

Learning Math Patterns, Functions, and Algebra

> A professional development course for elementary and middle school teachers • 3 graduate credits

Part of the NCTM standards-based series *Learning Math*, this course explores the “big ideas” in algebraic thinking, such as finding, describing, and using patterns; using functions to make predictions; understanding linearity and proportional reasoning; understanding nonlinear functions; and understanding and exploring algebraic structure. Produced by WGBH Boston. 2001.



Learning Math features non-mathematics teachers approaching mathematical topics in depth.

30-MINUTE PROGRAMS

- | | |
|-------------------------------|--|
| 1. Algebraic Thinking | 8. More Non-Linear Functions |
| 2. Patterns in Context | 9. Algebraic Structure |
| 3. Functions and Algorithms | 10. Classroom Case Studies, Grades K-2 |
| 4. Proportional Reasoning | 11. Classroom Case Studies, Grades 3-5 |
| 5. Linear Functions and Slope | 12. Classroom Case Studies, Grades 6-8 |
| 6. Solving Equations | |
| 7. Non-Linear Functions | |

Formats

- DVD-R**
- Entire Course [LMADVDRK] \$240.00
• 12 half-hour programs on 4 discs, 1 guide
- VHS**
- Entire Course [LMASVE] \$240.00
• 12 half-hour programs on 10 VHS cassettes, 1 guide

Guides

- Additional Guides \$39.95

Web Site

www.learner.org/channel/courses/learningmath/algebra

Learning Math Number and Operations

> A professional development course for elementary and middle school teachers • 3 graduate credits

Part of the NCTM standards-based *Learning Math* series, this course examines the three main categories in the Number and Operations strand of NCTM’s Principles and Standards of School Mathematics—understanding numbers, representations, relationships, and number systems; the meanings of operations and relationships among those operations; and reasonable estimation and fluent computation. The course covers the real number system, place value, the behavior of zero and infinity, meanings and models of basic operations, percentages, and modeling operations with fractions, often with the aid of concrete, physical models that enhance understanding. Also, examine Basic Number Theory topics, such as factors and multiples, as well as divisibility tests, at both practical and abstract levels. (Accordingly, parts of the *Number and Operations* course may be more challenging than other *Learning Math* courses.) Produced by WGBH Educational Foundation. 2003.



Professor Carol Findell introduces manipulatives for solving problems.

30-MINUTE PROGRAMS

- | | |
|---------------------------------------|--|
| 1. What Is a Number System? | 7. Fractions and Decimals |
| 2. Number Sets, Infinity, and Zero | 8. Rational Numbers and Proportional Reasoning |
| 3. Place Value | 9. Fractions, Percents, and Ratios |
| 4. Meanings and Models for Operations | 10. Classroom Case Studies, K-2 |
| 5. Divisibility Tests and Factors | 11. Classroom Case Studies, 3-5 |
| 6. Number Theory | 12. Classroom Case Studies, 6-8 |

Formats

- DVD-R**
- Entire Course [LMNDVDRK] \$310.00
• 12 half-hour programs on 4 discs, 1 guide
- VHS**
- Entire Course [LMNSVE] \$310.00
• 12 half-hour programs on 12 VHS cassettes, 1 guide

Guides

- Additional Guides \$39.95

Web Site

www.learner.org/channel/courses/learningmath/number

Learning Math

Data Analysis, Statistics, and Probability

> A professional development course for elementary and middle school teachers
• 3 graduate credits

Part of the NCTM standards-based series *Learning Math*, this course introduces statistics as a problem-solving process. Increase understanding through investigations of different ways to collect and represent data and to analyze and interpret variation in data. Practical examples help viewers understand statistical concepts, such as data representation, variation, the mean and median, bivariate data, probability, designing statistical experiments, and population estimations. Produced by WGBH Educational Foundation. 2001.

30-MINUTE PROGRAMS

- | | |
|---|--|
| 1. Statistics As Problem Solving | 7. Bivariate Data and Analysis |
| 2. Data Organization and Representation | 8. Probability |
| 3. Describing Distributions | 9. Random Sampling and Estimation |
| 4. The Five-Number Summary | 10. Classroom Case Studies, Grades K-2 |
| 5. Variation About the Mean | 11. Classroom Case Studies, Grades 3-5 and 6-8 |
| 6. Designing Experiments | |



A line plot helps teachers visualize variation in data.

Formats

- DVD-R**
- **Entire Course [LMDDVDRK]** \$240.00
• 11 half-hour programs on 4 discs, 1 guide
- VHS**
- **Entire Course [LMDSVE]** \$240.00
• 11 half-hour programs on 10 VHS cassettes, 1 guide

Guides

- **Additional Guides** \$39.95

Web Site

www.learner.org/channel/courses/learningmath/data

More on **Statistics** at
www.learner.org/interactives

Against All Odds: Inside Statistics

> An instructional series for high school, college, and adult learners
• distance learning telecourse

With an emphasis on “doing” statistics, this series goes on location to help uncover statistical solutions to the puzzles of everyday life. Learn how data collection and manipulation—paired with intelligent judgment and common sense—can lead to more informed decision-making. This series can also be used as a resource for teacher professional development. Produced by the Consortium for Mathematics and Its Applications and Chedd-Angier. 1989.

30-MINUTE PROGRAMS

- | | | |
|-----------------------------|-------------------------|--|
| 1. What Is Statistics? | 4. Normal Distributions | 7. Models for Growth |
| 2. Picturing Distributions | 5. Normal Calculations | 8. Describing Relationships |
| 3. Describing Distributions | 6. Time Series | 9. Correlation |
| | | 10. Multidimensional Data Analysis |
| | | 11. The Question of Causation |
| | | 12. Experimental Design |
| | | 13. Blocking and Sampling |
| | | 14. Samples and Surveys |
| | | 15. What Is Probability? |
| | | 16. Random Variables |
| | | 17. Binomial Distributions |
| | | 18. The Sample Mean and Control Charts |
| | | 19. Confidence Intervals |
| | | 20. Significance Tests |
| | | 21. Inference for One Mean |
| | | 22. Comparing Two Means |
| | | 23. Inference for Proportions |
| | | 24. Inference for Two-Way Tables |
| | | 25. Inference for Relationships |
| | | 26. Case Study |



Series host Teresa M. Amabile

Formats

- DVD-R**
- **Entire Series [AADVDR]** \$389.00
• 26 half-hour programs on 7 discs
- VHS**
- **Entire Series [AASVE]** \$389.00
• 26 half-hour programs on 13 VHS cassettes

Coordinated books are also available. Go to www.learner.org or call 1-800-LEARNER®.

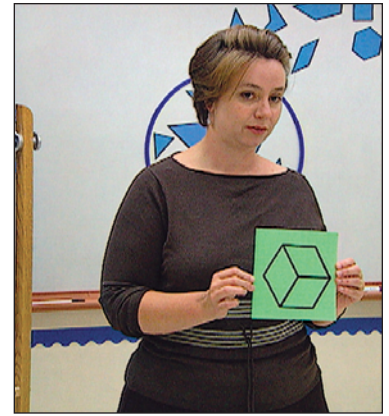
Web Site

www.learner.org/exhibits/statistics

Learning Math Geometry

> A professional development course for elementary and middle school teachers • 3 graduate credits

Part of the NCTM standards-based series *Learning Math*, this course uses geometric reasoning as a method for problem solving. Explore the properties of geometric figures; make constructions using pencil and paper, and also use dynamic software; and practice using mathematical language to express ideas and justify your reasoning. Explore other important geometric ideas, such as symmetry, similarity, and trigonometry as well as the basis of formal mathematical proofs and solid geometry. The course material progresses from visual, intuitive ways of solving problems to more formal explorations of geometric ideas, properties, and proofs. Produced by WGBH Educational Foundation. 2003.



Michelle Manes holds up a shape for participants to draw from memory.

30-MINUTE PROGRAMS

- | | |
|---------------------------------|---|
| 1. What Is Geometry? | 7. Symmetry |
| 2. Triangles and Quadrilaterals | 8. Similarity |
| 3. Polygons | 9. Solids |
| 4. Parallel Lines and Circles | 10. Classroom Case Studies, K–5 |
| 5. Dissections and Proof | 11. Classroom Case Studies, 6–8, Part 1 |
| 6. The Pythagorean Theorem | 12. Classroom Case Studies, 6–8, Part 2 |

Formats

DVD-R

- **Entire Course [LMGDVDRK]** \$310.00
• 12 half-hour programs on 4 discs, 1 guide

VHS

- **Entire Course [LMGSVE]** \$310.00
• 12 half-hour programs on 12 VHS cassettes, 1 guide

Guides

- **Additional Guides** \$39.95

Web Site

www.learner.org/channel/courses/learningmath/geometry

More on 3D SHAPES at www.learner.org/interactives

Learning Math Measurement

> A professional development course for elementary and middle school teachers • 3 graduate credits

Part of the NCTM standards-based *Learning Math* series, this course explores procedures for measuring and covers standard units, the relationships among units, and the approximate nature of measurement. Examine how measurement can illuminate concepts such as irrational numbers, properties of circles, and area and volume formulas, and discover how other mathematical concepts can inform measurement tasks. Produced by WGBH Educational Foundation. 2002.



Teachers prepare to make a scale drawing on paper.

30-MINUTE PROGRAMS

- | | |
|--|---------------------------------------|
| 1. What Does It Mean To Measure? | 6. Area |
| 2. Fundamentals of Measurement | 7. Circles and Pi (π) |
| 3. The Metric System | 8. Volume |
| 4. Angle Measurement | 9. Measurement Relationships |
| 5. Indirect Measurement and Trigonometry | 10, 11, or 12. Classroom Case Studies |

Formats

DVD-R

- **Entire Course [LMMDVDRK]** \$310.00
• 12 half-hour programs on 4 discs, 1 guide

VHS

- **Entire Course [LMMSVE]** \$310.00
• 12 half-hour programs on 12 VHS cassettes, 1 guide

Guides

- **Additional Guides** \$39.95

Web Site

www.learner.org/channel/courses/learningmath/measurement

Mathematics Assessment:

A Video Library, K–12

> A professional development library for K–12 teachers

This video library portrays the Assessment Standards and Purposes of Assessment of the National Council of Teachers of Mathematics. Showing classrooms where informal and formal assessments are used, the videos help educators sort through many options. They also help teachers see the link between instruction and assessment. Produced by WGBH Boston. 1997.



PROGRAMS

1. Introduction—10 MINS.

Provides an overview of the library and issues covered.

School-Level Videos—60 MINS.

Each one-hour program contains two case studies and a sequence of teacher insights that shows a variety of assessment techniques.

2. Elementary Assessment

3. Middle School Assessment

4. High School Assessment

5. Beyond Testing—30 MINS.

This program addresses questions such as equity, openness, validity, and consistency at the state, district, and school levels. It will also help spur discussions on assessment with educators and community members.

Formats

DVD-R

• **Entire Library [TMADVDRK]** \$220.00
 • 5 video programs (varying lengths) on 3 discs, 1 guide

VHS

• **Entire Library [TMAL]** \$220.00
 • 5 programs (varying lengths) on 5 VHS cassettes, 1 guide

Guides

• **Additional Guides** \$39.95

The Missing Link: Essential Concepts for Middle School Math Teachers

> A professional development workshop for middle school teachers • 2 graduate credits

This workshop explores four concepts identified by TIMSS (the Third International Mathematics and Science Study) as crucial to students' future success. Learn about these math topics through instructional techniques that strive to involve students in their own learning. In the "Discovery" session of each topic pair, Master Teacher Jan Robinson (from the First in the World Consortium) leads the on-camera "learner teachers" as they investigate a series of problem-based activities. The learner teachers customize and expand upon these lessons in their own classrooms and return with samples of their students' work. In the "In Practice" sessions, they report on their experiences, evaluate student work, and develop new instructional and assessment techniques. Produced by A-Plus Communications and Lavine Production Group. 2000.



Teachers experience group work before taking it to their classrooms.

60-MINUTE PROGRAMS

1. Proportionality and Similar Figures: Discovery

2. Proportionality and Similar Figures: In Practice

3. Patterns and Functions: Discovery

4. Patterns and Functions: In Practice

5. Polygons and Angles: Discovery

6. Polygons and Angles: In Practice

7. Sampling and Probability: Discovery

8. Sampling and Probability: In Practice

Formats

DVD-R

• **Entire Workshop [MLDVDRK]** \$220.00
 • 8 one-hour programs on 4 discs, 1 guide

VHS

• **Entire Workshop [MLSVE]** \$220.00
 • 8 one-hour programs on 8 VHS cassettes, 1 guide

Guides

• **Additional Guides** \$39.95

Web Site

www.learner.org/channel/workshops/missinglink

TEACHING MATH

Free Online Courses

The *Teaching Math* online courses provide pre-service and in-service teachers with an overview and exploration of the National Council of Teachers of Mathematics process standards.

There are four courses, one each for the four NCTM grade bands: pre-kindergarten–2, 3–5, 6–8, and 9–12. Each session includes text, illustrations, animations, video, and interactive activities. Two graduate credits. Go to www.learner.org.

Web Site

- www.learner.org/channel/courses/teachingmath/gradesk_2
- www.learner.org/channel/courses/teachingmath/grades3_5
- www.learner.org/channel/courses/teachingmath/grades6_8
- www.learner.org/channel/courses/teachingmath/grades9_12

The screenshot shows the Annenberg/CPB Learner.org website. The page is titled 'Exploring Problem Solving' and is part of a course on 'Cuisenaire Rod Patterns' for Grades 9–12. It includes a navigation menu with 'SESSION 3: PROBLEM SOLVING', 'OVERVIEW', and tabs 'A', 'B', 'C', 'D', 'E', and 'REFERENCE'. The main content area is titled 'PART B Exploring Problem Solving' and includes an 'Introduction' and 'Your Journal' link. Below this, there is an 'Intro' section for 'Cuisenaire Rods' with a description of the activity and a list of five figures made with rods. A '> Begin' link is at the bottom.

Teaching Math: A Video Library, K–4

> A professional development library for elementary school teachers

Watch the excitement of young children as they solve problems, communicate, reason, and make connections between math and their physical world. This extraordinary video library documents effective teaching and learning in many sizes and types of schools: small, large, rural, suburban, inner-city, and with and without technology. Produced by WGBH Boston. 1995.



Students estimate the number of marshmallows required for a class camping trip.

15-MINUTE PROGRAMS

1. Introduction

Content Standards

Number Sense and Numeration

2. K Ants Go Marching
3. K Math Buddies
4. 1 Place-Value Centers
5. 1–2 Pumpkin Seeds
6. 4–5 Animals in Yellowstone

Concepts of Whole Number Operations

7. K Cubes and Containers
8. 1 Amazing Equations
9. 1–2 Domino Math
10. 2 Marshmallows
11. 3 What's the Price?

Whole Number Computation

12. K Dino Math
13. 1 Window Puzzle
14. 1 Wheel Problem
15. 2 Bean Sprouts
16. 2 This Small House
17. 4 Choose a Method

Geometry and Spatial Sense

18. 1 Thanksgiving Quilt
19. 2 Pattern Blocks
20. 2–3 Shapes from Squares
21. 4 A Rocket Shape
22. 4–5 Circumference/ Diameter

Measurement

23. 1 Windows, Dinos, and Ants
24. 1 How Long Is a Minute?
25. 2–3 Balloon Travel
26. 3–4 Meter Cords
27. 4 Pencil Box Staining

Statistics and Probability

28. 1 Lady Bugs
29. 1–2 Woodpecker Habitat
30. 3 Bubble Gum Contest
31. 4 Dice Toss
32. 4–6 Questioning Data

Fractions and Decimals

33. 1–2 Fraction Strips
34. 1–3 Arrays and Fractions
35. 2–3 Everyday Decimals
36. 4 Cookies to Share
37. 4–5 Fractions With Geoboards

Patterns and Relationships

38. K People Patterns
39. K–1 All Sorts of Buttons
40. 2 Story-Based Centers
41. 4 Products and Sums
42. 4 Valentine Exchange

Estimation

43. K Beans, Beans, Beans
44. 1 How Many People Will Fit?
45. 2 Cranberry Estimation
46. 3 Buffalo Estimation
47. 4 The White Pages

Process Standards—30 MINS.

48. Problem Solving
49. Communication
50. Reasoning
51. Mathematical Connections
52. Classrooms Over Time

Formats

DVD-R

- Entire Library [TM4DVDRK]..... \$375.00
 - 52 programs (varying lengths) on 11 discs, 1 guide

VHS

- Entire Library [TM4L] \$375.00
 - 52 programs (varying lengths) on 24 VHS cassettes, 1 guide

Guides

- Additional Guides \$39.95

Teaching Math: A Video Library, 5–8

> A professional development library for middle school teachers

See real middle school teachers incorporating the NCTM standards into their lessons, while learning as much about teaching as their students do about math. The programs demonstrate how teachers guide and assess student understanding. They also offer strategies for keeping students motivated and engaged as they learn mathematics at this critical age. Produced by WGBH Boston. 1997.



Pre-algebra students study linear relationships.

Formats

DVD-R

• **Entire Library [TM5DVDRK]** \$125.00
• 6 fifteen-minute programs on 1 disc, 1 guide

VHS

• **Entire Library [TM5L]** \$125.00
• 6 fifteen-minute programs on 3 VHS cassettes, 1 guide

Guides

• **Additional Guides** \$17.00

15-MINUTE PROGRAMS

1. Fraction Tracks

Using a board game, a fifth-grade class studies and practices fractions and equivalent fractions.

2. Hexominoes

A fifth-grade class studies geometry by creating hexominoes, figures made up of six squares.

3. The Location

A sixth-grade teacher uses a secret location game to teach the class about statistics, connections, and reasoning.

4. Building Viewpoints

Seventh-graders learn about spatial sense and geometry from a blueprint of ancient buildings. They then create their own three-dimensional models and draw them from different viewpoints.

5. The Largest Container

Seventh- and eighth-grade students work on geometry and measurement as they attempt to create the largest container from a single sheet of paper.

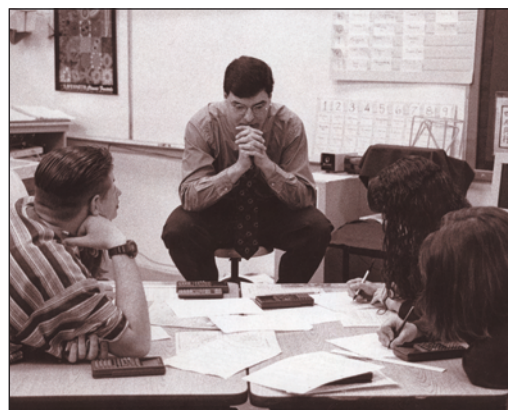
6. Building Rafts With Rods

Groups of students learn about patterns, functions, and problem-solving as they calculate the surface area and volume of various-sized rafts, then graph their data.

Teaching Math: A Video Library, 9–12

> A professional development library for high school teachers

In this high school library, teachers demonstrate the fine art of guiding students through reasoning and problem solving. Students comment on the new way of learning, often expressing frustration as well as the sense of accomplishment they feel when working through problems with peers. Produced by WGBH Boston. 1996.



Group testing in an algebra/trigonometry class.

PROGRAMS

1. Introduction

A 10-minute overview of the library components.

Content Standards—15-MINS.

2. **Alice to the Moon** (algebra)
3. **Group Test** (functions)
4. **Exploring Functions** (functions)
5. **Bungee Jump** (functions)
6. **Staircase Problem** (functions)
7. **Ferris Wheel** (functions)
8. **Properties of Parallelograms** (geometry synthetic)
9. **Finding Proof** (geometry synthetic)

10. Exploring Congruence

(geometry synthetic)

11. Enveloping Functions

(trigonometry)

12. Calculator-Based Labs

(statistics)

13. Taxicabs

(probability)

14. Fish Derby

(discrete math)

15. Maximizing Profits

(discrete math)

16. Conjectures Through Graphing

(calculus)

Process Standards—30-MINS.

17. **Problem Solving**
18. **Communication**
19. **Reasoning**
20. **Connections**

Formats

DVD-R

• **Entire Library [TM9DVDRK]** \$250.00
• 20 video programs on 4 discs, 1 guide

VHS

• **Entire Library [TM9L]** \$250.00
• 20 programs (varying lengths) on 10 VHS cassettes, 1 guide

Guides

• **Additional Guides** \$25.00

Private Universe Project in Mathematics

> A professional development workshop for K–12 educators • 2 graduate credits



Even the youngest students can explain complex mathematical thinking when encouraged over time.

60-MINUTE PROGRAMS

- | | |
|--|--|
| 1. Following Children's Ideas in Mathematics | 4. Thinking Like a Mathematician |
| 2. Are You Convinced? | 5. Building on Useful Ideas |
| 3. Inventing Notations | 6. Possibilities of Real-Life Problems |

Research shows that children formulate extraordinarily interesting and complex mathematical ideas, even at a very young age. The *Private Universe Project in Mathematics* demonstrates and honors the power and sophistication of these ideas and explores how mathematics teaching can be structured to resonate with children's sophisticated thinking. This six-program workshop, with a companion interactive Web site, offers a rare opportunity to follow the mathematical development of one group of students throughout grades 1–12 and to observe teachers in the process of redefining what mathematics is for themselves and for their students. Produced by the Harvard-Smithsonian Center for Astrophysics. 2000.

Formats

DVD-R

Entire Workshop [PMDVDRK] \$149.00
 • 6 one-hour programs on 3 discs, 1 guide

VHS

Entire Workshop [PMHV] \$149.00
 • 6 one-hour programs on 6 VHS cassettes, 1 guide

Guides

Additional Guides \$39.95

Web Site

www.learner.org/channel/workshops/pupmath

Surprises in Mind

> A video documentary for K–8 teachers and administrators • 1 one-hour video program

Many people—in and out of school—find mathematics frustrating, difficult, even impossible. This documentary uncovers a surprise: Mathematical creativity—expressed in art, architecture, and music and valued by industry—is built into the brain and can flourish under the right conditions. A remarkable 12-year study following students from first grade through high school demonstrates the brain's surprising natural abilities for learning math. The results of the study, led by Professor Carolyn Maher of Rutgers University, have been corroborated by new research from leading cognitive psychologists. Produced by the Harvard-Smithsonian Center for Astrophysics. 2001.

Formats

DVD-R

Documentary [URDVDRK] \$39.95
 • 1 hour programs on 1 disc

VHS

Documentary [URSV] \$39.95
 • 1 hour programs on VHS cassettes



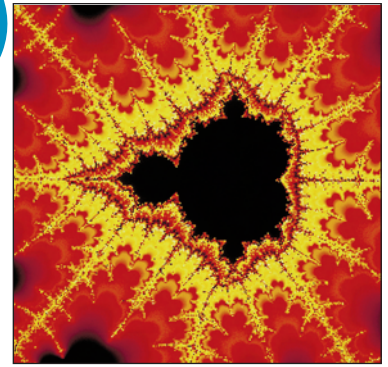
Blocks are a tool used to nurture young children's natural mathematical abilities.

Mathematics Illuminated

NEW

> A professional development series for high school, college, and adult learners
• distance learning telecourse

Mathematics Illuminated is a 13-part multimedia course for adult learners and high school teachers in math and other disciplines. The series explores major themes in the field of mathematics, from mankind's earliest study of prime numbers, to the cutting edge mathematics used to reveal the shape of the universe. Rather than a series of problems to be solved, mathematics is presented as play we engage in to answer deep questions that are relevant in our world today. Mathematics also provides us with a powerful language for uncovering and describing phenomena in the world around us. The groundbreaking videos, interactive web exploration, text materials, and group activities included in *Mathematics Illuminated* reveal the secrets and hidden delights of the ever-evolving world of mathematics. Produced by Oregon Public Broadcasting, 2008.



A fractal image reveals patterns, symmetry and mathematics in art.

INDIVIDUAL PROGRAMS

1. The Primes

The properties and patterns of prime numbers—whole numbers that are divisible only by themselves and one—have been a source of wonder across cultures for thousands of years, and the study of prime numbers is fundamental to mathematics. This unit explores our fascination with primes, culminating in the million-dollar puzzle of the Riemann Hypothesis, a possible description of the pattern behind the primes, and the use of the primes as the foundation of modern cryptography.

2. Combinatorics Counts

Counting is an act of organization, a listing of a collection of things in an orderly fashion. Sometimes it's easy; for instance counting people in a room. But listing all the possible seating arrangements of those people around a circular table is more challenging. This unit looks at combinatorics, the mathematics of counting complicated configurations. In an age in which the organization of bits and bytes of data is of paramount importance—as with the human genome—combinatorics is essential.

3. How Big Is Infinity?

Throughout the ages, the notion of infinity has been a source of mystery and paradox, a philosophical question to ponder. As a mathematical concept,

infinity is at the heart of calculus, the notion of irrational numbers—even measurement. This unit explores how mathematics attempts to understand infinity, including the creative and intriguing work of Georg Cantor, who initiated the study of infinity as a number, and the role of infinity in standardized measurement.

4. Topology's Twists and Turns

Topology, known as “rubber sheet math,” is a field of mathematics that concerns those properties of an object that remain the same even when the object is stretched and squashed. In this unit we investigate topology's seminal relationship to network theory, the study of connectedness, and its critical function in understanding the shape of the universe in which we live.

5. Other Dimensions

The conventional notion of dimension consists of three degrees of freedom: length, width, and height, each of which is a quantity that can be measured independently of the others. Many mathematical objects, however, require more—potentially many more—than just three numbers to describe them. This unit explores different aspects of the concept of dimension, what it means to have higher dimensions, and how fractional or “fractal” dimensions may be better for measuring real-world objects such as ferns, mountains, and coastlines.

6. The Beauty of Symmetry

In mathematics, symmetry has more than just a visual or geometric quality. Mathematicians comprehend symmetries as motions—motions whose interactions and overall structure give rise to an important mathematical concept called “group.” This unit explores Group Theory, the mathematical quantification of symmetry, which is key to understanding how to remove structure from (i.e., shuffle) a deck of cards or to fathom structure in a crystal.

7. Making Sense of Randomness

Probability is the mathematical study of randomness, or events in which the outcome is uncertain. This unit examines probability, tracing its evolution from a way to improve chances at the gaming table to modern applications of understanding traffic flow and financial markets.

8. Geometries Beyond Euclid

Our first exposure to geometry is that of Euclid; in which all triangles have 180 degrees. As it turns out, triangles can have more or less than 180 degrees. This unit explores these curved spaces that are at once otherworldly, yet firmly of this world—and present the key to understanding the human brain.

9. Game Theory

Competition and cooperation can be studied mathematically, an idea that first arose in the analysis of games like chess and checkers, but soon showed its relevance to economics and geopolitical strategy. This unit shows how conflict and strategies can be thought about mathematically, and in doing so, reveal important insights about human and even animal behaviors.

10. Harmonious Math

All sound is the product of airwaves crashing against our eardrums. The mathematical technique for understanding this and other wave phenomena is called the Fourier analysis, which allows the disentangling of a complex wave into

basic waves called sinusoids, or sine waves. In this unit we discover how the Fourier analysis is used in creating electronic music and underpins all digital technology.

11. Connecting with Networks

Connections can be physical, as with bridges, or immaterial, as with friendships. Both types of connections can be understood using the same mathematical framework called network theory, or graph theory, which is a way to abstract and quantify the notion of connectivity. This unit looks at how this branch of mathematics provides insights into extremely complicated networks such as ecosystems.

12. In Sync

Systems of synchronization occur throughout the animate and inanimate world. The regular beating of the human heart, the swaying and near collapse of the Millennium Bridge, the simultaneous flashing of gangs of fireflies in Southeast Asia: these varied phenomena all share the property of spontaneous synchronization. This unit shows how synchronization can be analyzed, studied and modeled via the mathematics of differential equations, an outgrowth of calculus, and the application of these ideas toward understanding the workings of the heart.

13. The Concepts of Chaos

The flapping of a butterfly's wings over Bermuda causes a rainstorm in Texas. Two sticks start side by side on the surface of a brook, only to follow divergent paths downstream. Both are examples of the phenomenon of chaos, characterized by a widely sensitive dependence of the future on slight changes in a system's initial conditions. This unit explores the mathematics of chaos, which involves the discovery of structure in what initially appears to be random, and imposes limits on predictability.

Formats

DVD-R

• **Entire Course [MADVD]** **\$375.00**
• 13 half-hour programs on 4 discs

VHS

• **Entire Workshop [MAVHS]** **\$375.00**
• 13 half-hour programs on 7 VHS cassettes

Guides

• **Additional Guides** **\$44.95**

Web Site

• www.learner.org/channel/courses/mathilluminated

Insights Into Algebra 1: Teaching for Learning

> A professional development video workshop for middle and high school
• 2 graduate credits

This professional development workshop explores strategies to improve how 16 topics found in most Algebra 1 programs are taught. Each video includes two lessons that showcase effective strategies for teaching mathematical topics. The workshop guide provides activities designed to help participants examine their teaching practice, incorporate what they are learning into their practice, and share their experiences with other teachers. Produced by Thirteen/WNET. 2004.



A student compares the graphs of different quadratic functions.

Formats

DVD-R

• Entire Workshop [IADVDRK] \$220.00
• 8 one-hour programs on 4 discs, 1 guide

VHS

• Entire Workshop [IASVE] \$220.00
• 8 one-hour programs on 8 VHS cassettes, 1 guide

Guides

• Additional Guides \$39.95

Web Site

www.learner.org/channel/workshops/algebra

60-MINUTE PROGRAMS

1. Variables and Patterns of Change
2. Linear Functions and Inequalities
3. Systems of Equations and Inequalities
4. Quadratic Functions
5. Properties
6. Exponential Functions
7. Direct and Inverse Variation
8. Mathematical Modeling

ways to order
1-800-LEARNER®
www.learner.org

Algebra: In Simplest Terms

> An instructional series for high school, college, and adult learners
• distance learning telecourse

This series explains the sometimes baffling concepts of algebra. Series host Sol Garfunkel explains why this branch of mathematics is necessary for solving real-world problems. With this “textbook on film,” repeated exposure to concepts and visually oriented presentations improve comprehension. This series has applications in geometry and calculus instruction. Produced by the Consortium for Mathematics and Its Applications and Chedd-Angier. 1991.



Series host Sol Garfunkel

30-MINUTE PROGRAMS

- | | |
|---------------------------------------|-------------------------------------|
| 1. Introduction | 15. Variation |
| 2. The Language of Algebra | 16. Polynomial Functions |
| 3. Exponents and Radicals | 17. Rational Functions |
| 4. Factoring Polynomials | 18. Exponential Functions |
| 5. Linear Equations | 19. Logarithmic Functions |
| 6. Complex Numbers | 20. Systems of Equations |
| 7. Quadratic Equations | 21. Systems of Linear Inequalities |
| 8. Inequalities | 22. Arithmetic Sequences and Series |
| 9. Absolute Value | 23. Geometric Sequences and Series |
| 10. Linear Relations | 24. Mathematical Induction |
| 11. Circle and Parabola | 25. Permutations and Combinations |
| 12. Ellipse and Hyperbola | 26. Probability |
| 13. Functions | |
| 14. Composition and Inverse Functions | |

Formats

DVD-R

• Entire Series [ALDVDR] \$389.00
• 26 half-hour programs on 7 discs

VHS

• Entire Series [ALSVE] \$389.00
• 26 half-hour programs on 13 VHS cassettes

Coordinated books are also available. Go to www.learner.org or call 1-800-LEARNER®.