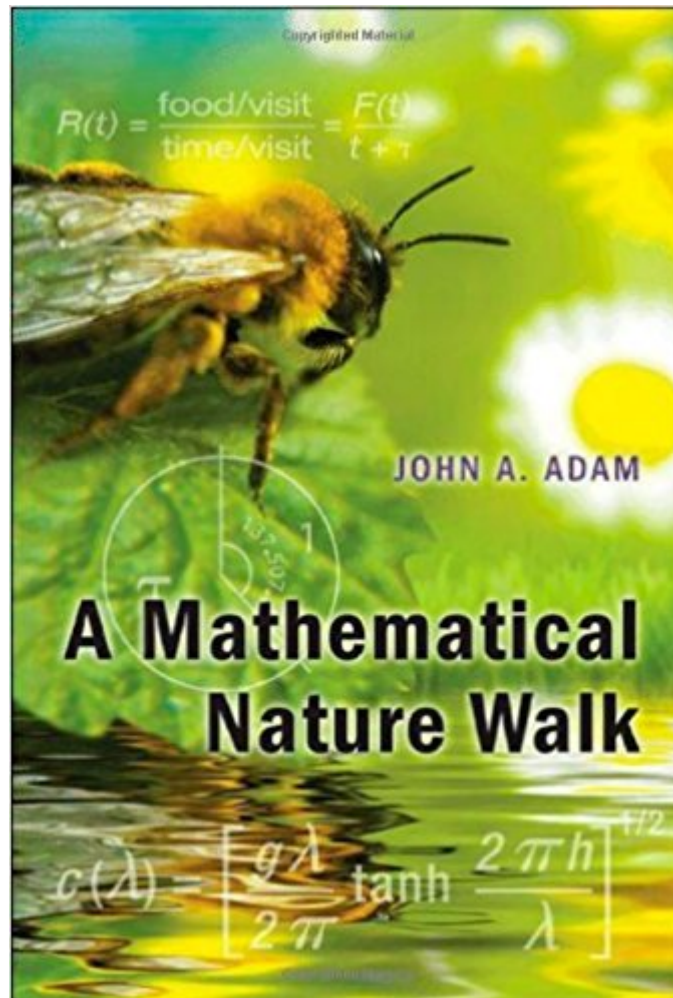




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# A Mathematical Nature Walk



## Synopsis

How heavy is that cloud? Why can you see farther in rain than in fog? Why are the droplets on that spider web spaced apart so evenly? If you have ever asked questions like these while outdoors, and wondered how you might figure out the answers, this is a book for you. An entertaining and informative collection of fascinating puzzles from the natural world around us, *A Mathematical Nature Walk* will delight anyone who loves nature or math or both. John Adam presents ninety-six questions about many common natural phenomena--and a few uncommon ones--and then shows how to answer them using mostly basic mathematics. Can you weigh a pumpkin just by carefully looking at it? Why can you see farther in rain than in fog? What causes the variations in the colors of butterfly wings, bird feathers, and oil slicks? And why are large haystacks prone to spontaneous combustion? These are just a few of the questions you'll find inside. Many of the problems are illustrated with photos and drawings, and the book also has answers, a glossary of terms, and a list of some of the patterns found in nature. About a quarter of the questions can be answered with arithmetic, and many of the rest require only precalculus. But regardless of math background, readers will learn from the informal descriptions of the problems and gain a new appreciation of the beauty of nature and the mathematics that lies behind it.

## Book Information

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## Customer Reviews

"[A] snappy guide to the mathematics of the outdoors. . . . A sharp eye and an ingenious mind are at work on every page. . . . Read this book with pencil and paper in hand. Then go forth, enjoy the

view, and impress your friends."--Laurence A. Marschall, *Natural History*"Mathematics professor John Adam has come up with a novel combination. This book will provide anyone with a solid grounding in mathematics with enough conversation starters to keep fellow walkers' brains working as hard as their legs."--Dominic Lenton, *Engineering & Technology*"A catalogue of playful inquiries and their mathematical solutions."--*Conservation Magazine*"Adam has written a terrific book that takes his earlier work a step further. . . . [T]his is a well written guide not only to seeing our world with simplified and useful models and mathematics, but to asking good questions of what we see and then answering those questions on our own. I found the book delightful, engaging, and interesting. It's written for anyone with a calculus background, and that's all one needs. If you're looking for a fun book with a touch of complexity, this is a good one."--David S. Mazel, *MAA Reviews*"For teachers who are interested in seeing how what they teach might be used or for students or parents who might be interested in seeing how mathematics might be used, this is an intriguing book."--*Mathematics Teacher*"[A]dam's love of both nature and mathematics is obvious, and his chatty style and sense of humour--look out for the question about spontaneously combusting haystacks--enliven a book that will get readers thinking as well as itching for a pleasant stroll."--*Physics World*"Indeed, Adam has deliberately reworked topics treated in *Mathematics in Nature* to make them accessible to a larger audience. Beyond insights into specific questions about nature, the general reader will find here a remarkably lucid explanation of how mathematicians create a formulaic model that mimics the key features of some natural phenomenon. Adam particularly highlights the importance in this process of solving inverse problems. Ordinary math becomes adventure."--*Booklist*"If you are a walker, as I am, your daypack probably contains sunscreen, a poncho, a floppy hat, and a pair of binoculars. After reading this snappy guide to the mathematics of the outdoors, by John Adam, a professor of mathematics at Old Dominion University in Virginia, you might consider tossing in a programmable calculator. . . . A sharp eye and an ingenious mind are at work on every page. . . . Read this book with pencil and paper in hand. Then go forth, enjoy the view, and impress your friends."--*Natural History*"There are now few (if any) areas of science where mathematics does not play a role and, by extension, many of the sights and sounds of nature can be studied using mathematics. This is the motivation behind *A Mathematical Nature Walk* by John Adam, which considers some of the natural phenomena that might be encountered on a walk in the countryside (or even just a wander around one's own garden)."--Sarah Shepherd, *iSquared*"[S]urprising and entertaining. . . . Adam's book is lucidly written, making it suitable for people of all ages."--*Good Book Guide*"The dedicated reader stands a lot to gain from delving into the text and thinking hard about the problems posed. As the saying goes, 'mathematics

is not a spectator sport,' so if this book is read with pencil and paper at hand, to scribble along and confirm understanding of the mathematical trains of thought--all the better."--Philip McIntosh, Suite101.com

"Finally a book that shows the general reader how mathematics can explain the natural phenomena that we continuously encounter but rarely understand. John Adam answers questions about nature's secrets--many of which we haven't even thought to ask. This is a delightful book."--Alfred S. Posamentier, coauthor of *The Fabulous Fibonacci Numbers*"John Adam's *A Mathematical Nature Walk* is a true gem of popular scientific writing. He adroitly does what all good science writers should do: he inspires readers first to observe and then to analyze the world outside their windows."--Raymond Lee, author of *The Rainbow Bridge*"With a mathematician's eye and a playful wit, John Adam takes a walk through the woods and returns with stories aplenty! His narratives are about nature and how things work, about looking analytically at the world around us, and about the art of creating mathematical models. For anyone with a mathematical bent who has ever asked 'what is that?,' this book will provide an interesting read and a valuable resource."--Kenneth G. Libbrecht, author of *The Snowflake: Winter's Secret Beauty*"Do not miss this memorable walk with John Adam, filled with delightful surprises that bring together nature, mathematics, and the infectious pleasure of thought, culminating in a special kind of wonder."--Peter Pesic, author of *Sky in a Bottle*"For generations, field guides to plants and animals have sharpened the pleasure of seeing by opening our minds to understanding. Now John Adam has filled a gap in that venerable genre with his painstaking but simple mathematical descriptions of familiar, mundane physical phenomena. This is nothing less than a mathematical field guide to inanimate nature."--Hans Christian von Baeyer, author of *Information: The New Language of Science*"When you see a spider's web bedecked with morning dew like strings of pearls or the lazy bends in a distant river valley, you are seeing mathematics as well as beauty. You will find equations in *A Mathematical Nature Walk* for the evanescent colors of the sky--as well as for why you can't fly over a rainbow. John Adam can help you see a world of algebra in a drop of water, and a Fibonacci sequence in a wild flower."--Neil Downie, author of *Vacuum Bazookas, Electric Rainbow Jelly, and 27 Other Saturday Science Projects*"John Adam presents a wonderful set of mathematical inquiries into a broad range of natural phenomena. This rich book will be interesting to mathematically minded readers who are inspired by nature."--Will Wilson, Duke University"In *A Mathematical Nature Walk*, John Adam encourages readers to explore everyday observations of the natural world from a mathematical point of view. The problems are presented in an engaging style and most of the

mathematics is well within the grasp of beginning college students."--Brian Sleeman, University of Leeds

Exactly as the title and description says. I got lost in the math, however, and put it down.

The book is filled with little examples of what we see and do during our day; then shows how to calculate the magnitudes of what is going on. Pick it up, look up your subject/interest, read and within 5 minutes see how math explains another event.

Excellent book.

I have read a number of books of this general sort and I would classify this one, without hesitation, as one of the better ones. The book's format is a bit different. Each new section begins with a question, e.g., "How far away is that cloud?", "How are star magnitudes measured", etc. Then what follows may be an experience that the author has had during one of his nature walks, or simply a written description of the phenomenon. Then the mathematical analysis/modelling begins in an effort to arrive at a plausible (but not necessarily rigorous) answer to the original query. The book contains 85 such questions that are dealt with in this way and these are sorted into twelve chapters, each with a different theme, e.g., "In the Playground", "In the Sky", etc. Most of the topics are well explained and the mathematical details are generally easy to follow and/or to verify for oneself; however, in a few cases, some formulas are presented as if by magic with little or no explanation - possibly leaving the reader (certainly me) occasionally perplexed. Also, I found a few (but not that many) misprints which were likely due to imperfect editing. The text is well-illustrated with plenty of helpful diagrams (a few of which have some crucial information accidentally left out, leaving the reader to fill it in). The colour plates and black and white photographs were also useful. The author, a theoretical astrophysicist by training, is certainly well-qualified to write such a book. His writing style is friendly, generally clear and actually quite entertaining - even occasionally witty and humorous - rather unusual for books of this type. A review on the book's back cover calls the book "a true gem of popular scientific writing". I find this a bit misleading since the word "popular" will likely mean different things to different people. To put things into perspective, I would expect that those who love observing natural phenomena and have a good working knowledge of geometry, trigonometry and differential and integral calculus would likely appreciate this book the most.

An enjoyable discussion of applying math to everyday phenomena, presented in a clear question/answer format. I particularly enjoyed relating shadows of tree's leaves to their height and estimating the size of the earth from observations that, at first sight, seem unrelated. The book uses trigonometry extensively, and occasionally calculus, so the book could supplement classes in those subjects. Missing from the book is using dimensional analysis for 'back of the envelope' estimates before developing the mathematical model. Most annoying is the continual switch among metric and English units, including some implicit in numerical constants. This makes it difficult to identify relationships directly from the equations. Much clearer would have been to stick to a consistent set to develop the models, especially metric which simplifies estimation. And then, perhaps, mention the English unit value parenthetically after the final answer. If you are more interested in estimation and dimensional analysis, the author's earlier book *Guesstimation: Solving the World's Problems on the Back of a Cocktail Napkin* is better and doesn't require as much math background.

I am not a mathematician and therefore it was beyond me.

I have begun studying maths as part of a science degree and I thought this would be a good book to add a little spice to the often dry theoretical work involved in introductory calculus. Although the book is good for what it is, it should be advertised for people who have at least mastered the fundamentals of calculus and probably beyond. I have had to hold off reading this book until my calculus is at an intermediate level, so while I don't feel cheated I would warn against buying this unless you're very 'fluent' in maths.

I have found this book to be a good source of answers to some very common questions about nature, science, and the things we see every day. In the age of search few of these answers are out of reach, but this book is a nice compilation presented in easy to follow ways. I particularly think it a good review for people wanting to keep some of these answers fresh in case children's inquisitive minds happen to ask.

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