Newsletter No. 13 **May 2002**

The item on infinitesimals in Newsletter No. 12 created some interest, mostly because we'd thought that negative numbers had been around since the ancient Greeks. They are, however, much more recent than that. Blaise Pascal, for example, in the 17th century wrote, "I have known those who could not understand that to take four from zero there remains zero." At about the same time, on a more technical note, Antoine Arnauld wrote, "How can the ratio –1:1 equal 1:–1, because –1 is less than 1 and the ratio of the smaller to the greater can hardly equal that of the greater to the lesser."

I left you with an afterthought in April's Newsletter by asking if you could remember which mathematician wrote about an old man named William who was a chronic cranopod (cranopods being those unlikely people who make a habit of standing on their heads). It was, of course, Charles Dodgson, otherwise known as Lewis Carroll. He wrote the nonsense poem 'You are old, Father William' in his book *Alice in Wonderland.* The first verse runs;

"You are old, father William," the young man said,
"And your hair has become very white;
And yet you incessantly stand on your head.
Do you think, at your age, it is right?"

Maybe dear old Lewis Carroll deserves another look. I wonder if he'd be as popular today with youngsters as he used to be … but I'd better let you read on.

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WHAT'S NEW ON THE NZMATHS SITE THIS MONTH?

This month we have focused on getting the data-bases associated with Numeracy Projects on-line and functioning so haven't added any new units to the site. However there are 10 new links on the site and one of them comes highly recommended from our reviewer.

http://disney.go.com/disneychannel/playhouse/bear/bear_balance.html
This site provides a virtual balance that is easily used and we think captivating. It allows student to practice the use of a balance in a unique and fun way.

DIARY DATES

7 – 10 July: 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

16 July: Teacher Fellowships close
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. The November newsletter is especially useful for ideas as to how to word your application.

11 - 17 August: Maths Week
Maths Week begins 12th August. For more information, contact www.nzamt.org.nz. (We say more about this web site below.) Hopefully there will be some useful activities there that you will be able to use.

PROBABILITY AND STATISTICS – SOME THOUGHTS

We believe that problem solving and 'hands on' activities provide some of the best ways to learn mathematics. In particular, the Probability and Statistics sections of the nzmaths website include a wide selection of investigations and practical activities for your pupils to explore.

In surveys undertaken on children's understanding of probability concepts, it was found that ideas involving counting were well understood but those requiring a facility with ratios were not. (This ties in with our editorial comments of the March Newsletter.) Moreover, not only were concepts requiring knowledge of ratio

poorly understood but this knowledge did not improve with age, unlike that of most other probability concepts.

A contributing reason, of course, is that pupils' verbal ability is often inadequate for accurately describing probabilistic situations. It is important therefore that children are given every opportunity to describe the steps in their investigations and the results as they emerge.

David Green, from the University of Loughborough in England, in his survey of nearly 3000 students aged from 11 to 16, discovered that pupils' appreciation of randomness also did not improve with age. Only a quarter were able to choose, from a selection of three patterns, the one which was most likely to describe the way snowflakes would fall on a shed roof – and this proportion did not improve with age.

Items involving the stability of frequencies and inference were also poorly done and didn't improve with age. When asked which of the following results was more likely;

- getting 7 or more boys out of the first 10 babies born in a new hospital, or
- getting 70 or more boys out of the first 100 babies born in a new hospital

less than 10 per cent at any age correctly chose the first. Most pupils (over 60%) stated that it was impossible to know, while a quarter said that both options were equally likely.

What is certain is that there is a great need for practical activity involving probability and statistical concepts from an early age to build adequate experience for students. A scheme of guided discovery seems to be the best approach.

The nzamt web site (www.nzamt.org.nz)

There are a number of maths associations that operate around the world and many of them have their own web site. You may not be aware but New Zealand has an association for teachers called, surprisingly, the New Zealand Association of Mathematics Teachers (NZAMT). Like most of these associations, the emphasis is on secondary people and that is where their main energy is directed. However, there are some aspects of NZAMT that primary people will find valuable. Of particular use will be the maths week activities. If you click on CONFERENCE/MATHS WEEK on the home page you'll see that the maths activities for 1999, 2000 and 2001 are accessible. As these are broken up into Years 1 – 3, 4 – 6, 7 – 8 and 9 – 11, you'll find something useful there. There are plenty of things that you might use too. In 1999, Years 1 – 3 contained 12 activities and in 2001, they had 19 problems. You'll be glad to hear that there are answers there too.

Also on the CONFERENCE/MATHS WEEK button you can access conferences. NZAMT holds a conference every odd year. If it is near your home town, then I would recommend that you consider attending. Naturally most of the time will be given over to secondary pursuits but there is usually enough going on to keep primary teachers happy.

The LINKS/COOL SITES button of the site might also interest primary teachers. Sites relating to problem solving, number and history, should give you some valuable classroom material. That is, of course, if you have the time to spend playing on the web.

APRIL SOLUTION

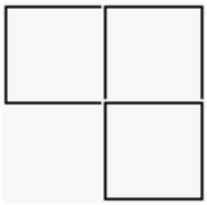
In essence, we had to find two numbers that multiplied to make a million, neither of which ended in a zero. Well, a million can be obtained by multiplying six 2s and six 5s together which tells us that the two amounts we're looking for are 64 (all the 2s multiplied together) and 15,625 (all the 5s multiplied together).

The solution to the problem was the sum of these two amounts expressed in dollars, i.e. $15,689.

This month's winners are both from Raetihi Primary School. They are Pushkar Khire, Year 6 and Donna Stout, Year 7. Congratulations both of you. Their teacher is Alison McGregor and this is the first time she has given Newsletter problems to her class to solve. Both students went home and worked it out overnight on their own. So congratulations to them again and congratulations and thanks too to all the other people who sent in a correct solution.

THIS MONTH'S PROBLEM

Perimeter = 6 units



Perimeter = 8 units

A unit square has perimeter 4 units. When two such squares are placed, non-overlapping, in a plane, the minimum perimeter of the shape they form is 6 units. For three squares the minimum perimeter possible is 8 units.

What is the minimum perimeter when (i) four unit squares are placed, non-overlapping, in a plane? (ii) How about five squares? (iii) Six squares? (iv) 200 squares?

Just as an afterthought I wonder, can you generalise the result for shapes formed from non-overlapping unit squares in a plane?

Just a reminder that 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.

Enjoy your teaching!

Gill, Derek, Russ and Joe.