concepts that are introduced in the lectures will be driven home. For a book that is sponsored by the UNESCO, the production value is unfortunately quite poor. Spelling mistakes abound; proof reading has been poor. What makes up for this, apart from the price, is the easy colloquial style of the exposition — it is written pretty much as it could be spoken, and that goes a long way in enhancing the value of the book as a teaching aid. That said, I do wonder which universities or colleges will have the imagination or the courage to innovate a syllabus that could have a course based on this book as an integral part. I hope that they are out there – the effort that the authors have put into the book is considerable, and the result is valuable; it would be a pity to see it go waste.

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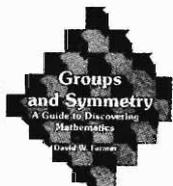Email:rama@jnuniv.ernet.in,rama@alumni. princeton.edu, Website: http://202.41.10.146.

Groups and Symmetry

Geetha Venkataraman

Groups and Symmetry: A Guide to Discovering Mathematics
David W Farmer
Universities Press, 1998,
pp.102,Price: Rs. 85.

The aim of this book is to introduce the reader to 'real mathematics' through a process of self-discovery. The general principal followed is to introduce concepts via examples and set tasks for the reader on various topics which will take them on a voyage of self-discovery. There are hints and pointers given so that the reader has an idea of the results he or she may find.

So what is this book about? As the title suggests, a large part of the book is devoted to the concept of symmetry and attempts to discover groups via symmetry. This is definitely not a book on 'Group Theory' but it will give the reader an idea of what groups are.

The first chapter introduces the idea of infinite square, hexagonal and triangular grids and the second chapter describes the rigid motions of the plane, namely translation, rotation, reflection and glide-reflection.

Symmetry of planar figures is discussed in the third chapter. A symmetry of a planar figure is basically a rigid body motion which leaves the figure unchanged. This is probably the most interesting chapter in the book. The reason is that while there is still a lot· of discovery type tasks set out for the reader, it is well organised and attempts to lay down some kind of formal notation to describe basic symmetries. It then lets the reader translate freely between the symbols

describing various combinations of symmetries and actually manipulating the figure that undergoes these rigid body motions in succession. This gives the reader a concrete way of looking at what would otherwise be a purely algebraic manipulation of symbols under the rules that are laid down. Multiplication tables are introduced as tools which give complete information on what the result of combining two symmetries of the given figure is. The notion of inverse of a symmetry and 'symmetry type' is also laid out.

Chapters 4 and 5 talk about symmetries for strips and wall-paper patterns. Groups are introduced in chapter 5 informally as a set of legal moves of a square grid satisfying certain rules which essentially correspond to the concepts of closure, identity and inverses. (A legal move is a move which leaves the entire grid looking exactly the same after it is applied.)

Finite groups are discussed in chapter 6. The approach is informal and looks at the symmetry group of regular n-gons. The idea of subgroups is also examined. Examples of finite groups of numbers via the operations of addition and multiplication modulo a positive integer n, finite permutation groups, representation of permutations as product of disjoint cycles are discussed. 'Isomorphism between groups' is defined as a matching of elements which also gives a matching of the corresponding multiplication tables.

The last chapter talks about symmetry in real life and how you can use the tools developed in the book to analyse it. There are also various projects suggested which use group theory and symmetry to analyse puzzles, kinship relations, crystals etc.

This book will give an idea of what groups are and their role as a measure of how symmetric a figure is, but the lack of any formal foundation will leave the student with an incomplete picture of groups. On the other hand a final year school student or a first year undergraduate will have a lot to think about and will develop the process of discovering results for oneself on reading this book, though it will probably be best to read it with some level of supervision from instructors.

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The progress of Science is often affected more by frailties of humans and their institutions than by the limitations of scientific measuring devices. The scientific method is only as effective as the humans using it. It does not automatically lead to progress.

Steven Stanford Zumdahl