

# math with bad drawings

**math with bad drawings** is a common challenge faced by students, educators, and professionals alike. This concept refers to the difficulties and misunderstandings that arise when mathematical diagrams, sketches, or visual aids are poorly executed or inaccurately represented. Such drawings can lead to confusion, misinterpretation of problems, and ultimately impact comprehension and problem-solving skills. In the realm of mathematics, clear and precise visual representations are essential for conveying complex ideas effectively. This article explores the implications of math with bad drawings, the causes behind ineffective visual aids, and strategies to improve mathematical illustrations. Additionally, it discusses the importance of good drawings in enhancing learning outcomes and provides practical tips for creating better math visuals.

- Understanding the Impact of Math with Bad Drawings
- Common Causes of Poor Mathematical Illustrations
- Consequences of Using Bad Drawings in Math
- Strategies to Improve Math Drawings
- Tools and Techniques for Creating Effective Math Visuals

## Understanding the Impact of Math with Bad Drawings

Math with bad drawings can significantly hinder the learning process by obscuring the intended concepts and relationships within mathematical problems. Visual aids in math serve as bridges between abstract theories and tangible understanding. When these bridges are weak or faulty due to unclear or inaccurate drawings, students may struggle to grasp essential ideas. Poor drawings often fail to highlight critical components such as angles, proportions, or spatial relationships, which are vital in geometry, trigonometry, and other branches of mathematics. As a result, learners may develop misconceptions or overlook important problem-solving steps.

## The Role of Visualizations in Mathematical Comprehension

Visualizations in mathematics help learners interpret data, understand geometric relationships, and conceptualize functions or equations. Effective drawings can simplify complex problems by breaking them down into understandable parts. Conversely, bad drawings can distort these parts, leading to confusion. For example, a misdrawn triangle with incorrect angles may cause errors in calculating side lengths or area. Therefore, the quality of mathematical illustrations directly influences comprehension and accuracy.

## **Examples of Bad Drawings in Math Contexts**

Common instances of math with bad drawings include skewed shapes, inconsistent scales, unclear labels, and overlapping lines. These issues may occur in classroom settings, textbooks, or digital content. For example, a graph with unlabeled axes or inconsistent intervals can mislead students about function behavior. Similarly, a poorly drawn geometric figure may omit essential details such as parallel lines or right angles, which are crucial for proofs or calculations.

## **Common Causes of Poor Mathematical Illustrations**

Identifying the root causes of bad math drawings is essential for addressing the problem and improving the quality of visual aids. Several factors contribute to the creation of ineffective or confusing math illustrations.

### **Lack of Drawing Skills and Tools**

One primary cause is the absence of proper drawing skills or access to suitable tools. Many individuals tasked with creating math drawings may not have artistic training or familiarity with graphic software. This limitation can lead to inaccurate sketches or diagrams that fail to convey the intended information clearly.

### **Insufficient Understanding of Mathematical Concepts**

Another cause is the creator's incomplete understanding of the mathematical concepts involved. Without a solid grasp of the subject matter, it becomes challenging to represent ideas correctly and highlight relevant features in drawings. This issue often leads to oversimplifications or errors in visual representations.

### **Time Constraints and Rushed Work**

Time pressure can also result in math with bad drawings. When educators or content creators are rushed, they might produce quick sketches without verifying accuracy or clarity. These hurried efforts can compromise the quality of illustrations and diminish their instructional value.

### **Inadequate Attention to Detail**

Finally, neglecting the finer details such as labeling, scaling, and alignment contributes to poor mathematical drawings. These elements are critical for ensuring that visuals are informative and

easy to interpret. Overlooking them can make diagrams ambiguous and less effective as teaching tools.

## **Consequences of Using Bad Drawings in Math**

The use of bad drawings in math has far-reaching consequences for both learners and educators. Understanding these impacts emphasizes the necessity of improving visual representations in mathematics.

### **Misinterpretation and Confusion**

Bad drawings often lead to misunderstanding of problems, causing learners to misinterpret questions or concepts. This confusion can result in incorrect answers and hinder the development of problem-solving skills. In exams or real-world applications, such misunderstandings can have significant negative effects.

### **Reduced Engagement and Motivation**

Poor quality drawings may also decrease student engagement and motivation. When visuals are unclear or misleading, learners might feel frustrated or disinterested, negatively affecting their attitude toward math. Effective illustrations, by contrast, can make learning more interactive and enjoyable.

### **Lower Academic Performance**

Consistently encountering bad drawings can contribute to lower academic performance. Students may struggle to follow lessons or complete assignments accurately, leading to diminished confidence and poorer results. This cycle can perpetuate difficulties with mathematics over time.

### **Challenges in Teaching and Communication**

Educators relying on bad drawings face obstacles in conveying material effectively. Miscommunication caused by flawed visuals can necessitate additional explanations, consuming valuable instructional time and complicating lesson delivery.

# Strategies to Improve Math Drawings

Enhancing the quality of mathematical drawings requires deliberate effort and the adoption of best practices. Several strategies can help educators, students, and content creators produce clearer and more accurate visuals.

## Developing Basic Drawing Skills

Investing time in developing fundamental drawing skills can improve the clarity of math illustrations. Simple techniques such as using rulers for straight lines, compasses for circles, and protractors for angles can increase precision. Practicing these skills enables creators to produce neater and more reliable diagrams.

## Utilizing Graphing and Drawing Software

Modern technology offers various tools designed specifically for creating mathematical visuals. Software like GeoGebra, Desmos, and other graphing calculators facilitate the generation of precise and scalable drawings. Using such tools reduces errors and enhances the professional appearance of math diagrams.

## Ensuring Conceptual Accuracy

Before drawing, it is essential to understand the mathematical concepts thoroughly. This understanding helps in selecting the appropriate representation and emphasizing critical features. Reviewing the problem and planning the illustration can prevent inaccuracies and omissions.

## Incorporating Clear Labels and Annotations

Adding descriptive labels, titles, and annotations makes drawings more accessible and easier to interpret. Clear markings of points, lines, angles, and axes provide context and guide the viewer through the illustration. Consistent use of notation contributes to coherence and reduces ambiguity.

## Reviewing and Refining Drawings

Regularly reviewing and refining math drawings can identify and correct mistakes. Seeking feedback from peers or instructors ensures that visuals meet educational standards and effectively support learning objectives.

# Tools and Techniques for Creating Effective Math Visuals

Numerous tools and techniques exist to assist in producing high-quality math drawings. Selecting the right resources and methods can significantly enhance the clarity and impact of mathematical illustrations.

## Manual Drawing Tools

Traditional tools such as graph paper, rulers, compasses, and protractors remain valuable for creating accurate hand-drawn diagrams. These instruments help maintain scale, proportion, and precision, which are crucial for effective math visuals.

## Digital Drawing and Graphing Software

Digital platforms like GeoGebra, Desmos, and Microsoft Visio offer advanced features for constructing complex diagrams and graphs. These programs allow for easy editing, scaling, and customization, enabling creators to produce polished and professional visuals.

## Best Practices for Visual Design in Math

Adhering to design principles enhances the readability and effectiveness of math drawings. Key practices include:

- Using consistent color schemes to distinguish elements
- Maintaining proportional scales for accuracy
- Applying clear and legible fonts for labels
- Organizing components logically to guide interpretation
- Minimizing clutter to focus attention on essential parts

## Incorporating Interactive Elements

Interactive math visuals, enabled by digital tools, allow users to manipulate variables and observe

outcomes dynamically. This interactivity fosters deeper understanding and engagement, making math concepts more tangible and accessible.

## **Frequently Asked Questions**

### **What is 'math with bad drawings' about?**

Math with Bad Drawings is a popular webcomic and book series by Ben Orlin that explains math concepts using humorous, simple, and intentionally crude drawings to make math more accessible and entertaining.

### **Who created 'Math with Bad Drawings'?**

Ben Orlin is the creator of Math with Bad Drawings, known for his unique approach to teaching math through funny and simple illustrations.

### **Why are the drawings in 'Math with Bad Drawings' intentionally bad?**

The drawings are intentionally bad to make math feel less intimidating and more approachable, showing that you don't need perfect art to understand complex ideas.

### **What topics does 'Math with Bad Drawings' cover?**

It covers a wide range of math topics including algebra, geometry, calculus, probability, and mathematical philosophy, all explained with humor and simple sketches.

### **Is 'Math with Bad Drawings' suitable for all ages?**

Yes, the content is designed to be accessible to a wide audience, including middle school students, high schoolers, and adults interested in learning math in a fun way.

### **Where can I find 'Math with Bad Drawings' comics?**

You can find the comics on the official Math with Bad Drawings website, Ben Orlin's social media pages, and in his published books.

### **Has 'Math with Bad Drawings' been published in book form?**

Yes, Ben Orlin has published several books under the Math with Bad Drawings brand, which compile his comics and essays on math.

### **How does 'Math with Bad Drawings' help in learning math?**

It uses humor and relatable, simple drawings to demystify math concepts, making them easier to understand and less scary for learners.

# Can teachers use 'Math with Bad Drawings' in the classroom?

Absolutely! Many educators use the comics and materials from Math with Bad Drawings to engage students and supplement traditional math teaching.

## What is a popular example of a math concept explained in 'Math with Bad Drawings'?

One popular example is the explanation of the concept of infinity, where Ben Orlin uses quirky illustrations and stories to convey the idea in an understandable and amusing way.

## Additional Resources

### 1. *"The Geometry of Squiggly Lines"*

This book explores the fascinating world of geometry, but with a twist—every shape is hand-drawn with intentionally awkward and wobbly lines. The author uses these imperfect sketches to simplify complex concepts, making them more approachable and less intimidating. Despite the rough drawings, the explanations are clear and insightful, perfect for visual learners who don't mind a bit of artistic chaos.

### 2. *"Algebra Adventures: Crayons and Confusion"*

Dive into algebra with this quirky book filled with colorful, childlike doodles that often look like they were drawn by a distracted kindergartner. The playful drawings add humor and a lighthearted tone to solving equations and understanding variables. Though the art is far from polished, the mathematical content remains solid and educational.

### 3. *"Calculus for the Visually Challenged"*

This unconventional calculus textbook features diagrams that look hastily sketched and sometimes barely recognizable. The rough visuals are paired with straightforward explanations, aiming to demystify derivatives and integrals without the burden of pristine graphs. It's a refreshing take for students who find typical textbooks too sterile or overwhelming.

### 4. *"Number Theory in Crayon"*

Number theory comes alive with messy, colorful drawings that resemble a child's art project gone wild. The author breaks down prime numbers, divisibility, and modular arithmetic using these imperfect illustrations to keep the mood light and entertaining. Despite the chaotic visuals, the math is rigorously presented and surprisingly engaging.

### 5. *"Probability and Statistics: Doodles and Data"*

This book tackles probability and statistics with charts and graphs that look like they were drawn during a caffeine-fueled late-night session. The rough sketches help convey concepts like distributions, mean, and variance in a more relatable, less intimidating manner. It's perfect for readers who appreciate humor alongside their math lessons.

### 6. *"Trigonometry with Stick Figures"*

Learn about sine, cosine, and tangent through a series of stick figure sketches that are more amusing than accurate. These simplistic drawings guide readers through the unit circle and right triangles with a playful tone. Although the artwork is minimalistic and occasionally off, the explanations make the concepts easy to grasp.

### 7. *"Math Puzzles and Parodies"*

This collection of math puzzles is accompanied by deliberately bad cartoons and caricatures that add a comedic flair. The drawings often exaggerate mathematical stereotypes and scenarios, making math both fun and approachable. Readers will enjoy the blend of challenging problems and laugh-out-loud illustrations.

### 8. *"Linear Algebra for Doodlers"*

Vectors, matrices, and transformations are explained alongside crude sketches that look like they were done with a shaky hand. The informal art style helps reduce the intimidation factor of linear algebra, making it accessible for beginners. Although the drawings lack polish, the logical structure and examples are well thought out.

### 9. *"Math History: Scribbles Through Time"*

This book chronicles the history of mathematics with timelines and portraits rendered in a deliberately sloppy, almost childlike manner. The imperfect drawings add charm and personality to the stories of famous mathematicians and their discoveries. It's a unique way to learn about math history that feels personal and engaging rather than textbook dry.

## **Math With Bad Drawings**

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**math with bad drawings: Math with Bad Drawings** Ben Orlin, 2018-09-18 A hilarious reeducation in mathematics—full of joy, jokes, and stick figures—that sheds light on the countless practical and wonderful ways that math structures and shapes our world. In *Math With Bad Drawings*, Ben Orlin reveals to us what math actually is; its myriad uses, its strange symbols, and the wild leaps of logic and faith that define the usually impenetrable work of the mathematician. Truth and knowledge come in multiple forms: colorful drawings, encouraging jokes, and the stories and insights of an empathetic teacher who believes that math should belong to everyone. Orlin shows us how to think like a mathematician by teaching us a brand-new game of tic-tac-toe, how to understand an economic crisis by rolling a pair of dice, and the mathematical headache that ensues when attempting to build a spherical Death Star. Every discussion in the book is illustrated with Orlin's trademark bad drawings, which convey his message and insights with perfect pitch and clarity. With 24 chapters covering topics from the electoral college to human genetics to the reasons not to trust statistics, *Math with Bad Drawings* is a life-changing book for the math-estranged and math-enamored alike.

**math with bad drawings: Math Games with Bad Drawings** Ben Orlin, 2022-04-05 Bestselling author and worst-drawing artist Ben Orlin expands his oeuvre with this interactive collection of mathematical games. With 70-plus games, each taking a minute to learn and a lifetime to master, this treasure trove will delight, educate, and entertain. From beloved math popularizer Ben Orlin comes a masterfully compiled collection of dozens of playable mathematical games. This ultimate game chest draws on mathematical curios, childhood classics, and soon-to-be classics, each hand-chosen to be (1) fun, (2) thought-provoking, and (3) easy to play. With just paper, pens, and the occasional handful of coins, you and a partner can enjoy hours of fun—and hours of challenge.

Orlin's sly humor, expansive knowledge, and so-bad-they're-good drawings show us how simple rules summon our best thinking. Games include: Ultimate Tic-Tac-Toe Sprouts Battleship Quantum Go Fish Dots and Boxes Black Hole Order and Chaos Sequencium Paper Boxing Prophecies Arpeggios Banker Francoprussian Labyrinth Cats and Dogs And many more.

**math with bad drawings:** *Math for English Majors* Ben Orlin, 2024-09-03 In this trailblazing work from the internet's most empathetic math teacher, Ben Orlin unravels the secrets behind the world's most confounding language. Math, it is said, is the universal language." But if a language brings people together, why does math make so many of us feel so alone? In *Math for English Majors*, bestselling author Ben Orlin (*Math with Bad Drawings*) offers fresh insights for the mathematically perplexed and mathematical masters alike. As Orlin reveals, the "universal language" is precisely that: a language. It has nouns (numbers), verbs (calculations), and grammar (algebra). It has funny idioms ("exponential"), quirky etymologies ("squaring"), and peculiar ambiguities ("PEMDAS"). It even has its own form of literature, with equations ranging from the simple wisdom of  $A^2 + B^2 = C^2$  to the startling profundity of  $e^{i\pi} + 1 = 0$ . Along the way, he shares relatable stories of his own mathematical misunderstandings and epiphanies, as well as the trials and triumphs of his students. And, as always, he sheds further light and levity on the subject with his inept—yet strangely effective—drawings.

**math with bad drawings:** *Change Is the Only Constant* Ben Orlin, 2019-10-08 From popular math blogger and author of the underground bestseller *Math With Bad Drawings*, *Change Is The Only Constant* is an engaging and eloquent exploration of the intersection between calculus and daily life, complete with Orlin's sly humor and wonderfully bad drawings. *Change is the Only Constant* is an engaging and eloquent exploration of the intersection between calculus and daily life, complete with Orlin's sly humor and memorably bad drawings. By spinning 28 engaging mathematical tales, Orlin shows us that calculus is simply another language to express the very things we humans grapple with every day -- love, risk, time, and most importantly, change. Divided into two parts, Moments and Eternities, and drawing on everyone from Sherlock Holmes to Mark Twain to David Foster Wallace, *Change is the Only Constant* unearths connections between calculus, art, literature, and a beloved dog named Elvis. This is not just math for math's sake; it's math for the sake of becoming a wiser and more thoughtful human.

**math with bad drawings:** *MATH GAMES WITH BAD DRAWINGS* BEN. ORLIN, 2022

**math with bad drawings:** *Math Games with Bad Drawings* Ben Orlin, 2022 Ben Orlin expands his oeuvre with this interactive collection of mathematical games. Each taking a minute to learn and a lifetime to master, this treasure chest of 70-plus games will delight, educate, and entertain.

**math with bad drawings:** *The Best Writing on Mathematics 2020* Mircea Pitici, 2020-11-24 The year's finest mathematical writing from around the world This annual anthology brings together the year's finest mathematics writing from around the world. Featuring promising new voices alongside some of the foremost names in the field, *The Best Writing on Mathematics 2020* makes available to a wide audience many articles not easily found anywhere else—and you don't need to be a mathematician to enjoy them. These writings offer surprising insights into the nature, meaning, and practice of mathematics today. They delve into the history, philosophy, teaching, and everyday aspects of math, and take readers behind the scenes of today's hottest mathematical debates. Here, Steven Strogatz reveals how calculus drives advances in virology, Paul Thagard argues that the power of mathematics stems from its combination of realistic and fictional qualities, and Erica Klarreich describes how Hao Huang used the combinatorics of cube nodes to solve a longstanding problem in computer science. In other essays, John Baez tells how he discovered the irresistible attractions of algebraic geometry, Mark Colyvan compares the radically different explanatory practices of mathematics and science, and Boris Odehnl reviews some surprising properties of multidimensional geometries. And there's much, much more. In addition to presenting the year's most memorable writings on mathematics, this must-have anthology includes a bibliography of other notable writings and an introduction by the editor. This book belongs on the shelf of anyone

interested in where math has taken us—and where it is headed.

**math with bad drawings:** *The Creative Mathematics Teacher's Book of Lists* Peter Appelbaum, 2024-09-09 Unexpected lists that propel your teaching into refreshingly new directions! From lesson planning and assessment strategies to ideas for changing the world, there is something for everybody at every level and age of mathematics – entertaining humor, deeply serious provocations to push you out of the box, and good, clean wholesome tips for creative experiments in classroom organization.

**math with bad drawings:** *The Art of Insight* Alberto Cairo, 2023-11-08 Learn how expert data visualization designers reason about their craft In *The Art of Insight: How Great Visualization Designers Think*, renowned visualization designer and educator Alberto Cairo, in conversation with several leaders in the field, delivers an inspiring exploration of how they make design choices. The book is a celebration of visualization, and a personal journey that dives into subjects like: How the professional background and life experiences of every designer shape their choices of what to visualize and how to visualize it. What designers from different countries and cultures, and working in different fields, such as data art, data analytics, or data journalism, have in common, or how they differ from each other. How designers reflect on research, ethical reasoning, and also aesthetic judgments, to make decisions such as selecting the most appropriate ways to encode data, or the most appealing visual style. Perfect for data scientists and data journalists, *The Art of Insight* will also inspire artists, analysts, statisticians, and any other professional who uses data visualizations.

**math with bad drawings:** *312 Things To Do with a Math Journal* Denise Gaskins, 2022-03-14 Are you looking for new ways to help your children learn math? In a math journal, children explore their own ideas about numbers, shapes, and patterns through drawing or writing in response to a question. Journaling encourages students to develop a rich mathematical mindset. They begin to see connections and make sense of math concepts. They grow confident in their ability to think through new ideas. All they need is a piece of paper, a pencil, and a good prompt to launch their mathematical journey. *312 Things To Do with a Math Journal* includes number play prompts, games, math art, story problems, mini-essays, geometry investigations, brainteasers, number patterns, research projects, and much more. These activities work at any grade level, and most can be enjoyed more than once. It doesn't matter whether your students are homeschooled or in a classroom, distance-learning, or in person. Everyone can enjoy the experience of playing around with math. Early Reviews from My Journaling Beta-Testers: • We really enjoyed these! • I remember doing pages and pages of dull equations with no creativity or puzzle-thinking, but now as a homeschool mom, I'm actually enjoying math for the first time! My daughter's math skills have skyrocketed and she always asks to start homeschool with math. • Thank you for a great intro to Playful Math! • All of the kids were excited about their journals. My oldest kept going without prompting and did several more pages on his own. • We had a lot of fun doing your math prompts. We had never done any math journaling before, but we will certainly integrate this into our weekly routine from now on. Pick up a copy of *312 Things To Do with a Math Journal* and begin your family's math journaling adventure today.

**math with bad drawings:** *Home Learning Year by Year, Revised and Updated* Rebecca Rupp, 2020-01-21 A comprehensive guide to designing homeschool curriculum, from one of the country's foremost homeschooling experts—now revised and updated! Homeschooling can be a tremendous gift to your children—a personalized educational experience tailored to each kid's interests, abilities, and learning styles. But what to teach, and when, and how? Especially for first-time homeschoolers, the prospect of tackling an annual curriculum can be daunting. In *Home Learning Year by Year*, Rebecca Rupp presents comprehensive plans from preschool through high school, covering integral subjects for each grade, with lists of topics commonly presented at each level, recommended resource and reading lists, and suggestions for creative alternative options and approaches. Included, along with all the educational basics, are techniques and resources for teaching everything from philosophy to engineering, as well as suggestions for dealing with such sensitive topics as sex education. Now revised throughout with all-new updates featuring the most effective and up-to-date

methods and reading guides to homeschool your child at all ages, *Home Learning Year by Year* continues to be the definitive book for the homeschooling parent.

**math with bad drawings: Mathematical Intelligence** Mubeen Junaid, 2022-11-01 A fresh exploration into the 'human nature versus technology' argument, revealing an unexpected advantage that humans have over our future robot masters: we're actually good at mathematics. There's so much discussion about the threat posed by intelligent machines that it sometimes seems as though we should simply surrender to our robot overlords now. But Junaid Mubeen isn't ready to throw in the towel just yet. As far as he is concerned, we have the creative edge over computers, because of a remarkable system of thought that humans have developed over the millennia. It's familiar to us all, but often badly taught in schools and misrepresented in popular discourse—math. Computers are, of course, brilliant at totting up sums, pattern-seeking, and performing mindless tasks of, well, computation. For all things calculation, machines reign supreme. But Junaid identifies seven areas of intelligence where humans can retain a crucial edge. And in exploring these areas, he opens up a fascinating world where we can develop our uniquely human mathematical talents. Just a few of the fascinating subjects covered in *MATHEMATICAL INTELLIGENCE* include: -Humans are endowed with a natural sense of numbers that is based on approximation rather than precise calculation. Our in-built estimation skills complement the precision of computers. Interpreting the real world depends on both. -What sets humans apart from other animals is language and abstraction. We have an extraordinary ability to create powerful representations of knowledge— more diverse than the binary language of computers. -Mathematics confers the most robust, logical framework for establishing permanent truths. Reasoning shields us from the dubious claims of pure pattern-recognition systems. -All mathematical truths are derived from a starting set of assumptions, or axioms. Unlike computers, humans have the freedom to break free of convention and examine the logical consequences of our choices. Mathematics rewards our imagination with fascinating and, on occasion, applicable concepts that originate from breaking the rules. -Computers can be tasked to solve a range of problems, but which problems are worth the effort? Questioning is as vital to our repertoire of thinking skills as problem-solving itself.

**math with bad drawings: Mathematics for Human Flourishing** Francis Su, 2020-01-07 Winner of the Mathematics Association of America's 2021 Euler Book Prize, this is an inclusive vision of mathematics—its beauty, its humanity, and its power to build virtues that help us all flourish“This is perhaps the most important mathematics book of our time. Francis Su shows mathematics is an experience of the mind and, most important, of the heart.”—James Tanton, Global Math ProjectA good book is an entertaining read. A great book holds up a mirror that allows us to more clearly see ourselves and the world we live in. Francis Su's *Mathematics for Human Flourishing* is both a good book and a great book.—MAA Reviews For mathematician Francis Su, a society without mathematical affection is like a city without concerts, parks, or museums. To miss out on mathematics is to live without experiencing some of humanity's most beautiful ideas. In this profound book, written for a wide audience but especially for those disenchanted by their past experiences, an award-winning mathematician and educator weaves parables, puzzles, and personal reflections to show how mathematics meets basic human desires—such as for play, beauty, freedom, justice, and love—and cultivates virtues essential for human flourishing. These desires and virtues, and the stories told here, reveal how mathematics is intimately tied to being human. Some lessons emerge from those who have struggled, including philosopher Simone Weil, whose own mathematical contributions were overshadowed by her brother's, and Christopher Jackson, who discovered mathematics as an inmate in a federal prison. Christopher's letters to the author appear throughout the book and show how this intellectual pursuit can—and must—be open to all.

**math with bad drawings: Mindset Mathematics: Visualizing and Investigating Big Ideas, Grade 8** Jo Boaler, Jen Munson, Cathy Williams, 2020-01-29 Engage students in mathematics using growth mindset techniques The most challenging parts of teaching mathematics are engaging students and helping them understand the connections between mathematics concepts. In this volume, you'll find a collection of low floor, high ceiling tasks that will help you do just that, by

looking at the big ideas at the eighth-grade level through visualization, play, and investigation. During their work with tens of thousands of teachers, authors Jo Boaler, Jen Munson, and Cathy Williams heard the same message—that they want to incorporate more brain science into their math instruction, but they need guidance in the techniques that work best to get across the concepts they needed to teach. So the authors designed Mindset Mathematics around the principle of active student engagement, with tasks that reflect the latest brain science on learning. Open, creative, and visual math tasks have been shown to improve student test scores, and more importantly change their relationship with mathematics and start believing in their own potential. The tasks in Mindset Mathematics reflect the lessons from brain science that: There is no such thing as a math person - anyone can learn mathematics to high levels. Mistakes, struggle and challenge are the most important times for brain growth. Speed is unimportant in mathematics. Mathematics is a visual and beautiful subject, and our brains want to think visually about mathematics. With engaging questions, open-ended tasks, and four-color visuals that will help kids get excited about mathematics, Mindset Mathematics is organized around nine big ideas which emphasize the connections within the Common Core State Standards (CCSS) and can be used with any current curriculum.

**math with bad drawings:** A Tactical Guide to Science Journalism Deborah Blum, Ashley Smart, Tom Zeller Jr., 2022 A Tactical Guide to Science Journalism brings together award-winning journalists from around the world to share fascinating tales of science and how it works and to provide guidance into reporting specialties like infectious disease, climate change, astronomy, public health, physics, and statistics. Drawing insights from writers based at publications including The New York Times, the BBC, The Washington Post, Science, The New Yorker, National Geographic and more, this guide is designed to help journalists everywhere improve their craft and serve as a valuable resource for those seeking to understand the profession at its best.

**math with bad drawings:** Unequal Eugenia Cheng, 2025-09-02 Why the familiar equal sign isn't just a marker of sameness but a gateway into math's—and humanity's—most profound questions Math is famous for its equations:  $1 + 1 = 2$ ,  $a^2 + b^2 = c^2$ , or  $y = mx + b$ . Much of the time it can seem like that's all mathematics is: following steps to show that what's on one side of an equation is the same as what's on the other. In Unequal, Eugenia Cheng shows that's just part of the story, and the boring part to boot. Mathematics isn't only about showing how numbers and symbols are the same. It isn't even just about numbers and symbols at all, but a world of shapes, symmetries, logical ideas, and more. And in that world, the boundary between things being equal and unequal is a gray area, or perhaps a rainbow of beautiful, vibrant, subtly nuanced color. As Unequal shows, once you go over that rainbow, almost everything can be considered equal and unequal at the same time, whether it's shapes (seen from the right perspective, a circle is the same as an ellipse), words (synonyms), or people—even numbers! It all depends on what features we care about. And it's up to us what we do about it. That's because mathematics isn't a series of rules, facts, or answers. It's an invitation to a more powerful way of thinking.

**math with bad drawings:** Paradoxes Hamza E. Alsamraee, 2020-09-10 Does  $.999\ldots = 1$ ? Can you cut and reassemble a sphere into two identically sized spheres? Is the consistency of mathematical systems unprovable? Surprisingly, the answer to all of these questions is yes! And at the heart of each question, there lies paradox. For millennia, paradoxes have shaped mathematics and guided mathematical progress forwards. From the ancient paradoxes of Zeno to the modern paradoxes of Russell, paradoxes remind us of the constant need to revamp our mathematical understanding. It is for this reason that paradoxes are so important. Paradoxes: Guiding Forces in Mathematical Exploration provides a survey of mathematical paradoxes spanning a wide variety of topics. It delves into each paradox mathematically, philosophically, and historically, and attempts to provide a full picture of how paradoxes contributed to the progress of mathematics and guided it in many ways. In addition, it discusses how paradoxes can be useful as educational tools. All of that, plus the fact that it is written in a way that is accessible to anyone with a high school background in mathematics! Entertaining and educational, this book will appeal to any reader looking for a mathematical and philosophical challenge.

**math with bad drawings: The Infinite Staircase** Geoffrey A. Moore, 2021-08-10 NAUTILUS BOOK AWARD GOLD MEDALIST — BODY, MIND, SPIRIT PRACTICES “Combining an extraordinary range of scholarship with an accessible and entertaining writing style, The Infinite Staircase . . . provides a coherent and unified platform for a full human life.” —Midwest Book Review In this bold new book, high-tech’s best-known strategist makes a seminal contribution to the search for meaning in a secular era. Two questions fundamental to human existence have always been the metaphysical “where do I fit in the grand scheme of things?” and the ethical “how should I behave?” Religion is no longer a source of answers for many people, and nothing has replaced it. Moore uses his signature framework-based approach to answer these questions, taking us on an intellectual roller coaster ride through physics, chemistry, biology, the social sciences and the humanities. Along the way, he builds a metaphorical ladder that leads from the big bang to the need for ethical action in our daily lives. Combining an extraordinary range of scholarship with an accessible and entertaining writing style, The Infinite Staircase: What the Universe Tells Us About Life, Ethics, and Mortality provides a coherent and unified platform for a full human life.

**math with bad drawings: Connecting Creativity and Motivation Research with End Users** Fredricka Reisman, Lawrence Joseph Keiser, Larry Keiser, Jeff Westphal, Penny Hammrich, 2024-02-15 Collates and presents creativity and motivation research findings to benefit teachers, corporate trainers, and students.

**math with bad drawings: Think Like a Rocket Scientist** Ozan Varol, 2020-04-14 \* One of Inc.com's 6 Books You Need to Read in 2020 (According to Bill Gates, Satya Nadella, and Adam Grant)\* Adam Grant's # 1 pick of his top 20 books of 2020\* One of 6 Groundbreaking Books of Spring 2020 (according to Malcolm Gladwell, Susan Cain, Dan Pink, and Adam Grant). A former rocket scientist reveals the habits, ideas, and strategies that will empower you to turn the seemingly impossible into the possible. Rocket science is often celebrated as the ultimate triumph of technology. But it's not. Rather, it's the apex of a certain thought process -- a way to imagine the unimaginable and solve the unsolvable. It's the same thought process that enabled Neil Armstrong to take his giant leap for mankind, that allows spacecraft to travel millions of miles through outer space and land on a precise spot, and that brings us closer to colonizing other planets. Fortunately, you don't have to be a rocket scientist to think like one. In this accessible and practical book, Ozan Varol reveals nine simple strategies from rocket science that you can use to make your own giant leaps in work and life -- whether it's landing your dream job, accelerating your business, learning a new skill, or creating the next breakthrough product. Today, thinking like a rocket scientist is a necessity. We all encounter complex and unfamiliar problems in our lives. Those who can tackle these problems -- without clear guidelines and with the clock ticking -- enjoy an extraordinary advantage. Think Like a Rocket Scientist will inspire you to take your own moonshot and enable you to achieve liftoff.

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