

3D PYTHAGOREAN THEOREM WORKSHEET

DECODING THE THIRD DIMENSION: A DEEP DIVE INTO THE 3D PYTHAGOREAN THEOREM WORKSHEET

AUTHOR: DR. EVELYN REED, PhD IN MATHEMATICS EDUCATION, SPECIALIZING IN SPATIAL REASONING AND CURRICULUM DEVELOPMENT. DR. REED HAS OVER 15 YEARS OF EXPERIENCE DESIGNING AND IMPLEMENTING INNOVATIVE MATHEMATICS CURRICULA, INCLUDING SEVERAL WIDELY ADOPTED RESOURCES FOCUSED ON VISUALIZING THREE-DIMENSIONAL GEOMETRY. HER EXPERTISE IS PARTICULARLY RELEVANT TO THE ANALYSIS OF A '3D PYTHAGOREAN THEOREM WORKSHEET' AS SHE UNDERSTANDS THE PEDAGOGICAL CHALLENGES AND OPPORTUNITIES INHERENT IN TEACHING THIS COMPLEX CONCEPT.

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EDITOR: PROFESSOR DAVID CHEN, PhD IN MATHEMATICS, SPECIALIZING IN GEOMETRY AND TOPOLOGY. PROFESSOR CHEN'S DECADES-LONG CAREER IN ACADEMIA INCLUDES EXTENSIVE RESEARCH ON SPATIAL REASONING AND ITS APPLICATION IN STEM FIELDS. HIS EDITORIAL CONTRIBUTION ADDS SIGNIFICANT CREDIBILITY, ENSURING THE ACCURACY AND PEDAGOGICAL SOUNDNESS OF THE '3D PYTHAGOREAN THEOREM WORKSHEET' ANALYSIS.

1. HISTORICAL CONTEXT OF THE PYTHAGOREAN THEOREM AND ITS 3D EXTENSION

THE PYTHAGOREAN THEOREM, FAMOUSLY STATED AS $a^2 + b^2 = c^2$, HOLDS A PROMINENT PLACE IN THE HISTORY OF MATHEMATICS. ITS DISCOVERY IS ATTRIBUTED TO THE ANCIENT GREEKS, SPECIFICALLY PYTHAGORAS AND HIS FOLLOWERS, ALTHOUGH EVIDENCE SUGGESTS ITS KNOWLEDGE EXISTED IN VARIOUS CULTURES EVEN EARLIER. THE THEOREM, FUNDAMENTALLY RELATING THE SIDES OF A RIGHT-ANGLED TRIANGLE, HAS BEEN APPLIED EXTENSIVELY IN ARCHITECTURE, SURVEYING, AND NAVIGATION FOR MILLENNIA.

EXTENDING THE PYTHAGOREAN THEOREM TO THREE DIMENSIONS WASN'T A STRAIGHTFORWARD LEAP. WHILE THE 2D VERSION FOCUSES ON A PLANE, THE 3D EXTENSION NECESSITATES UNDERSTANDING SPATIAL RELATIONSHIPS IN A CUBE OR A RECTANGULAR PRISM. THIS NECESSITATES A GRASP OF THREE-DIMENSIONAL COORDINATES AND THE CONCEPT OF DISTANCE IN SPACE. THE '3D PYTHAGOREAN THEOREM WORKSHEET' ACTS AS A TOOL TO BRIDGE THIS GAP, ALLOWING STUDENTS TO VISUALLY AND MATHEMATICALLY GRASP THE EXTENSION: $a^2 + b^2 + c^2 = d^2$, WHERE D REPRESENTS THE LENGTH OF THE SPACE DIAGONAL OF A RECTANGULAR PRISM WITH SIDES A, B, AND C.

2. THE SIGNIFICANCE OF A 3D PYTHAGOREAN THEOREM WORKSHEET IN MODERN EDUCATION

THE '3D PYTHAGOREAN THEOREM WORKSHEET', WHETHER A PHYSICAL HANDOUT OR A DIGITAL RESOURCE, SERVES AS A CRUCIAL TOOL IN MODERN MATHEMATICS EDUCATION. ITS RELEVANCE STEMS FROM SEVERAL KEY FACTORS:

VISUAL LEARNING: THE WORKSHEET TYPICALLY INCORPORATES DIAGRAMS, ILLUSTRATIONS, AND POSSIBLY INTERACTIVE ELEMENTS (IF DIGITAL), FOSTERING A STRONGER UNDERSTANDING OF THE THEOREM'S SPATIAL IMPLICATIONS. MANY STUDENTS STRUGGLE WITH ABSTRACT GEOMETRICAL CONCEPTS, AND A VISUAL APPROACH SIGNIFICANTLY IMPROVES COMPREHENSION.

PROBLEM-SOLVING SKILLS: WORKSHEETS OFTEN CONTAIN A VARIETY OF PROBLEMS OF INCREASING DIFFICULTY, REQUIRING STUDENTS TO APPLY THE THEOREM IN DIFFERENT CONTEXTS. THIS STRENGTHENS THEIR PROBLEM-SOLVING SKILLS AND ANALYTICAL THINKING CAPABILITIES.

REAL-WORLD APPLICATIONS: A WELL-DESIGNED '3D PYTHAGOREAN THEOREM WORKSHEET' CAN HIGHLIGHT REAL-WORLD

APPLICATIONS OF THE THEOREM, SUCH AS CALCULATING DISTANCES IN 3D SPACE, DETERMINING THE LENGTH OF DIAGONALS IN BUILDINGS, OR SOLVING PROBLEMS IN ENGINEERING AND ARCHITECTURE. THIS DEMONSTRATES THE THEOREM'S PRACTICALITY AND RELEVANCE BEYOND ABSTRACT MATHEMATICS.

FOUNDATION FOR ADVANCED CONCEPTS: UNDERSTANDING THE 3D PYTHAGOREAN THEOREM IS FOUNDATIONAL FOR MORE ADVANCED CONCEPTS IN GEOMETRY, TRIGONOMETRY, AND CALCULUS. MASTERING THIS CONCEPT EARLY ON LAYS A ROBUST GROUNDWORK FOR FUTURE MATHEMATICAL LEARNING.

3. ANALYZING THE STRUCTURE AND CONTENT OF A TYPICAL 3D PYTHAGOREAN THEOREM WORKSHEET

A TYPICAL '3D PYTHAGOREAN THEOREM WORKSHEET' MIGHT INCLUDE THE FOLLOWING COMPONENTS:

INTRODUCTION AND DEFINITION: A CONCISE EXPLANATION OF THE 3D PYTHAGOREAN THEOREM AND ITS FORMULA ($a^2 + b^2 + c^2 = d^2$).

WORKED EXAMPLES: STEP-BY-STEP SOLUTIONS TO ILLUSTRATIVE PROBLEMS, DEMONSTRATING THE APPLICATION OF THE FORMULA AND THE CALCULATION PROCESS.

PRACTICE PROBLEMS: A RANGE OF PROBLEMS WITH VARYING LEVELS OF COMPLEXITY, REQUIRING STUDENTS TO CALCULATE LENGTHS OF DIAGONALS IN DIFFERENT 3D SHAPES.

APPLICATIONS: PROBLEMS THAT SHOWCASE THE PRACTICAL APPLICATIONS OF THE THEOREM IN REAL-WORLD SCENARIOS.

REVIEW QUESTIONS: QUESTIONS TO TEST UNDERSTANDING OF THE KEY CONCEPTS AND FORMULAS.

ANSWER KEY: A COMPREHENSIVE ANSWER KEY FOR SELF-ASSESSMENT AND LEARNING VERIFICATION.

4. PEDAGOGICAL APPROACHES AND EFFECTIVENESS OF THE 3D PYTHAGOREAN THEOREM WORKSHEET

THE EFFECTIVENESS OF A '3D PYTHAGOREAN THEOREM WORKSHEET' RELIES HEAVILY ON ITS PEDAGOGICAL DESIGN. EFFECTIVE WORKSHEETS WILL INCORPORATE:

CLEAR AND CONCISE LANGUAGE: AVOIDING JARGON AND USING ACCESSIBLE LANGUAGE TO ENSURE EASY COMPREHENSION.

GRADUAL PROGRESSION: PRESENTING CONCEPTS IN A LOGICAL SEQUENCE, STARTING WITH SIMPLER PROBLEMS AND GRADUALLY INCREASING COMPLEXITY.

VISUAL AIDS: UTILIZING DIAGRAMS AND ILLUSTRATIONS TO AID UNDERSTANDING OF SPATIAL RELATIONSHIPS.

REAL-WORLD CONTEXT: INCORPORATING REAL-WORLD EXAMPLES TO MAKE THE LEARNING MORE ENGAGING AND RELEVANT.

INTERACTIVE ELEMENTS (IF DIGITAL): INTERACTIVE EXERCISES AND SIMULATIONS CAN SIGNIFICANTLY ENHANCE ENGAGEMENT AND LEARNING.

5. ADDRESSING COMMON CHALLENGES IN UNDERSTANDING THE 3D PYTHAGOREAN THEOREM

STUDENTS OFTEN ENCOUNTER CHALLENGES IN UNDERSTANDING AND APPLYING THE 3D PYTHAGOREAN THEOREM. THESE CHALLENGES FREQUENTLY STEM FROM:

DIFFICULTY VISUALIZING 3D SPACE: MANY STUDENTS STRUGGLE TO VISUALIZE AND MENTALLY MANIPULATE THREE-DIMENSIONAL OBJECTS.

MISAPPLICATION OF THE FORMULA: INCORRECTLY SUBSTITUTING VALUES INTO THE FORMULA OR FAILING TO IDENTIFY THE CORRECT SIDES OF THE 3D SHAPE.

LACK OF CONCEPTUAL UNDERSTANDING: FAILING TO GRASP THE UNDERLYING MATHEMATICAL PRINCIPLES BEHIND THE THEOREM.

6. THE ROLE OF TECHNOLOGY IN ENHANCING THE 3D PYTHAGOREAN THEOREM WORKSHEET

TECHNOLOGY PLAYS A SIGNIFICANT ROLE IN ENHANCING THE LEARNING EXPERIENCE ASSOCIATED WITH THE '3D PYTHAGOREAN

THEOREM WORKSHEET'. INTERACTIVE SOFTWARE, ONLINE SIMULATIONS, AND 3D MODELING TOOLS CAN SIGNIFICANTLY IMPROVE VISUALIZATION CAPABILITIES AND ENHANCE ENGAGEMENT. THESE TOOLS ALLOW STUDENTS TO ACTIVELY EXPLORE 3D SHAPES AND MANIPULATE VARIABLES, LEADING TO A DEEPER UNDERSTANDING OF THE CONCEPTS.

7. ASSESSMENT AND EVALUATION OF LEARNING USING THE 3D PYTHAGOREAN THEOREM WORKSHEET

THE '3D PYTHAGOREAN THEOREM WORKSHEET' SERVES NOT ONLY AS A LEARNING TOOL BUT ALSO AS AN ASSESSMENT TOOL. THE PROBLEMS INCLUDED IN THE WORKSHEET, RANGING IN DIFFICULTY, PROVIDE A MEANS TO EVALUATE STUDENT UNDERSTANDING AND IDENTIFY AREAS WHERE FURTHER INSTRUCTION MAY BE NEEDED. A WELL-DESIGNED WORKSHEET WILL INCORPORATE A VARIETY OF QUESTION TYPES, INCLUDING MULTIPLE-CHOICE, SHORT ANSWER, AND PROBLEM-SOLVING QUESTIONS, OFFERING A COMPREHENSIVE EVALUATION OF STUDENT COMPREHENSION.

8. FUTURE TRENDS AND DEVELOPMENTS IN 3D PYTHAGOREAN THEOREM TEACHING RESOURCES

FUTURE '3D PYTHAGOREAN THEOREM WORKSHEET' RESOURCES ARE LIKELY TO INCORPORATE EVEN MORE ADVANCED TECHNOLOGIES, SUCH AS AUGMENTED REALITY AND VIRTUAL REALITY, TO CREATE IMMERSIVE AND INTERACTIVE LEARNING EXPERIENCES. FURTHERMORE, PERSONALIZED LEARNING PLATFORMS MAY ADAPT THE COMPLEXITY AND CONTENT OF THE WORKSHEET BASED ON INDIVIDUAL STUDENT NEEDS AND PROGRESS.

CONCLUSION

THE '3D PYTHAGOREAN THEOREM WORKSHEET' IS A VITAL TOOL IN MODERN MATHEMATICS EDUCATION. ITS EFFECTIVENESS RELIES ON CAREFUL PEDAGOGICAL DESIGN, INCORPORATING VISUAL AIDS, REAL-WORLD APPLICATIONS, AND A GRADUAL PROGRESSION OF DIFFICULTY. BY ADDRESSING COMMON CHALLENGES AND LEVERAGING TECHNOLOGICAL ADVANCEMENTS, EDUCATORS CAN UTILIZE THIS RESOURCE TO FOSTER A DEEP UNDERSTANDING OF THE 3D PYTHAGOREAN THEOREM, EQUIPPING STUDENTS WITH ESSENTIAL SKILLS FOR FUTURE ACADEMIC AND PROFESSIONAL SUCCESS. THE HISTORICAL CONTEXT OF THE THEOREM, COMBINED WITH ITS MODERN APPLICATIONS, UNDERSCORES ITS ENDURING SIGNIFICANCE IN MATHEMATICS AND BEYOND.

FAQs

1. WHAT IS THE DIFFERENCE BETWEEN THE 2D AND 3D PYTHAGOREAN THEOREMS? THE 2D THEOREM APPLIES TO RIGHT-ANGLED TRIANGLES IN A PLANE ($A^2 + B^2 = C^2$), WHILE THE 3D THEOREM EXTENDS THIS TO RECTANGULAR PRISMS, RELATING THE LENGTHS OF THE SIDES TO THE LENGTH OF THE SPACE DIAGONAL ($A^2 + B^2 + C^2 = D^2$).
1. HOW CAN I VISUALIZE THE 3D PYTHAGOREAN THEOREM? USE PHYSICAL MODELS LIKE BUILDING BLOCKS OR IMAGINE A RECTANGULAR BOX. THE DIAGONAL CONNECTS OPPOSITE CORNERS.
1. WHAT ARE SOME REAL-WORLD APPLICATIONS OF THE 3D PYTHAGOREAN THEOREM? CALCULATING DISTANCES IN 3D SPACE (E.G., SURVEYING, GPS), DETERMINING THE LENGTH OF DIAGONALS IN BUILDINGS, ENGINEERING CALCULATIONS.
1. WHY IS IT IMPORTANT TO LEARN THE 3D PYTHAGOREAN THEOREM? IT'S FOUNDATIONAL FOR ADVANCED CONCEPTS IN GEOMETRY, TRIGONOMETRY, AND CALCULUS, CRUCIAL FOR STEM FIELDS.

1. HOW CAN I IMPROVE MY UNDERSTANDING OF THE 3D PYTHAGOREAN THEOREM? PRACTICE PROBLEMS, USE VISUAL AIDS, AND SEEK HELP WHEN NEEDED.
1. ARE THERE ONLINE RESOURCES TO HELP ME LEARN THE 3D PYTHAGOREAN THEOREM? YES, MANY WEBSITES AND EDUCATIONAL PLATFORMS OFFER INTERACTIVE LESSONS AND SIMULATIONS.
1. WHAT IF I GET STUCK ON A PROBLEM IN THE 3D PYTHAGOREAN THEOREM WORKSHEET? REVIEW THE EXAMPLES, CONSULT A TEACHER OR TUTOR, OR SEARCH FOR ONLINE EXPLANATIONS.
1. HOW CAN I USE A 3D PYTHAGOREAN THEOREM WORKSHEET EFFECTIVELY? WORK THROUGH THE EXAMPLES, COMPLETE THE PRACTICE PROBLEMS SYSTEMATICALLY, AND CHECK YOUR ANSWERS.
1. ARE THERE DIFFERENT TYPES OF 3D PYTHAGOREAN THEOREM WORKSHEETS? YES, SOME FOCUS ON SPECIFIC SHAPES OR APPLICATIONS, WHILE OTHERS OFFER A BROADER RANGE OF PROBLEMS.

RELATED ARTICLES

1. "VISUALIZING THE THIRD DIMENSION: A GUIDE TO SPATIAL REASONING IN GEOMETRY": THIS ARTICLE EXPLORES TECHNIQUES FOR IMPROVING SPATIAL REASONING SKILLS, CRUCIAL FOR UNDERSTANDING THE 3D PYTHAGOREAN THEOREM.
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1. "INTERACTIVE 3D GEOMETRY SOFTWARE FOR ENHANCED LEARNING": A REVIEW OF SOFTWARE PROGRAMS THAT CAN BE USED TO VISUALIZE AND MANIPULATE 3D SHAPES, AIDING IN UNDERSTANDING THE 3D PYTHAGOREAN THEOREM.
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1. "TROUBLESHOOTING COMMON MISTAKES IN 3D PYTHAGOREAN THEOREM PROBLEMS": THIS ARTICLE IDENTIFIES COMMON ERRORS STUDENTS MAKE AND OFFERS STRATEGIES TO AVOID THEM.

1. "DEVELOPING PROBLEM-SOLVING SKILLS THROUGH 3D GEOMETRY": THIS EXPLORES THE CONNECTION BETWEEN 3D GEOMETRY PROBLEMS AND THE DEVELOPMENT OF STRONG PROBLEM-SOLVING SKILLS.
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1. "CREATING ENGAGING 3D PYTHAGOREAN THEOREM WORKSHEETS: A TEACHER'S GUIDE": A GUIDE FOR EDUCATORS ON DEVELOPING EFFECTIVE WORKSHEETS THAT CATER TO DIVERSE LEARNING STYLES.
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 **3d pythagorean theorem worksheet:** The Pythagorean Theorem Eli Maor, 2019-11-19 Frontmatter --Contents --List of Color Plates --Preface --Prologue: Cambridge, England, 1993 --1. Mesopotamia, 1800 BCE --Sidebar 1: Did the Egyptians Know It? --2. Pythagoras --3. Euclid's Elements --Sidebar 2: The Pythagorean Theorem in Art, Poetry, and Prose --4. Archimedes --5. Translators and Commentators, 500-1500 CE --6. François Viète Makes History --7. From the Infinite to the Infinitesimal --Sidebar 3: A Remarkable Formula by Euler --8. 371 Proofs, and Then Some --Sidebar 4: The Folding Bag --Sidebar 5: Einstein Meets Pythagoras --Sidebar 6: A Most Unusual Proof --9. A Theme and Variations --Sidebar 7: A Pythagorean Curiosity --Sidebar 8: A Case of Overuse --10. Strange Coordinates --11. Notation, Notation, Notation --12. From Flat Space to Curved Spacetime --Sidebar 9: A Case of Misuse --13. Prelude to Relativity --14. From Bern to Berlin, 1905-1915 --Sidebar 10: Four Pythagorean Brainteasers --15. But Is It Universal? --16. Afterthoughts --Epilogue: Samos, 2005 --Appendixes --Chronology --Bibliography --Illustrations Credits --Index.

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3d pythagorean theorem worksheet: Video-interventions Naďa Vondrová, 2021-01-01 The book deals with developing the concept of professional vision (noticing and knowledge-based reasoning) among future primary and secondary school teachers of Biology, Mathematics, English as a foreign language, Art, and Social Studies. Researching the use of video interventions during teacher-training programmes, the authors show that short-term interventions do not significantly improve professional vision, which is in contrast to student teachers' perception of the practice. The book also uses case studies to uncover individual differences in student teachers' learning, taking into account their various backgrounds and approaches. This is a valuable resource for teacher educators who are considering the incorporation of video-intervention courses into study programmes and for researchers interested in the development of professional vision.

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3d pythagorean theorem worksheet: *Connecting Mathematics and Mathematics Education* Erich Christian Wittmann, 2020-12-09 This open access book features a selection of articles written by Erich Ch. Wittmann between 1984 to 2019, which shows how the “design science conception” has been continuously developed over a number of decades. The articles not only describe this conception in general terms, but also demonstrate various substantial learning environments that serve as typical examples. In terms of teacher education, the book provides clear information on how to combine (well-understood) mathematics and methods courses to benefit of teachers. The role of mathematics in mathematics education is often explicitly and implicitly reduced to the delivery of subject matter that then has to be selected and made palpable for students using methods imported from psychology, sociology, educational research and related disciplines. While these fields have made significant contributions to mathematics education in recent decades, it cannot be ignored that mathematics itself, if well understood, provides essential knowledge for teaching mathematics beyond the pure delivery of subject matter. For this purpose, mathematics has to be conceived of as an organism that is deeply rooted in elementary operations of the human mind, which can be seamlessly developed to higher and higher levels so that the full richness of problems of various degrees of difficulty, and different means of representation, problem-solving strategies, and forms of proof can be used in ways that are appropriate for the respective level. This view of mathematics is essential for designing learning environments and curricula, for conducting empirical studies on truly mathematical processes and also for implementing the findings of mathematics education in teacher education, where it is crucial to take systemic constraints into account.

3d pythagorean theorem worksheet: *Advanced Calculus (Revised Edition)* Lynn Harold Loomis, Shlomo Zvi Sternberg, 2014-02-26 An authorised reissue of the long out of print classic textbook, *Advanced Calculus* by the late Dr Lynn Loomis and Dr Shlomo Sternberg both of Harvard University has been a revered but hard to find textbook for the advanced calculus course for decades. This book is based on an honors course in advanced calculus that the authors gave in the 1960's. The foundational material, presented in the unstarred sections of Chapters 1 through 11, was normally covered, but different applications of this basic material were stressed from year to year, and the book therefore contains more material than was covered in any one year. It can accordingly be used (with omissions) as a text for a year's course in advanced calculus, or as a text for a three-semester introduction to analysis. The prerequisites are a good grounding in the calculus of one variable from a mathematically rigorous point of view, together with some acquaintance with linear algebra. The reader should be familiar with limit and continuity type arguments and have a certain amount of mathematical sophistication. As possible introductory texts, we mention *Differential and Integral Calculus* by R Courant, *Calculus* by T Apostol, *Calculus* by M Spivak, and *Pure Mathematics* by G Hardy. The reader should also have some experience with partial derivatives. In overall plan the book divides roughly into a first half which develops the calculus (principally the differential calculus) in the setting of normed vector spaces, and a second half which deals with the calculus of differentiable manifolds.

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3d pythagorean theorem worksheet: 411 SAT Algebra and Geometry Questions , 2006 In order to align the SAT with the math curriculum taught in high schools, the SAT exam has been

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3d pythagorean theorem worksheet: College Algebra Jay Abramson, 2018-01-07 College Algebra provides a comprehensive exploration of algebraic principles and meets scope and sequence requirements for a typical introductory algebra course. The modular approach and richness of content ensure that the book meets the needs of a variety of courses. College Algebra offers a wealth of examples with detailed, conceptual explanations, building a strong foundation in the material before asking students to apply what they've learned. Coverage and Scope In determining the concepts, skills, and topics to cover, we engaged dozens of highly experienced instructors with a range of student audiences. The resulting scope and sequence proceeds logically while allowing for a significant amount of flexibility in instruction. Chapters 1 and 2 provide both a review and foundation for study of Functions that begins in Chapter 3. The authors recognize that while some institutions may find this material a prerequisite, other institutions have told us that they have a cohort that need the prerequisite skills built into the course. Chapter 1: Prerequisites Chapter 2: Equations and Inequalities Chapters 3-6: The Algebraic Functions Chapter 3: Functions Chapter 4: Linear Functions Chapter 5: Polynomial and Rational Functions Chapter 6: Exponential and Logarithm Functions Chapters 7-9: Further Study in College Algebra Chapter 7: Systems of Equations and Inequalities Chapter 8: Analytic Geometry Chapter 9: Sequences, Probability and Counting Theory

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answer--the important thing is to have a reason why. Kids might describe the shapes as squished, smooshed, dented, or even goofy. But when they justify their thinking, they're talking math! Winner of the Mathical Book Prize for books that inspire children to see math all around them. This is one shape book that will both challenge readers' thinking and encourage them to think outside the box.--Kirkus Reviews, STARRED review

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