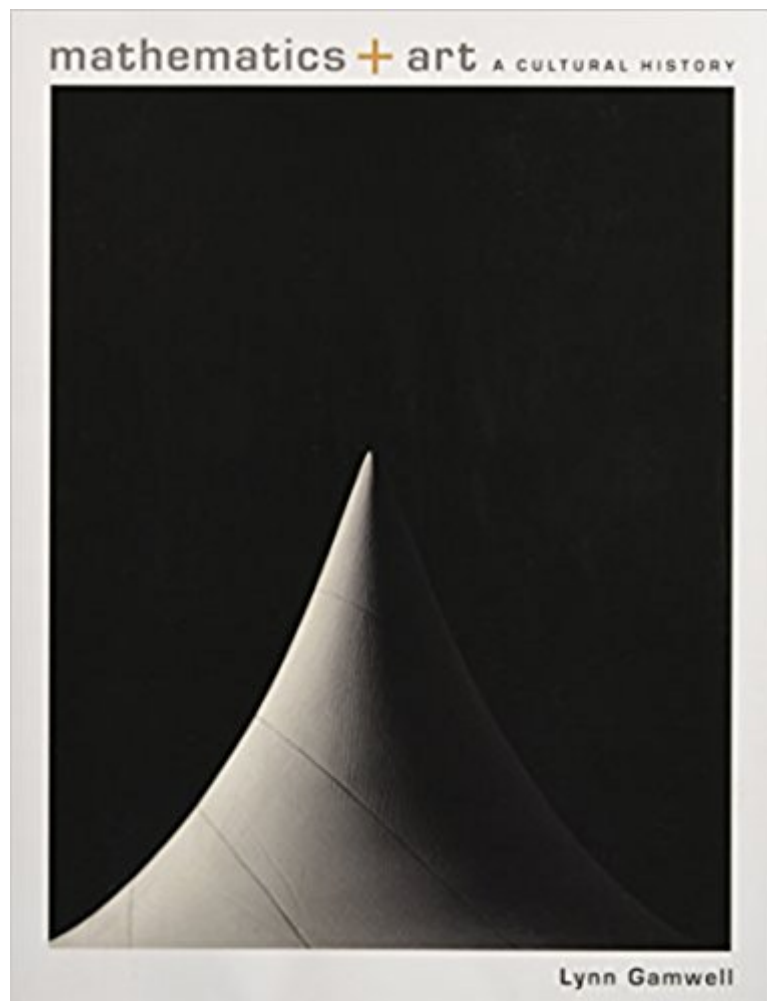




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Mathematics And Art: A Cultural History



Synopsis

This is a cultural history of mathematics and art, from antiquity to the present. Mathematicians and artists have long been on a quest to understand the physical world they see before them and the abstract objects they know by thought alone. Taking readers on a tour of the practice of mathematics and the philosophical ideas that drive the discipline, Lynn Gamwell points out the important ways mathematical concepts have been expressed by artists. Sumptuous illustrations of artworks and cogent math diagrams are featured in Gamwell's comprehensive exploration. Gamwell begins by describing mathematics from antiquity to the Enlightenment, including Greek, Islamic, and Asian mathematics. Then focusing on modern culture, Gamwell traces mathematicians' search for the foundations of their science, such as David Hilbert's conception of mathematics as an arrangement of meaning-free signs, as well as artists' search for the essence of their craft, such as Aleksandr Rodchenko's monochrome paintings. She shows that self-reflection is inherent to the practice of both modern mathematics and art, and that this introspection points to a deep resonance between the two fields: Kurt Gödel posed questions about the nature of mathematics in the language of mathematics and Jasper Johns asked "What is art?" in the vocabulary of art. Throughout, Gamwell describes the personalities and cultural environments of a multitude of mathematicians and artists, from Gottlob Frege and Benoît Mandelbrot to Max Bill and Xu Bing. *Mathematics and Art* demonstrates how mathematical ideas are embodied in the visual arts and will enlighten all who are interested in the complex intellectual pursuits, personalities, and cultural settings that connect these vast disciplines.

Book Information

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Customer Reviews

"This is a marvelous coffee table book . . . very well researched and documented. It touches upon so many fundamental questions that philosophers, scientists, mathematicians and artists have asked since antiquity. But yet it guides the reader smoothly through all these competing visions and theories without becoming dull or getting lost in abstraction. This is the history of Western civilization with particular interest in art and mathematics, illuminating and instructive, and all wrapped up in a rich, colorful, and fancy book."--Adhemar Bultheel, European Mathematical Society

"This is the beauty and power of this book: [Mathematics and Art] is an intellectual tour de force of art history and its interaction with mathematics that will draw most readers, including me, back for further reading and study."--Frank Swetz, MAA Reviews

"Excellent new book. . . . Overall this is a comprehensive, valuable and detailed book. It is written in an accessible style, with enough mathematics to interest the technical reader without overwhelming one with an arts background. . . . Its rich anthology is particularly relevant today, given the explosion of interest in the digital arts and the need for digital artists to use maths creatively. I will definitely be keeping it close at hand."--William Latham, New Scientist

"The author does an artful job in creating a wide-ranging and beautifully illustrated survey that mathematicians and art historians will enjoy."--John Barrow, The Art Newspaper

"This sumptuously illustrated book chronicles the history of mathematics through its intersection with the development of visual art. . . . Gamwell articulates the compelling, far-reaching connections within these fields in a way that is rewarding for scholars yet accessible to non-specialists."--Choice

"Beautiful books that display the beauty of art are fine additions to many coffee tables; beautiful books that display the beauty of mathematics are fine additions to few coffee tables. Gamwell's impressive work integrates the beauty of these two disciplines to create a work larger than their sum. . . . A book for all ages and of all ages: truly a brilliant 'œmillennial' composition!"--Sandra L. Arlinghaus, Mathematical Reviews

"This splendidly produced volume will appeal to everybody interested in mathematics and art and offers room for agreement and disagreement with the author. . . . This volume stands out by its richness in contents, its wealth of colour reproductions and, last but not least, its very affordable price."--Dirk Werner, Zentralblatt MATH

"This wonderful book gives a very thorough overview of the impact of mathematics (and science) of the visual arts (and architecture) over the centuries."--Eos

"An interesting read, filled with paradigm-shifting history and art, the book still posits a linear perspective of the relationship of art and mathematics, specifically recounting the ways math has influenced art."--Karie Brown, Mathematics Teacher

"A monumental volume. . . . Excellently illustrated by 523 images. . . . Many highlighted quotations from writings of outstanding personalities of the sciences and the arts make

the volume more colourful."--György Darvas, *Symmetry*"Mathematics and Art is an enjoyable read accessible to anyone interested in the history of mathematics and art."--Andre Michael Hahn, *British Journal for the History of Science*

"Mathematics and Art describes mankind's search for patterns and the expression of these numbers and forms by artists. This book will enrich the reader's understanding of mathematics and the arts throughout history, and their deep interconnections in today's global culture of high technology and contemporary art."--Tatsuo Miyajima, artist

Lynn Gamwell is a singular intellect and this is a singular book. Her text weaves together philosophy, art, science, and mathematics in their historical settings. The illustrations are absolutely stunning. Her eye for the juxtaposition of art images, math diagrams, text, and marginal quotations makes turning every page a delight. Each chapter leaves the reader with a sense of beauty, insight, and truth."--Eric Heller, Harvard University

Often artists understand how to make art but not what to make, and for centuries, artists have looked toward nature for subject matter and inspiration. Leonardo advised, 'Don't copy nature. Follow the ways of nature.' Everything in nature, from plants and atoms to crystals and cosmology, can be predicted through mathematics, and a visual study of the intersection between mathematics and art history has long been needed. This book beautifully satisfies that need."--Dorothea Rockburne, artist

Handsomely illustrated and containing a wealth of information, this book is a must for anyone interested in the relations between science, nature, mathematics, and art. It is destined to become a classic on par with E. H. Gombrich's landmark work *The Sense of Order*."--Eli Maor, author of *e: The Story of a Number*

This impressive work is a must for anyone interested in the interactions between mathematical ideas and art, and in particular the ways in which, throughout history, mathematical ideas have inspired painters, sculptors, and architects. Few books dealing with this complex topic achieve such a degree of accomplishment and clarity as Gamwell's handsome volume does."--Leo Corry, author of *A Brief History of Numbers*

Many contemporary artists feel a deep connection to mathematics and computer science. In this book, Lynn Gamwell traces the origin of this connection and describes why it is particularly strong in artists, like myself, who are from a European culture."--Manfred Mohr, artist

Having spent many decades putting mathematics into visual form for a new understanding of it in my art, I recommend this thoroughly researched and well-written book for students to immerse themselves in mathematics' intricacies, rich history, precision, and yes, wonders."--Agnes Denes, artist

In this book, Lynn Gamwell provides a marvelous exploration of the development of symbols and diagrams, and shows how this helps us to better understand the rich connections between art and mathematics."--Dick Termes,

internationally acclaimed artist" This book stands alone in describing how art has been inspired by mathematics. With its lavish illustrations, it has a stunning visual impact and Lynn Gamwell does a masterful job of providing a history of mathematics and art, and how they are intertwined. From ancient works to modern abstract expressionism, the book's many colorful artworks are mesmerizing. This is an important reference for anyone interested in mathematics or art."--Edward Belbruno, Princeton University

"With intelligent writing and abundant illustrations, Lynn Gamwell's book presents a kaleidoscope of art related to math and physics. The global breadth of the work discussed spans from antiquity to modernity and reflects a courageous vision, resulting in a tremendous resource for scientists and artists alike."--Claire and Helaman Ferguson, coauthors of Helaman Ferguson: Mathematics in Stone and Bronze

"Delving into this remarkable and profusely illustrated book is akin to slipping into a seminar on two areas--art and mathematics--that are often thought of as being at odds. Instead, Lynn Gamwell eloquently links the artist and the mathematician, as she traces the cultural history of their interconnected disciplines. You will find yourself coming back to these pages, again and again, to reread part of a chapter or to savor certain passages and images."--Richard Waller, executive director of the University of Richmond Museums

"There is increasing interest in the intersection of mathematics and art, and this wonderful book shows that mathematicians and artists have been inspiring each other for a long time. All who are interested in these two fields--as well as many who believe they are interested in one but not the other--will be enthralled."--Robert Bosch, Oberlin College

"This well-written and interesting book links the philosophical views of different periods to trends in mathematics, philosophy of mathematics, and cutting-edge art. Filled with wonderful illustrations and delightfully insightful and inspiring connections, this book can be enjoyed by scholars, general readers, and all who are interested in mathematics, philosophy, and art history."--Eve Torrence, coauthor of *The Student's Introduction to Mathematica*

I purchased this after hearing Lynn Gamwell on a mathematics podcast and was impressed enough to buy her book. I'm not disappointed. This is a very large and image-rich book with fascinating insights into the commonly neglected influence on art of mathematics (as well as science and physics). Pick it up (it's heavy) and read any page for a revealing and beautiful connection.

An excellent read on the origins of design. Lynn Gamwell "disturbs" conventional thinking of the analytical standards of art and architecture. She debunks approaches like the Geometric Mean - which actually was not used nearly as much as it was thought to be. This book shows how we

humans make fatal errors of rationalizing and using our current value systems and theories - and making the even bigger error of imposing them on our past. Well written, my compliments!

Mathematics and Art: A cultural history is a masterpiece of integration of mathematical knowledge with their artistic implications and vice versa. Filled with good figures and in-depth information, this book is a must for those who love mathematics and enjoyed the arts.

This is a seriously beautiful and interesting coffee table book. I thought it would be more an art book, but there is a surprising emphasis on the math. It is an eminently readable book with lots of great illustrations and photographs. Truly, this is a lovely book and very worth the price.

It was a great gift for my High School grand daughter who is also Studying at the Art Students League and does well at a math Olympiads.

A beautiful book. What better way is there to know the world than through the lens of Art and Mathematics.

A bit too bland. Nothing exciting.

Are you a mathematician and an art connoisseur? If you are, then this book is for you. Author by Lynn Gamwell, has written an outstanding book, that describes in plain English, together with clear symbols and cogent diagrams, the ideas that drive mathematics: numbers, infinity, geometry, and pattern. The author begins by with an overview of mathematics and art from prehistory to the culmination of the classical ideals and rationality, objectivity, and universalizable knowledge during the Enlightenment. Next, she debunks the widely held misconceptions that Euclid's mean and extreme ratio is the key to beautiful proportion; and, that it was used in major monuments of art history. Then, the author describes a distinctly Germanic version of the struggle between reason and intuition that played out as Enlightenment reason versus the Romantic imagination. Also, she describes David Hilbert's formalist conception of mathematics, as an axiomatic system: An internally consistent, self-contained arrangement of abstract, meaning-free, replaceable signs. Then, the author shows why Logicism was the premise of modern symbolic logic, as developed by the German logician Gottlob Frege and his heir. In addition, she covers how both Hilbert and Russell both held modern versions of Platonism; but, the leading intuitionist mathematician, the Dutchman

L.E.J. Brouwer, declared that abstract objects exist only in the human mind. Also, the author focuses on how scientists described the symmetries of nature, mass and energy, by using the mathematics of group theory. She continues by covering the successes (the basic principles that underline arithmetic, geometry, set theory and logic) that led Hilbert to suspect that there could be an even lower level to the foundation: A bedrock set of axioms for all branches of mathematics, by challenging his colleagues to find it. Next, the author discusses how a young Viennese Logician, Kurt Godel, proved that the one bedrock set of axioms does not exist, because there are inherent limits to artificial symbolic languages. Then, she describes how Godel's 1931 Theorem was important not only for his surprising result, but also for the new method that Godel invented to achieve his result: A proof by computation, that propelled the development of computers. In addition, the author describes how the destruction of Germanic intellectual communities during World War II, undermined confidence in the Enlightenment ideals of rationality, objectivity, and universalizable knowledge for all who suffered losses. Also, she describes the rapid development of computers in the post-1945 era in Britain and America, and their adoption as a tool by both mathematicians, as a fractal geometry and the first computer-assisted proof, and artists, as in digital photography and computer animation for special effects in film. Finally, the author observes that mathematics has been largely immune to post-modern critiques of terms such as truth and certainty, because these concepts are so deeply rooted in the history of mathematics. Almost all of the interactions between mathematics and art that the author describes in this excellent book, are cases of an artist being inspired by a piece of mathematics, and not vice versa. This great book also moves beyond vague expressions of intellectual climate, and shows specific links between the mathematician's study and the artist's studio, such as an historical or a popularization of mathematics known to the artist.

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