

# Spiral Stairs Math Playground



## Spiral Stairs: A Math Playground for Curious Minds

### Introduction:

Ever looked at a spiral staircase and felt a surge of fascination? It's more than just a beautiful architectural feature; it's a captivating mathematical puzzle wrapped in elegant design. This post dives deep into the mathematical principles behind spiral stairs, transforming them from mere structures into a thrilling math playground. We'll explore the geometry, calculations, and surprising applications of spiral staircases, proving that mathematics isn't just confined to textbooks—it's all around us, even in the curves of a staircase. Get ready to unravel the fascinating world of spiral stairs and the mathematics they embody.

## Understanding the Geometry of Spiral Stairs

Spiral staircases aren't just randomly curving structures; their design is governed by precise mathematical principles. The fundamental shapes involved are circles and spirals, primarily the Archimedean spiral. This type of spiral, named after the ancient Greek mathematician Archimedes, features a constant distance between its successive turns. This consistent spacing is crucial for the usability and structural integrity of the staircase.

### #### The Role of the Radius and the Pitch

Two key parameters define the spiral: the radius, which is the distance from the center of the spiral to any point on the curve, and the pitch, which represents the vertical distance covered in one complete revolution around the central axis. The pitch dictates the steepness of the staircase. A larger pitch results in a less steep climb, while a smaller pitch makes for a more challenging ascent.

### #### Calculating the Length of a Spiral Staircase

Determining the total length of the spiral staircase requires integrating along the spiral curve. This involves calculus, specifically using the arc length formula with respect to the spiral's equation. While the exact calculation can be complex, approximations using simpler geometric shapes can provide reasonably accurate estimations for practical purposes. Many online calculators and software tools are available to assist in these calculations.

## Beyond the Archimedean Spiral: Exploring Other Spiral Types

While the Archimedean spiral is common in spiral staircase design, other spirals, like the logarithmic spiral, can also be used. These spirals have a variable spacing between turns, leading to different aesthetic and structural properties. Logarithmic spirals are often preferred for their aesthetically pleasing, naturally occurring appearance, found in seashells and galaxies. However, the design and construction of staircases using logarithmic spirals is more complex.

## Practical Applications and Considerations

The design of a functional and safe spiral staircase involves more than just mathematical calculations. Several practical considerations must be taken into account:

### #### Building Codes and Safety Regulations:

Local building codes dictate minimum dimensions for steps, landings, and handrails to ensure safety. These regulations often constrain the design choices based on the spiral's parameters.

### #### Material Selection and Structural Integrity:

The materials chosen for the staircase—wood, metal, or concrete—significantly influence its structural strength and the feasible design parameters. The chosen material affects the weight-bearing capacity and overall stability of the structure.

### #### Space Optimization and Architectural Integration:

Spiral staircases are often chosen for their space-saving properties, particularly in smaller buildings or areas where traditional staircases are impractical. Careful integration with the overall architectural design is essential for a seamless and aesthetically pleasing result.

## Spiral Stairs as a Teaching Tool

Spiral staircases offer a unique opportunity to bridge the gap between abstract mathematical

concepts and real-world applications. They serve as excellent visual aids for teaching geometry, calculus, and even design principles. Using spiral staircases as case studies can make learning more engaging and memorable for students.

## Conclusion:

Spiral staircases are more than just functional structures; they are captivating examples of mathematical principles applied to architecture. Understanding the underlying geometry, the role of various parameters, and the practical considerations involved in their design provides a fascinating insight into the interplay between mathematics and the built environment. From the elegance of the Archimedean spiral to the more intricate logarithmic spiral, the world of spiral stairs offers endless opportunities for mathematical exploration and creative design.

## FAQs:

1. Can I design my own spiral staircase using online calculators? Yes, many online calculators and software programs provide tools to help you estimate dimensions and calculate material requirements for your spiral staircase design, but professional consultation is recommended.
2. What are the most common materials used in spiral staircase construction? Common materials include wood, steel, wrought iron, and concrete. The choice depends on budget, aesthetics, and structural requirements.
3. Are spiral staircases suitable for all types of buildings? While space-saving, they might not be suitable for every building due to potential accessibility concerns (steepness) and building codes.
4. How do I ensure the safety of a spiral staircase? Adherence to local building codes regarding step dimensions, handrail height, and overall stability is crucial for safety. Professional design and installation are recommended.
5. Where can I find more resources to learn about spiral staircase design and construction? Architectural journals, engineering textbooks, and online forums dedicated to construction and design are excellent resources. Consulting with architects and structural engineers is highly recommended for complex projects.

**spiral stairs math playground: Popular Science** , 2008-05 Popular Science gives our readers the information and tools to improve their technology and their world. The core belief that Popular Science and our readers share: The future is going to be better, and science and technology are the driving forces that will help make it better.

**spiral stairs math playground: Sophie's World** Jostein Gaarder, 2007-03-20 A page-turning novel that is also an exploration of the great philosophical concepts of Western thought, Jostein Gaarder's Sophie's World has fired the imagination of readers all over the world, with more than twenty million copies in print. One day fourteen-year-old Sophie Amundsen comes home from school to find in her mailbox two notes, with one question on each: Who are you? and Where does the world come from? From that irresistible beginning, Sophie becomes obsessed with questions that take her far beyond what she knows of her Norwegian village. Through those letters, she enrolls in a kind of correspondence course, covering Socrates to Sartre, with a mysterious philosopher, while receiving letters addressed to another girl. Who is Hilde? And why does her mail keep turning up? To unravel

this riddle, Sophie must use the philosophy she is learning—but the truth turns out to be far more complicated than she could have imagined.

**spiral stairs math playground:** High on Arrival Mackenzie Phillips, 2011-08-04 Not long before her fiftieth birthday, Mackenzie Phillips walked into Los Angeles International Airport. She was on her way to a reunion for *One Day at a Time*, the hugely popular 70s sitcom on which she once starred as the lovable rebel Julie Cooper. Within minutes of entering the security checkpoint, Mackenzie was in handcuffs, arrested for possession of cocaine and heroin. Born into rock and roll royalty, flying in Learjets to the Virgin Islands at five, making pot brownies with her father's friends at eleven, Mackenzie grew up in an all-access kingdom of hippie freedom and heroin cool. It was a kingdom over which her father, the legendary John Phillips of The Mamas & the Papas, presided, often in absentia, as a spellbinding, visionary phantom. When Mackenzie was a teenager, Hollywood and the world took notice of the charming, talented, precocious child actor after her star-making turn in *American Graffiti*. As a young woman she joined the nonstop party in the hedonistic pleasure dome her father created for himself and his fellow revelers, and a rapt TV audience watched as Julie Cooper wasted away before their eyes. By the time Mackenzie discovered how deep and dark her father's trip was going, it was too late. And as an adult, she has paid dearly for a lifetime of excess, working tirelessly to reconcile a wonderful, terrible past in which she succumbed to the power of addiction and the pull of her magnetic father. As her astounding, outrageous, and often tender life story unfolds, the actor-musician-mother shares her lifelong battle with personal demons and near-fatal addictions. She overcomes seemingly impossible obstacles again and again and journeys toward redemption and peace. By exposing the shadows and secrets of the past to the light of day, the star who turned up *High on Arrival* has finally come back down to earth -- to stay.

**spiral stairs math playground:** Caught Janice Singleton, 2015-01-23 All my life, I've had a love for control. In order to have control, I needed money. It started out from something as simple as an allowance. If it wasn't given to me, I found a way to get it. Hell, I was filling my little Gerber baby food jars with all the coins that I could get my hands on at an early age. The sound of the money clinking against the glass thrilled me. Somehow, I understood that what I had in my hand was power, and I wanted it all the time. I was becoming a master of money before I even mastered multiplication. I've always excelled at anything that I made up my mind to do. From grade school through high school, I had no problems academically. I graduated college, had a successful business, and entered into the positive career field of law enforcement. I was extremely blessed, but greed got the best of me while climbing my way to the top of the economic ladder. Then there I was, living it up in Laughlin, Nevada, in a clean brown Armani suit to match my complexion, wearing jewelry that could pay someone's mortgage for a year, enjoying the high life in the City of Lights and Chances. Everything was so exciting, every moment so electric, and I was clueless that the ground beneath me was caving in. As I placed another bet, eyes glazed over in anticipation, waiting for the big money hit, I was oblivious to the fact that my quiet, secure, humble home and my business were being surrounded for a raid. How foolish and greedy could I have been to let it get this far? Now there was no way out. I was caught!

**spiral stairs math playground:** Elementary Differential Equations William E. Boyce, Richard C. DiPrima, Douglas B. Meade, 2017-08-14 With Wiley's Enhanced E-Text, you get all the benefits of a downloadable, reflowable eBook with added resources to make your study time more effective, including: Embedded & searchable equations, figures & tables Math XML Index with linked page numbers for easy reference Redrawn full color figures to allow for easier identification *Elementary Differential Equations*, 11th Edition is written from the viewpoint of the applied mathematician, whose interest in differential equations may sometimes be quite theoretical, sometimes intensely practical, and often somewhere in between. The authors have sought to combine a sound and accurate (but not abstract) exposition of the elementary theory of differential equations with considerable material on methods of solution, analysis, and approximation that have proved useful in a wide variety of applications. While the general structure of the book remains unchanged, some notable changes have been made to improve the clarity and readability of basic material about

differential equations and their applications. In addition to expanded explanations, the 11th edition includes new problems, updated figures and examples to help motivate students. The program is primarily intended for undergraduate students of mathematics, science, or engineering, who typically take a course on differential equations during their first or second year of study. The main prerequisite for engaging with the program is a working knowledge of calculus, gained from a normal two ] or three ] semester course sequence or its equivalent. Some familiarity with matrices will also be helpful in the chapters on systems of differential equations.

**spiral stairs math playground:** *Popular Science* , 2008

**spiral stairs math playground: A Simplified Guide to Custom Stairbuilding and Tangent Handrailing** George Di Cristina, 2000 In order to construct continuous climbing-turn handrail sections for a staircase, the basic elements of tangent handrailing must be understood. This guide to building custom staircases, including elliptical stairs and continuous incline stairs, explains the tangent principle for the advanced woodworker. Covering everything from locating risers in a curved stairway to the installation of balusters, this simple method enables the craftsman to make distinctive, personalized stair and handrail designs that are not available from stock staircase companies.

**spiral stairs math playground: Gamelife** Michael W. Clune, 2015-09-15 In telling the story of his youth through seven computer games, critically acclaimed author Michael W. Clune (*White Out*) captures the part of childhood we live alone. You have been awakened. Floppy disk inserted, computer turned on, a whirring, and then this sentence, followed by a blinking cursor. So begins *Suspended*, the first computer game to obsess seven-year-old Michael, to worm into his head and change his sense of reality. Thirty years later he will write: Computer games have taught me the things you can't learn from people. *Gamelife* is the memoir of a childhood transformed by technology. Afternoons spent gazing at pixelated maps and mazes train Michael's eyes for the uncanny side of 1980s suburban Illinois. A game about pirates yields clues to the drama of cafeteria politics and locker-room hazing. And in the year of his parents' divorce, a spaceflight simulator opens a hole in reality.

**spiral stairs math playground: Mad Skills** Walter Greatshell, 2010-12-28 The Braintree Institute saved Maddy Grant's life by implanting her with technology designed to correct her brain injury-and turn her into a killer.

**spiral stairs math playground: The Cult of Smart** Fredrik deBoer, 2020-08-04 Named one of *Vulture's* Top 10 Best Books of 2020! Leftist firebrand Fredrik deBoer exposes the lie at the heart of our educational system and demands top-to-bottom reform. Everyone agrees that education is the key to creating a more just and equal world, and that our schools are broken and failing. Proposed reforms variously target incompetent teachers, corrupt union practices, or outdated curricula, but no one acknowledges a scientifically-proven fact that we all understand intuitively: Academic potential varies between individuals, and cannot be dramatically improved. In *The Cult of Smart*, educator and outspoken leftist Fredrik deBoer exposes this omission as the central flaw of our entire society, which has created and perpetuated an unjust class structure based on intellectual ability. Since cognitive talent varies from person to person, our education system can never create equal opportunity for all. Instead, it teaches our children that hierarchy and competition are natural, and that human value should be based on intelligence. These ideas are counter to everything that the left believes, but until they acknowledge the existence of individual cognitive differences, progressives remain complicit in keeping the status quo in place. This passionate, voice-driven manifesto demands that we embrace a new goal for education: equality of outcomes. We must create a world that has a place for everyone, not just the academically talented. But we'll never achieve this dream until the Cult of Smart is destroyed.

**spiral stairs math playground: Mathematical Mindsets** Jo Boaler, 2015-10-12 Banish math anxiety and give students of all ages a clear roadmap to success *Mathematical Mindsets* provides practical strategies and activities to help teachers and parents show all children, even those who are convinced that they are bad at math, that they can enjoy and succeed in math. Jo Boaler—Stanford

researcher, professor of math education, and expert on math learning—has studied why students don't like math and often fail in math classes. She's followed thousands of students through middle and high schools to study how they learn and to find the most effective ways to unleash the math potential in all students. There is a clear gap between what research has shown to work in teaching math and what happens in schools and at home. This book bridges that gap by turning research findings into practical activities and advice. Boaler translates Carol Dweck's concept of 'mindset' into math teaching and parenting strategies, showing how students can go from self-doubt to strong self-confidence, which is so important to math learning. Boaler reveals the steps that must be taken by schools and parents to improve math education for all. Mathematical Mindsets: Explains how the brain processes mathematics learning Reveals how to turn mistakes and struggles into valuable learning experiences Provides examples of rich mathematical activities to replace rote learning Explains ways to give students a positive math mindset Gives examples of how assessment and grading policies need to change to support real understanding Scores of students hate and fear math, so they end up leaving school without an understanding of basic mathematical concepts. Their evasion and departure hinders math-related pathways and STEM career opportunities. Research has shown very clear methods to change this phenomena, but the information has been confined to research journals—until now. Mathematical Mindsets provides a proven, practical roadmap to mathematics success for any student at any age.

**spiral stairs math playground:** Solariad Surazeus Astarius, 2017-10-15 Solariad of Surazeus - Guidance of Solaria presents 114,920 lines of verse in 1,660 poems, lyrics, ballads, sonnets, dramatic monologues, eulogies, hymns, and epigrams written by Surazeus 2006 to 2011.

**spiral stairs math playground:** The Fading of the Scars Orrin Carpenter, 2005-06 In the aftermath of nearly crossing paths with serial killer John Wayne Gacy, the author of the Fading of the Scars felt a spiritual urging to write a novel.

**spiral stairs math playground:** *The Perfect Stage Crew* John Kaluta, 2012-01-13 Here is an indispensable, nuts-and-bolts guide to putting on a stunning, low-budget show in less than 40 days! The Perfect Stage Crew explains the pitfalls to avoid and provides solutions to the most common as well as most complex stage performance problems. Readers without Broadway-size budgets and resources will learn the low-cost, low-tech approaches to painting scenery, building sets, hanging lights, setting cues, and operating sound. They'll also find crucial guidance for generating publicity, preparing tickets, technical rehearsals, and more.

**spiral stairs math playground:** *Seedfolks* Paul Fleischman, 2013-07-30 ALA Best Book for Young Adults • School Library Journal Best Book • Publishers Weekly Best Book • IRA/CBC Children's Choice • NCTE Notable Children's Book in the Language Arts A Vietnamese girl plants six lima beans in a Cleveland vacant lot. Looking down on the immigrant-filled neighborhood, a Romanian woman watches suspiciously. A school janitor gets involved, then a Guatemalan family. Then muscle-bound Curtis, trying to win back Lateesha. Pregnant Maricela. Amir from India. A sense of community sprouts and spreads. Newbery-winning author Paul Fleischman uses thirteen speakers to bring to life a community garden's founding and first year. The book's short length, diverse cast, and suitability for adults as well as children have led it to be used in countless one-book reads in schools and in cities across the country. Seedfolks has been drawn upon to teach tolerance, read in ESL classes, promoted by urban gardeners, and performed in schools and on stages from South Africa to Broadway. The book's many tributaries—from the author's immigrant grandfather to his adoption of two brothers from Mexico—are detailed in his forthcoming memoir, *No Map, Great Trip: A Young Writer's Road to Page One*. The size of this slim volume belies the profound message of hope it contains. —Christian Science Monitor And don't miss Joyful Noise: Poems for Two Voices, the Newbery Medal-winning poetry collection!

**spiral stairs math playground:** *Class* Paul Fussell, 1992 This book describes the living-room artifacts, clothing styles, and intellectual proclivities of American classes from top to bottom.

**spiral stairs math playground:** *Struck by Genius* Jason Padgett, Maureen Seaberg, 2014-04-22 From head trauma to scientific wonder—a “deeply absorbing . . . fascinating” true story of acquired

savant syndrome (Entertainment Weekly). Twelve years ago, Jason Padgett had never made it past pre-algebra. But a violent mugging forever altered the way his brain worked. It turned an ordinary math-averse student into an extraordinary young man with a unique gift to see the world as no one else does: water pours from the faucet in crystalline patterns, numbers call to mind distinct geometric shapes, and intricate fractal patterns emerge from the movement of tree branches, revealing the intrinsic mathematical designs hidden in the objects around us. As his ability to understand physics skyrocketed, the “accidental genius” developed the astonishing ability to draw the complex geometric shapes he saw everywhere. Overcoming huge setbacks and embracing his new mind, Padgett “gained a vision of the world that is as beautiful as it is challenging.” Along the way he fell in love, found joy in numbers, and spent plenty of time having his head examined (The New York Times Book Review). Illustrated with Jason’s stunning, mathematically precise artwork, his singular story reveals the wondrous potential of the human brain, and “an incredible phenomenon which points toward dormant potential—a little Rain Man perhaps—within us all” (Darold A. Treffert, MD, author of *Islands of Genius: The Bountiful Mind of the Autistic, Acquired, and Sudden Savant*). “A tale worthy of Ripley’s Believe It or Not! . . . This memoir sends a hopeful message to families touched by brain injury, autism, or neurological damage from strokes.”  
 —Booklist “How extraordinary it is to contemplate the bizarre gifts that might lie within all of us.”  
 —People

**spiral stairs math playground: Blindsight** Peter Watts, 2006-10-03 Hugo and Shirley Jackson award-winning Peter Watts stands on the cutting edge of hard SF with his acclaimed novel, *Blindsight* Two months since the stars fell... Two months of silence, while a world held its breath. Now some half-derelict space probe, sparking fitfully past Neptune's orbit, hears a whisper from the edge of the solar system: a faint signal sweeping the cosmos like a lighthouse beam. Whatever's out there isn't talking to us. It's talking to some distant star, perhaps. Or perhaps to something closer, something en route. So who do you send to force introductions with unknown and unknowable alien intellect that doesn't wish to be met? You send a linguist with multiple personalities, her brain surgically partitioned into separate, sentient processing cores. You send a biologist so radically interfaced with machinery that he sees x-rays and tastes ultrasound. You send a pacifist warrior in the faint hope she won't be needed. You send a monster to command them all, an extinct hominid predator once called vampire, recalled from the grave with the voodoo of recombinant genetics and the blood of sociopaths. And you send a synthesist—an informational topologist with half his mind gone—as an interface between here and there. Pray they can be trusted with the fate of a world. They may be more alien than the thing they've been sent to find. At the Publisher's request, this title is being sold without Digital Rights Management Software (DRM) applied.

**spiral stairs math playground: Planning Algorithms** Steven M. LaValle, 2006-05-29 Planning algorithms are impacting technical disciplines and industries around the world, including robotics, computer-aided design, manufacturing, computer graphics, aerospace applications, drug design, and protein folding. Written for computer scientists and engineers with interests in artificial intelligence, robotics, or control theory, this is the only book on this topic that tightly integrates a vast body of literature from several fields into a coherent source for teaching and reference in a wide variety of applications. Difficult mathematical material is explained through hundreds of examples and illustrations.

**spiral stairs math playground: Generative Art** Matt Pearson, 2011-06-29 Summary Generative Art presents both the technique and the beauty of algorithmic art. The book includes high-quality examples of generative art, along with the specific programmatic steps author and artist Matt Pearson followed to create each unique piece using the Processing programming language. About the Technology Artists have always explored new media, and computer-based artists are no exception. Generative art, a technique where the artist creates print or onscreen images by using computer algorithms, finds the artistic intersection of programming, computer graphics, and individual expression. The book includes a tutorial on Processing, an open source programming language and environment for people who want to create images, animations, and interactions.

About the Book *Generative Art* presents both the techniques and the beauty of algorithmic art. In it, you'll find dozens of high-quality examples of generative art, along with the specific steps the author followed to create each unique piece using the Processing programming language. The book includes concise tutorials for each of the technical components required to create the book's images, and it offers countless suggestions for how you can combine and reuse the various techniques to create your own works. Purchase of the print book comes with an offer of a free PDF, ePub, and Kindle eBook from Manning. Also available is all code from the book. What's Inside The principles of algorithmic art A Processing language tutorial Using organic, pseudo-random, emergent, and fractal processes ===== Table of Contents Part 1 Creative Coding Generative Art: In Theory and Practice Processing: A Programming Language for Artists Part 2 Randomness and Noise The Wrong Way to Draw A Line The Wrong Way to Draw a Circle Adding Dimensions Part 3 Complexity Emergence Autonomy Fractals

**spiral stairs math playground:** *Boxitects* Kim Smith, 2020 Meg goes to Maker School to hone her talent for building with boxes, but when Simone, another boxitect, arrives they become so competitive they nearly fail in the annual Maker Match. --

**spiral stairs math playground:** *A New English Dictionary on Historical Principles* James Augustus Henry Murray, 1908

**spiral stairs math playground:** *Cooking Class* Deanna F. Cook, 2015-03-10 The kids are taking over the kitchen! Deanna F. Cook presents more than 50 recipes designed for the cooking abilities and tastes of children ages 6 to 12. Basic cooking techniques are explained in kid-friendly language, and recipes include favorites like applesauce, French toast, popcorn chicken, pizza, and more. Full of fresh, healthy ingredients and featuring imaginative presentations like egg mice, fruit flowers, and mashed potato clouds, *Cooking Class* brings inspiration and confidence to the chefs of the future.

**spiral stairs math playground:** *A New English Dictionary on Historical Principles* Sir James Augustus Henry Murray, 1908

**spiral stairs math playground:** *Architecture* Francis D. K. Ching, 2012-07-16 A superb visual reference to the principles of architecture Now including interactive CD-ROM! For more than thirty years, the beautifully illustrated *Architecture: Form, Space, and Order* has been the classic introduction to the basic vocabulary of architectural design. The updated Third Edition features expanded sections on circulation, light, views, and site context, along with new considerations of environmental factors, building codes, and contemporary examples of form, space, and order. This classic visual reference helps both students and practicing architects understand the basic vocabulary of architectural design by examining how form and space are ordered in the built environment.? Using his trademark meticulous drawing, Professor Ching shows the relationship between fundamental elements of architecture through the ages and across cultural boundaries. By looking at these seminal ideas, *Architecture: Form, Space, and Order* encourages the reader to look critically at the built environment and promotes a more evocative understanding of architecture. In addition to updates to content and many of the illustrations, this new edition includes a companion CD-ROM that brings the book's architectural concepts to life through three-dimensional models and animations created by Professor Ching.

**spiral stairs math playground:** *In the Dark on the Sunny Side* Lawrence W. Baggett, 2012-12-06 A memoir that describes the groundbreaking life and career of blind mathematician Larry Baggett, interspersed with musings on mathematics.

**spiral stairs math playground:** *"Spiers and Surenne's" French and English [english and French] Pronouncing Dictionary* Alexander Spiers, 1857

**spiral stairs math playground:** *Seriously...I'm Kidding* Ellen DeGeneres, 2011-10-04 ~b~>With the winning, upbeat candor that has made her show one of the most popular and honored daytime shows on the air, beloved talk show host and comedian Ellen DeGeneres shares her views on life, love, and American Idol. I've experienced a whole lot the last few years and I have a lot to share. So I hope that you'll take a moment to sit back, relax and enjoy the words I've put together for



you in this book. I think you'll find I've left no stone unturned, no door unopened, no window unbroken, no rug unvacuumed, no ivories untickled. What I'm saying is, let us begin, shall we? Seriously... I'm Kidding is a lively, hilarious, and often sweetly poignant look at the life of the much-loved entertainer as she opens up about her personal life, her talk show, and more. PRAISE FOR Seriously... I'm Kidding DeGeneres's amiably oddball riffs on everything from kale to catwalks to Jesus will make fans smile. -- People Whatever the topic, DeGeneres's compulsively readable style will appeal to fans old and new. - Publishers Weekly Fans will not be disappointed...[DeGeneres's] trademark wit and openness shine through and through. -- Kirkus/DIVspan

**spiral stairs math playground: *Balanced on the Blade's Edge*** Lindsay Buroker, 2014-04-01 Colonel Ridge Zirkander isn't the model of military professionalism—he has a tendency to say exactly what's on his mind, and his record has enough demerits to wallpaper the hull of an airship—but as the best fighter pilot in the Iskandian army, he's used to a little leniency from his superiors. Until he punches the wrong diplomat in the nose and finds himself issued new orders: take command of a remote prison mine in the inhospitable Ice Blades Mountains. Ridge has never been in charge of anything larger than a flier squadron—what's he supposed to do with a frozen fortress full of murderers and rapists? Not to mention the strange woman who shows up right before he arrives... Sardelle Terushan wakes from three hundred years in a mage stasis shelter, only to realize that she is the last of the Referatu, the sorcerers who once helped protect Iskandia from conquerors. Their subterranean mountain community was blown up in a treacherous sneak attack by soldiers who feared their power. Everyone Sardelle ever knew is dead, and the sentient soulblade she has been bonded to since her youth is buried in the core of the mountain. Further, what remains of her home has been infested by bloodthirsty miners commanded by the descendants of the very soldiers who destroyed her people. Sardelle needs help to reach her soulblade—her only link to her past and her last friend in the world. Her only hope is to pretend she's one of the prisoners while trying to gain the commander's trust. But lying isn't her specialty, especially when the world has changed so much in the intervening centuries, and if Colonel Zirkander figures out who she truly is, he'll be duty-bound to sentence her to the only acceptable punishment for sorcerers: death.

**spiral stairs math playground: *Math Girls 5*** Hiroshi Yuki, 2021-11-15 This fifth entry in the highly acclaimed Math Girls series focuses on the mathematics of Évariste Galois, the nineteenth-century wunderkind who revolutionized mathematics with work he performed while still a teenager. Mathematicians before him had discovered solutions to general second-, third-, and fourth-degree equations, but a similar quintic formula that would allow knowing the solutions to any fifth-degree equation had eluded mathematicians for centuries. Through his ingenious approach of bridging the worlds of groups and fields, young Galois not only showed that such a formula was impossible, he newly developed group theory and the branch of mathematics that today bears his name. Join Miruka and friends to see how Galois developed his theory, along with related topics such as geometric constructions and the angle trisection problem, derivation of the cubic formula, reducible and irreducible polynomials, group theory and field theory, symmetric polynomials, roots of unity, sets and cosets, cyclotomic polynomials, vector spaces, extension fields, and symmetric groups. The book concludes with a tour through Galois's first paper, in which he describes for the first time the necessary and sufficient conditions for a polynomial to be algebraically solved using radicals. Math Girls 5: Galois Theory has something for anyone interested in mathematics, from advanced high school to college students and educators.

**spiral stairs math playground: *Staircases and Garden Steps*** Guy Cadogan Rothery, 2008-12 PREFACE. THE Author of this very practical treatise on Scotch Loch - Fishing desires clearly that it may be of use to all who had it. He does not pretend to have written anything new, but to have attempted to put what he has to say in as readable a form as possible. Everything in the way of the history and habits of fish has been studiously avoided, and technicalities have been used as sparingly as possible. The writing of this book has afforded him pleasure in his leisure moments, and that pleasure would be much increased if he knew that the perusal of it would create any bond of sympathy between himself and the angling community in general. This section is interleaved with

blank sheets for the readers notes. The Author need hardly say that any suggestions addressed to the case of the publishers, will meet with consideration in a future edition. We do not pretend to write or enlarge upon a new subject. Much has been said and written-and well said and written too on the art of fishing but loch-fishing has been rather looked upon as a second-rate performance, and to dispel this idea is one of the objects for which this present treatise has been written. Far be it from us to say anything against fishing, lawfully practised in any form but many pent up in our large towns will bear us out when we say that, on the whole, a days loch-fishing is the most convenient. One great matter is, that the loch-fisher is dependent on nothing but enough wind to curl the water, -and on a large loch it is very seldom that a dead calm prevails all day, -and can make his arrangements for a day, weeks beforehand whereas the stream-fisher is dependent for a good take on the state of the water and however pleasant and easy it may be for one living near the banks of a good trout stream or river, it is quite another matter to arrange for a days river-fishing, if one is looking forward to a holiday at a date some weeks ahead. Providence may favour the expectant angler with a good day, and the water in order but experience has taught most of us that the good days are in the minority, and that, as is the case with our rapid running streams, -such as many of our northern streams are, -the water is either too large or too small, unless, as previously remarked, you live near at hand, and can catch it at its best. A common belief in regard to loch-fishing is, that the tyro and the experienced angler have nearly the same chance in fishing, -the one from the stern and the other from the bow of the same boat. Of all the absurd beliefs as to loch-fishing, this is one of the most absurd. Try it. Give the tyro either end of the boat he likes give him a cast of ally flies he may fancy, or even a cast similar to those which a crack may be using and if he catches one for every three the other has, he may consider himself very lucky. Of course there are lochs where the fish are not abundant, and a beginner may come across as many as an older fisher but we speak of lochs where there are fish to be caught, and where each has a fair chance. Again, it is said that the boatman has as much to do with catching trout in a loch as the angler. Well, we don't deny that. In an untried loch it is necessary to have the guidance of a good boatman but the same argument holds good as to stream-fishing...

**spiral stairs math playground: We Beat the Street** Sampson Davis, George Jenkins, Rameck Hunt, Sharon Draper, 2006-04-20 Growing up on the rough streets of Newark, New Jersey, Rameck, George, and Sampson could easily have followed their childhood friends into drug dealing, gangs, and prison. But when a presentation at their school made the three boys aware of the opportunities available to them in the medical and dental professions, they made a pact among themselves that they would become doctors. It took a lot of determination—and a lot of support from one another—but despite all the hardships along the way, the three succeeded. Retold with the help of an award-winning author, this younger adaptation of the adult hit novel *The Pact* is a hard-hitting, powerful, and inspirational book that will speak to young readers everywhere.

**spiral stairs math playground: The Lions of Fifth Avenue** Fiona Davis, 2020-08-04 A Good Morning America Book Club Pick and a New York Times bestseller! "A page-turner for booklovers everywhere! . . . A story of family ties, their lost dreams, and the redemption that comes from discovering truth."—Adriana Trigiani, bestselling author of *The Shoemaker's Wife* In New York Times bestselling author Fiona Davis's latest historical novel, a series of book thefts roils the iconic New York Public Library, leaving two generations of strong-willed women to pick up the pieces. It's 1913, and on the surface, Laura Lyons couldn't ask for more out of life—her husband is the superintendent of the New York Public Library, allowing their family to live in an apartment within the grand building, and they are blessed with two children. But headstrong, passionate Laura wants more, and when she takes a leap of faith and applies to the Columbia Journalism School, her world is cracked wide open. As her studies take her all over the city, she is drawn to Greenwich Village's new bohemia, where she discovers the Heterodoxy Club—a radical, all-female group in which women are encouraged to loudly share their opinions on suffrage, birth control, and women's rights. Soon, Laura finds herself questioning her traditional role as wife and mother. And when valuable books are stolen back at the library, threatening the home and institution she loves, she's forced to confront

her shifting priorities head on . . . and may just lose everything in the process. Eighty years later, in 1993, Sadie Donovan struggles with the legacy of her grandmother, the famous essayist Laura Lyons, especially after she's wrangled her dream job as a curator at the New York Public Library. But the job quickly becomes a nightmare when rare manuscripts, notes, and books for the exhibit Sadie's running begin disappearing from the library's famous Berg Collection. Determined to save both the exhibit and her career, the typically risk-averse Sadie teams up with a private security expert to uncover the culprit. However, things unexpectedly become personal when the investigation leads Sadie to some unwelcome truths about her own family heritage—truths that shed new light on the biggest tragedy in the library's history.

**spiral stairs math playground: Greystone Secrets #1: The Strangers** Margaret Peterson Haddix, 2019-04-02 New York Times bestselling author Margaret Peterson Haddix takes readers on a thrilling adventure filled with mysteries and plot twists aplenty in this absorbing series about family and friendships. Perfect for fans of *A Wrinkle in Time* and *The City of Ember*! What makes you you? The Greystone kids thought they knew. Chess has always been the protector over his younger siblings, Emma loves math, and Finn does what Finn does best—acting silly and being adored. They've been a happy family, just the three of them and their mom. But everything changes when reports of three kidnapped children reach the Greystone kids, and they're shocked by the startling similarities between themselves and these complete strangers. The other kids share their same first and middle names. They're the same ages. They even have identical birthdays. Who, exactly, are these strangers? Before Chess, Emma, and Finn can question their mom about it, she takes off on a sudden work trip and leaves them in the care of Ms. Morales and her daughter, Natalie. But puzzling clues left behind lead to complex codes, hidden rooms, and a dangerous secret that will turn their world upside down. Praise for *The Strangers*: A secret-stacked, thrilling series opener about perception, personal memories, and the idiosyncrasies that form individual identities. (Publishers Weekly, starred review) \* Winter 2018-2019 Kids' Indie Next List Pick \* Indie Bestseller \* Time for Kids Book Club: Top 10 Summer Reads \* PW Best Books 2019 \* Texas Bluebonnet Award List 2020-2021 \* 2020 LITA Excellence in Children's and Young Adult Science Fiction Notable Book: The Eleanor Cameron Notable Middle Grade Books List \*

**spiral stairs math playground: Learning**, 1986

**spiral stairs math playground: The Order of Odd-Fish** James Kennedy, 2008-08-12 JO LAROCHE HAS lived her 13 years in the California desert with her Aunt Lily, ever since she was dropped on Lily's doorstep with this note: This is Jo. Please take care of her. But beware. This is a dangerous baby. At Lily's annual Christmas costume party, a variety of strange events take place that lead Jo and Lily out of California forever—and into the mysterious, strange, fantastical world of Eldritch City. There, Jo learns the scandalous truth about who she is, and she and Lily join the Order of Odd-Fish, a collection of knights who research useless information. Glamorous cockroach butlers, pointless quests, obsolete weapons, and bizarre festivals fill their days, but two villains are controlling their fate. Jo is inching closer and closer to the day when her destiny is fulfilled, and no one in Eldritch City will ever be the same.

**spiral stairs math playground: The Hungry Brain** Stephan J. Guyenet, Ph.D., 2017-02-07 A Publishers Weekly Best Book of the Year From an obesity and neuroscience researcher with a knack for engaging, humorous storytelling, *The Hungry Brain* uses cutting-edge science to answer the questions: why do we overeat, and what can we do about it? No one wants to overeat. And certainly no one wants to overeat for years, become overweight, and end up with a high risk of diabetes or heart disease--yet two thirds of Americans do precisely that. Even though we know better, we often eat too much. Why does our behavior betray our own intentions to be lean and healthy? The problem, argues obesity and neuroscience researcher Stephan J. Guyenet, is not necessarily a lack of willpower or an incorrect understanding of what to eat. Rather, our appetites and food choices are led astray by ancient, instinctive brain circuits that play by the rules of a survival game that no longer exists. And these circuits don't care about how you look in a bathing suit next summer. To make the case, *The Hungry Brain* takes readers on an eye-opening journey through cutting-edge

neuroscience that has never before been available to a general audience. The Hungry Brain delivers profound insights into why the brain undermines our weight goals and transforms these insights into practical guidelines for eating well and staying slim. Along the way, it explores how the human brain works, revealing how this mysterious organ makes us who we are.

**spiral stairs math playground:** *A Playful Path* Bernard De Koven, 2013-12-18 A Playful Path, the new book by games guru and fun theorist Bernard De Koven, serves as a collection of ideas and tools to help us bring our playfulness back into the open. When we find ourselves forgetting the life of the game or the game of life, the joy of form or the content, the play of brain or mind, body or spirit, this book can help us return to that which our soul is heir.

**spiral stairs math playground: Introduction to Sports Biomechanics** Roger Bartlett, 2002-04-12 First published in 1996. Routledge is an imprint of Taylor & Francis, an informa company.

**spiral stairs math playground:** *Out Of Control* Kevin Kelly, 2009-04-30 Out of Control chronicles the dawn of a new era in which the machines and systems that drive our economy are so complex and autonomous as to be indistinguishable from living things.

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