



Central Council of Church Bell Ringers

What is a peal?

One sentence:

A peal is the 'gold standard' change ringing performance during which the bells are rung continuously in over 5000 different sequences, without visual aids, typically taking 3 hours.

A short paragraph or two:

Bells rung English-style are uniquely controlled with ropes and wheels to enable ringers to ring predefined sequences of changes or permutations. A peal is a non-stop sequence of a minimum of 5,000 changes where each sequence is different and cannot be repeated on seven or more bells. This takes around three hours to ring and is the bell ringers' equivalent of a marathon, requiring concentration and stamina to complete the peal.

Peals are often rung for special celebrations, such as Royal births or weddings or to mark local events, or just for pleasure. Ringers enjoy ringing peals for the sense of achievement provided and for the highest possible standard of ringing that can often be achieved during such long periods. When peal attempts fail it is usually because one or more of the ringers makes a mistake. Small slips are recoverable, from the knowledge of the method, and how the 'work' of different bells fits together. But bigger trips can cascade, and because the paths of different bells intermesh, one wrong bell alters the sign posts used by the others. Others can be caught out and make another trip, and so on. Once the ringing destabilises, it is hard for any but the most clear headed to retain their bearings, and the method 'fires out'. Peals can also fail due to conductor error and mechanical problems with the bells, such as a rope breaking, or ringers becoming unwell.

Around 5000 peals are rung each year.

Why do ringers ring peals?

- As a special celebration.
- Because it is a challenge, like climbing mountains, and not all attempts are successful.
- Because it is rewarding for the best ringers to ring at their best with other excellent ringers
- Because it is a good way to introduce newer ringers to the excellence that can be achieved
- Because ringers, like many others, like to collect things and some will want to ring lots of different methods and ring in lots of different places, as well as counting how many peals they have rung and competing with others. Some ringers have rung thousands of peals.

Other information:*What was special about the peal in 1715?*

Ringers were aware that the maximum number of different orders for seven bells to sound was 5040 – factorial 7, for the mathematically-minded: $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 5040$. Most change ringing was done on six, seven or eight bells in those days and ringers knew that 5040 changes would take around 3 hours to ring, and was therefore feasible. The maximum number on 8 – $5040 \times 8 = 40,320$ – would take around 24 hours to ring and was therefore considered impossible (although it has since been done). Ringers interested in mathematics and ringing compositions have always been keen to try to perform new things and create new records. In the early 18th Century our predecessors were sure it was possible to compose a peal of 5040 different changes, in a recognised pattern or method, and spent much effort working out how to do it and how to prove that no change was repeated. There were many attempts to ring a peal of 5040 different changes around this time and others were probably successful, but the peal in 1715 is the first one for which we have a record of where it was rung and who rang in it.

How does the maths work?

The mathematical permutations needed to produce changes, or rows, for ringing are generated by the ringers changing the position of each bell in relation to the others by one position at a time, so that, for example, a bell that rings first (or 'leads') one row can only move to be in second place in the next row or to remain in the lead position. There are hundreds of different permutations, known as methods, that can be rung and the ringer learns the pattern that one bell makes as its position alters in relation to the others row by row. Ringers do not read from music as they ring, they learn the pattern off by heart. Some patterns are fairly simple, others can be amazingly complex – this is part of the challenge. All ringers in one peal will be ringing the same pattern but starting from different places, rather like racing cars going round the same circuit but starting at staged intervals around it. Unlike racing cars they maintain the same distance apart throughout. To complete the full pattern once can take around ten minutes (once round the circuit), but variations are called out by the conductor of the peal, causing some of the ringers to move their bells to a different point in the pattern (to change places with another car going round the circuit). This extends the period of ringing from ten minutes to any time required, such as three hours and 5040 changes or rows.

The race track analogy of course does not work totally. Ringing a peal is a team effort and can perhaps be more like a rowing marathon, if there were such a thing. Everyone needs to keep going at the same speed from start to finish without making a mistake or taking a break. If anyone becomes unwell or wants to stop or if the boat starts to sink the marathon is over and unsuccessful.

The method that was rung in 1715 is shown here, with the starting position of each bell shown.

Plain Bob Triples

