

$$R(t) = \frac{\text{food/visit}}{\text{time/visit}} = \frac{F(t)}{t + \tau}$$

JOHN A. ADAM

# A Mathematical Nature Walk

$$c(\lambda) = \left[ \frac{g \lambda}{2 \pi} \tanh \frac{2 \pi h}{\lambda} \right]^{1/2}$$

"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 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*

How tall is that tree? How far away is that cloud, and how heavy is it? 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.





**JOHN A. ADAM** is professor of mathematics at Old Dominion University. He is the coauthor of *Guesstimation: Solving the World's Problems on the Back of a Cocktail Napkin* and the author of *Mathematics in Nature* (both Princeton).

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