Review of “Symmetry A Very Short Introduction”, by Ian Stewart

by GPE.

10/06/2021

I was very excited about reading this book as I love symmetry and already have some background on the topic. The Oxford “A Very Short Introduction” series has many excellent titles across a vast range of subjects. They are aimed at the curious lay reader as “stimulating ways into new subjects”.

This particular book turned out to be a survey course in 8 chapters in group theory. Whilst I love group theory (the algebra behind symmetry), I have never been a fan of survey courses, as I would rather understand a little in depth than be introduced to a lot with very little explanation. Chapter 1 introduces the concept of symmetry in a variety of situations, which provide interest and focus. This is all very gentle.

The pace begins to pick up in chapter 2 with the exploits of Évariste Galois who tragically the night before getting himself killed in a duel at the age of twenty, introduced the group concept in his proof that it is impossible to solve the general quintic equation algebraically. Another highlight of this chapter is the material on elliptic functions but I feel it is all too brief.

Chapters 3 and 4 on types of symmetry and group structure were very good with clear explanations of symmetries of geometric objects and permutations. The section on group structure was good but I would have liked more detail on homomorphisms and quotient groups.

The next 2 chapters applies group theory to the 15 puzzle, the Rubik's Cube and Sudoku. And looks at the symmetries of sand dunes, snow flakes, spiral nautilus shells, and galaxies, as well as animal locomotion.

Chapter 7 was my favourite chapter because it gives some explanation of modern physical theory, looking at symmetries in the the laws of nature discussing Lie groups and Lie algebras , the Standard Model and the Eightfold Way of particle physics with some discussion of Noether’s theorem too.

The final chapter discusses the classification of finite simple groups and how they have been used to prove conjectures in pure maths and the monumental efforts that were required to do this.

I get the impression that this is a book the author rushed to produce. Occasionally there is mathematical terminology which is not defined (Google is your friend!). There is loads of interesting material in the book, but I think symmetry is perhaps just too broad a topic to be treated in 144 pages.