THE UNIVERSITY OF THE THIRD AGE

Mathematics and Statistics

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A few words of introduction

Ems Lord, Director of NRICH, shares with us some coping strategies when stuck in problem solving.

We are introduced to the London Mathematical Society.

Our book review is of a little book on Applied Mathematics.

I am interested in knowing group members motivation and background. See the request on page 2.

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

Number Theory Course

In 2017 Andrew Holt wrote a Number Theory Course for U3A On Line Australia. It later ran as a U3A Maths course in the UK with about 20 participants.
This 7 unit course explains what the basic concepts and ideas are but with limited proofs and was aimed at people with just school maths as a background. It contains a mix of 'Recreational Maths' and some deeper serious topics (which will be of interest to those with a more advanced maths background). Although the copyright is held by U3A On Line Australia, they have agreed that the material can be used by UK U3A Maths Groups in face to face meetings. Andrew has submitted this course to U3A Resources.

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Ems Lord, Director of NRICH and President of the Mathematical Association 2019-2020 writes:

At NRICH (https://nrich.maths.org/), the home of rich mathematics, we've been focusing on identifying coping strategies for when we get stuck solving problems. In our school days, we may have been shown some worked examples by our teacher and then asked to answer a dozen similar questions.

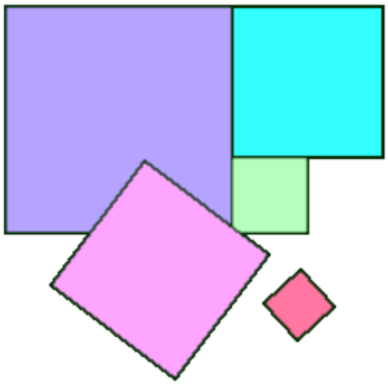
If we got stuck, it was rarely for very long, because a teacher could come to the rescue. However, mathematicians researching the very limits of humanity's mathematical understanding often get stuck too, but they do not have a teacher to turn too! Of course, most mathematicians do not work alone for such prolonged periods without discussing their work with others, so help may be at hand!

Otherwise, there are some straightforward approaches which we've found helpful when we get stuck. These include simplifying the problem, drawing a diagram, remembering when we've solved a similar problem and trying a similar strategy and even working backwards (Hungarian mathematician George Polya referred to this approach 'doing and undoing'). If we're still stuck, we often find that leaving the problem alone for a while and coming back to it later can help too!

The NRICH team have been designing problems which might require some, or all, of those strategies to reach a solution and one of our favourites is Alison's Quilt (continued on page 2) .

Alison's Quilt (https://nrich.maths.org/13124)

Alison joins together nine squares with side lengths $1, 4, 7, 8, 9, 10, 14, 15$ and 18 cm with no gaps and no overlaps, to form a rectangular quilt.



Can you find the dimensions of the finished quilt, and show how Alison fitted the squares together?

Alison wants to make a second quilt from ten squares with side lengths $3, 5, 6, 11, 17, 19, 22, 23, 24$ and 25 cm.

Can you find the dimensions of this quilt?

Once you've found an answer, or if you need a hint, you can compare your solution with others submitted to NRICH (https://nrich.maths.org/13124/solution). If you'd like to try some similar problems, which also require resilience and perseverance to reach a solution, then click (https://nrich.maths.org/13179).

Book review

Applied Mathematics: A very short introduction by Alain Goriely, Oxford University Press (2018)

This pocket-sized book is another of those enjoyable companions as I waited for buses and had spare moments on my travels. Alain Goriely explains the nature of applied mathematics and uses applications of mathematics to illustrate the role that mathematics plays in science.

The London Mathematical Society

The London Mathematical Society (LMS, https://www.lms.ac.uk/) is the UK's learned society formed in 1865 for mathematics. Its purpose is the advancement, dissemination and promotion of mathematical knowledge, both nationally and internationally. As one of its many activities it organises popular lectures each year. These are available on YouTube (search LMS Popular). U3A Resources hold some earlier lectures in DVD form. These lectures present stimulating topics in mathematics and its applications to a broad audience. They are designed to be intelligible to a non-specialist audience, although A-levels are useful. The lecturers are always chosen for their mathematical distinction and their ability to communicate.

Hailstone numbers

In the December newsletter we introduced 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→22→11→34→17→52→26→13→40→20→10→5→16→8→4→2→1…

After 1 you will observe that the sequence circles through 4, 2, 1. All known sequences progress to 1 but no one has yet proved that this will always be the case (The Collatz conjecture). If we change the rules, say replacing 3n+1 by 3n-1, then the sequence appears to behave a little more erratically. Thus 7 → 20 → 10 → 5 → 14 → 7...

Background and Motivation

To build up a bigger picture I would love to hear from individual members of mathematics and statistics groups about their background and motivation for attending their U3A mathematics and statistics group. (Responses please to david.martin@answers.me.uk)