



Centre for Teaching Mathematics News

Issue 10
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Welcome

Welcome to the 10th edition of the CTM News. We publish this newsletter every term and distribute it to schools, colleges and interested people. If you are reading somebody else's copy please contact the Centre secretary to be added to the mailing list. Also if you are moving schools and would like to continue receiving the newsletter please send us details of your new school. The newsletter will contain information on the staff and activities of the CTM. Each issue will contain a teaching resource which might be a graphic calculator activity, a problem solving activity or a practical mechanics problem. This term we have a photocopyable resource for all ages – the 24 challenge – can you make the number 24 out of the four numbers given, and a resource titled 'Magic Maths' which looks at some ideas behind numbers.

The Centre for Teaching Mathematics

The CTM is an inter-faculty group of mathematics educators based at the University of Plymouth within the Mathematics Department and the Education Faculty at Exmouth plus associate members.

The aims of the Centre are:

Creative Resources and Research

Training for Teachers

Mathematics Enrichment for Pupils

Contacting Us

Members of the CTM can be contacted via the Secretary:

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All Change in CTM

After 17 years in Plymouth and 10 years at the helm of being Director of the Centre for Teaching Mathematics, I have decided to retire from my full time post as Professor of Mathematics Education in the University. But my interest in school Mathematics will not be retiring too!! As well as continuing my research collaboration with colleagues in CTM, I am looking forward to returning to the classroom as a part-time teacher to teach mathematics in Wells Cathedral School. I am also available as a mathematics education consultant to visit schools to run masterclasses with pupils and professional development courses for teachers.

If you would like an activity in your school or a local network of schools please write to jberry@plymouth.ac.uk.

In the meantime I wish the CTM many more years of success in promoting mathematics and I am delighted that Ted Graham will take over the leadership.

Good luck, Ted!

John Berry

Does your school or college have special Mathematics Status?

We are starting a research project that will require data from schools that have recently gained specialist Mathematics status. Would you be able to help?

Please contact Ted Graham or John Berry if you would be interested in finding out more about how you might help us with our research. Thanks.

GRAPHIC CALCULATOR COURSES TO RUN IN LONDON

The Centre is to run its two popular graphic calculator courses in London. Please see page 4 for more details.

Staff Profile – Suki Honey



I graduated from University College, Cardiff with an honours degree in Mathematics, went on to do a PGCE at Keele and became a fully-fledged teacher in 1987. My teaching career began at Tring School, Hertfordshire. Three years later I decided to move on and joined the staff at Willows High School, and

then Cantonian High School in Cardiff. I moved to Plymouth in 1997, and worked for four years at Notre Dame RC School.

Since then I have built up a 'portfolio' career; working as a visiting lecturer for PGCE students from Exeter University, a mathematics tutor at the College of St Mark and St John and an associate lecturer for the Open University. However, these university posts are mere fripperies compared to my proper job as a part-time classroom teacher at Devonport High School for Girls and part-time research student at the Centre for Teaching Mathematics.

I joined the Centre in 2001, having completed a Masters Degree through the Open University. My main interest is in the use of graphics calculators as tools for teaching and learning mathematics. Part of my current research project is to develop an understanding of graphics calculators in mathematics classrooms.

I am grateful to all of the maths teachers within Plymouth City, Devon and Cornwall that have supported me with my research by allowing me to spend time with them. All I need to do now is to analyse the data that they have provided and write up my literature review!

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The New AS and A-Levels

You will probably have heard about some of the changes that are taking place at A-level. Here are the answers to some of the key questions that teachers and lecturers will need answers to.

When do I have to change my teaching?

In September 2004 year 12 will begin to study the new courses. The AS and A-level examinations that they take will all be from the new syllabus.

What about retakes for students on the old syllabus?

These students will complete their A-levels in June 2005. There will be an opportunity for these students to retake modules for the last time in January 2006.

Will there still be six modules?

Yes, but four of these will now be pure maths modules. They will be renamed core maths and known as C1, C2, C3 and C4. The other two modules will be applications. The first two modules C1 and C2 are at AS level and C3 and C4 are at A2 level.

What modules do students need to study to get an AS?

To get an AS award students need modules C1, C2 and one application module (M1, S1 or D1).

Can A-level students study two application areas?

Yes, your students can take study either one or two application areas. For example they could take any of the following combinations.

Two applications could be M1 and S1, M1 and D1 or D1 and S1. Note that all of these combinations give an A-level that is made up of 4 AS units and 2 A2 units. These combinations are allowed in the new schemes.

One application could be made up of M1 and M2, S1 and S2 or D1 and D2. These combinations give an A-level that is made up of 3 AS units and 3 A2 units.

What about calculator restrictions?

The rules for calculators are very much simpler than for the current syllabus. One of the modules C1 and C2 will have a calculator free examination paper. The decision as to which module this will be has to be made by the awarding bodies. A graphics calculator will be permitted in all of the other examination papers.

Do my students still have to learn formulae for the examinations?

Yes, but there have been a few changes to the list of core formulae that students need to learn. A few of the formulae on the old list have been removed and can now be included in formulae books. The formulae for APs and GPs can now be put into the formula book.

Do A-Levels include coursework?

Some of the awarding bodies will require coursework, while others may not. AQA have taken an interesting approach, offering both coursework and non-coursework versions of the modules M1, M2, S1 and S2. The coursework and non-coursework versions cover the same topics, but teachers or their students can then decide which version they want to take. It is even possible to use the non-coursework version as a retake for the coursework version.

Can students still take AS Applied Mathematics?

No, this qualification will no longer exist. Students who only want to take AS mathematics may find that the AS Use of Mathematics is a possible alternative. This award is made of free standing mathematics units. Further details can be obtained from the awarding bodies.

How can I find out more?

Most of the awarding bodies are close to finalising their new specifications with QCA. They should be published in the near future, but draft specifications may be available at the moment. Some of the awarding bodies are holding briefing meetings to give more information to teachers and lecturers.

Ted Graham

Degrees and Careers in Mathematics and Statistics

The School of Mathematics and Statistics at the University of Plymouth is organising a one-day subject conference on the 9th of July 2004. This is an opportunity for teachers and lecturers to come together and discuss our subjects and students' perceptions of them. In particular we will review the importance of mathematics at post 16, how to enter into university and how students manage the transition into degree programmes, the current structure and contents of degrees in maths and stats and the many career opportunities for graduates. We will also debate the 'maths problem' and how we can together try to promote a greater interest and take up in our subject across the South West.

Provisional Structure of Day:

Introduction
The Maths Problem
Careers for Mathematicians and Statisticians
Overview of Research in Plymouth
Lunch
The Transition to University
Current Degrees
Forging Links and Outreach

While this day is intended for schools in the South West we would welcome any teacher who would like to attend.

To attend the conference, or to find out more details, please send an email to Sharon Ward (s2ward@plymouth.ac.uk) or phone Sharon on 01752 232700 giving your name, contact details and the name of your school or college.

Continuing Professional Development

We are busy planning our CPD courses for this year. As well as our normal courses in the Summer term which we run at Plymouth we are also offering a number of courses in London.

Friday March 12th, Central London: Teaching and Learning KS3 Mathematics with a Graphic Calculator:

This full day course is designed for teachers of mathematics at Key Stage 3 to support the suggested use of graphic calculators proposed in the draft Framework for Teaching Mathematics at Key Stage 3. The DfEE document emphasises the use of ICT in teaching and learning mathematics and in particular there are specific references to the use of graphic calculators.

The aim of this course is to provide teachers with the opportunity to explore the use of a graphic calculator as a means to help pupils to explore problems, develop an understanding of concepts in mathematics and to work with real data. The course will build on the examples provided in the supplement of the draft document.

The course fee is £150 which includes an extensive set of classroom ready resources, refreshments and lunch.

Friday March 19th, Central London: Teaching and Learning A level Mathematics with a Graphic Calculator:

The AS and A2 syllabuses in Mathematics expect students to be using a graphic calculator. This hands-on, practical course will provide you with the skills and resources to incorporate this technology into the teaching *and* learning of mathematics. During this full day course you will explore the use of a graphic calculator in teaching topics in pure mathematics and statistics.

The course is designed for those teachers who have no experience of a graphic calculator as well as those who have some experience but would like to extend their competence.

The course fee is £150 which includes an extensive set of classroom ready resources, refreshments and lunch.

Summer Courses in Plymouth 2004

22nd - 25th June: CAS, Modelling and Investigations in International Baccalaureate Mathematics

This is a hands-on practical residential course which will provide you with the skills, resources and classroom teaching ideas for using computer algebra software and technology of the future such as the TI-89 in the teaching and learning of mathematics. The course also covers mathematical investigations; extended closed problem solving; and mathematical modelling.

The course fee is £490 which includes an extensive set of classroom notes, a TI-89 and meals and accommodation.

28th - 30th June: Decision & Discrete Maths 1

The aim of the course is to provide teachers with the personal competencies, knowledge and skills to teach the Decision 1 syllabus. The course is applicable for all examination boards.

The course fee is £350 which includes an extensive set of classroom notes, meals and accommodation.

We have a number of one day courses running

28th June: **AS Pure Mathematics**

29th June: **A2 Pure Mathematics**

30th June: **Cabri Geometry**

1st July: **Decision and Discrete Maths 2**

1st July: **KS3/4 Graphics Calculators**

1st July: **A Level Mechanics 1**

2nd July: **AS/A2 Graphics Calculators**

The course fee for each one day course is £120 which includes an extensive set of classroom notes, lunch and refreshments.

For further details please contact:

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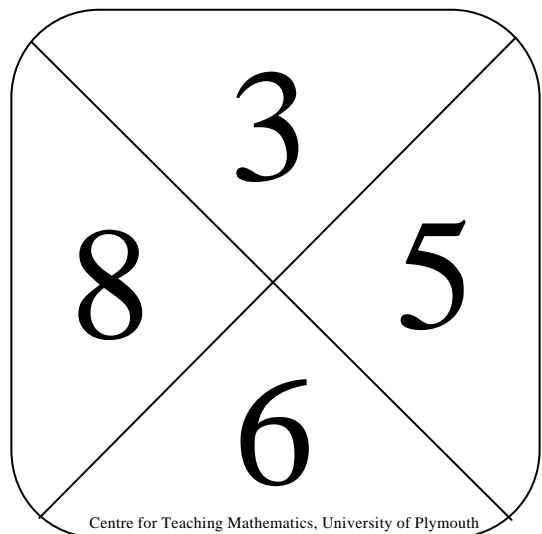
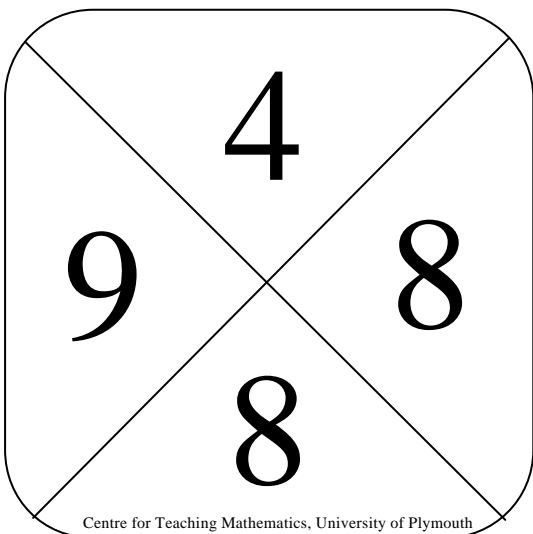
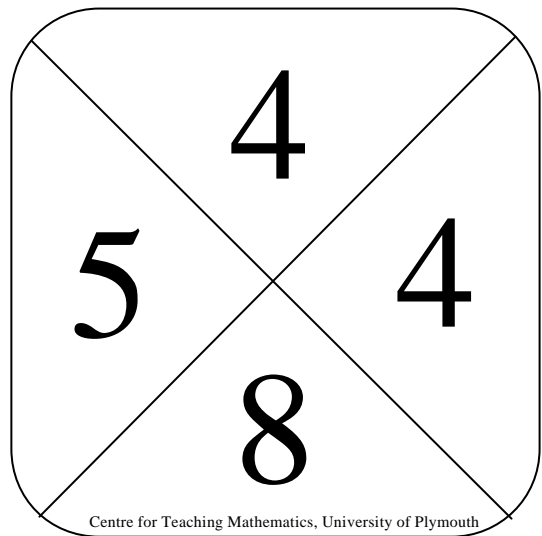
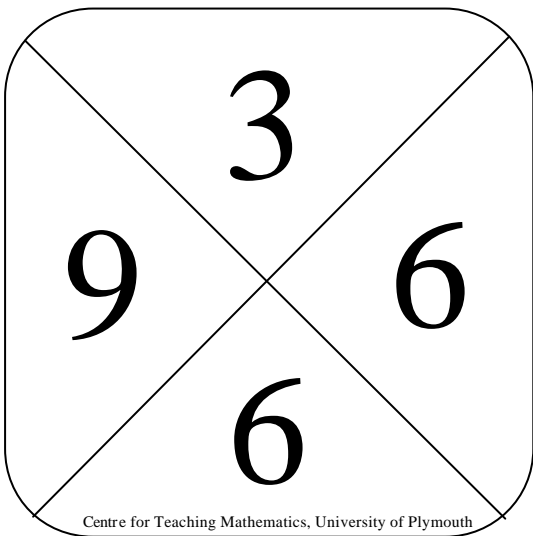
The 24 Challenge

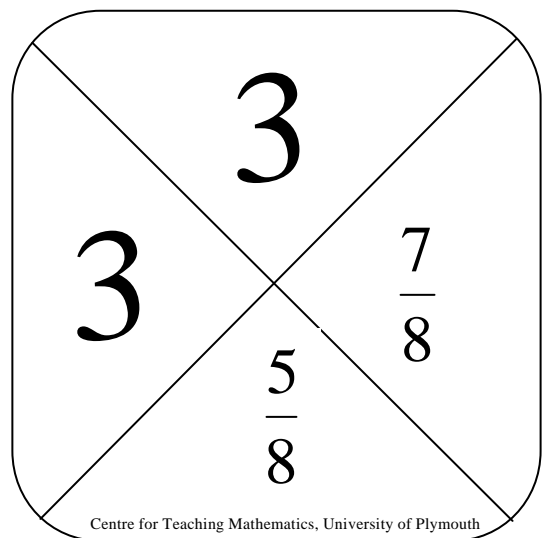
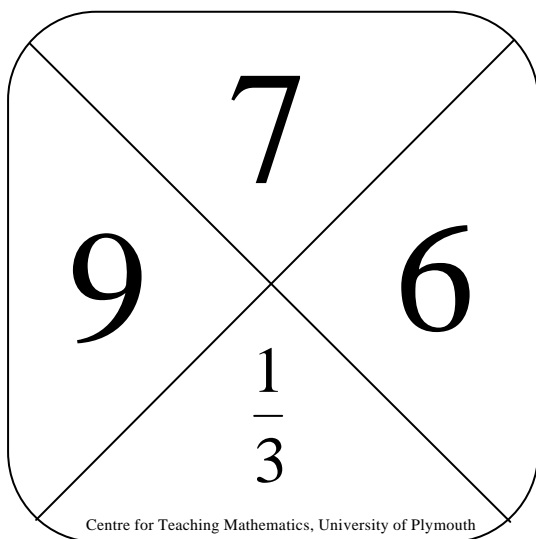
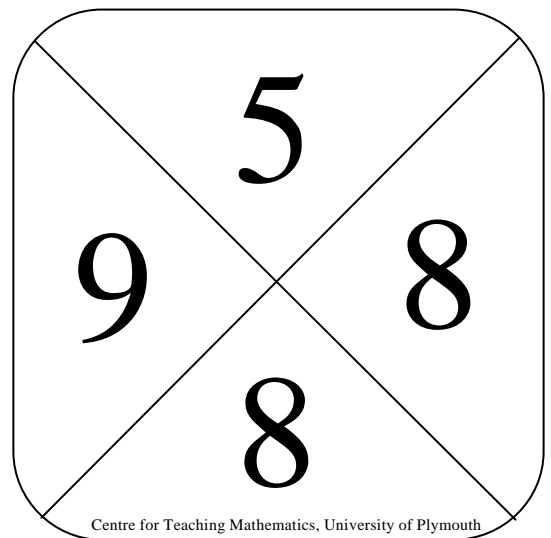
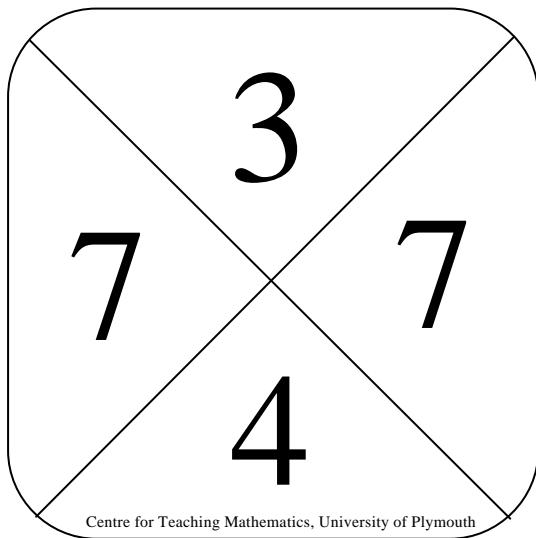
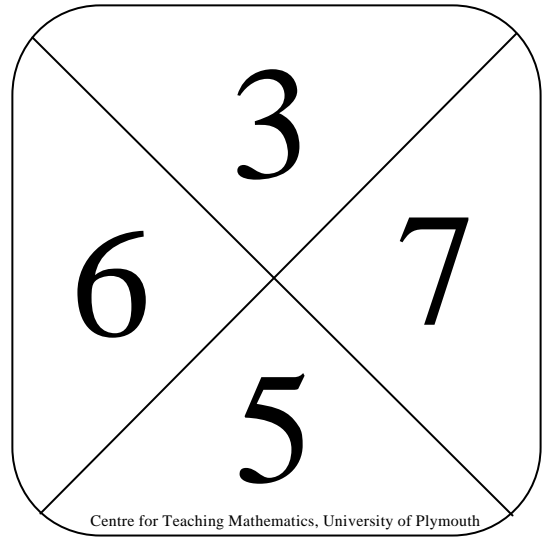
We have used the 24 challenge with students from Primary through to VIth form as a way of getting the brain going – ideal for the mental starter! 24 is a great number to work with because it has a large number of factors. We will be publishing 10 cards an issue, you can photocopy them onto card for students to use individually or in pairs or onto transparency to use with an OHP for a whole class activity.

The rules are simple:

Make the number 24 by:

- Using all four numbers once and only once
- Using the four operations $+$, $-$, \times and \div





Magic Maths

Mathematicians are often seen as magicians due to the popularity of puzzles where it appears you can guess the number that the person thought of or everyone gets the same number. It is nice to do those which always gives the same solution with a whole class and the students all shout out their final answer — they are surprised when they all get the same despite starting with different numbers. However the good mathematician should ask the question why? They are often very easy to prove and will make a good lesson for lots of different topics — proof itself, algebra skills, decomposition of number etc.

This issue concentrates on ones which are simply a number of steps which are done and then undone and ones which require you to decompose the numbers into 100's, 10's and units.

Magic Maths 1

1. Think of a number
2. multiply by 5
3. add 6
4. multiply by 4
5. add 9
6. multiply by 5
7. subtract 165
8. divide by 100
9. What do you get?

Magic Maths 2

1. Choose any three different digits between 1 and 9
2. Write down the six possible two digit numbers that can be formed from your three digits
3. Add these six numbers together
4. Add the original three digits together
5. Divide the first total by the second total
6. What do you get?

Magic Maths 3

1. Take a three digit number and repeat it to make a six digit number.
2. Divide that six digit number by 7.
3. Now divide your answer by 11.
4. Now divide your answer by 13.
5. What do you get?

Magic Maths: — Hints and Tips

Magic Maths 1: This is simply a number of steps which are done and then undone to get back to where you started from:

Step	Result
1. Think of a number	n
2. multiply by 5	$5n$
3. add six	$5n + 6$
4. multiply by 4	$20n + 24$
5. add 9	$20n + 33$
6. multiply by 5	$100n + 165$
7. subtract 165	$100n$
8. divide by 100	n

Extension: Get the students to create other puzzles of this form and challenge each other to show why they work.

Magic Maths 2: This will always give the number 22:

Let our 3 digits be a , b , and c . a , b , and c are integers between 1 and 9.

The six possible two digit numbers are:

ab ac ba bc ca cb

We can write these numbers as

ab	$10a + b$
ac	$10a + c$
ba	$10b + a$
bc	$10b + c$
ca	$10c + a$
cb	$10c + b$

$$\begin{aligned} \text{Adding gives } & 22a + 22b + 22c \\ & = 22(a + b + c) \end{aligned}$$

Adding our three original numbers
 $= a + b + c$
 and so dividing gives the result 22.

Extension: What about if you make all the possible three digit numbers?

Magic Maths 3: This will always get back to where you started:

Let our 3 digits number be abc . a , b , and c are integers between 1 and 9.

Our six digit number is now $abcabc$

$$\begin{aligned} \text{Now we can write this as} \\ 100000a + 10000b + 1000c + 100a + 10b \\ + c \end{aligned}$$

$$= 100100a + 10010b + 1001c$$

$$= 1001(100a + 10b + c)$$

$$\text{Now } 7 \times 11 \times 13 = 1001$$

So dividing by 7, 11 and 13 leaves
 $100a + 10b + c$

which was our original number.

Extension: Get the students to make up their own Magic Maths based on the ideas above.