



# Centre for Teaching Mathematics News



Issue 15  
www.tech.plym.ac.uk/maths/CTMHOME/CTM.HTML

## Welcome

Welcome to the Summer 2005 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 photocopiable resource for all ages – the 24 challenge – can you make the number 24 out of the four numbers given, and the second of a series on Polygonal Numbers.

Editor – Jenny Sharp [jsharp@plymouth.ac.uk](mailto:jsharp@plymouth.ac.uk)

## 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:

**C**reative Resources and Research

**T**raining for Teachers

**M**athematics Enrichment for Pupils

## Contacting Us

Members of the CTM can be contacted via the Secretary:

Julie Tombs

Centre for Teaching Mathematics

School of Mathematics and Statistics

University of Plymouth

Plymouth

Devon

PL4 8AA

Tel/fax 01752 232772

Email [jtombs@plymouth.ac.uk](mailto:jtombs@plymouth.ac.uk)

## Continuing Professional Development

### Courses for 2005 in Plymouth

We have a number of courses for teachers of A level mathematics who wish to update their subject knowledge or for teachers who are about to teach A level for the first time.

- 27<sup>th</sup> – 29<sup>th</sup> June: Decision Maths 1.  
This three day course costs £370 which includes accommodation, meals and resources.
- 27<sup>th</sup> June: Core Mathematics 1
- 28<sup>th</sup> June: Core Mathematics 2
- 29<sup>th</sup> June: Core Mathematics 3
- 30<sup>th</sup> June: Core Mathematics 4
- 29<sup>th</sup> June: Statistics 1
- 30<sup>th</sup> June: Mechanics 1  
These one day courses each cost £130 which includes lunch, refreshments and resources.
- 21<sup>st</sup> – 24<sup>th</sup> June: CAS, Modelling and Investigations in International Baccalaureate Mathematics.  
This four day course costs £490 which includes accommodation, meals, resources and a TI-89.
- 20<sup>th</sup> June: A Level Mathematics with a Graphic Calculator.  
This one day course costs £130 which includes lunch, refreshments and resources. A TI84 will be made available for delegates use on this course

### Courses for 2005 in London

We are running a number of courses this year in Central London:

- 8<sup>th</sup> June 2005: Core Mathematics 3
  - 8<sup>th</sup> July 2005: Core Mathematics 4
- These one day courses each cost £150 which includes lunch, refreshments and resources.

Further details and reservation forms can be found on the website:

[http://www.tech.plym.ac.uk/maths/CTMHOM E/training\\_courses.htm](http://www.tech.plym.ac.uk/maths/CTMHOM E/training_courses.htm)  
or contact Julie at the address opposite.

## Student Profile: Brad Metcalf

### BSc (Hons) Applied Statistics with Management Science



I decided to study the Applied Statistics with Management Science degree at Plymouth as I intended to apply my statistical knowledge

within the business environment. However, by the second year, my interest had shifted from business to the medical application of statistics and I chose to base my dissertation on skin cancer prevalence and causal factors.

After graduating I spent 3 years working as a statistician for the Consumers Association which ranged from designing growing trials to analysing survey data. For the last 5 years I have worked as a statistician for an internationally recognised study based in Plymouth looking at factors that lead to diabetes. During that time the study has had over 20 publications in medical journals and its results have been presented at many conferences across Europe. As part of my work I am also a statistical reviewer for one of the world's leading diabetes journals.

The attention given to medical applications in many of my degree modules has given me a really good grounding for my chosen career in medical research. As a student in the classroom I never imagined I would be referring to my course notes as often as I do now, it just goes to show how well my degree equipped me for the real world.

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## Interactive PDF Maths Packages

Over the last few years members of the School of Mathematics and Statistics at the University of Plymouth have been developing a library of interactive pdf packages to

support student learning of mathematics. They include quizzes and exercises with detailed worked solutions. Most of this work, which is funded by Hefce and sections of the Higher Education Academy, is designed to help the large number of university students without an A level in mathematics who need to learn some maths to understand the core of their degrees. This means that many of the packages, whose level ranges from fractions to calculus, may be useful to school students.

The packages feature an uncluttered appearance and come in reasonably small sized chunks. They are straightforward to navigate around (one only needs to know that anything in green is a link inside the document). The packages may be accessed or downloaded from

[www.plymouth.ac.uk/mathaid](http://www.plymouth.ac.uk/mathaid)

The only software required to use them is the widely obtainable Adobe Acrobat Reader. These resources are all freely available for use in schools and colleges. Any feedback or comments would be appreciated and may be given via the above web page, which regularly has new packages added to it.

[Martin Lavelle mlavelle@plymouth.ac.uk](mailto:mlavelle@plymouth.ac.uk)

## Mathematics and Statistics Subject Conference

The School of Mathematics and Statistics at the University of Plymouth is organising a one-day subject conference on the 8th of July 2005. This follows a previous meeting in July 2004 with new topics and speakers including the head of mathematics at a maths specialist school.

The day offers an opportunity for teachers and lecturers to come together and discuss our subjects and students' perceptions of them. We will review the importance of mathematics at post 16 and the curriculum, some surprising applications of mathematics and statistics and the varied career opportunities for mathematicians and

statisticians. The day will include the opportunity to talk to graduates about their careers and the chance to explore mathematical and statistical problems using powerful modern software. We will debate the 'maths problem' and how we can together try to promote a greater interest and take up in our subject.

To attend this free meeting, or to find out more details, please send an email to Denise Horne (scunit@plymouth.ac.uk) giving your name, contact details and the name of your school or college.

### **Provisional Structure of Day:**

- **Mathematics Futures**
- **Challenging the Mathematics Curriculum**
- **How is Mathematics and Statistics Used in the Real World?**
- **Lunch**
- **Parallel Sessions** (*To be confirmed, but will permit a choice of two from: talks on cutting edge applications of maths and stats; explorations of exciting maths and stats problems in the computing labs and a tour of the University's new facilities.*)
- **Feedback Session and Future Plans**

## **Graphic Calculator Programs for KS2**

Ted Graham and Paulette Smith have been working for a few years on the use of graphic calculators in KS2. As part of this work they have developed a number of programs for use by the students during their year 5 mathematics lessons. These programs are listed below with a brief description of what they do.

<b>Program</b>	<b>Brief Description</b>
<b>Areas</b>	Presents shapes for which the students are required to calculate the area.
<b>Bigsmall</b>	Presents four digits and asks the student to find the largest or smallest number that can be made with these digits.
<b>Convert</b>	This program requires students to convert to and from metric and imperial units. The conversion

	factor is given to students in each case.
<b>Decimal</b>	This program is similar to sequences (see below), but presents sequences involving decimals.
<b>Division</b>	A program to practice division facts.
<b>Hard</b>	This is a harder version of the tables program (see below). It has the same format, but one of the numbers to be multiplied will be a two digit number.
<b>Metric</b>	This program gives practice in rounding metric units.
<b>Metricu</b>	This program gives opportunity to practice converting between metric units, e.g. kg to grams, cm to mm etc.
<b>Missing</b>	This programme presents calculations with a missing number. Pupils have to find the missing number. Negative numbers are involved.
<b>Percent1</b>	Changing fractions to percentages.
<b>Perimte</b>	Presents shapes for which the students are required to calculate the perimeter.
<b>Round</b>	Pupils are presented with numbers to round to the nearest 10, 100, 1000.
<b>Scales</b>	The calculator draws a scale with an arrow. The pupils are required to read the value indicated by the arrow.
<b>Sequence</b>	The calculator presents the pupils with sequences. They have to find the next term of the sequence. The sequences are arranged with 4 levels of difficulty.
<b>Squares</b>	A program that asks pupils to square or cube numbers.
<b>Subtract</b>	A program to practice subtraction.
<b>Tables</b>	Presents tables practice at three different levels, easy, medium and hard.
<b>Variable</b>	This program presents sequences, which do not have constant differences. Pupils have to find the next term of the sequence.

While several of these address numerical topics, there were others that were designed for more spatial areas of the curriculum. Over the next few issues there will be details of the programs which match to the different areas of the curriculum. This issue concentrates on

the **Sequence, Decimal and Variable** Programs.

The **Sequence** program gives the pupils sequences to complete at four different levels of difficulty. The program generates the first five terms of an arithmetic sequence and asks the pupils to find the next term. The different levels allow for more complex sequences to be produced. The table below summarises the differences between the four levels.

Level	Range for First Term	Difference	Type
1	0 – 10	1 – 5	Increasing
2	0 – 20	1 – 10	Increasing
3	2 – 20	3 – 10	Increasing or decreasing
4	-10 - 20	3 -15	Increasing or decreasing

Figure 1 below shows a question from level 1 and the feedback given for a correct response:

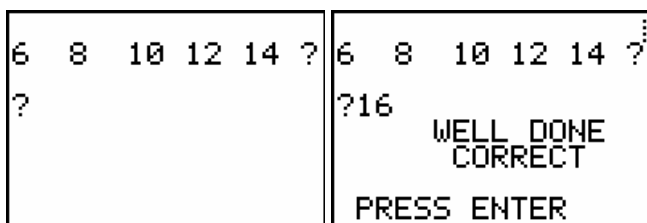


Figure 1

Figure 2 below shows a sequence from level 2 and the feedback given for an incorrect response.

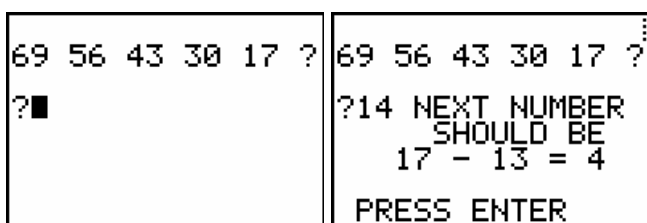


Figure 2

The ideas of the sequence program were developed further in the **decimal** program, which had a similar format to sequence, but that used sequences containing decimal values. This was developed to pose a little more challenge to those pupils who were doing well with the sequence program and to offer some consolidation work in the area of decimal arithmetic. Figure 3 shows two

screens from the decimal program. One shows the feedback for a correct response and the other the feedback for an incorrect response.

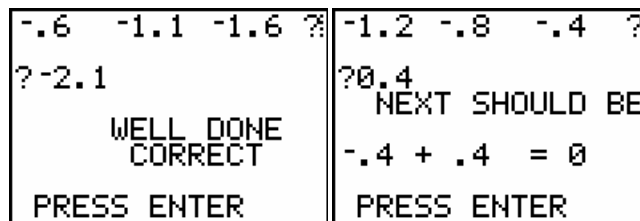


Figure 3

In order to show that not all sequences are arithmetic, the program **Variable** was developed. The aim of this was to present sequences in the same way as in the earlier two programs, but to use sequences which did not have a constant difference. Figure 4.4 shows three screens that illustrate the different types of sequences posed for pupils to extend to the next term.

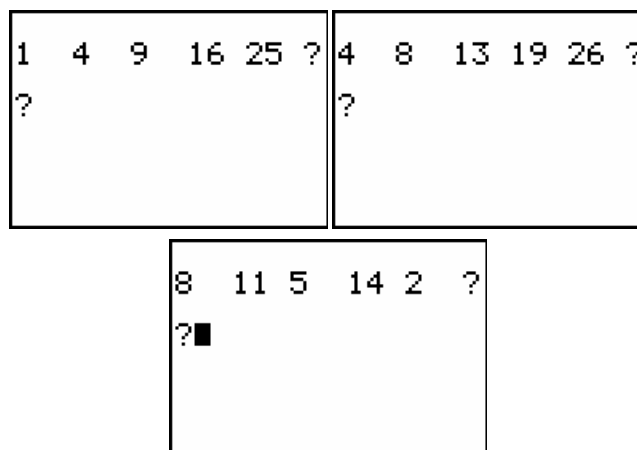


Figure 4

All the programs are written for the TI83 or TI84 range of calculators and can be downloaded from our website: [www.tech.plym.ac.uk/maths/CTMHOME/Resources\\_GC\\_KS2\\_Programs.htm](http://www.tech.plym.ac.uk/maths/CTMHOME/Resources_GC_KS2_Programs.htm)

(note Resources is all one word)

In the next issue we will give details on the the Convert, Metric and Metricu Programs which are concerned with working with units, both metric and imperial.

**Ted Graham**  
**egraham@plymouth.ac.uk**

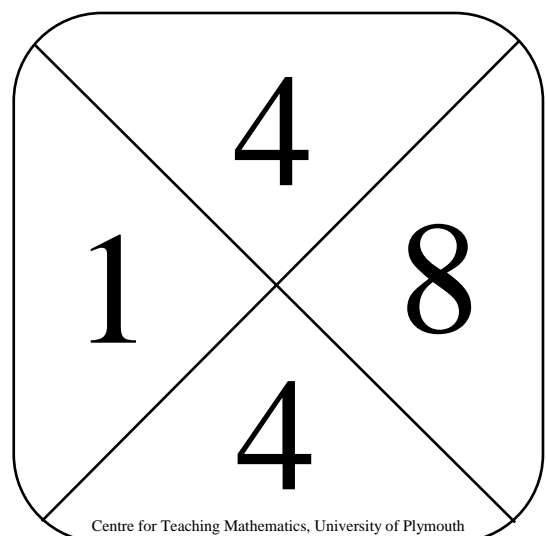
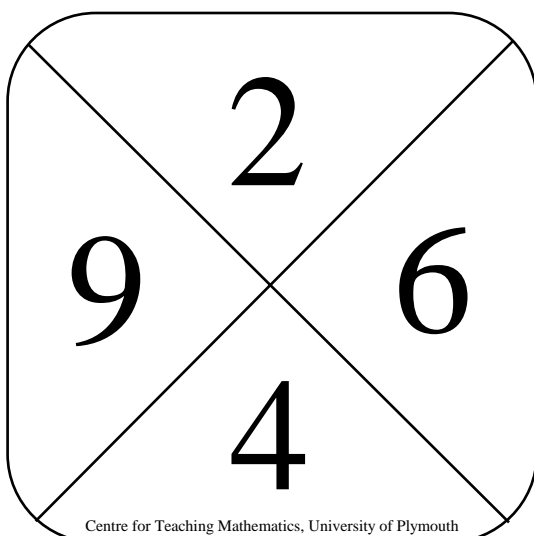
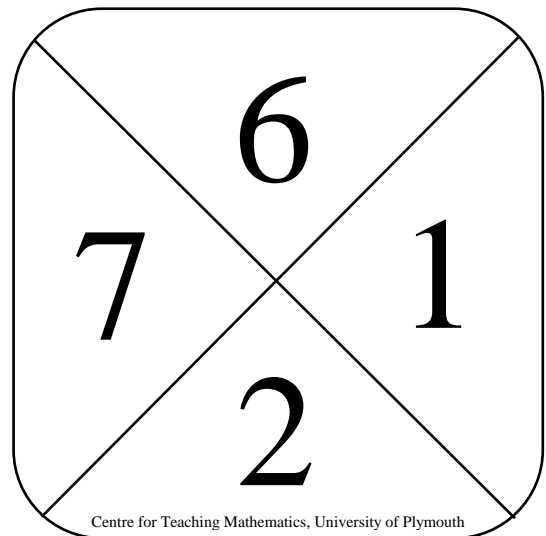
# The 24 Challenge

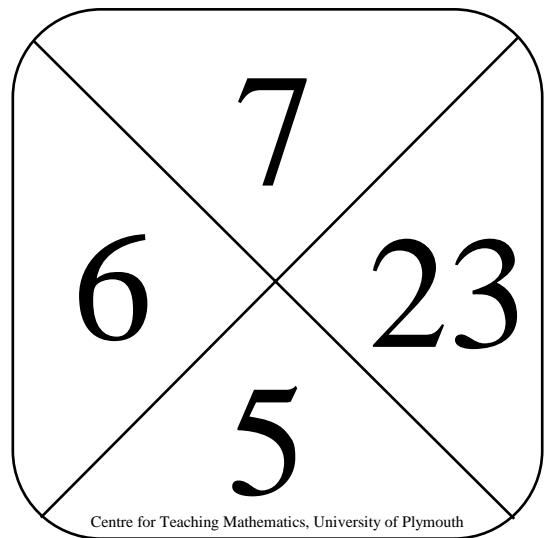
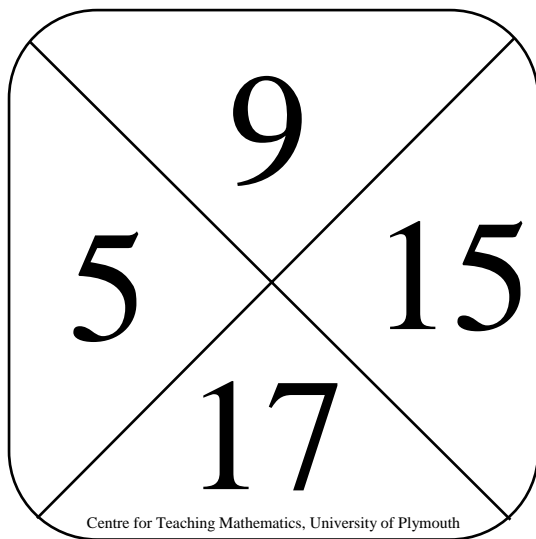
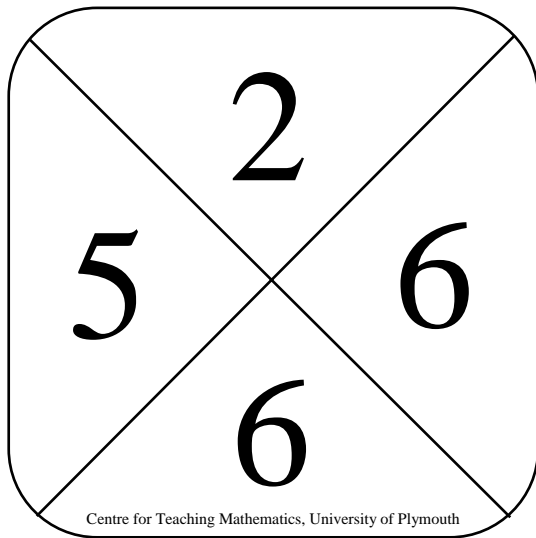
We have used the 24 challenge with students from Primary through to VIth form as a way of getting the brain going – ideal for the mental starter! 24 is a great number to work with because it has a large number of factors. We will be publishing 10 cards an issue, you can photocopy them onto card for students 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  $\div$

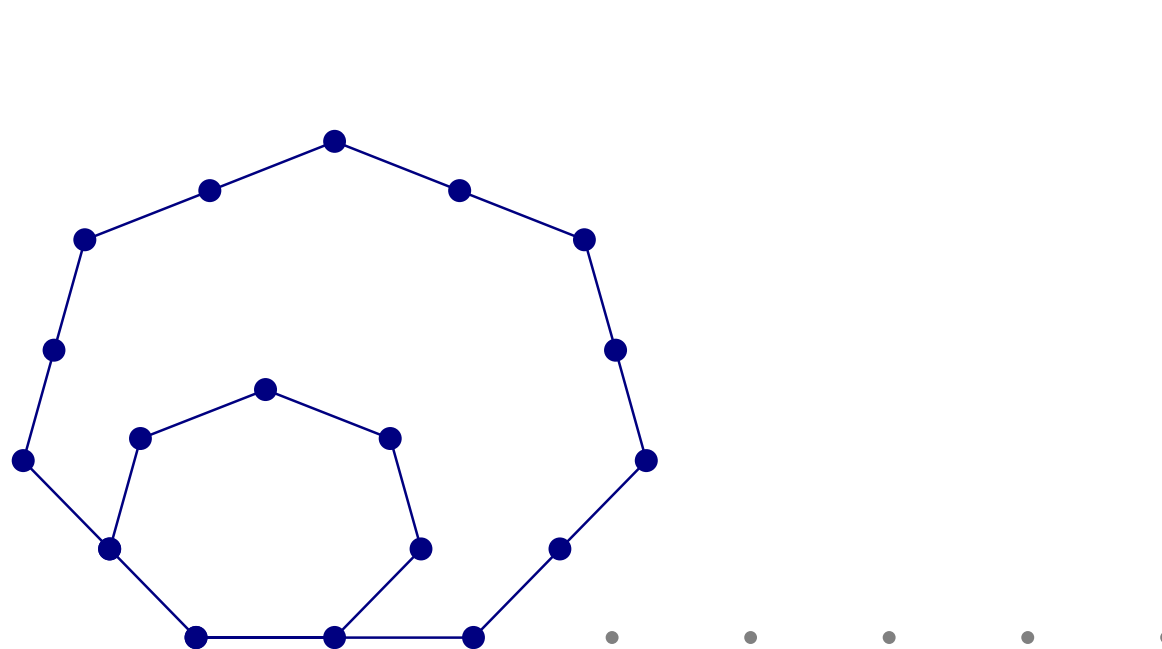




# Polygonal Numbers

We have all done triangle numbers and square numbers but how about extending the ideas to other polygons – polygonal numbers. Last issue we had pentagonal and hexagonal, in this issue we have the templates for creating septagonal numbers and octagonal numbers.

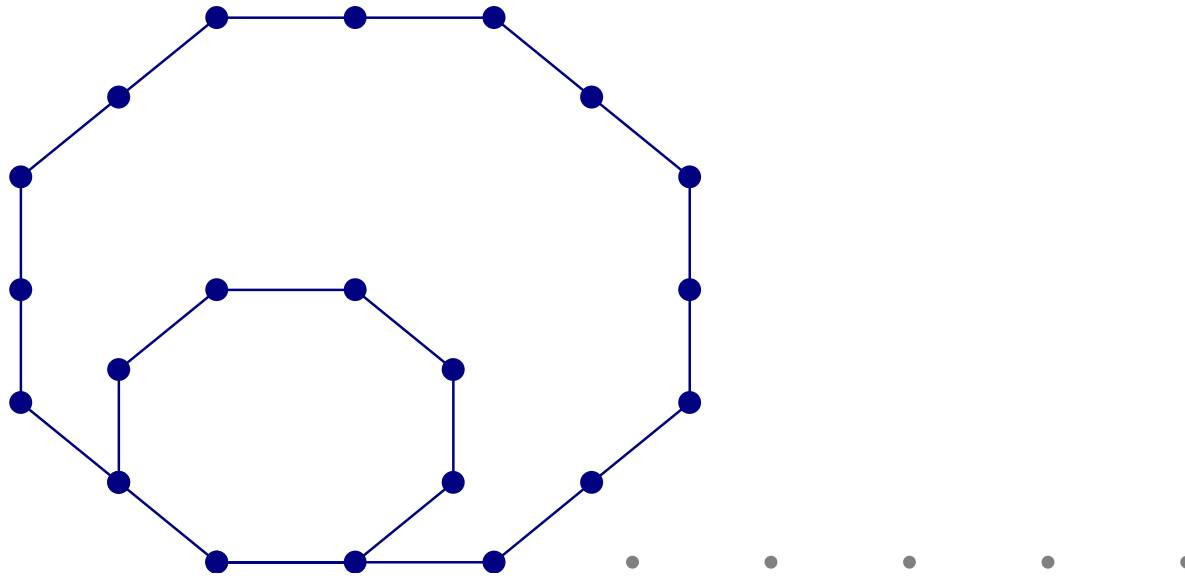
## Septagonal Numbers



What's the pattern?

Order	1	2	3	4	5			
Points	1	7	18	?	?			

# Octagonal Numbers



What's the pattern?

Order	1	2	3	4	5			
Points	1	8	21	?	?			