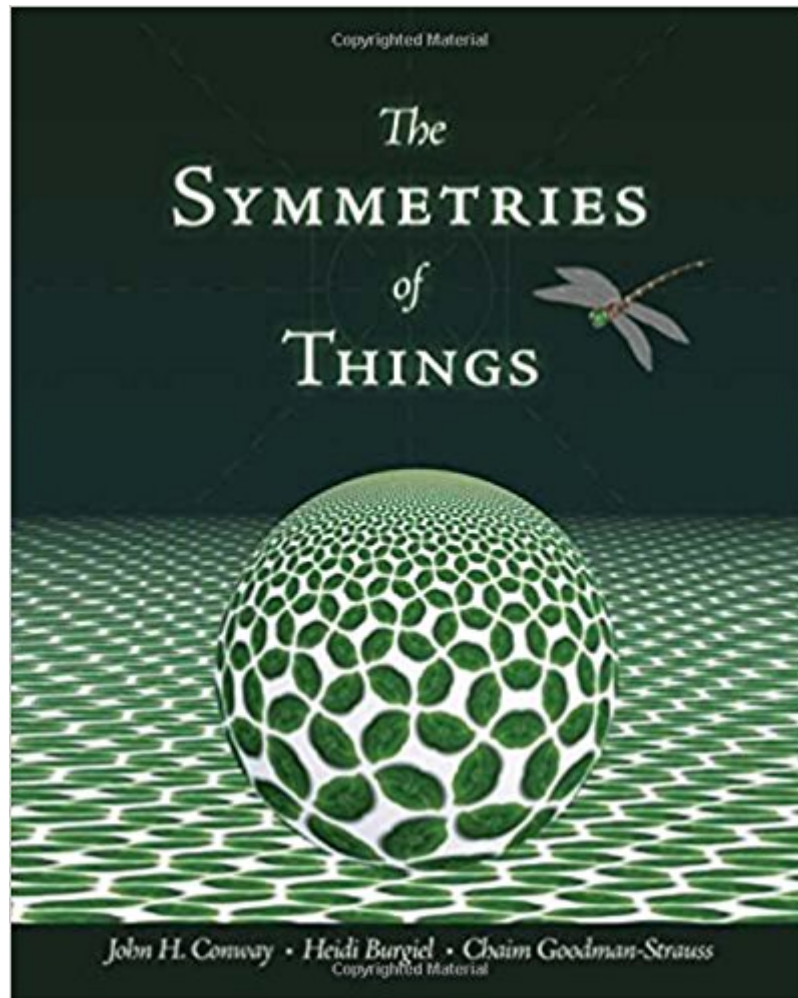




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# The Symmetries Of Things



## Synopsis

Start with a single shape. Repeat it in some way—translation, reflection over a line, rotation around a point—and you have created symmetry. Symmetry is a fundamental phenomenon in art, science, and nature that has been captured, described, and analyzed using mathematical concepts for a long time. Inspired by the geometric intuition of Bill Thurston and empowered by his own analytical skills, John Conway, with his coauthors, has developed a comprehensive mathematical theory of symmetry that allows the description and classification of symmetries in numerous geometric environments. This richly and compellingly illustrated book addresses the phenomenological, analytical, and mathematical aspects of symmetry on three levels that build on one another and will speak to interested lay people, artists, working mathematicians, and researchers.

## Book Information

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## Customer Reviews

The book contains many new results. ... [and] is printed on glossy pages with a large number of beautiful full-colour illustrations, which can be enjoyed even by non-mathematicians. -- EMS Newsletter, June 2009 One of the most basic concepts of art [is] symmetry. The Symmetries of Things is a guide to this most basic concept showing that even the most basic of things can be beautiful-and addresses why the simplest of patterns mesmerizes humankind and the psychological and mathematical importance of symmetry in ones every day life. The Symmetries of Things is an intriguing book from first page to last, highly

recommended to the many collections that should welcome it. -- The Midwest Book Review, June 2008 Conway, Burgiel, and Goodman-Strauss have written a wonderful book which can be appreciated on many levels. ... [M]athematicians and math-enthusiasts at a wide variety of levels will be able to learn some new mathematics. Even better, the exposition is lively and engaging, and the authors find interesting ways of telling you the things you already know in addition to the things you don't. -- Darren Glass, MAA Reviews, July 2008 This rich study of symmetrical things . . . prepares the mind for abstract group theory. It gets somewhere, it justifies the time invested with striking results, and it develops . . . phenomena that demand abstraction to yield their fuller meaning. . . . the fullest available exposition with many new results. -- D. V. Feldman, CHOICE Magazine , January 2009 This book is a plaything, an inexhaustible exercise in brain expansion for the reader, a work of art and a bold statement of what the culture of math can be like, all rolled into one. Like any masterpiece, The Symmetries of Things functions on a number of levels simultaneously. . . . It is imperative to get this book into the hands of as many young mathematicians as possible. And then to get it into everyone else's hands. -- Jaron Lanier, American Scientist, January 2009 You accompany the authors as they learn about the structures they so beautifully illustrate on over 400 hundred glossy and full-colour pages. Tacitly, you are given an education in the ways of thought and skills of way-finding in mathematics. . . . The style of writing is relaxed and playful . . . we see the fusing of the best aspects of textbooks -- conciseness, flow, reader-independence -- with the best bit of popular writing -- accessibility, fun, beauty. -- Phil Wilson, Plus Magazine, February 2009 This book gives a refreshing and comprehensive account of the subject of symmetry -- a subject that has fascinated humankind for centuries. . . . Overall, the book is a treasure trove, full of delights both old and new. Much of it should be accessible for anyone with an undergraduate-level background in mathematics, and is likely to stimulate further interest. -- Marston Conder, Mathematical Reviews, March 2009 Inspired by the geometric intuition of Bill Thurston and empowered by his own analytical skills, John Conway, together with his coauthors, has developed a comprehensive mathematical theory of symmetry that allows the description and classification of symmetries in numerous geometric environments. This richly and compellingly illustrated book addresses the phenomenological, analytical, and mathematical aspects of symmetry on three levels that build on one another and will speak to interested lay people, artists, working mathematicians, and researchers. -- L'Enseignement Mathematique, December

John H. Conway is the John von Neumann Chair of Mathematics at Princeton University. He obtained his BA and his PhD from the University of Cambridge (England). He is a prolific mathematician active in the theory of finite groups, knot theory, number theory, combinatorial game theory, and coding theory. He has also contributed to many branches of recreational mathematics, notably the invention of the Game of Life. Heidi Burgiel is a professor in the Department of Mathematics and Computer Science at Bridgewater State College. She obtained her BS in Mathematics from MIT and her PhD in Mathematics from the University of Washington. Her primary interests are educational technology and discrete geometry. Chaim Goodman-Strauss is a professor in the department of mathematical sciences at the University of Arkansas. He obtained both his BS and PhD in Mathematics at the University of Texas at Austin. His research interests include low-dimensional topology, discrete geometry, differential geometry, the theory of computation, and mathematical illustration. Since 2004 he has been broadcasting mathematics on a weekly radio segment.

This is the first review of a book I've ever posted on . I just want to say that if you're a non-mathematician this book may still have something to interest and intrigue you. I have taught it to math phobic non-math majors at the collegiate level, and it went over pretty well. If you're thinking it looks interesting but "too mathy" maybe you should take the plunge. There's plenty of math in there, but it's presented very gently. Or at least gently enough that a classroom full of people who have tried to avoid math all their lives found non-intimidating.

The book is separated into 3 clear sections. The first one is easily accessible to people with a limited mathematical background who, with little effort, will learn how to classify symmetries in the plane and sphere. The 2nd section can be followed with some effort by those with a better background but the 3rd section is probably for mathematicians. This is no fault of the authors who try to keep the demonstrations as intuitive as possible. Even if you only follow the demonstrations on the first section, you will want to browse the whole book as the drawings are amazing: the beauty of mathematics in plain view! Conway is a pioneer in this (and other) fields and the book bears the imprint of his unorthodox thinking.

This book has extremely high production values - the graphics are magnificent. It is interesting to

see the kind of topics that occupy mathematicians who study symmetry intensely.

The Symmetry of Things is a fantastic resource for mathematicians and artists alike. The artwork inside is amazing! And the book has spawned a great deal of artwork inside the mathematical art community. I thank the authors for this tremendous contribution to the literature.

This is not an ordinary book. It is really beautiful, really beautiful! And on the other hand it isn't afraid of describing the actual mathematical concepts. This is not an ordinary book, it really shows you how things can be visualized, from depicting how to "zip" the almost ghost-like blobs in Fig.8.2-5, that the order of operators in a group matters with a simple sketch in chapter 9, up to so many different views on the problems, that it would do no justice to the book to just have an enumeration here. This is the type of book I wish my parents had in their library when I was 16. Yes, it has many concepts that you will not be taught at high school, however, the visualisations and the patient tour from the authors, makes this a perfect book for an autodidact. You can do the rotations and mirroring of the beautiful Escher-like patterns in your head and are constantly taken one step further in the book to understand the underlying regularities. I feel this book is much more comparable to learning how to tie complex knots, then to learn, say, linear algebra. The only thing that would have benefited the reader, would be the connection to other scientific disciplines. It would be great to see so now and then what group theory brought to the table in chemistry, physics, cryptography, or machine learning. Especially, because the authors are not afraid to present complex mathematical objects, it might be trivial for them to do this and tell stories that are really hard to tell without such a detailed exposition as in this book. For me this book is like "Gödel, Escher, Bach" to me.

One of my new favorite books!

This came fast and in good shape. What a good reference and study book!

Bought it for my son. He loves it!

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