



THE UNIVERSITY OF THE THIRD AGE

Mathematics and Statistics



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A few words of introduction

Stephen Lyon, Mathematics Specialist at the National STEM Learning Network continues with his introduction to some resources on the National STEM Learning website.

We are introduced to the organisation Adults Learning Mathematics by its Chair David Kaye and Treasurer Beth Kelly in 'Fascinating Mathematics'.

We examine the interlinking of different problems.

Our book review is of a little book on Numbers.

Newsletter articles, puzzles and book reviews are most welcome (max 250 words)

Problem Sheets and Solutions

Do continue sending in ideas for problems and sample solutions to Andrew Holt (draaholtco@yahoo.com) for use in future editions of Andrew's problem sheets. The next one is planned for April 2019.

Future Newsletters and Problems

Newsletters are planned for April, August and December to coincide with problem sheets, with sample solutions sent out a week after the problems.

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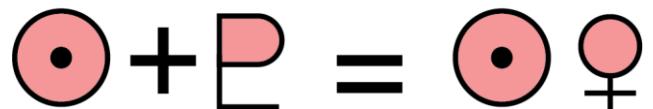
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Stephen Lyon, Mathematics Specialist, National STEM Learning Network continues from the last newsletter:

Free Resources and Teaching Ideas from STEM Learning

The National STEM Learning website has recently added a number of interesting, useful and engaging collections of resources.

The '[1001 Math problems](#)' collection contains a series of interesting problems and puzzles. The '[Cryptarithms](#)' resource contains a variety of puzzles similar to this one



Find the value of each symbol.

This activity is discussed in more detail in the [Secondary Mathematics Community Group](#) on the STEM Learning website

[It might be useful to point out, for clarity, that each distinct symbol represents a different digit from 0 to 9]

SYMMetryplus and Mathematical Pie

The **Society of Young Mathematicians** (SYMS) members receive the termly SYMMetryplus and Mathematical Pie delivered direct to their homes for £10.99 per year (www.m-a.org.uk/SYMS) containing mathematics problems, puzzles and articles. U3A members are very welcome to join SYMS.

Triangular numbers

In the August newsletter we suggested exploring connections in solving the following problems:

1. How many choices could I make of 2 books to take on holiday from 6 books I have yet to read?
2. At a party 6 guests shake hands with each other. How many handshakes take place?
3. How many balls fit into a snooker triangle?

You may have noticed that for all these problems a key link is the calculation of the triangular number

$$1+2+3+4+5 = (6 \times 5)/2$$

As an example, we could look at Question 1 in at least two ways.

i) Let us call the 6 books A, B, C, D, E and F. Taking book A we could pair this with any of the other 5 books B, C, D, E or F giving 5 choices AB, AC, AD, AE, AF. Book A can now be put aside as we have accounted for all pairs that include book A. Taking book B we can pair this with any of the other 4 books C, D, E or F giving a further 4 pairs BC, BD, BE and BF. Book B can now be put aside and repeating the above process we can add the pairs CD, CE and CF; DE and DF; EF giving a total of $5+4+3+2+1$ pairs.

ii) Looking at the problem a different way. Any of the 6 books can be paired with any of the other 5 books giving $6 \times 5 = 30$ pairs. AB is the same pair as BA, and so we have counted each pair of books twice, so the number of distinct pairs is $(6 \times 5)/2 = 15$.

Spotting connections is a powerful way of developing both understanding and problem-solving ability.

Book review

Numbers: A very short introduction
by Peter M. Higgins, Oxford University Press (2011)

This pocket-sized book became an enjoyable companion as I waited for buses and had spare moments on my travels. Peter Higgins is clearly both an expert and a good communicator. Examining the number line, he considers the different types of number that lie on it including the primes, rationals and irrationals and the challenges of counting them. He introduces us to Cryptography, Fibonacci numbers, Hailstone numbers (see below) and Stirling numbers, to name a few, moving on to complex numbers, adding interesting historical detail as he progresses.

Hailstone numbers

Take a whole number n . If it is even, then divide it by 2, otherwise replace it by $3n+1$. Following these rules, starting with $n = 7$ we get the sequence.

$7 \rightarrow 22 \rightarrow 11 \rightarrow 34 \rightarrow 17 \rightarrow 52 \rightarrow 26 \rightarrow 13 \rightarrow 40 \rightarrow 20 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1 \dots$

1. What happens after 1?
2. Does every sequence progress to 1?
3. What happens if we change the rules slightly e.g. if we replace $3n+1$ by $3n-1$?

Fascinating Mathematics

Why would you be interested in learning or teaching Mathematics? Many people have very mixed feelings about mathematics, but even after finishing school and college many years ago, some are still fascinated to learn particular topics or find out more about the history of mathematics or its influence in society.

Adults Learning Mathematics (ALM) is an international forum for researchers and practitioners, which covers a range of aspects of mathematics. For example: ways of teaching and learning mathematics with adult learners (e.g. curriculum, pedagogies), mathematics for citizenship (e.g. mathematical literacy), mathematics in and for work (e.g. technological literacies), mathematics and societal effects (e.g. critical mathematics, PIAAC research), as well as good practice in adult mathematics education and lifelong learning.

Founded in 1992, our membership now extends across Europe, the Americas, and Australasia, and includes some leading figures in mathematics education research, policy and practice, many numeracy practitioners, and postgraduate researchers. Our annual conferences offer unique opportunities to present new thinking and research within a supportive and friendly environment. Conference proceedings are published annually, along with an International Journal of peer-reviewed papers.

We invite you to visit our website at <http://www.alm-online.net/about/welcome/> to view our publications and webinars. If you are interested you could subscribe to our bi-monthly bulletin or join our group.

If you would like to find out more or have a question you can contact David Kaye, Chair or Dr Beth Kelly, at treasurer@alm-online.net.