

Michael Aschbacher – Mathematics

“for his fundamental contributions to one of the largest mathematical projects ever, the classification of finite simple groups, notably his contribution to the quasi-thin case”

Symmetries have long captured mathematicians' interest. An equilateral triangle that is rotated one or two thirds of a full turn, for example, has the same orientation as the original figure. This kind of triangle thus has three rotational symmetries (the first position, before it is moved at all, counts as one symmetry). Similarly, there are 60 rotations that preserve a dodecahedron (see the diagram below). The symmetries for a geometrical figure make up what are called a 'group of symmetries' (or 'symmetry group'). In the 19th century, the 'group' notion was found interesting in many other contexts, and abstract group theory was developed.

Each group with a finite number of elements can be divided into components known as 'simple groups'. This is analogous to how an integer (whole number) can be written as the product of prime numbers; here, the simple groups play the role of prime numbers. Both the above examples (the triangle and the dodecahedron) are simple groups, with three and 60 elements respectively. Trying to find or classify all simple groups was a natural problem to address. The task of classifying all the finite simple groups came to be the largest single project in mathematical history. It also revealed intriguing patterns with several infinite series, along with a total of 26 'sporadic groups', mostly discovered in the course of the work. The most complex of these sporadic groups, containing 808017424794512875886459904961710757005754368000000000 elements, is known as the 'Monster group' owing to its enormous size. This group has proved to have startling connections with other disciplines, such as number theory and mathematical physics.

Michael Aschbacher made several essential contributions in this project, and by approximately 1980 the work was almost entirely finished. A gap, which came to be known as the 'quasi-thin' case, remained before the classification could be completed. The missing case proved highly challenging and the project was not concluded until two books written by Michael Aschbacher and Stephen Smith, with a total length of more than 1200 pages, were published in 2004.

Michael Aschbacher was born in 1944. He received his BS degree at the California Institute of Technology, to which he returned in 1970 (after gaining a PhD at the University of Wisconsin–Madison), and where he is now the Shaler Arthur Hanisch Professor of Mathematics. He has made fundamental contributions to group theory, especially regarding the classification of finite simple groups. He was awarded the Cole Prize by the American Mathematical Society in 1980, and became a member of the United States National Academy of Sciences in 1990.

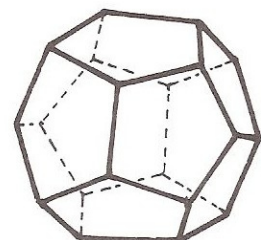
Contacts, members of the Prize committee

Professor Jan-Erik Roos, +46 18 51 87 34, +46 8 16 45 51, jeroos@math.su.se

Professor Torsten Ekedahl +46 08 16 45 26, teke@math.su.se

Link

<http://www.math.caltech.edu/people/asch.html>



Dodecahedron