

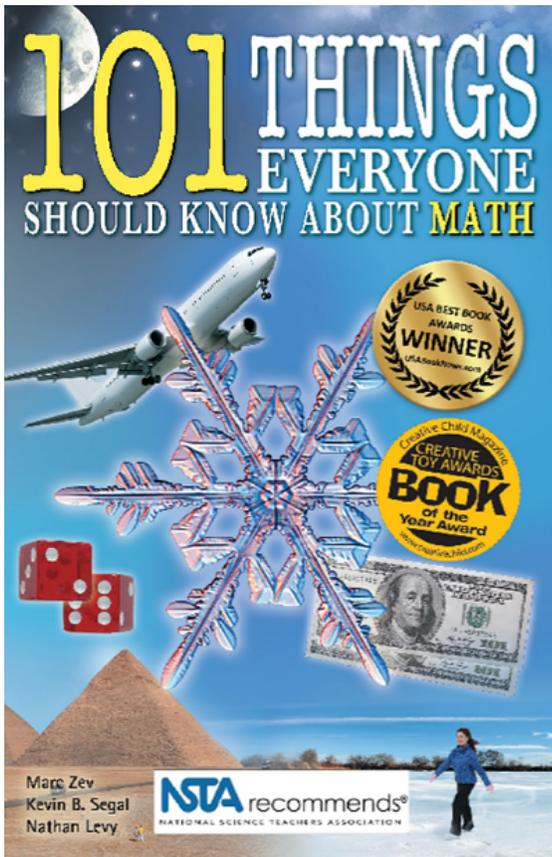
101 Things Everyone Should Know About Math

By Marc Zev, Kevin B. Segal, and Nathan Levy

Published by Science Naturally, 2010

ISBN: 978-0-9678020-3-9

Ages 10-14 | Grades 5-9



These aren't your average math problems... Each minute-long story introduces an engaging mystery that can only be solved with math. The brainteasers are entertaining, but-even better-their real-world connections help kids see math concepts as approachable, learnable, and solvable. The brainteasers help support literacy, problem-solving, and deductive-reasoning skills, while exploring essential math topics. A fun way to develop deductive reasoning skills and discover the joys of math!

The main focus of these mysteries is to stimulate creative problem solving and develop critical thinking skills. However, almost all of the mysteries require some knowledge of math content. A mystery a day is a great way to begin class while taking care of administrative requirements such as attendance and returning papers.

Articulated to the **National Mathematics Education Standards**

All math curriculum standards were identified by Ali Tribley.

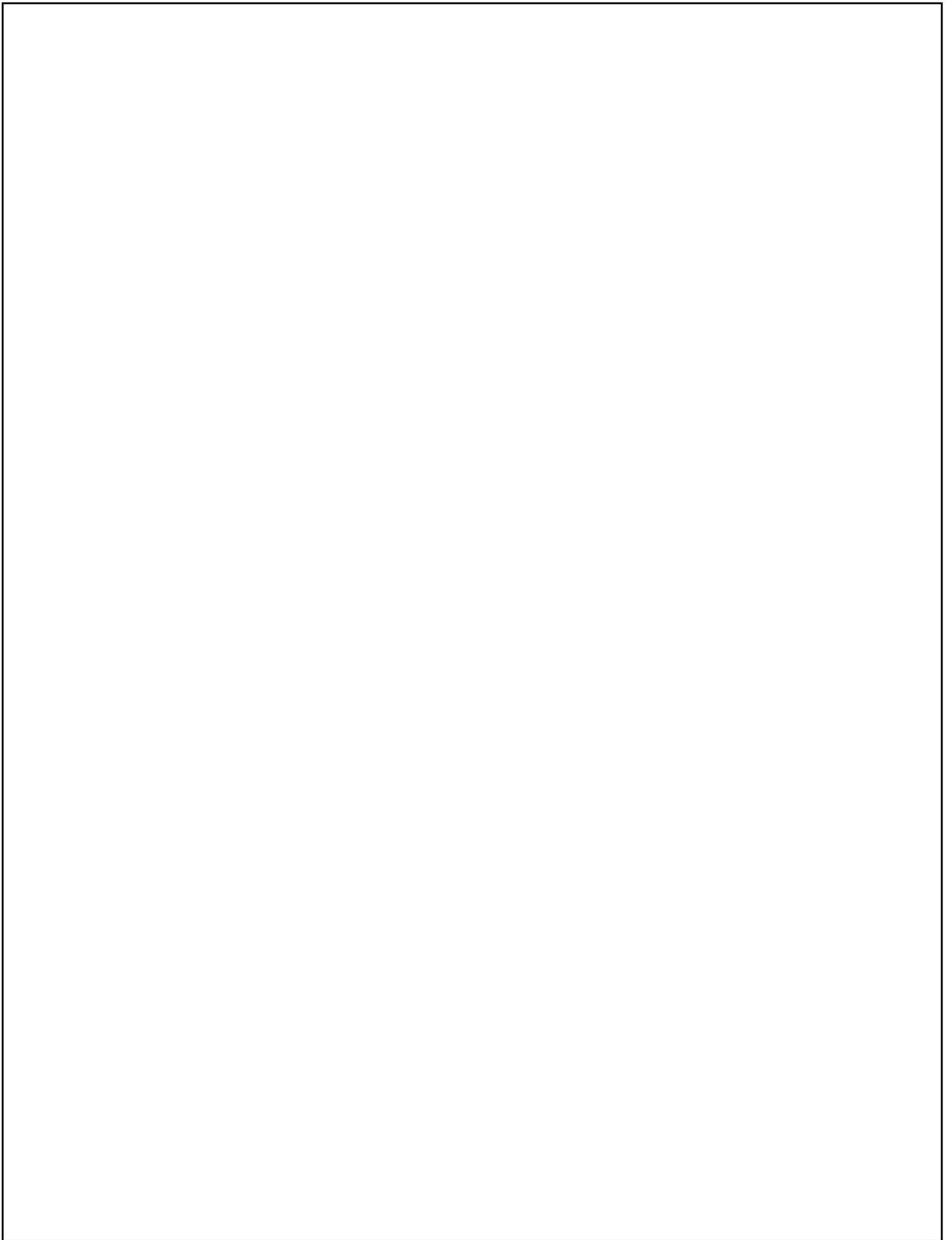
Ali Tribley graduated from SUNY Plattsburgh with a double major in Mathematics and Education. Her first job was teaching students ages 16-24 at the Hubert H. Humphrey Job Corps in St. Paul, MN. She then moved to teaching 8th and 9th grade math in Minnesota, then New York public schools. She currently teaches 7th grade math and a 7th grade honors class that integrates science, math and technology. She can be reached at Ali@ScienceNaturally.com.



Sparking curiosity
through reading

1-866-SCI-9876
(1-866-724-9876)

Info@ScienceNaturally.com



Summary of National Mathematics Education Standards

Below is a summary of the five content standards as well as their corresponding goals. The standards indicate what is expected of students in grades 6–8, while the corresponding goals indicate what students should acquire from prekindergarten through grade 12.

Each of the goals and standards are listed with identifying codes. For a more detailed description of each standard go to: <https://www.nctm.org/standards/>

Numbers and Operations

Goal N1: The Number and Operations standards states that Instructional programs for prekindergarten through grade 12 should enable all students to: understand numbers, ways of representing numbers, relationships among numbers, and number systems.

Standard N1:

- Work flexibly with fractions, decimals, and percents to solve problems;
- Compare and order fractions, decimals, and percents efficiently and find their approximate locations on a number line;
- Develop meaning for percents greater than 100 and less than 1;
- Understand and use ratios and proportions to represent quantitative relationships;
- Develop an understanding of large numbers and recognize and appropriately use exponential, scientific, and calculator notation;
- Use factors, multiples, prime factorization, and relatively prime numbers to solve problems;
- Develop meaning for integers and represent and compare quantities with them.

Goal N2: Understand meanings of operations and how they relate to one another.

Standard N2:

- Understand the meaning and effects of arithmetic operations with fractions, decimals, and integers;
- Use the associative and commutative properties of addition and multiplication and the distributive property of multiplication over addition to simplify computations with integers, fractions, and decimals;
- Understand and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems.

Goal N3: Compute fluently and make reasonable estimates.

Standard N3:

- Select appropriate methods and tools for computing with fractions and decimals from among mental computation, estimation, calculators or computers, and paper and pencil, depending on the situation, and apply the selected methods;
- Develop and analyze algorithms for computing with fractions, decimals, and integers and develop fluency in their use;
- Develop and use strategies to estimate the results of rational-number computations and judge the reasonableness of the results;
- Develop, analyze, and explain methods for solving problems involving proportions, such as scaling and finding equivalent ratios.

Algebra

Goal A1: Understand patterns, relations, and functions.

Standard A1:

- Represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic rules;
- Relate and compare different forms of representation for a relationship;
- Identify functions as linear or nonlinear and contrast their properties from tables, graphs, or equations.

Goal A2: Represent and analyze mathematical situations and structures using algebraic symbols.

Standard A2:

- Develop an initial conceptual understanding of different uses of variables;
- Explore relationships between symbolic expressions and graphs of lines, paying particular attention to the meaning of intercept and slope;
- Use symbolic algebra to represent situations and to solve problems, especially those that involve linear relationships;
- Recognize and generate equivalent forms for simple algebraic expressions and solve linear equations.

Goal A3: Use mathematical models to represent and understand quantitative relationships.

Standard A3:

- Model and solve contextualized problems using various representations, such as graphs, tables, and equations.

Goal A4: Analyze change in various contexts

Standard A4:

- Use graphs to analyze the nature of changes in quantities in linear relationships.

Geometry

Goal G1: Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.

Standard G1:

- Precisely describe, classify, and understand relationships among types of two- and three-dimensional objects using their defining properties;
- Understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects;
- Create and critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.

Goal G2: Specify locations and describe spatial relationships using coordinate geometry and other representational systems.

Standard G2:

- Use coordinate geometry to represent and examine the properties of geometric shapes;
- Use coordinate geometry to examine special geometric shapes, such as regular polygons or those with pairs of parallel or perpendicular sides.

Goal G3: Apply transformations and use symmetry to analyze mathematical situations.

Standard G3:

- Describe sizes, positions, and orientations of shapes under informal transformations such as flips, turns, slides, and scaling;
- Examine the congruence, similarity, and line or rotational symmetry of objects using transformations.

Goal G4: Use visualization, spatial reasoning, and geometric modeling to solve problems.

Standard G4:

- Draw geometric objects with specified properties, such as side lengths or angle measures;
- Use two-dimensional representations of three-dimensional objects to visualize and solve problems such as those involving surface area and volume;
- Use visual tools such as networks to represent and solve problems;
- Use geometric models to represent and explain numerical and algebraic relationships;
- Recognize and apply geometric ideas and relationships in areas outside the mathematics classroom, such as art, science, and everyday life.

Measurement

Goal M1: Understand measurable attributes of objects and the units, systems, and processes of measurement.

Standard M1:

- Understand both metric and customary systems of measurement;
- Understand relationships among units and convert from one unit to another within the same system;
- Understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume.

Goal M2: Apply appropriate techniques, tools, and formulas to determine measurements.

Standard M2:

- Use common benchmarks to select appropriate methods for estimating measurements;
- Select and apply techniques and tools to accurately find length, area, volume, and angle measures to appropriate levels of precision;
- Develop and use formulas to determine the circumference of circles and the area of triangles, parallelograms, trapezoids, and circles and develop strategies to find the area of more-complex shapes;
- Develop strategies to determine the surface area and volume of selected prisms, pyramids, and cylinders;
- Solve problems involving scale factors, using ratio and proportion;
- Solve simple problems involving rates and derived measurements for such attributes as velocity and density.

Data Analysis and Probability

Goal D1: Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.

Standard D1:

- Formulate questions, design studies, and collect data about a characteristic shared by two populations or different characteristics within one population;
- Select, create, and use appropriate graphical representations of data, including histograms, box plots, and scatter plots.

Goal D2: Select and use appropriate statistical methods to analyze data.

Standard D2:

- Find, use, and interpret measures of center and spread, including mean and interquartile range;
- Discuss and understand the correspondence between data sets and their graphical representations, especially histograms, stem-and-leaf plots, box plots, and scatter plots.

Goal D3: Develop and evaluate inferences and predictions that are based on data.

Standard D3:

- Use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken;
- Make conjectures about possible relationships between two characteristics of a sample on the basis of scatter plots of the data and approximate lines of fit;
- Use conjectures to formulate new questions and plan new studies to answer them.

Goal D4: Understand and apply basic concepts of probability.

Standards D4:

- Understand and use appropriate terminology to describe complementary and mutually exclusive events;
- Use proportionality and a basic understanding of probability to make and test conjectures about the results of experiments and simulations;
- Compute probabilities for simple compound events, using such methods as organized lists, tree diagrams, and area models.

Articulation of National Mathematics Education Standards

Facts, Just Math Facts

1. Easy as Pi: **G1**
2. Hip to be Squared: **N2**
3. A Prime Number: **N1**
4. Following Orders: **N2**
5. Given the Choice: **N2**
6. You Know the Drill: **N2, M1**
7. Find it Fast: **N2**
8. Facts and Figures: **M1, M4**
9. Name that Polygon: **M1**
10. Polygon Area: **M2**
11. Polygon Area, the Sequel: **M2**
12. Show Me a Postcard: **M2**
13. The Great Pumpkins: **M1**
14. Over the Moon: **D1**
15. Father of Algebra: **G4**
16. Proof Positive: **A2, N2**

Health, Food & Nutrition

17. Pi and Pie: **N1, N3**
18. Smart Cookie: **N1, M1**
19. Half-Baked: **M1, N1, N2**
20. Tin Pan Tally: **G1, M2**
21. Marshmallow Treats: **M1, M2**
22. Putting on the Zits: **N1, D4**
23. Cricket Calories: **N2**
24. Going Buggy: **N2**
25. Pizza Combo: **D4**
26. Pizza Combo Part 2: **D4**
27. Dough Boy: **N1, M1**
28. Sugar and Spice: **N1, M1**
29. Hard Pill to Swallow: **N1**
30. Worth the Weight: **M1, M2, N1, N2, N3**

Travel Questions

31. Dim Bulb Racing: **G1**
32. Zoning Out: **G1, N2**
33. Instantaneous Travel: **N2**
34. Flying to Florida: **N2**
35. Ticket to Ride: **A3, N1, N2**

Travel Questions (con't)

36. There and Back Again: **N1, N3**
37. Get Me to School on Time!: **A2, A3, N2**
38. Going the Extra Mileage: **N1, N2, N3, M2**
39. Sprockets: **N2, D4**
40. Moon Landing: **N1, G1, M2**
41. June Bugs: **N1, N2**
42. Around the World: **N1, N2, G1, G4**

Recreation and Sports Questions

43. Steve, Steve, Steve,
Mary and Steve: **N1, D4**
44. Team Player: **N1, D4**
45. Round Robin: **A3, N2**
46. Batting Average: **N2**
47. Play Ball!: **N2, A3**
48. Cracking the Lock: **D4**
49. Slam Dunk: **N2**
50. Super Sprinter: **M1, N1, N3, A2**
51. Perfect Scores: **N1**
52. Tennis, Anyone?: **N3, G3, A2**
53. Triple Doubles: **D4**

Economics Questions

54. Scrimp and Save: **A2, N1, N2**
55. A Good Investment: **A1, A2, A3, N2**
56. Realty Check: **D1, D2**
57. Examining eCommerce: **N1, N2**
58. Chuck the Woodchuck: **N1**
59. DVD Deals: **N1**
60. Peanut Whiz Kid: **N2, N3**
61. We All Scream for
Ice Cream: **N2, M1**
62. Here's a Tip: **N1, N2**
63. Buying Tires: **M2**
64. Calling Card: **N2**
65. Interesting Interest: **N2, N3, A3**
66. Gauging a Mortgage: **N2, A3**
67. Where Credit is Due: **A3, N1, N2**
68. Goody Goody Gumballs: **N2**
69. Kabibbleberry Jam: **A1, A3**

Nature, Music & Art Questions

- 70. Nanoseconds: **N1**
- 71. The Symmetry of Shapes: **G3**
- 72. Abby's Birthday: **N2, A1, A3**
- 73. Scale Model: **A3, N1**
- 74. Bubba the Flying Squirrel: **N1, N3**
- 75. Naked Mole Rats: **N3, N2, D2**
- 76. Terrific Tessellation: **G1, G3, G4**
- 77. Map Quest: **A3, D1**
- 78. Patching Things Up: **N2**
- 79. Tag, You're it: **N2**
- 80. Speed of Sound: **A2, A3, A4**
- 81. Make a Pitch: **A1, A2, A3**
- 82. Tuning Up: **A3, N1, N2**
- 83. Musical Mathematicians: **G4**
- 84. Shapely Structures: **G1, G4**
- 85. The Big Chill: **A1, A3**
- 86. Watch for Falling Rocks: **A3, N1, N2, N3**
- 87. Shaking Things Up: **N2**
- 88. Around the Sun: **N1, N2**
- 89. Seeing the Light: **A3**

Miscellaneous Questions

- 90. Cave Paper: **G1, G4, N2**
- 91. Cave Paper Continued: **N1, N2, G1**
- 92. Pet Pen: **N1, G1, A2**
- 93. Weather or Not: **A2, A3, M1**
- 94. Temperature Crossover: **A2, A3, A4, M1**
- 95. Flip a Coin: **D4**
- 96. Betting on the Square: **N2, A3**
- 97. Covering All the Bases: **N2**
- 98. Exceptional Student
Combinations: **D4, N2**
- 99. Too Much Tunafish: **D4**
- 100. Electoral College: **A3**

Bonus Questions

- 1. Monthly Lunch: **N1, A3**
- 2. Freedom the Frog: **A1, A2, A3**
- 3. Counting in Binary: **A1, N2**
- 4. Road Trip: **A3**
- 5. Funny Bunnies: **G4**