



Newsletter No. 30

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Welcome to 2004. I wonder what the year will bring. We certainly hope it includes plenty of successful teaching ideas - many of which you're sure to find on the NZ Maths website, that is certainly our intention.

Moving right along

The Russian-Swiss mathematician Alexander Ostrowski once said that when he came up for his qualifying examinations at the University of Marburg he was expected to answer questions from any branch of mathematics. That was in 1915, the same can't be said today. John Von Neumann estimated that in the 1940s a skilled mathematician might know about ten percent of what was available. Today the figure is well below one percent.

The body of mathematical knowledge increases all the time. New theories are created, new entities defined and investigated, interconnections found and applications sought. The rate is speeding up with greater use being made of computers for exploring new pathways and occasionally even in proof (see the editorial of issue 21, March 2003).

Although mathematics is a cumulative discipline, continually being built upon and enlarged, at the same time material is lost. Techniques fall into disuse. For example, since the introduction of hand-held electronic calculators nobody uses logarithms to do calculations. Some theories become less popular and neglected - it looks as though Euclidean geometry is going, or has gone, that way. Other theories, after a promising start, are found to have fewer applications than originally expected and the mainstream of mathematics passes them by - catastrophe theory might come into this category. The study of other theories becomes saturated and mathematicians move on - Boolean algebra might be one example. Over time applications become irrelevant - the dynamics of steam engines perhaps. Early work can become incomprehensible. Try working through some of the arithmetical calculations found in the Ahmes papyrus, for example, or read Chaucer on the astrolabe. They say that only specialists can interpret the writings of Newton.

Mathematics has become so specialised today that for those at the cutting edge of research in a particular area the exchange of ideas is only possible with perhaps a dozen people worldwide. No wonder mathematicians are often depicted as slightly disturbed, unbalanced individuals - they're just plumb lonely!

Mathematicians are like Frenchmen: whatever you say to them they translate into their own language and forthwith it is something entirely different.

Goethe

What's new on the nzmaths site this month?

As usual, January and February are busy months on the nzmaths site. In particular keep an eye on the Cross Strand units in the Number area of the site. There are plenty of ideas for combining Number Strategies with other strands of the curriculum.

Diary Dates

New Zealand: Our Place in Time and Space

On 8 June 2004, the planet Venus will do something that it has not done in well over a century. It will fall in line with the Earth and Sun, and for 6 hours, appear as a tiny black dot slowly traversing the width of our sun's disk. Although this transit will not be visible from New Zealand, save the northernmost tip of Northland, it has incredible historical and scientific significance to our country.

In fact, it was the observation of the 1769 transit of Venus that was the primary motive for Captain James Cook's momentous first voyage to the Pacific. It was not until after Cook had successfully observed the transit in Tahiti that he received secret orders from the British Admiralty to head south in search of the "Great Southern Continent". It was on this second leg of the first voyage that James Cook first made contact with New Zealand.

To mark this occasion, the Royal Society of New Zealand is coordinating a special series of lectures, events, and activities which will focus on the many historical, scientific aspects of the Transit of Venus, with a New Zealand focus. To find out more information on this, have a look at http://www.rsnz.org/news/releases/venus_comp.php

New Zealand Science Mathematics and Technology Teacher Fellowships

This year Karen Sturman (James Hargest High School) is spending a year working with a radio station looking at the collection and use of sports statistics while Fa'avesi Talamaivoa (Western Springs College) is also looking at the use of statistics, but in the fitness industry, and Pauline Hall of Nayland Primary School is investigating the use of mathematical language by new entrants. . Go to http://www.rsnz.org/awards/teacher_fellowships/ for more information on this opportunity to be released from school for up to a year to investigate your own project.

The Royal Society has put a new page on the teacher fellowship website this year which has ideas for projects/hosts and an invitation to submit ideas for comment. For further details go to http://www.rsnz.org/awards/teacher_fellowships/ideas.php.

We are sure that if you are trying to think of a project, the Mathematics or Statistics Department of your local university or polytechnic would be only too glad to help. Crown Research Institutes are also happy to lend a hand. The project should be mathematical/statistical in nature (unless you're looking in the science or technology area, of course), and be something that will further an interest of yours that will have some spin off for your students after your Fellowship year is over. The project should probably not be just to make resources, although resources often come from a good project.

Above there are three examples of successful projects. You can find more by looking at the November newsletter and by hooking into the Royal Society web site. There were very few applications for mathematical projects last year from either primary or secondary teachers. You'll get a lot of enjoyment following your own interests. Go for it!

Mathematical Part-timers

In the editorial above we looked at how the increase in the body of mathematical knowledge over time has meant greater specialisation by researchers. This of course suggests that looking back there was a time when knowledge was limited enough for individuals to know just about all of it. Although that may not be quite the case, it is certainly true that in times 'of yore' the study of mathematics was a part-time or amateur occupation. Indeed, for some of the most well-known of the historical figures in the subject, mathematics was only one aspect of their busy professional lives. Here is a somewhat random selection from the Renaissance and just after:

Lucas Pacioli (d.1510) A monk. He wrote on arithmetic and geometry.

Roberte Record (1510 - 1558) Lectured on medicine. He wrote works on arithmetic and algebra. His *Whetstone of Witte* contained the earliest introduction of the = sign for equality.

Ludovico Ferrari (1522 - 1565) Tax assessor. He worked on the solution of quartic equations.

L. van Ceulen (1539 - 1610) A fencing master. He spent much of his life successfully finding a numerical approximation of π to 35 places of decimals.

Franciscus Vieta (1540 -1603) Lawyer and politician. He wrote numerous works on algebra and geometry. His *In Artem* was the earliest on symbolic algebra. It introduced the use of letters for unknown quantities and developed a notation for powers.

Johann Kepler (1571 - 1630) One of the founders of modern astronomy. His work on geometry and algebra is often overlooked.

Gerard Desargues (1593 - 1662) Engineer and architect. He wrote an important work on perspective.

Rene Descartes (1596 - 1650) Philosopher. He is particularly known for his researches into analytical geometry. His greatest advance was allocating

coordinates x and y to points in a plane. He gave his name to Cartesian geometry.

Pierre de Fermat (1601 - 1665) Councillor in local politics. Often called the Prince of Amateurs he wrote on algebra, geometry, probability and the theory of numbers. Many of the problems he proposed on numbers long defied all efforts to solve them. His famous 'last theorem' was only solved in the last few years.

Christian Huygens (1629 - 1695) Astronomer and the inventor of the pendulum clock. He wrote on the geometry of the conics and probability.

Solution to November's problem

Just in case you have forgotten, here is the November problem.

The 12 grandchildren got together to celebrate their grandfather's birthday. He was a retired mathematician with a poor memory who had trouble remembering their names, let alone their ages. They decided to give him a little conundrum to help him out.

"Our ages are all a different whole number of years", the eldest said.

"No age divides into any other", her brother piped up.

"And the ages of the oldest and youngest are as small as they can be," piped up his twin.

What were the ages of the 12 grandchildren?

Perhaps the best way to solve the problem is to use a tried-and-true method in problem solving - that of first attempting a simpler version of the same type. In this case, for example, how would the ages be found if there were only three grandchildren?

We know the children's ages were different and none divided into any other, so looking at the options we might find 2, 3, 5 or 3, 4, 5 or 10, 11, 12. Going back to the question, we read that the ages of the youngest and oldest are to be minimal, so the solution is 2, 3, 5.

How about four grandchildren? The following solutions are arrived at 2, 3, 5, 7; 3, 4, 5, 7 and 4, 5, 6, 7. For both the eldest and youngest ages to be minimal the first solution is the one we're looking for.

At this stage, it looks as though a list of prime numbers will give the solution but to assume this is premature. Looking at five grandchildren we find the solution is NOT given by a list of five primes. We'll leave you to continue the exploration.

The twelve ages turn out to be: 4, 6, 9, 10, 11, 13, 14, 15, 17, 19, 21, 23.

We're sorry to say that, although we had several answers sent in, not one of them was correct.

This Month's Problem (from Brian Bolt)

When sending a birthday card to her father, a day that coincided with her own birthday, Samantha realised that their ages would both belong to the select set of numbers which could not be expressed as the sum of consecutive integers. So how old will each of them be on their birthday?

Each month we give a petrol voucher to one of the correct entries. Please send your solutions to derek@nzmaths.co.nz and remember to include a postal address so we can send the voucher if you are the winner.

Brickbats

The thirteenth letter in the alphabet is M not N as we indicated in our last issue!