

Newsletter No. 12
April 2002
Well, I wonder how things are going for you. You'll have solved most of those problems which occur at the beginning of every year and be into some form of routine, no doubt. Anyway, you've found time to read the newsletter, that's good!

Apropos of nothing in particular, I was looking at the year 2002 and noticed that it was the product of an even and three consecutive prime numbers - but you didn't need me to tell you that. And we all know 2002 is palindromic but when was the last palindromic year and why was it of interest to cranopods?

You may remember that in last month's editorial I mentioned how poorly I thought ratios were understood, citing a few examples. Well, it seems that the Ministry of Education is of the same belief. In their pamphlet 'Frequently Asked Questions, Education Outside the Classroom', recently distributed to schools, the second question is 'What is a ratio?'. The answer is given in the context of EOTC over 20 lines. If, because it is one of the most frequently asked questions, the Ministry feels that the word needs some further explanation then maybe it's a curriculum topic that deserves a new focus.

Perhaps l'd better let you get on and read the newsletter .....

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## WHAT'S NEW ON NZMATHS SITE

## Home Page

What's new on the NZMaths site this month?

## Numeracy Project Material

The booklets which accompany the Numeracy Project are available online as pdf's. Two of these booklets were added in March and the remaining five are be available during April. The material masters referred to in the booklets are also available online.

## Links

10 new links were added to the site in March. We plan to add 10 each month to give a further 100 by the end of 2002.

## Site Statistics

There are hundreds of statistics available to website developers to help them make judgments about the effectiveness of a website. One of the easiest ways is to look at the number of sessions served from the site. We assume that if people like the site and find it useful they will continue to visit it and over time the number of sessions served per month will increase. Another good indicator is the numbers of sessions served to people that come directly to the website i.e. not referred via a search engine. This indicates how well the site is known by the users. As shown in the graph below the overall trend for both these indicators is very positive for the NZMaths website.


## Diary Dates

## MERGA 25

The annual conference of the Mathematics Education Research Group of Australasia (is
scheduled for July 7-10, 2002 at Auckland University. The 2002 MERGA conference will provide opportunities for mathematics teachers, educators and curriculum developers to contribute and listen to research presentations and be actively involved in workshops,
symposia and special interest groups developed around the conference theme of Mathematics Education in the South Pacific. For further details look on the conference website: www.math.auckland.ac.nz/MERGA25

## Applications for NZ Science Mathematics and Technology Teacher Fellowships

close 16 July 2002. For more details on these Fellowships see our newsletter No. 9 of last November or contact:
www.rsnz.govt.nz/awards/teacher fellowships/index.php
Maths Week begins $12^{\text {th }}$ August. For more information contact www.nzamt.org.nz

## Infinitesimals

More than once in the history of maths the meaning of the word 'number' has been changed to accommodate a new application. When a need arose for negative numbers, for example, the definition of number was widened to include them. Prior to that time, if they arose in the solution of a problem, they were ignored. D'Alembert, as late as the $18^{\text {th }}$ century, stated, "Arriving at a negative solution means that some part of the hypothesis was false but assumed true." A little later Francis Maseres wrote, "Negative signs serve only to puzzle the whole doctrine of equations, and to render obscure and mysterious things that are in their own nature exceedingly plain and simple."

Similar feelings were held concerning the so-called infinitesimals. Archimedes was one of the first to use them to determine the area of a circle. Since he knew how to find the area of a polygon he considered the circumference of the circle to be a regular polygon and looked at how its area changed as the number of sides was increased. Isaac Newton and others used infinitesimals to solve problems of calculus. There were, however, logical difficulties associated with infinitesimals as they couldn't exist in a technical sense. Although they were positive, certainly not zero, there were contradictions in accepting them as real numbers (being able to represent them as decimals).

The problem wasn't got round until the 1960s when logician Abraham Robinson suggested they were too small to be represented as decimals and should be considered as non-real numbers. He then worked out a consistent arithmetic for them. The branch of mathematics which developed from this change, called nonstandard analysis, has been utilized profitably to solve problems of Brownian motion and the Jordan Curve Theorem. It also has fascinating applications in computer science.

If you'd like to read more on the subject try "Sweet Nothings" by lan Stewart in New Scientist magazine, No. 2327 (26 Jan 2002)

## Solution to March's problem

March's problem was one of logic in which we knew that three boating couples lived on yachts. We were told that each yacht had a dinghy tied to the stern, that Alan and Barbara's yacht was neither Seahorse nor the one with a yellow dinghy and that the blue dinghy was tied to the yacht called Foxy. We were also told that Sam was proud of his silver dinghy, that Sarah did not live on Tuku and that there were two other people Brian and Kiri.

We had to find out who was married to whom? On what yacht each couple lived and what colour dinghy each had?

Perhaps the best way to attack this problem is to head up a table and put on it any information we're sure about. Well, we know the three men are called Alan, Sam and Brian, that Alan and Barbara are a couple and that Sam's dinghy is silver, so tabling these we have:

| Husband | Wife <br> Alan | Barbara |  |
| :--- | :--- | :--- | :--- |
| Sam |  | Dinghy colour |  |
| Brian |  |  | silver |

Since the yacht Seahorse and the yellow dinghy belong to different couples, not Alan and Barbara, the yellow dinghy must belong to Brian (since we know Sam's dinghy is silver) and hence the yacht Seahorse to Sam. This in turn means that Foxy and the blue dinghy belong to Alan and Barbara. The table is filling up nicely:

| Husband | Wife | Yacht | Dinghy colour |
| :--- | :--- | :--- | :--- |
| Alan | Barbara | Foxy | blue |
| Sam |  | Seahorse | silver |
| Brian |  |  | yellow |

The remainder of the table is easily completed. Tuku is the third yacht and Sarah does not live on it, which means she must be married to Sam. The correct solution is:

| Husband | Wife | Yacht | Dinghy colour |
| :--- | :--- | :--- | :--- |
| Alan | Barbara | Foxy | blue |
| Sam | Sarah | Seahorse | silver |
| Brian | Kiri | Tuku | yellow |

## April's Problem

At a recent meeting of the Southland Appeal Committee, the Treasurer was adding the value of two cheques on his battered old calculator. He almost fell out of his seat when the total that flashed on the screen was one million dollars.
"Gollygosh, l've done something wrong," he said, "the total shouldn't have been as large as that. And it seems a bit odd to get such a round sum, one with all those zeros in it. After all, both the cheques were for a whole number of dollars and neither of them were amounts ending in a zero."

It gradually became clear that he had multiplied the two numbers instead of adding them. "That's all very well," said the Chairwoman, "but we want to know the correct total."

What was the correct total?
Each month we give a petrol voucher for 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.

All success in your maths teaching, Gill, Derek, Russ and Joe.
[By the way, 1991 was the last palindromic year and was of interest to cranopods, those who stand on their heads, because it is also palindromic when written upside down. Can you remember which mathematician wrote about an old man named William who was a chronic cranopod?

