics research project during the 1980s. Much thought and discussion was generated by their recollections of what they thought they had learnt from that time.
>
> Julie-Ann, who was then a young teacher, talked about catalytic effects of her interaction and collaboration with Ros, a not yet very experienced young researcher.

*"Ros's enthusiasm was infectious…she'd say to me things like 'I think so-and-so really understands now what a variable does in that program', then a couple of weeks later would say 'I think that person now understands **why** that variable works in the way that it does'.*

"It developed a lot of my confidence in listening to children, and observing them, and being able to assess learning. I trusted your judgement about things – I didn't need to have seen things for myself…I began looking for parallels in what children were doing to consolidate what Ros had said was happening. I learnt not to be afraid of what I didn't know…my A-level teaching got much better."

During the workshop Julie-Ann's and Ros's powerful communication of their reflections was also infectious. Other participants began to talk clearly about their own teaching.

"I can't believe that I thought that everything had to be channelled through me…it's taken me a long time to let go."

*"Essentially I want **children** to do the mathematical thinking."*

"What were the questions that you couldn't answer in 1984?"

"It was about when I made the decision to ask that question…about the timing of intervention."

*"That is such a big thing, and it's something which is overlooked a lot of the time. But it's a decision that we all make every day, and it's a really difficult decision. I was thinking about this only yesterday…the four cubes joined together…and there are 8 different shapes that you can make… . At what stage do you intervene when the kids say 'I've got them all – I've got 6'? And **how** do you intervene? Do you say 'there are 8'? Or do you say 'you haven't got them all'? Or do you say 'are you sure'? Or…"*

This energetic workshop concluded with all participants responding to the following challenges:

Think of something you are passionate about; a principle about teaching and learning mathematics that you firmly believe in and espouse. What, in your teaching behaviour, reflects this?

Think of one thing that you do or say regularly – a behaviour that typifies your teaching. Why do you do this? What principle, what belief, lies behind it?

You can read summaries of, and download the PowerPoint presentations used in, all eight workshops. You might choose to watch the full videos of the three filmed workshops, or see selected highlights within their summaries.

During the final session of the conference Tim Coombs, WM Regional Coordinator of the NCETM, made closing remarks, and some participants reflected on what they believed the day had triggered in them:

"I think I came here today expecting someone to say 'This is research – you do it like this'. But actually there's no right or wrong way to do it – different things work for different people – and you can take the best bits from different people and make it work for you."

"As teachers we're brilliant at reflecting on what we do, but it's what you do with your reflections – 'I've reflected on this but where do I take it now?' What do I do with it?"

"I think one of the things we'll definitely take away from today is that you need to start small and reign in the ideas and then develop them."

"We have to encourage our students to behave mathematically – to develop their higher-order thinking skills."

"I've come to realise that I'm constructing my own theory!"

5 things to do this fortnight

- The Royal Institution is offering grants to mathematics teachers of up to £500 to support them in engaging their students in mathematics enrichment and enhancement activities stimulated by ideas derived from the online STEM Directories. The deadline for applications is 18 February for round 1, or 27 May for round 2.

- Are you someone, such as a teaching assistant, who provides valuable support in mathematics classrooms? If so, have you visited the new NCETM microsite, Teaching Assistants and Other Adults in the Classroom, which was launched in January and which aims to help you develop the wide variety of professional skills that you need? It has several sections, one of which will help you to revise what you know, and to identify and fill any knowledge gaps. Another section will show you the wide variety of professional development opportunities that are available, and finally a set of case studies shows some examples of good practice.

- Have you considered applying for an NCETM Special Leaders Award for STEM - Does maths count? In order to win an award you need to interview at least one professional person whose working life involves the use of mathematics, and then write an article of 1 500 words derived from your interview(s). Three chosen interview reports will be awarded cash prizes – 1st place £250, 2nd place £150, 3rd place £100, and there will be 11 Merit Awards of £50 each! The deadline is 30 April 2011.

- Two London ATM Branch Meetings will take place during February at King's College, London. The first meeting, *Maths from the 99p Store: activities, games and puzzles with low cost materials*, is on Saturday 12 February from 10:00 to 12:30. The second meeting, *Creativity in the Classroom: What does it mean?*, is on the following Wednesday 16 February from 17:45 to 19:15. And, on Saturday 5 March 5 two ATM/MA meetings will be held. One is a meeting of The Marches Network at which Stephanie Prestage and Pat Perks will lead a whole morning workshop – at Tenbury Wells School, for teachers from all sectors – on beginning algebra without equations. The other is an East Midlands ATM/MA Branch Meeting in Leicester at which Sue Pope and Tung Ken Lam will lead sessions on using origami in the mathematics classroom.

- If you cannot go to the East Midlands ATM/MA Branch Meeting to explore ways of using origami in the classroom, you can see Tung Ken Lam folding a cuboctahedron in this video.

Image Credits
Page header - Blackbird photograph by Dave F some rights reserved

Subject Leadership Diary

How many seconds in a year? This question always gets them thinking, and students ask if they can use a calculator. 'No', I say, 'please use only your brains'. The answers generally vary quite a bit, with some good estimates. But there is always a groan when they ask for the answer and I say '12 – January the second, February the second, …'. Then there's the follow up question from the students – 'What about January the 22nd?'

Where does this kind of interaction fit in? Is it recreational? Humour in mathematics? There's plenty of humour to keep our students smiling if we look around. At the moment we are preparing students for the UK Mathematics Trust's Intermediate Mathematical Challenge (IMC) which is always held on the first Thursday in February. This one-hour paper is a 25-question multiple-choice paper that tests mathematical wits – and there's some hidden humour in some of the questions! Our students love it because they do not have to show any working out, so can think of short cuts in order to tackle as many questions as they can in the time. You could look at details of the challenge and sample papers. Although it is now too late to enter this year's IMC, there's still time for students to take part in the Junior Mathematical Challenge (JMC) - but hurry, since entries close on 4 March for the challenge that takes place on 6 May.

Our faculty is stable at the moment – which is a change from last year when we were looking for some new staff due to some teachers moving to pastures new. I notice that there are quite a few jobs being advertised now in the Times Educational Supplement, and my work with PGCE students shows me that they are now looking for jobs. If your faculty has a vacancy it is important to get it advertised quickly so that you have a good choice of candidates. We missed having our (excellent) PGCE student apply for one of our vacancies last year because she was offered a job before we had advertised ours. I find looking through job applications and helping to select candidates for interview very interesting. One thing that makes an application for a TLR post stand out is seeing that the applicant has written articles that have been published. Both the Mathematical Association and the Association of Teachers of Mathematics welcome articles from mathematics teachers, and it is well worth writing something for publication – sharing your thoughts and resources involves you in the wider mathematical community, and is part of your professional development. Having been a member of both associations for over 30 years, I have derived great pleasure both from writing articles and from using in my classroom ideas and resources described by others. Why not give it a try? I see it as a main part of my role to try to help my faculty members develop professionally, so I encourage them to write and disseminate materials, and to read, write and use materials that others have written. As professionals we owe a lot of our development to others, and we should be reinvesting that in the teachers of the future.

Are you ready for 2012 – for the event that happens once in every four years? No, not the Olympics, but the ICME! What's an ICME, you say? It is the International Congress on Mathematical Education, and is more important to me than the Olympics since it gives me a chance to contribute to mathematical education at an international level. ICME-12 will take place from 8-15 July 2012 in Seoul, Korea – it moves around the world every four years. ICME-11 in 2008 was in Monterrey, Mexico. I have attended every ICME since ICME-6 in Budapest in 1988, and contributed to every one through workshops, papers, posters and exhibitions. It gives me a chance to hear how mathematics is taught in other countries, and to find out more about the latest international research into mathematical education. It recharges my batteries, and I find plenty of ideas to disseminate back in the UK and in my school. Teachers can apply for financial help to attend ICME; I have always been supported by my headteacher and mathematics adviser – who recognise that the benefits of my attending outweigh the inconvenience of my time out of school near the end of the summer term. Prepare the way now! Mention it to your headteacher and contact governor that you are interested in being at ICME 12 – and in so doing, putting your school on the international map!