NZ Maths Newsletter No.5 **July 2001**

July's newsletter is short on communications from the rest of the world so we have pretty much made it up ourselves. So, basically, we have the regular features with a twist of lemon. But we'd be glad to hear from you on anything that has been raised or on anything that you would like to raise. And we're glad to receive solutions to our problems for the usual fee (and come to think of it we've handed out a few of these lately).

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What's new on the nzmaths site this month?

We finally have units of work for the number strand. We have sorted our units into two "threads" of the number strand:

1. **Number Facts**

   Number Facts includes the basic addition and multiplication facts or "tables". It also includes facts or knowledge about the sequence of numbers, the identification of numerals and the place value nature of our number system. We have presented the material for Number Facts as activities rather than units of work. Most of the activities are designed to take less than 10 minutes and we imagine would be useful as maintenance activities for the whole class or groups of children. Alternatively the Number Facts activities may form the focus of a small group teaching session.

   Five Number Fact activities are now on the site and we plan to add at least another 20 by the end of the year.

2. **Operating with Numbers**

   Operating with Numbers is about the strategies that children use to solve number problems. We have written these as mini-units in the sense that they are designed for a single week. We imagine that as a teacher you might want to combine 2 or 3 of our mini-units to form a substantial unit of number.

   By the start of July we will have six Operating with Numbers units on the site and plan to add another ten units by the end of the year.

Each of the units and activities are linked to the Levels and Achievement Objectives of *Mathematics in the New Zealand Curriculum*. They are also linked to a single learning sequence, which describes a progression from counting-by-one strategies to strategies that use proportional thinking. This learning sequence is discussed in depth in the Information section of the number component.

What's the point • ?

In last month's newsletter we received some comments on the "oh point seven five" that appeared in Kaye Stacey's comments. As our correspondents said, "***zero*** point seven five" is what we meant to say.

Numeracy, Exemplars and the Curriculum Stocktake

Numeracy 1: On Wednesday 30th May a meeting of the Numeracy Development Project (NDP) Reference Group was held in Wellington. Many of you have been involved in the NDP and many more of you will gain first hand experience of it before too many years have passed.

The Project has grown out of Count Me in Too but is now further down the track than it's Ozzie parent. Essentially it is about teaching Number and it is based on observing the progression that children pass through as they gain a gradually more sophisticated concept of Number and how to apply it. The kind of progression behind the Project is illustrated by the development of addition. Children first of all are unable to add because they don't know the number sequence. Then they add by counting all of the objects in the given two sets. From here they realise that it is more efficient to count on from one of the numbers in the addition. At a later stage they have a better feel for number and so might add 12 and 13 by remembering that 12 + 12 = 24 and so 1 more makes 25 or by "bridging" to a decade so that 12 + 13 = (12 + 8) + 5 = 20 + 5 = 25 or by separating out the tens and the units so that 12 + 13 = (10 + 2) + (10 + 3) = (10 + 10) + (2 + 3) = 20 + 5 = 25.

The two leading lights in the NDP are Peter Hughes (Auckland College of Education) and Vince Wright (University of Waikato). We hope to get a longer article from them in a forthcoming newsletter. In the meantime, if you would like to ask any questions about the NDP, then please contact us and we'll do our best to have them answered.

Numeracy 2: At the same meeting, a definition of Numeracy was produced that should be in schools very soon. This is a broad definition that includes more than just arithmetic.

Exemplars: These were the final part of the meeting of the 30th. The group that is developing the maths exemplars also bases its ideas around progressions. The first exemplar task has now been exposed to thousands of students and as a result has been modified and the progression pretty much confirmed. This task is essentially the following: Will this table fit through that door? By how much?

The progression that is being seen here is first direct comparison where the child moves the table to the door for a direct check. Then an indirect comparison is made using string, say. This is followed by a non-standard measurement where hands or books or rods are used as the non-standard unit. All of these steps show children at progressively higher stages of Level 1. From here the students move on to Level 2 and standard units. At Level 3 students may see that the problem can be done in more than one way. At Level 4 they can enunciate this and say in what circumstances it is more convenient or sufficient to use one measurement method over another.

It is hoped that teachers will find the highest "step" that a particular child can reach on this progression and then provide activities that will move the child to a higher step.

The second task being trialled is on probability. This is causing some difficulties as probability appears to not be well understood. Right now a geometry exemplar task is being developed. This has a progression related with the identification of shapes using basic geometric properties and a progression that relates strongly to the concept of angle as applied to tessellations. We hope to have more on these in a later newsletter.

Curriculum Stocktake: Now that all of the curricula for the main learning areas have been finished, the Ministry of Education is starting to think about what modifications should be made to them. On May 31st, there was another Wellington meeting that considered aspects of the Maths Curriculum. At this stage there is no plan to change anything. The current round of discussions is simply looking at the issues and will make recommendations for another group to consider later.

One hope expressed was that only minor changes would be made to the curriculum. There was a feeling in favour of slow evolution rather than drastic change. After all, MiNZC isn't that bad is it?

Diary Dates

3 July to 6 July: Wellington 2001: A Maths Odyssey (NZ Association of Mathematics Teachers Conference No. 7)
Information can be found on www.nzamt.org.nz .

27 July: Closing date for Applications for the New Zealand Science, Mathematics and Technology Teacher Fellowships.
Information, can be found on
http://www.rsnz.govt.nz/awards/teacher_fellowships.

13 August to 17 August: Mathematics Week
Information can be found on www.nzamt.org.nz .

News From the USA

In the April *Notices* of the American Mathematical Society there was an article entitled "Spotlight on Teachers". This outlines three national reports on the teaching of mathematics in the US. These are "Before It's Too Late"

(http://www.ed.gov/americacounts/glenn/ - also known as the Glenn Report, 'Glenn' as in 'astronaut'); "Educating Teachers of Science, Mathematics, and Technology" (http://www.nap.edu); and "The Mathematical Education of Teachers" (http://www.maa.org/metdraft/index.htm). It would seem that America is worried about the mathematical education of its children as these have all been produced with the backing of important national bodies. It clearly sees mathematics as fundamental for individual and national success and it sees the quickest way to improve mathematical achievement for all students is to improve teaching. Goal 3 of the Glenn Report is to "Improve the working environment for K-12 mathematics and science teachers and make the teaching profession more attractive."

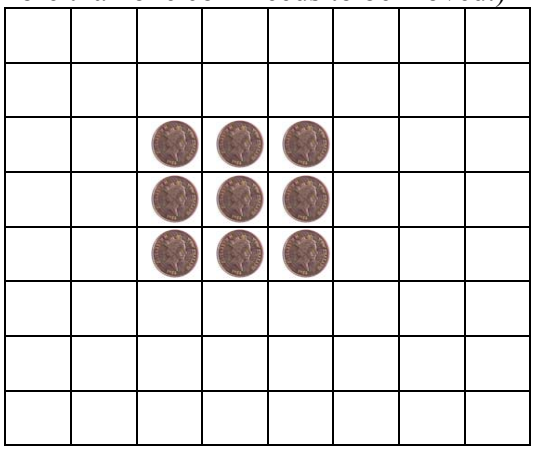
The other two reports are concerned about the preparation of teachers. The second report above finds, among other things, that (i) the preparation that many colleges and universities provide to those intending to become teachers does not meet the needs of the modern classroom; and that (ii) many professional development programs for continuing teachers do little to enhance teachers' content knowledge or the techniques and skills they need to teach science and mathematics effectively. Both this and the third report pay attention to teacher knowledge and teacher development. The third report says "prospective teachers need mathematics courses that develop a deeper understanding of the mathematics they will teach." It goes on to recommend "[primary] teachers (K-4) should take at least 9 semester-hours of mathematics courses on fundamental ideas of [primary] school mathematics." Middle grade teachers should take even more maths.

So it looks as if the USA is taking its mathematical bull by the horns. Do we have the same problems here? Are the solutions the same?

Anyone wishing to see the *Notices'* article should email Lenette Grant at the University of Otago (lgrant@maths.otago.ac.nz). She will fax you a copy free of charge.

The June Solution

Last month we asked the following question. Place 9 coins in a 3 by 3 array somewhere in the middle of a chessboard. A coin can 'take' another coin by jumping over that coin and landing on an empty square. Show that in a sequence of 8 'takes', all the coins except one can be removed. Is it possible for the last coin to end up on its original square? (More than one coin needs to be moved.)



We received this winning entry from Andy who will receive a petrol voucher for his efforts; well Done! Andy's solution follows:

> "Coins are numbered 1 to 9, as most people would, from left to right and top to bottom ie.
> 1 2 3
> 4 5 6
> 7 8 9
>
> 2 takes 3,
> 8 takes 9,
> 8 takes 6,
> 1 takes 8,
> 2 takes 1,
> 7 takes 4, then 2, and lastly the centre 5 to end up back on it's own starting point, within 8 'takes'."

The interesting thing about this problem is that it can be developed into quite an investigation. After a little work it's possible to solve this more complicated looking problem. Place 2704 coins in a 52 by 52 array somewhere in the middle of a chessboard. (Of course, it has to be a pretty big chessboard!) A coin can 'take' another coin by jumping over that coin and landing on an empty square. Show that in a sequence of 2703 'takes', all the coins except one can be removed and the last coin can end up on its original square. We'll find another petrol voucher for a solution to this.

Problem of the Month

> The Census Takers Problem
>
> A census taker approaches a house and asks the woman who answers the door, "How many children do you have, and what are their ages?"
> Woman: "I have three children, the product of their ages are 36, the sum of their ages are equal to the address of the house next door."
> The census taker walks next door, comes back and says, "I need more information."
> The woman replies, "I have to go, my oldest child is sleeping upstairs."
> Census taker: "Thank you, I have everything I need."
> Question: What are the ages of each of the three children?

Once again we will give a $50 petrol voucher to (i) anyone who sends us a solution to this month's problem (we'll choose one at random if we have a deluge) or (ii) anyone who sends us a problem that we can use here next month. Please send your solutions to joe@nzmaths.co.nz

All the best for your teaching.

Gill, Derek and Joe.