

Newsletter No. 8
October 2001

You may have read recently that using lasers Satoshi Kawata and colleagues have just made a 3D model of a bull in resin which is 150 nanometres in size. That put a thought in my head. How many of them, standing head to tail, could you fit into a centimetre? It might even make an interesting lesson starter.

Besides our usual features, in this months' newsletter Debbie de Geus tells us about some of the things her school got up to during Math's Week and Nicole Roper shares some of her excitement at being awarded a Teaching Fellowship.

By the way, I'm Russ Dear and I'm sharing a little of the load that Derek and Gill have been carrying. I taught mathematics at the secondary level for a number of years, working occasionally on secondment to the Department of Education, advising mostly on project and practical work in mathematics but also on more prosaic subjects like running a Maths Department and writing schemes of work and so on. I've written a few books, contributed to others and had regular magazine columns on recreational mathematics and other subjects. Maths has excited me almost as long as I remember, ever since I was 12 and a colleague of my father's showed me how to draw up general magic squares. I'm now chasing a number of disparate interests but they include mathematics.

Anyway, l'll let you get on and read the October newsletter.

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## WHAT'S NEW ON THE NZMATHS SITE THIS MONTH?

This month we have added another 10 sites to the links component. Seven of these were for teachers and the rest for students. The new links are summarised in the following table:

| Site Link | Level | Strand(s) | Summary |
| :---: | :---: | :---: | :---: |
| http://freespace.virgin.net/ lara.savory/inspired/math s.html | 1-4 | Number | A site that provides teaching ideas, resources, worksheets, links and inspiration. The maths section includes unique activity and resource ideas for teachers of junior children. Most of these are aids for counting or computation that could be used in a group-teaching situation or independently. |
| http://www.numeracyreso urces.co.uk/archi4.html | 2 | Student site | An interactive resource to help students interpret line graphs. Predict the shape of the graph (depth versus time) as you control the tap power, put the plug in or out and take Archimedes in or out of his bath. Strand: Statistics |
| http://www.teachnology.com/teachers/less on_plans/math/measure ment/ | 2-4 | Measurement | A variety of ideas and lesson plans for teaching measurement: length, volume, time, use of standard and non-standard units (some based on imperial units but can be adapted) and estimation. Ideas are varied, but most are designed to be used either in a small group situation or with a whole class. |
| http://www.thelighthousef oreducation.co.uk/numer acy/default.htm | 1-4 | Number, Measurement and Problem Solving | A useful source of problems for students to work on. Problems are listed both by year level and by content (money, measurement, etc.) so they can easily be incorporated into work on a particular theme or used in general sessions on problem solving. |
| http://www.schoolzone.co .uk/pip/search/default.asp ?searchit=yes\&search=P ROBI\&subject=20\&subca t=0\&levelid=10\&num=20 \&order=StarRating\&Engi ne $=0$ | 2-3 | Student site | Students use the answers to number problems to plot co-ordinates, which draw a picture. Covers Number and Geometry strands. |
| http://cleo2.lancs.ac.uk/cg ibin/frameset?url=resourc es_and_features/ | 4 | Geometry | This site contains some excellent geometry ideas for teachers to use in the classroom in focused teaching sessions. Two areas of note are coordinates (What (else) can we "do" with Coordinates?) and Shapes (Using Geoboards). |
| http://cleo2.lancs.ac.uk/co ntent/maths/nationalnume racy/cumbria/classroom_r es/classroom_resources_ materials.htm | 2-3 | Number and Measurement | This site provides numeracy resources for the classroom with several of the activities working on basic mathematics knowledge: measurement units, fractions and basic facts. <br> Also included is 100 different ways to use 100s squares and a sheet to help students visualise and come to terms with rounding numbers to the nearest ten. |
| http://atschool.eduweb.co | 2-4 | Number and | Quick numeracy activities designed to be used at |


| .uk/ufa10/starters.htm |  | Problem <br> Solving | the start of a lesson. |
| :--- | :--- | :--- | :--- |
| http://teacher.scholastic.c <br> om/maven/index.htm | $2-4$ | All strands and <br> Problem <br> Solving | Part of the Scholastic Site these word puzzles <br> involve Math Maven. She is always finding herself <br> in the middle of a fun new mystery and students <br> act as her "super sleuths" and crack the case. <br> Each mystery focuses on a particular area of math <br> reasoning and computation. |
| http://www.stats.govt.nz/d <br> efault.htm | $3-4$ | Statistics | This site is the home of Statistics New Zealand <br> and as such, it provides a variety of official <br> statistics and information. Students can use this <br> information to make their own data displays, or <br> interpret the data displays provided on-line. |

## STATISTICS ON THE SITE

This month we are having a look back at the usage of the site during the last year. We have taken two key indicators and graphed them for the period Feb Sept 2001.

- Total sessions served: This is how many users connected to the site this month.
- Total hits made on server: 753967 - this is the number of parts of a page downloaded.
- Total page view hits: This is the total number of web pages viewed this month.




## PERSONALITY OF THE MONTH

We didn't manage to find one this month but we're looking. If you know of someone who should be profiled please let us know. But I will tell you (this is Derek speaking) something interesting. Russ and I were at the same secondary school together. Any guesses as to which country that was or even what the name of the school is? (See the answer at the foot of the newsletter.)

## MATHS WEEK - AN AFTERMATH

What you did for maths week, we wonder. Debbie de Geus from Kaniere School in Hokitika wrote and told us of some of the things her school did. Prior to the week newsletters were sent to parents suggesting a range of mathematical activities that could be done at home. On the Friday teachers got together with parents and pupils to review the outcomes. Everyone reckoned that it had been a valuable exercise. Another successful event was the buddying together in threesomes of junior, middle and senior children for mathematical challenges around the school. It sounds like a good idea and we're not surprised the children enjoyed it so much.

Even though the school found that parents were somewhat reticent in accepting an invitation to join classes in problem-solving activities, we're sure that the gesture was well received. Obviously Kaniere School has laid the foundations for an exciting annual event, one that will be of great benefit to the pupils and an aid to school-parent communication.

Thanks for sharing that with us Debbie.

## WORD FROM A TEACHING FELLOW - NICOLE ROPER

Over the years the advertisements for Teaching Fellowships have passed across my desk and I have read with interest the exploits of a variety of teachers. The areas of research and study covered such practical, relevant and fascinating topics and whilst the notion of applying for such a Fellowship was extremely attractive, it never entered my head for a moment that this could be a possibility for me. After all I had my school department to run and all that accompanies that.

So, when I was approached by a member of the Mathematics Education Unit of Auckland University to make such an application, it took some convincing to get me to the point of agreement. A whole year, on full salary, to explore one's interests and enrich one's experience of a subject seemed too good to be true. As I said to my family, "If I am successful in being granted a Fellowship, it would be like dying and going to heaven (mathematically speaking)". AND I DID GET ONE!!

This year has not been a disappointment. I have spoken to mathematicians who are experts in their fields and learnt how mathematics is used in almost every area of life. I have realised how much mathematics I have forgotten over the years and also how much is relatively new and still developing. I have been able to read and research branches of mathematics with the luxury of having these afore-mentioned experts to assist and explain things to me. At this point I would like to say that despite the fact that these people are extremely busy, they have always been more than generous with their time and enthusiasm.

Some of the areas that I have looked at to date are:

- medical imaging
- archaeology
- optimisation (oil mining, forestry, crewing)
- architecture
- dynamical systems in ecology and weather, And I still have a few more to cover.

My department at school is managing just fine without me (why do we think we are indispensable?) and I know that when I return it will be with renewed enthusiasm and increased knowledge about the subject in general and also the uses to which it can be put.

Editor's note. Next month we hope to have the full list of winners of next year's Teacher Fellowships.

## Exemplars by Derek

At this stage of the year, the maths group working on the National Exemplar Project (see the July Newsletter) have two tasks ready for trialling, three tasks being considered by a number of teachers, and one task being developed. As you may recall, exemplars are being produced in Drama, English, Maori Medium, Maths, Science, Technology, and the Visual Arts. Exemplars are designed to give you an idea of what level of the curriculum your students are in a particular topic.

The maths exemplar tasks are all open-ended tasks that allow students to exhibit a variety of responses that will enable you to place then somewhere in Levels 1 to 5 inclusive. The tasks are designed to show where a student is on a mathematical progression. It is hoped that you will be able to elicit your students' highest level response and then be able to see how to move them on to the next stage of the progression. The full set of exemplars won't be available until 2003 but every now and then we'll give you a preview of what has been going on.

To help you see what exemplars mean in practice, consider the Probability Exemplar. First consider the probability progression. Students are able to: Level 2 - show that they know the concept and language of probability. Level 3 - find simple probabilities.
Level 3 - identify all possible outcomes of an event.
Level 4 - use possible outcomes to assign probabilities.
Level 5 - use multiple strategies to find probabilities for complex events.
The maths exemplar group see the above progression as the stages that a student passes through on the way to developing a strong sense of probability. You will notice that we have no Level 1 step on our progression, even though there is an Achievement Objective at Level 1 (classify events as certain, possible, impossible.) The reason for this omission is that on the work that the group saw from students, there seemed little way of distinguishing this AO from that of Level 2.

Fine now, so here is the probability task. The children are shown a picture of three containers of balls that are both coloured and numbered.


If Mary takes a ball from the first container, what are the chances of her taking a red? Repeat for the second and third containers.

Students who complete this successfully now go on to the next part of the task. Here they are shown a container with 5 balls. What are the chances of Mary choosing two red balls from this container?


In addition, suggestions will also be made in the exemplar of questions that might elicit the most sophisticated response of which a student is capable. The exemplar will also suggest ways to move students on to the next stage of the progression. As well as this, there will be links to relevant units on the nzmaths web site.

## DIARY DATES

I'm sure you won't forget the end of term four!

## THE SEPTEMBER SOLUTION

Cathy Walker has been at it again. Here is her solution to the last problem.
The 2001st number I think is 125874639 . I worked this out in a roundabout way like so...

6 digits give $6 \times 5 \times 4 \times 3 \times 2 \times 1=720$ different numbers
so 123456789-123987654 = 720 numbers
124356789-124987653 = 720 numbers thus the 1440th number is 124987653 .
After this I had to find combinations with 5 no's and group in lots of 120 As 5 digits give $5 \times 4 \times 3 \times 2 \times 1=120$ different numbers.

125346789-125398764 = 120 numbers - total 1560 numbers
125436789-125498763 = 120 numbers - total 1680 numbers
125634789-125698743 = 120 numbers - total 1800 numbers
125734689-125798643 = 120 numbers - total 1920 numbers
After this I had to find combinations with 4 no's and group in lots of 24 as 4 digits give $4 \times 3 \times 2 \times 1=24$ different numbers.

125834679-125839764 = 24 numbers - total 1944 numbers
125843679-125849763 = 24 numbers - total 1968 numbers
125863479-125869743 = 24 numbers - total 1992 numbers
After this I had to find combinations with 3 no's and group in lots of 6 as 3 digits give $3 \times 2 \times 1=6$ different numbers.

125873469-125873964 = 6 numbers - total 1998 numbers
Then ... 125874369-1999th number
125874396-2000th number
125874639-2001st number
Congratulations Cathy. A $\$ 50$ petrol voucher is on its way.

## PROBLEM OF THE MONTH

Marie and Wiremu were having lunch in the town square. "I wonder if it is square," Marie said. "Let's count the paving stones along each side. They're all the same size so that'll tell us. "

Wiremu counted along the north side, and then checked by counting them again. Marie did the same on the east side. They found that there were 100 pavers along one side and 99 along the other.
"They shouldn't call it a square if it's not, should they?" Marie exclaimed, opening up a choc bar.
"If I drew a straight line from one corner to the opposite one, I wonder how many pavers the line would cross," said Wiremu, sharing some of the chocolate.
"Let's work it out," said Marie. And they did.
Later Marie and Wiremu solved the problem for a town square 1000 pavers by 999 pavers but they had some problems with ones 100 by 98 and 100 by 95 although they eventually solved them.

Can you see why things would be different if the town square had been 100 pavers by 98 , or 100 by 95 ? Can you solve the problems?

We have the usual for $\$ 50$ petrol voucher for the best solution to this. Get your class working.

## YET MORE ON JULY'S PROBLEM

It was probably unreasonable to ask you to solve a problem using 2704 coins. After all, who has that many coins these days?! Here's one that uses only five. Children love this hands-on activity.

You can put three coins in a triangle so they all touch each other. You can lay a fourth on top of the three and then each of the four coins touches the other three. Now try arranging five coins (all the same size) in such a way that each touches the other four.

And while we're on the subject of money, do you know in how many ways it's possible to make change for a dollar? You may use any combination of 5, 10, 20 and 50 cent coins.

Answers to both these problems, as usual, will be in next months' newsletter. And we'll give petrol vouchers again for a good solution of any of these.

All the best for your teaching. Let us know if there is any way that we can help you.

Gill, Derek, Joe and Russ.
(Footnote: Derek and Russ were both at Erith Grammar School in Kent together. Do we have anyone else out there from good old Erith? Or from anywhere close by?)

