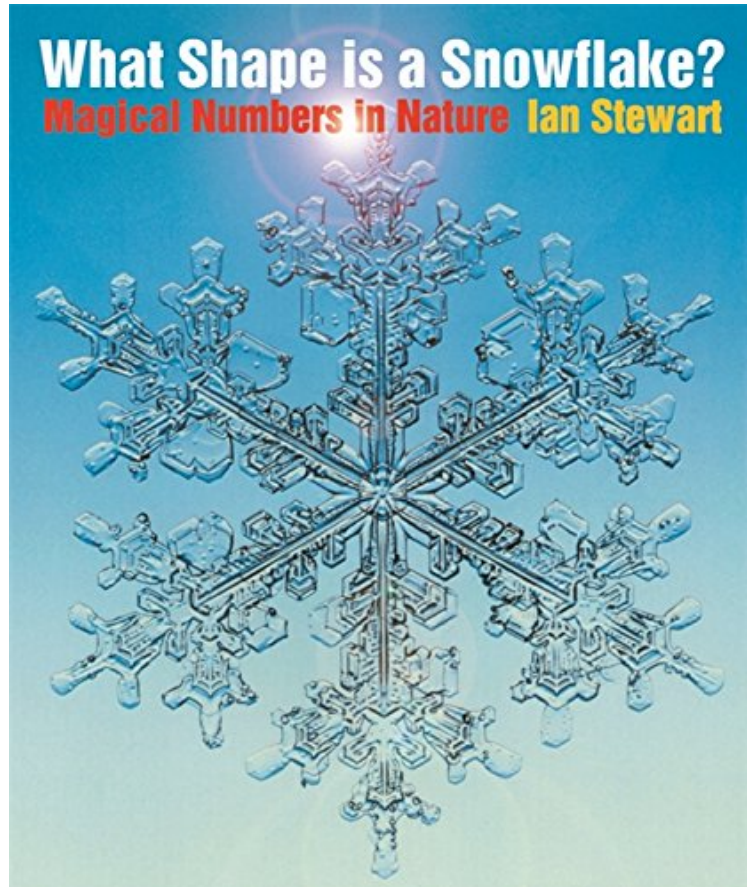


(Download) What Shape is a Snowflake?

What Shape is a Snowflake?

Ian Stewart

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Ian Stewart : What Shape is a Snowflake? before purchasing it in order to gauge whether or not it would be worth my time, and all praised What Shape is a Snowflake?:

1 of 1 people found the following review helpful. An Illustrated Tour of Mathematical Patterns in Nature. By mirasreviews In "What Shape Is a Snowflake?: Magical Numbers in Nature", author Ian Stewart uses a quest to understand why snowflakes form in unique six-sided designs to take the reader on a tour of mathematical patterns in nature. "Snowflakes are a showcase for the mathematics of pattern formation," he says. "What Shape Is a Snowflake?" is an overview of the mathematics behind nature's patterns, from the microscopic to astronomical. Stewart starts by hinting at the depth and implications of his seemingly simple question about snowflakes, presenting a little history of mathematicians' efforts to understand patterns, and explaining the significance of symmetry. Then he delves into the Why and How of patterns that manifest themselves in everything around us: big and small, living and non-living, spirals, wiggles, cycles, mirror symmetry, rotational symmetry, tiling patterns, spots and stripes, waves, lattices, and even patterns in time. When reading about patterns in living things, I could not help but doubt mathematical explanations of biological processes. But Stewart acknowledges this problem and makes the case that the principles

underlying which patterns can and will occur may be governed by mathematics, though the patterns are coded in genetics. The book's final section delves into some apparent inconsistencies in the links between mathematical laws and nature's patterns and mathematicians' continuing efforts to explain them with theories of bifurcation, symmetry-breaking, and fractal geometry. Finally, Ian Stewart answers that question about snowflakes -but not before he has posed a new question: What Shape Is the Universe? "What Shape is a Snowflake?" is a nice introduction to the mathematics of pattern formation for the layperson. It presents the ideas behind the patterns without mathematical formulae and with a great many color photographs and illustrations. It will pique the reader's interest in everything from ancient Pythagorean math to modern chaos theory by giving us a sense of what humans have learned about patterns and what continues to elude us.

32 of 32 people found the following review helpful. A Universe Full of Mathematics By Rob Hardy In *What Shape is a Snowflake? Magical Numbers in Nature* (W. H. Freeman), Ian Stewart has managed to write a wonderfully comprehensive and colorful mathematical tour of the universe from top to bottom without putting a single equation into his book. In fact, there aren't really many numbers. He gets to show what happens when a mathematician looks at the infinite aspects of the world. He writes, "I am a mathematician. I experience these wonders through a mind that has spent a lifetime learning how to detect patterns, how to understand patterns, how to find new patterns... I stand on the shoulders (and lean on the elbows) of giants, on five thousand years of mathematical history that has been groping toward such understanding. I see what all humans see, and in a few respects perhaps I see more. I see clues to rules, laws, regularities." The snowflake is key to his tour, and there is plenty to learn specifically from it, but since Stewart is keen to draw on patterns all over the place, the range of his book is amazing. In well connected chapters, looking closely at snowflakes takes him to the leafy patterns of frost on the window, the organization of leaves around spirals and Fibonacci numbers, the spiral of the nautilus shell, the stripes and amazing triangle patterns on other sea shells, the patterns of stripes on zebras and fish, the grooves in sand dunes and the lines of dunes themselves, the lines a sidewinder leaves in the sand, the synchrony of a millipede's legs and a horse's at different gaits, the oscillations of the legs of robots, the ups and downs of animal populations, the chaotic variations of weather and of the planets in the solar system, and the shape of the universe. It is clear that Stewart sees connections everywhere, and is only using the snowflake as an excuse to look at the foundations of physical laws, the nature of time, space, and matter, and why patterns in one field give clues to patterns in something entirely different. "I'm going on a journey in search of the snowflake's secret," he says, "and, with it, the deeper secrets of our astonishing universe. And you're coming with me." It's a beguiling invitation from a masterful guide. Naturally a tour of this type, with all it encompasses, is not going to be long on detail, and anyway, one would have to start getting into equations for that. There is a useful list for further reading at the back of the book, for those who insist on stronger doses of such stuff. Stewart's book, however, is an exhilarating, accessible, vividly illustrated voyage through classic and current mathematical ideas. By the end of it, a reader will understand that the snowflake's shape is determined by phase transition, bifurcation, symmetry-breaking, chaos, fractals, and other complexities. Oh, and the book does eventually reveal what shape a snowflake is.

4 of 4 people found the following review helpful. Required reading for everyone learning math. By Joseph Biskup Rob Hardy's review is an excellent summation of this excellent book. "What Shape is a Snowflake?" is a book about the big picture, about the meanings behind and the connections between big ideas. This book is not about details of applying or calculating under these frameworks. As has been stated before, this is an excellently illustrated and formatted book. The pictures and text dance with each other, nicely balancing and building interest in each other. As Mr. Stewart says, he sees mathematics and beauty as attached ideas and this book is an effort to show the beauty of mathematics. "Most people's mental image of mathematics is page upon page of complicated 'sums' - not an especially beautiful sight. I sympathize, believe me. But that's arithmetic, not mathematics (I'm quite passionate about this). Those symbols on the page come no closer to the subject's true beauty than the staves and semiquavers of musical notation come to a Beethoven symphony." As such, this is definitely a book about mathematics and definitely not about arithmetic. There are many references in the book to original publications and theories, and there is a short section at the end for further reading so anyone who wants more detail has a place to start looking. For me this book provided a clear and concise description of the ideas at the foundation of various mathematical principles. Mr. Stewart focuses his book on patterns and their implications. He talks about the different dimensions, scale, and symmetry of patterns, he talks about bifurcation, fractals, chaos, randomness, complexity and phase transitions. He also showed how these ideas and principles thread their way through literally everything in the universe. This book should be approachable for any child in junior high or high school. Additionally, I think it is an excellent introduction for any adult interested in understanding the world around us.

Think of the stripes of a zebra and the complexities of a spider's web. Think of a snowflake... These are natural patterns that have been recognized for centuries, and they can all be accounted for mathematically. In this enlightening book, Ian Stewart shows how life on Earth develops not simply from the outworkings of genetic processes, but also from the principles of mathematics. The result is a visually compelling guide to the links between mathematics and the natural world - a beautiful journey through the fields of science, mathematics, history and art.

From the Back Cover
PRAISE FOR STEWART'S FLATTERLAND
The most exciting book I have read this year...truly amazing. --A.S. Byatt
A book in which the hard science is as gripping as the fiction...one for anyone with an interest in where science comes from. --The Times
...an accurate, informative portrayal of contemporary mathematics without a single equation in sight. --Nature
A provocative, ambitious, and enjoyable attempt to ask and answer some of the most interesting Big Questions of modern science. --New Scientist
About the Author
IAN STEWART is Professor of Mathematics at the University of Warwick . He broadcasts regularly on television and radio, has written or co-authored more than 60 books. In 1995 he was awarded the Michael Faraday Medal by the Royal Society.
understanding of science.