Secondary Magazine
Issue 51

National Centre
for Excellence in the
Teaching of Mathematics

Welcome to Issue 51 of the Secondary Magazine. Wow – 2010 is here! This is a year of significant change for mathematics education – let us help you keep up to date with a range of articles to inform, amuse or provoke thought. Happy reading!

Contents

Secondary Magazine Issue 51

National Centre for Excellence in the Teaching of Mathematics

From the editor – New Year's Resolutions

I can still remember the Christmas holidays – can you? It was so very cold that I did spend some time catching up on some reading. During term time, I fall asleep as soon as my head hits the pillow so I need to indulge in a good thriller but in the holidays I started on some magazines. On the top of my pile was the magazine, Better: Evidence-based Education, which is produced by the Institute for Effective Education at the University of York. The Institute was established by a grant from the Bowland Trust to advance evidence-based practice. While this did not help me catch up on the love lives of the celebs or suggest any warming winter recipes, the autumn 2009 issue focuses on teaching and learning mathematics, so I was keen to have a look.

The issue includes the following articles:
What works in teaching mathematics by Robert Slavin
The importance of the early years by Douglas Clements and Julie Sarama
Building mathematics skills by Chris Kyriacou
Which teaching methods are most effective for maths? by James Hiebert and Douglas Grouws
Understanding maths learning by Celia Hoyles
Depth of knowledge by Norman Lott Webb
Supporting sense making: Thinking mathematically by Megan Franke
Mathematics matters by Jonathan Haslam
Bowland maths: turning theory into practice by Quentin Thompson

The autumn mathematics edition of the magazine is available online, and you can also sign up for future issues.

And what do I get from reading educational magazines like this?
I think this is a vital part of my own professional development – it's an aspect over which I have some control, I can read whenever I have the time and reflect at leisure! In the introduction to the magazine it states that it is "intended to give educators access to research" – so if this magazine plays a part in making the links between mathematics education research and practice it is something that I want to look at.

Reading through this magazine has prompted me to dig out that Bowland CD to think about using some of those materials and also to re-visit the material from Celia Hoyles about proof. But there are also things that I have read that I know I have put away somewhere in my mind which I have almost forgotten about – at some point something will link with a piece of new knowledge or a new experience and as a result make more sense to me and have a bigger impact on my ongoing development and hence my professional practice. I'll let you know when that happens! In the meantime, why not tell us about your holiday reading or professional development?

Up2d8 Maths

The fortnightly Up2d8 Maths resources explore a range of mathematical themes in a topical context. The resource is not intended to be a set of instructions but rather a framework which you can personalise to fit your classroom and your learners.

What's happening to the weather? Snow and ice caused chaos at the beginning of the year - schools were closed, people were advised not to travel and baboons were fed hot potatoes but, as always, there are claims that this is 'nothing special' and that people are overreacting.

The activity gives students the opportunity to explore strategies to manipulate a large data set to back up a predetermined hypothesis. They are presented with temperature data for each month and each season for different regions of the UK from 1914 to the present day and are asked to use this data either to back up or contradict the statement that winters are getting colder. This might take the form of a presentation, a newspaper article or a poster (or whatever you decide) and the data might be from your region, nationally or both.

This resource is not year group specific and so will need to be read through and possibly adapted before use. The way in which you choose to use the resource will enable your learners to access some of the Key Processes from the Key Stage 3 Programme of Study.

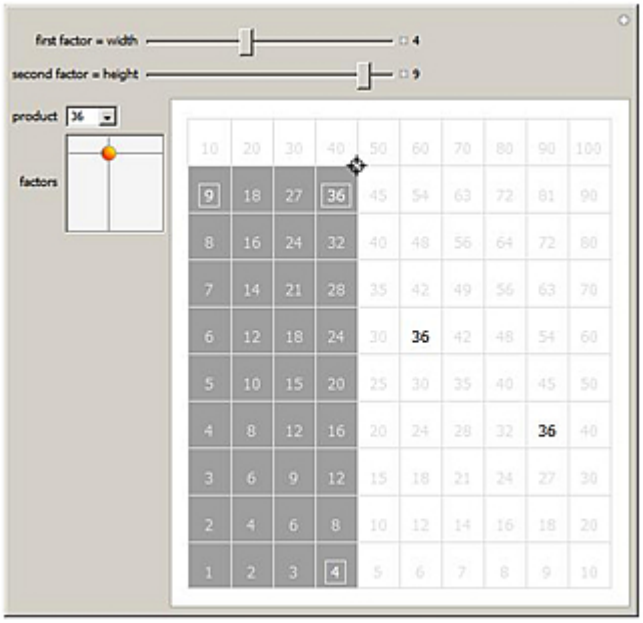
Download the Up2d8 Maths resource - in PowerPoint format.

Focus on…multiplication tables

- A tables square can be used to find a set of equivalent fractions. To find fractions equivalent to $\frac{3}{5}$ shade the row of the multiples of 3 and the row of the multiples of 5 producing the following diagram. The yellow row gives the numerator and the turquoise row the denominator of the fraction.

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

- Areas on a tables square can be used to explore factors as this demonstration from Wolfram Mathworld shows:



- How could writing songs help children learn their times tables? Read how Red Oaks Primary School in Swindon changed their teaching of the times tables using NCETM funding.

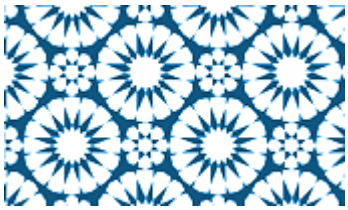
- How can the tables square be used to introduce proportional reasoning? This departmental workshop gives an idea for you to work on in a department meeting.

- In 493 AD, Victorius of Aquitaine wrote a 98-column multiplication table using Roman numerals. The rows were "a list of numbers starting with one thousand, descending by hundreds to one hundred, then descending by tens to ten, then by ones to one, and then the fractions down to 1/144" and the columns showed each of these multiplied by every integer from two to fifty.

- In 2002, one of the earliest known multiplication tables was found in South China. Dating from the Warring States period (475BC-221BC) the 22 cm-long and 4.5 cm-wide tablet clearly shows the eight times table.

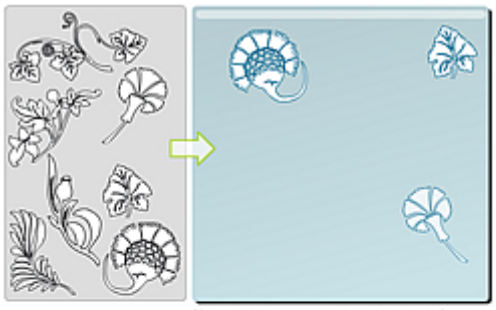
- John Mason has created a range of number grids. This times table grid might be used to construct understanding of multiplication with negative numbers. Ideas for using the grids are here.

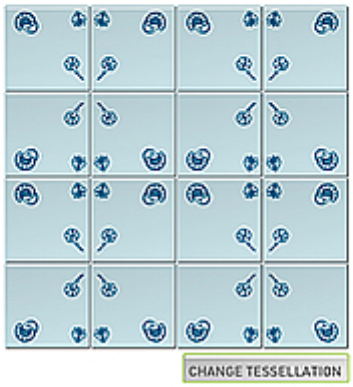
Secondary Magazine Issue 51



National Centre for Excellence in the Teaching of Mathematics

An idea for the classroom – design a tile





What a treat for the New Year! This delightful page on the Victoria and Albert Museum website allows you to design your own tile and tessellate that design in blocks of 2 x 2, 4 x 4 or 6 x 6. The tool also allows you to rotate and reflect the tile to get different effects in the tessellation – what fun!

There is no need for me to go into any great detail here as the tool is very user friendly.

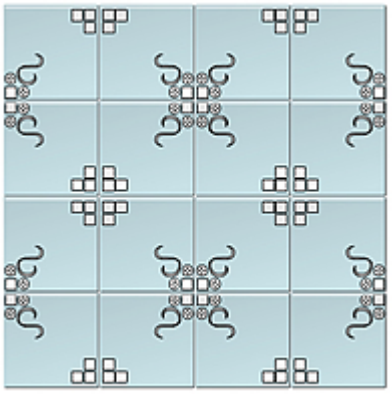
So how would I use this in the classroom?
If pupils have access to ICT it would be a great project to allow pupils to design their own tile and tessellate it. I would encourage them to capture the different tessellation possibilities by cutting and pasting into a Word document and writing about the one they like best using some technical mathematical language such as rotation, reflection and translation. They do not need to print out their account but can email it to their teacher for comments. They also have the possibility of posting their tile to the website gallery, but you could also set up a page on Flickr or on your school VLE for pupils to share their designs.

As part of some work on transformations, I would show pupils a tile tessellation and ask them to describe the tessellation in their own words. I would then enrich this experience by showing two different tessellations of the same tile and asking pupils to compare and contrast the designs, perhaps asking them to list what is the same and what is different about the designs.

This is a great vehicle for some display work either in the mathematics area or as a whole school display – using the tool gives the finished design a 'professional' feel.

Last year, I used a similar tool for each pupil to produce a colour design which was stuck onto the front of their exercise book, covered with a square of sticky-backed plastic – the exercise books had a personal quality that was not generated by graffiti!

Why not tell us how you have used the tool?



5 things to do this fortnight

- It's now 2010! How are you preparing for the changes to the GCSE coming this September? Most of the exam boards are running sessions to help ensure a smooth transition and OCR's courses are currently taking place around the country. Find out about your nearest venue on the OCR website.

- Did you do anything for World Maths Day last year? In 2009, more than two million students from 200 countries combined to correctly answer 452 681 681 questions. This year's event, taking place on 3 March, aims to beat this. More details will be available soon on the World Maths Day website, and you can pre-register now.

- Are your Year 11 students following a modular course? Don't forget that entries for the March module need to be submitted by the end of January!

- The 2010 ACME conference is focussing on Mathematical Needs – Implications for 5-19 Mathematics Education. The conference, on 2 March in London, will bring together more than 150 education professionals and academics with officials from Government, Parliamentarians and representatives from industry to discuss the current issues in mathematics education policy development and implementation. More information and a booking form are on the ACME website.

- Get the haggis, neeps and tatties ready – 25 January is Burns Night. Did you know that Burns Suppers were first held on 29 January because his friends got his birthday wrong? It was only after double checking the church register that the 25th became the definitive date! Find out more about the man himself on the Burns Interactive website.

Secondary Magazine Issue 51

National Centre for Excellence in the Teaching of Mathematics

Diary of a subject leader

Real issues in the life of a fictional Subject Leader

I wrote a while ago about the "walking-through-treacle" effect of Year 11 and how they were so exhausting to motivate. Well... we have just had our mock exam period and I have to say (apart from a few higher tier lads that thought an impromptu round of coughing would be hilarious), all went well.

Being new to the school last year I was shocked at just how many students were walking out of the exam so soon after the start, and the disruptive effect it had on the others. Our exam results need to improve, yet too many students were rushing papers just to "escape". Back in June, at SMT, we decided that we should make students stay until the end – we would have a new regime of expecting students to make full use of the time.

So, last week, 20 minutes into a 'gained-time' lesson I was understandably dismayed to see my year 11s arriving in dribs and drabs from their mock exams. When I had a quiet chat with them it was clear that they had been allowed to leave the exam they had been in (not mathematics) when they wanted. What happened to our new regime?

Well, I guess it is a bit like turning a tanker round, only you don't have access to the bridge! I think the exam invigilators are only too happy to allow the students to leave, and staff tend to do as they have always done – I don't suspect sabotage, just lack of awareness.

The next day, all of Year 11 had their 'non-calc' mathematics mock. I politely but forcibly reminded students that they would not be able to leave until the end of the exam (as it was internal they had no "right" to leave early – not that I informed them of that!). And then, they were off. A number of my weaker C/D students were at the Derby rather than the Grand National. A quiet word in their ear that, with 15 minutes gone out of 1h30, being three quarters of the way through was a bit speedy, appeared to have an effect. Students were calm, they were actually checking answers, and some were going back through and adding extra explanations and workings.

If I am honest, I think the time allowances are generous, and the Foundation lot were getting restless after 1h15. Nonetheless, I stuck to my guns and kept them for the full amount. They were fine. The higher students were on the whole annoyed but resigned to waiting for the extra 15 minutes. Our two most troublesome lads in the higher tier threw their toys out the pram and told me I could f*** off and stormed off.

It is far from the first time a student has suggested such an alternative activity in which I may participate, so I played my card, waited until they had crossed the hall and had hold of the door handle before I very politely reminded them they had left their coats behind. They still have a fair bit to learn!

What have I learnt from the whole process? Well, first of all my school is very slow to change and resents change greatly. We do things because we always have, not because we think they are the best things to do. Secondly, when I feel I have done as much as I can, I just need to keep giving that little bit more. I was at the point where I felt I could do no more with my Year 11s, yet they showed me in those exams that they did care and, for that hour, they had some pride. Thirdly, if students act in way that I consider totally inappropriate, most of the other students will be thinking that too. I'm not sure if I 'lost-face' in the storming out incident. When I dismissed the Higher Students, I was careful to thank them all for their efforts and good behaviour and how it was mutually supportive – we all want to do well, and need the chance to do well. According to the jungle drums, the word on the street and in the canteen was that the

two lads had really showed their true colours – and most students deplored them for that. The tide appears to be changing!

So, what will the marks from the exam be like? Well, to jump forward in time, I can tell you they are pretty shocking. We still have a very long and bumpy ride ahead. However, although I feel my bus is a little dilapidated and the seats definitely past threadbare, I am fairly confident that most or Year 11 will be stepping aboard. Not yet sure I'll get a fare out of them though!