Secondary & Further Education Magazine 95

National Centre for Excellence in the Teaching of Mathematics

Welcome to Issue 95 of the Secondary Magazine (incorporating FE)

Happy New Year! As we are getting used to the idea that it is 2013, did you know that:

- the last time that a year had four different digits was 1987?
- the last time that a year had four digits that can be re-arranged to be consecutive numbers was 1432?

The rest of this issue does not focus on mathematical trivia but does contain some articles to brighten up the start of a great new year.

Contents

From the editor: Mathematics across the curriculum

Just before Christmas, the latest RAISEonline reports were published. If you have not seen your school report yet, someone in your school has a username and password and will be able to download the report. The report is a synthesis of the data for the Year 11 cohort of 2012 and includes a variety of charts and reports that allow you to compare the attainment of your pupils to the national picture. The report is something in the region of 94 pages so it useful to have some key places to look to gauge how well your pupils are achieving (I'm including some screen shots from an anonymous report but do go and find your own to interpret).

Table 5.3.1 (page 61) is my first port of call if I want to look at the progress of different groups of pupils in mathematics. It should look like this (click to display as a larger PDF document):

Table 5.3.1: Expected Progress in mathematics Key Stage 2 to Key Stage 4

This table shows the number of pupils attaining each mathematics Key Stage 4 grade and their corresponding mathematics Key Stage 2 prior attainment.

Number of Pupils		Key Stage 4 Mathematics grade										Total Number of Pupils	Number Achieving Expected Progress	School Percentage Achieving Expected Progress	National Percentage Achieving Expected Progress
		no KS4 result	U	G	F	E	D	C	B	A	A*				
KS2 Mathematics attainment	Other or no prior available	0	3	1	0	4	7	9	3	1	1	8	5	63%	57%
	W	0	0	0	0	0	0	0	0	0	0	0	0	0%	11%
	1	0	0	1	0	0	0	0	0	0	0	1	0	0%	17%
	2	0	0	4	3	0	0	0	0	0	0	7	0	0%	21%
	3	0	0	2	8	9	9	8	0	0	0	36	17	47%	44%
	4	0	2	1	3	3	25	75	20	8	1	138	104	75%	74%
	5	0	0	0	0	0	3	18	31	17	18	87	66	76%	79%
											Summary	277	192	69%	68%

I'm able to find out the percentage of pupils who made appropriate progress from when they entered the school - this is indicated in dark green.

You can also get a breakdown of how much progress was made by pupils in vulnerable groups by looking at Table 5.5.1 (page 77) below (click to display as a larger PDF document):

Table 5.5.1: Key Stage 2 to Key Stage 4 performance - percentage making expected progress, School and National

This report shows the percentage of students making expected progress in English, mathematics.
The value added methodology has changed in 2011 for the Expected Progress reports.
Statistical significance tests have been performed on the data.

	English				Mathematics			
	Cohort	School	National	Sig	Cohort	School	National	Sig
All Pupils	285	77	67	Sig+	277	69	68	
Gender								
Male	143	69	61	Sig+	141	70	66	
Female	142	85	74	Sig+	136	69	70	
Free School Meals*								
FSM	46	72	54	Sig+	44	61	51	
Non FSM	239	78	71	Sig+	233	71	73	
Children Looked After								
CLA	2	0	35	-	2	50	34	-
Not CLA	283	78	67	Sig+	275	69	68	
Free School Meals* Or Children Looked After								
CLA or FSM	47	70	53	Sig+	45	60	51	

From looking at this table I'm immediately impressed by the English results – the green shading indicates progress that puts the school in the top quartile nationally- and I want to know how pupils can make such

good progress in mathematics too! As with any data, it's not the figures themselves that I dwell on - but the story that they tell and the questions that they raise.

Some other places you may wish to look at first are:

- Table 5.1.5 which considers the progress of groups of high, middle and low achieving pupils from Key Stage 2
- Table 5.1.1 which enables you to see the percentile ranking of your pupils' progress in mathematics
- Chart 4.1.11 and Table 4.1.12 consider Attainment by Average Total Point Score at Key Stage 4 for mathematics.

So what questions am I asking myself as I look through the RAISE report?

- how well have all pupils at my school achieved?
- what progress have they made?
- are there any groups of pupils who have made better or less good progress than others?
- can I identify the factors that have contributed to significantly good or poor achievement?
- what will I do about them?

To give data analysis further consideration you can refer to the NCETM Mathematics Subject Leader In-Depth Study Module 6.

Although this data is retrospective, I'm sure that if I can answer those questions for the 2012 cohort, the 2013 cohort will have a better mathematical experience.

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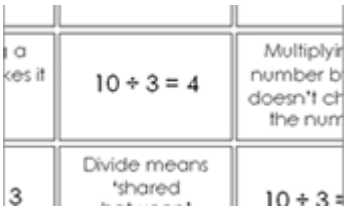


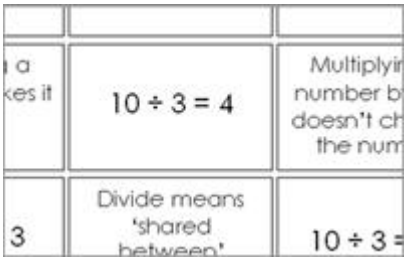
A resource for the classroom – Always, Sometimes, Never

As I was being driven up the motorway in that dull time between Christmas and New Year, I noticed this on Facebook:

> **Why aren't jokes in base 8 funny? Because 7 10 11. Merry Christmas everyone!**

I was on the way to a family gathering and consequently spent some of that party time trying to explain the comment to my eleven-year old nephew. The conversation on the drive home focussed on the role of number bases in the curriculum – I can remember working on them in Year 7…

My chain of thought led to an experience I had with a group of teachers using the Always, Sometimes, Never activity on the What makes a good resource microsite. Amongst the set of cards is one statement that says:



Some of the teachers in my group argued that this statement was true if a number base was used. If you are not familiar with *Always, Sometimes, Never* activities you can read an account of a teacher's experience in using this particular one where you can also download the resource itself (you could also look at the RSA Challenge and Clock Arithmetic if you want to explore these ideas further).

The power of *Always, Sometimes, Never* activities was brought home to me again recently when a colleague sent me this statement:

> **Imagine a right-angled triangle ABC where B is the right angle and D is the midpoint of AC. Is it always true, sometimes true, or never true that D is equidistant from A, B and C?**

I decided to use this statement as the starter for a departmental meeting. Having worked on the problem in pairs, strategies were shared. The person who said 'It's easy when you get the semi-circle thing' was surprised that others had done the problem without using a circle angle theorem.

The next stage was a discussion about how to use this resource in the classroom and included the following points:

- where would pupils start the problem?
- would pupils need to be given a diagram or could they draw their own?
- would it be better to say 'write down what you know about any of the lengths in your diagram' or to actually mention isosceles triangles?
- could pupils access this problem without knowing circle angle theorems?

- would this be a good statement to investigate as part of a circle angle theorem lesson?
- how much detail would we expect from different groups?
- could pupils use a dynamic geometry programme to illustrate their answer?

This statement provided the stimulus for a discussion about mathematics but also about our pedagogy in the teaching of mathematics. Have you had some good mathematical discussions recently?

With thanks to Gareth Smith, King Edward VI Community College, Totnes for this resource.

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Focus on…marking and feedback in mathematics

Marking books is a time-consuming task, but is at the very essence of our craft of teaching; it is crucial to find out what pupils can and cannot do and offer meaningful feedback to enable them to move on in their learning, wherever they are in their learning journey. You need to think carefully about what it is you are going to mark: it can be soul-destroying to sit down and mark the same exercise of questions 30 times – there are plenty of occasions when pupils can mark repetitive tasks which have been designed to improve fluency and technical mastery of a process – however, it is really useful (and interesting) to mark a task which has involved pupils communicating their understanding on paper. You will need to plan ahead to create these opportunities as an on-going part of a pupil's daily mathematical diet. The following paragraphs and references may give you something to work with while thinking about the quality of feedback that your pupils receive.

Mathematics: Made to Measure has a section devoted to Marking: the importance of getting it right (paragraphs 88 – 99). These paragraphs include some prime practice examples and some things to avoid.

The Suffolk maths website has some marking suggestions from colleagues, policies and features of good practice.

The blog entry Mathematics teachers mark too much talks about teachers having a dialogue with pupils through marking their books and contains this paragraph:

> *Good, well-considered, marking can of course be a motivator for learners. It can encourage, it can correct, it can tackle misconceptions and it can, in the very best practice, lead to a dialogue between the teacher and the taught. Let me take you into a Y10 mixed ability mathematics class in a large North London comprehensive a few years ago. The teacher, Jill, arrived late and was carrying a set of exercise books. She apologised for being late, gave the books out and then said, 'Now remember that your first job is to read my comments in your books and then reply to me in a sentence or two before you start on the work that I have set.' Now that is what I call marking! On close inspection I found a written dialogue going on between the pupils and their teacher.*

The Mathemapedia entry Marking Work considers different purposes and ways of marking.

You may find it helpful to spend part of a department meeting looking at a sample of books and considering your marking as a department. Using an interesting template to record your sample of marking may also help to identify next steps for your department.

5 things to do

Read about the NCETM's new Director, Charlie Stripp, and celebrate his appointment by looking at the MEI website which also has much to interest - including the *Trying Triangulars* problem.

If you are interested in research into mathematics education, the British Society for Research into Learning Mathematics (BSRLM) website may interest you. You could look at the informal proceedings documents from the June 2012 meeting, or consider going to the next Day Conference at Bristol University on 2 March 2013.

Find out about the ACME proposals for post-16 mathematics which includes a discussion paper.

Download the free app Quick Graph, which works as a graphic calculator on your phone or tablet.

Get ready for Valentine's Day on 14 February by visiting a website with Valentine's Day Math worksheets, graph paper and more!! I particularly liked the Valentine's Day patterns.

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Tales from the classroom

Intervention, intervention, intervention! It's all I seem to hear at the moment.

I have to provide regular data on how particular year 11 students are doing and what intervention they're taking part in. At the moment the options for students are: extraction from a few selected lessons, lunchtime maths club, after-school maths club, and extraction from registration. These students are monitored, tracked and talked about at length, but I can't help thinking that this is a whole lot of closing the door after the horse has bolted!

What does intervention mean? Who are the 'intervention students'? The obvious answer is that they are the C/D borderline students, those students who are close to the C but who we can't yet be confident are going to get it. But we're trying to broaden this out to any student who might not achieve to their potential (however you measure this - we're looking at FFT targets for each student). This means that, on my intervention list, I have a student who should be aiming for an A but is on track for a solid C. How can I cater for her in the same intervention session as students aiming for a C but who are currently working at a D or lower?

I'm trying to focus my intervention in the classroom - what used to be called Wave 1 teaching. Making sure that my lessons are as good as possible and that I talk to each student every lesson. I know that this sounds really basic, but be honest: how often do you prioritise teaching a great lesson over marking/meetings/writing reports/setting homework/chasing up homework…? I will hold my hands up and say that sometimes I find myself walking into a lesson under-prepared because I've had too many other things to do to think about the best way to teach a particular topic with a particular class.

As I write that last sentence I wonder how often I do this? How often do I read a topic in the scheme of work and go onto auto-pilot? I think I have a reasonable understanding of the theories behind teaching and learning, and I know that I believe in a constructivist approach, but how often do I think about whether the approach I'm taking is the best way for a student or group rather than just being 'the best way'? I find there's a tension between theory and practice. I know what I think is the best way to teach a topic to develop the concept but there's also looking at the students in front of me and thinking about their needs.

Maybe this should be my first stop for intervention, to look carefully at the needs of the students in my class, to look at what they need, and to think about the best way to support them in moving forward.

I'm not sure what this would look like in the classroom. I'm not really thinking about having individual tasks for each student but I am thinking about offering a couple of different activities, maybe a stronger focus on procedural fluency for some while others in the class work on conceptual understanding. Working out which students work on which part, and shifting the balance for some, feels like a reasonably straightforward way of addressing the different intervention needs for year 11 as we complete the scheme of work and move towards revision.

Does anybody have any suggestions?!