Our next meeting

Thursday, October 3rd 2019 at 7pm for 7.30pm in the MALL, School of Mathematics, University of Leeds

Let's work together: Effective collaboration in the mathematics classroom

A talk by the current Mathematical Association President, Ems Lord, who is Director of NRICH.

In this highly interactive workshop, Ems will share some of her favourite rich mathematical activities, exploring ways to maximise their potential for developing collaborative problem-solving skills. During the session, Ems will offer an insider's guide to the NRICH website, including top tips for classes hoping to see their solutions published on NRICH.

Officers of the Yorkshire Branch of the Mathematical Association 2019-20

President: Bill Bardelang (rgb43@gmx.com)

Secretary: Alan Slomson (a.slomson@leeds.ac.uk)

Treasurer: Jane Turnbull (da.turnbull@ntlworld.com)

See overleaf for *Mathematics in the Classroom*

A date for your diary

Tuesday, 3 December 2019 at 7.30pm

Our famous Christmas Quiz

Christmas cheer and lots of fun!

in the MALL School of Mathematics University of Leeds

+ + + +   + + + +

Please bring our events to the attention of your colleagues and anyone else who might be interested in them.

+ + + +   + + + +

Reminder:

Our centenary celebration takes place on Saturday, May 9th 2020.

The above photograph was taken at the 50th anniversary lunch in 1970.

**Do you recognize anyone?**

The area of an octagon

The vertices of an octagon lie on a circle.

The octagon has four sides of length 1, and four sides of length 3, in some order.

What is the area of the octagon?

Hint: One possibility for the octagon is shown in the diagram. Going round the octagon clockwise starting from the uppermost vertex, the lengths of its sides are 3, 3, 1, 3, 3, 1, 1, 1 in this order. The sides of different lengths could occur in a different order. Does this affect the area of the octagon?
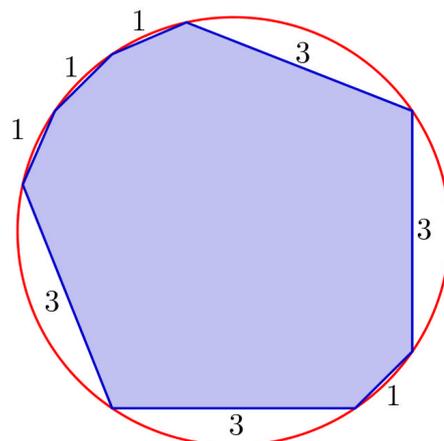
How Many Routes?

In the last issue we asked in how many different ways starting at the top square you could reach the bottom row of the grid shown in four moves, where a move consists of moving from one square to one of the squares below it, either directly below or diagonally to the left or the right.
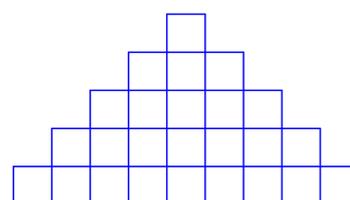
Method 1

A standard method for a problem of the type is to count, row by row, the number of routes to each square, taking into account the squares it can be reached from in one move.

For example, the square labelled *** can be reached in one move from any of the three squares labelled * in the row above. Therefore the number of ways of reaching the square labelled *** is the sum of the number of ways of reaching the squares labelled * . That is 3 + 6 + 7 = 16.

					Totals
1					1
1	1	1			3
1	2	3	2	1	9
1	3*	6*	7*	6 3 1	27
1	4	10	16***	19 16 10 4 1	81

The totals of the numbers in each row give the number of ways of reaching a square in that row. So there are 81 ways of reaching a square in the bottom row.

Method 2

We see that the row totals are successive powers of 3. This suggests a quicker method.

At each move we can go either left (L), straight down (D), or right (R).

Therefore a route to the bottom can be described by a sequence of four instructions, *WXYZ,* each of which is either L, D or R.

Since there are 3 choices for each of *W*, *X*, *Y* and *Z*, the total number of routes from the top row to the bottom row is $3 \times 3 \times 3 \times 3 = 3^4 = 81$.

Follow up question

The numbers in the table above will remind you of Pascal's Triangle. Is there a neat formula for the numbers in this table, similar to the formula for the binomial coefficients?