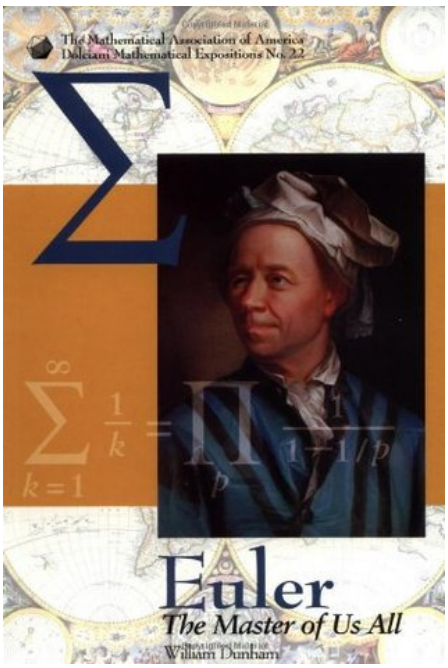

Euler

William Dunham

Euler

William Dunham

Euler William Dunham
This book examines the huge scope of mathematical areas explored and developed by Leonhard Euler.

Euler Details

Date	:	Published March 4th 1999 by Mathematical Association of America (MAA) (first published January 1st 1999)
ISBN	:	9780883853283
Author	:	William Dunham
Format	:	Paperback 208 pages
Genre	:	Science, Mathematics, Biography, History, Nonfiction

From Reader Review Euler for online ebook

H. Alesso says

I completely enjoyed this book. Beautiful mathematics exquisitely presented. Provocative discussion of deeper meaning of theorem and the creative development of conceptual ideas.

Nivasilyev says

This is a great book for a former Calculus student. No vector Calc prerequisite. The historical context and significant results of Euler are presented in a rich exposition.

Peter Wood says

Shorter than I'd hoped, but a nice exposition on Euler's life, including the various fields he improved upon in mathematics. Interesting and informative, just as William Dunham's other books are. If you like this, I recommend Journey Through Genius and his other books.

Yankey says

A must read for math enthusiasts.

David says

The title of the book is a quote of Lagrange: "Read Euler, read Euler. He is the master of us all." Euler and Gauss are the only two mathematicians I know to have appeared on currency.

At the time this book was written, 73 volumes of Euler's collected works (the *Opera Omnia*) were in print, most of them 400-500 pages (though some over 700). There are over 25,000 pages published so far. The publishing effort has been ongoing for the past 97 years, now, and much still remains unpublished. In the year of 1775, after Euler had already gone completely blind, he managed to publish a paper a week.

Nobody is crazy enough to even pretend to summarize Euler's life work in 180 pages.

This short book only gives a little taste of Euler's results and style, but it's an enlightening taste. After an introductory chapter on Euler's life, Dunham writes a chapter each on one of Euler's contributions to number theory, logarithms, infinite series, analytic number theory, complex variables, algebra, geometry, and combinatorics. The arguments given are those due to Euler, though Dunham sometimes interjects to shore up technical details where Euler's arguments fail modern standards of rigor. Though the book is written for a mathematically mature audience, almost all the technical chapters will be accessible to anyone who has gone through a rigorous undergraduate analysis class.

Jose Moa says

Leonhard Euler born in Basilea Suize was one of the greatest mathematicians, this excelent book tells his life and his works that cover theory of numbers ,infinite series, analitic theory of numbers trhoug the Euler product related whith the riemans zeta function ,complex varible,algebra and geometriy. Euler completly charactericed the perfect numbers related whith mersenne primes ,solved the Basel problem posed by the Bernouillis,discovered the Euler formulae that relates the real trigonometric functions with the complex exponential function that origined the beautifull formula e^îpi+1=0 that relates the five more important numbers in mathematics and bring the foundations of the modern mathematical analysis

Justin says

Fantastic! One of the rare books that adds a nice bit of humanity behind all the mathematics. That's a pretty common trait for Dunham's stuff. If you have a bit of a background in mathematics and you don't mind reading some proofs along with the exposition, this book is tops.

Doug says

This book begins with a preface and a short biographical sketch before setting off into a series of chapters which examine a significant contribution Euler made to each of 7 major branches of mathematics. Each chapter starts with background info on the topic, proceeds through Euler's reasoning on the matter (complete with very accessible proofs), and wraps up with a brief summary of later work in the field.

If nothing else, this book was worth reading just to confirm that infinite series are totally fucking awesome.

Warwick says

Leonhard Euler was one of those stratospheric geniuses that gets thrown up occasionally in any field. A pastor's son from Basel, he distinguished himself by the quality of his work – his name is attached to dozens of mathematical formulas and equations – as well as by its quantity, which is almost inconceivable. No one ever did more maths than Euler. And this against a background of personal disability: he started losing his sight in the 1730s and was functionally blind by 1771. Like Beethoven composing music that he couldn't hear, Euler was writing mathematics that he couldn't see.

In 1775, into his sixties – blind, remember – he was still producing more than one academic paper a week. So huge was the backlog after he passed away that Euler managed to publish fully 228 papers *posthumously* – they were still coming out decades after his death.

Yes. Euler published more papers dead than most mathematicians manage while alive.

In 1911, the Swiss Academy of Sciences decided to publish Euler's complete works. They brought the first volume out that year, *and they are still not done*. Eighty volumes so far and counting.

When he turned his attention to a problem, he blew it out of the water.

A simple example is the so-called ‘amicable numbers’. Amicable numbers are pairs of numbers whose proper divisors sum to each other. What does that mean? Well, the classic example is 220 and 284. The number 220 can be divided into the following smaller numbers:

1, 2, 4, 5, 10, 11, 20, 22, 44, 55, 110

…and if you add all those together, you get 284. Coincidentally, 284 divides into the following smaller numbers:

1, 2, 4, 71, 142

…which, added together, make 220. 220 and 284 are therefore said to be ‘amicable’.

This is a completely pointless property, but nevertheless intriguing if you're a mathematician. It is also very rare. The pair 220 and 284 was known to the Greeks, but after that no one in Europe could find another example until Fermat in 1636 – he managed to show that 17,296 and 18,416 are also amicable. At which point Descartes, Fermat's great rival, was determined to find a pair as well – he worked on it for two years and eventually came up with 9,363,584 and 9,437,056.

Three examples in more than 1500 years.

So a hundred years after Descartes, Euler decides to have a go. He publishes a paper in 1750 in which he finds **58** more pairs!

This was the Euler way. ‘Let me just have a quick look at this problem you've all been worried about – OH NO HERE'S EVERYTHING THERE IS TO KNOW ABOUT IT. Also, I just invented a new branch of mathematics to deal with the matter. Bored now…’

Euler is particularly associated with the number *e*, the base of the natural logarithm. Roughly equal to 2.718, *e* emerged from studying compound interest and is not difficult to understand in itself. But it's a very strange number all the same. It crops up everywhere in mathematics, though it's independent of any counting system; clearly, it is one of the fundamental values of how the universe fits together, indeed of how numbers work as a concept.

It's this that makes Euler's most famous equation so extraordinary. Known as ‘Euler's identity’, it emerged from his work on complex analysis and is, first of all, breathtakingly simple:

The reason mathematicians get so dewy-eyed over this is that it shows a beautiful and completely unexpected link between the worlds of pure maths and trigonometry – a bizarre, unintuitive relationship between the five most important numbers in mathematics (0, 1, *i*, *e*, and pi). There is no reason these numbers should be related, and no one really understands what it means that they are, except that it tells us *something* fundamental about reality.

This equation regularly tops mathematical polls of the most beautiful result of all time.

William Dunham is quite an Euler enthusiast and expert; if you're interested in the subject, I recommend his TED-like video tribute on YouTube. But this is a small book and can only touch on a few of the most impressive of Euler's accomplishments. Also, it is very very focused on the maths. I had been hoping for details of Euler's life in Switzerland, why he had a bust-up with Voltaire, and who he was sleeping with. In actual fact, every page of this book looks like this:

A lot of it is way above my A-level understanding of maths. But in the absence of any other good biographies of Euler, it'll do – and if you have the skills to follow the proofs, it's likely to give you a lot of delighted, mind-blown moments.

Nicholas Mecholsky says

Spectacular. I feel as though I learned too much to write in this little space. If I wrote down every neat thing I learned in that book, I would be forced to copy the book verbatim.

James F says

This book is not a biography of Leonhard Euler, although it is prefaced by a brief account of his life, but a discussion of a few of his discoveries. It is organized into eight categories, with chapter titles beginning "Euler and . . .": Number Theory, Logarithms, Infinite Series, Analytic Number Theory, Complex Variables, Algebra, Geometry, and Combinatorics. Each chapter deals with one or two questions, with a prologue outlining previous work and the state of the question before Euler, and an epilogue explaining how it has been treated since Euler's time. The book concludes with an appendix on Euler's *Opera Omnia*, the complete works which since beginning publication in 1909 had reached over seventy large (400 to 700 page) volumes by the end of the century. Euler was such a prolific writer that the journals were still publishing the backlog several decades after his death, so many of his discoveries carry the names of later mathematicians. (And he wrote much of it after going completely blind.) Naturally, a short book like this one can only deal with a small fraction of his work, but every chapter would have made the reputation of another mathematician.

I am currently reading Roger Penrose's massive book, *The Road to Reality*, which promises to teach all the math needed to understand modern physics (including string theory, twistors, etc.) -- I'm sure I will have something to say about that in my review, IF I actually finish his book -- but already less than a tenth of the way through I am finding it somewhat too complex for my current knowledge. Literally too complex; I haven't dealt with complex numbers since high school. It was Penrose's discussion of complex exponents that sent me to this book; Dunham's explanation was much clearer than Penrose. Of course, I ended up reading the whole book, and found it quite fascinating.

The book is not light reading; I read it "pencil in hand" and had to work through many of the calculations before I understood all the "obvious" steps that were assumed. It reminded me of the classic story of the math professor who said, "Now it is obvious that. . .", stopped short and disappeared into his office for forty-five minutes, then reappeared, said, "Yes, it is obvious" and continued with his lecture. The actual concepts, though, are not too difficult; I think anyone who has had a good high school ATA or pre-calculus course and a first year high school or college calculus course, would have no real trouble understanding anything in this book -- with a little effort.

Samar says

Mind-blowing. The elegance, simplicity, and absolute genius of Euler's mathematical mind kept me dumbfounded and intrigued that I finished the book in one sitting -- and wished that I didn't. If you are at all interested in tasting the beauty of a mathematical proof, this book is for you. It will only be the beginning, though, for your hunger for Euler's work will not be satisfied. Highly recommend!