MATHEMATICS ILLUMINATED

Mathematics Illuminated is a course on the theories, history, and beauty of mathematics. 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. Mathematics is presented as play we engage in to answer deep questions and also as 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 hidden delights of the ever-evolving world of mathematics. *Produced by Oregon Public Broadcasting. 2008*.

30-MINUTE PROGRAMS

- 1. The Primes
- 2. Combinatorics Counts
- 3. How Big Is Infinity?
- 4. Topology's Twists and Turns
- 5. Other Dimensions 🕨
- 6. The Beauty of Symmetry 🕨
- 7. Making Sense of Randomness
- 8. Geometries Beyond Euclid 🕨
- 9. Game Theory
- 10. Harmonious Math
- 11. Connecting with Networks
- 12. In Sync 🕨
- 13. The Concepts of Chaos 🕨

For individual program descriptions, visit www.learner.org/resources/series210.html

PRICES

- DVD-R @ [MADVD] = \$375.00 13 half-hour programs on 4 discs
- COURSE FACILITATOR GUIDE [MAGS] = \$44.95
- COURSE PARTICIPANT GUIDE [MAGF] = \$44.95

WEB SITE

www.learner.org/courses/ mathilluminated

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. 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 objects such as ferns, mountains, and coastlines.



The Beauty of Symmetry

Mathematicians comprehend symmetries as 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.

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 otherwordly, yet firmly of this world—and present a key to understanding the human brain.



- Ø Distance learning course
- 3 graduate credits

In Sync

The regular beating of the human heart and the simultaneous flashing of gangs of fireflies in Southeast Asia 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. The application of these ideas leads us toward understanding the workings of the heart.

The Concepts of Chaos

The flapping of a butterfly's wings over Bermuda causing a rainstorm in Texas exemplifies the phenomenon of chaos. Chaos is 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 finding structure in what initially appears to be random, and imposes limits on predictability.



STATISTICS

AGAINST ALL ODDS: INSIDE STATISTICS

Picking up where the original Against All Odds left off, the new series maintains the same emphasis on "doing" statistics. Each unit is based on a video module that introduces a statistical topic in real-world context and takes you on location to where people from all walks of life are using statistics in their work. Starting with descriptive statistics, the course continues through probability and inference. Examples range from finding patterns in lightning strikes, to examining possible genetic resistance to deadly Lassa fever in West Africa, to linking DDT to the decline of peregrine falcons. A new Web site and online interactives allow viewers to practice and review what they've learned. Produced by Chedd-Angier in collaboration with COMAP. 2013.

10-MINUTE VIDEO MODULES

- 1. What Is Statistics?
- 2. Stemplots
- 3. Histograms and Distributions
- 4. Measures of Center
- 5. Boxplots
- 6. Standard Deviation
- 7. Normal Curves
- 8. Normal Calculations
- 9. Checking Assumption of Normality
- 10. Scatterplots
- 11. Fitting Lines to Data
- 12. Correlation
- 13. Two-Way Tables
- 14. The Question of Causation
- **15. Designing Experiments**
- 16. Census and Sampling
- 17. Samples and Surveys
- 18. Introduction to Probability
- 19. Probability Models
- 20. Random Variables
- 21. Binomial Distributions

- 22. Sampling Distributions
- 23. Control Charts
- 24. Confidence Intervals
- 25. Tests of Significance
- 26. Small Sample Inference for One Mean
- 27. Comparing Two Means
- 28. Inference for Proportions
- 29. Inference for Two-Way Tables
- 30. Inference for Regression
- 31. One-Way ANOVA
- 32. Case Study

For individual program descriptions, visit www.learner.org/resources/series65

PRICES

- DVD CC @ [AADVDR] = \$220.00 32 10-minute video modules on 3 discs
- STUDY GUIDES [AASGS] = \$39.95
- TEXTBOOK [AAST] = \$180.95 Introduction to the Practice of Statistics, by Moore and McCabe, 6th ed., W.H. Freeman and Company, 2009

WEB SITE

www.learner.org/courses/againstallodds

See **DISCOVERING PSYCHOLOGY** page



72

and college-level instruction

NEWLY **UPDATED!**

A course for high school teachers



Coordinated new Web site with interactive statistical tools.

Normal Curves

A nature preserve that's tracked bird migrations through New England for decades records tons of bird-related data; everything from wingspan measurements to arrival dates provides examples of normal distributions.

Random Variables

The Challenger space shuttle disaster was blamed on faulty O-rings. How can probability calculations on random variables help predict the chances of this kind of failure?



Computational geneticist Dr. Pardis Sabeti hosts the updated series. She uses statistics in her own work combing through the evolutionary record found in our genes.

CURRICULUM CONNECTION

Learning Math PATTERNS, FUNCTIONS, AND ALGEBRA



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.

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

30-MINUTE PROGRAMS

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

For individual program descriptions, visit www.learner.org/resources/series140.html

PRICES

- DVD-R @ (LMADVDRK] = \$240.00 11 half-hour programs on 4 discs, 1 guide
- ADDITIONAL PROFESSIONAL DEVELOPMENT COURSE GUIDE [LMASGF] = \$39.95

WEB SITE

www.learner.org/courses/ learningmath/algebra



Learning Math NUMBER AND OPERATIONS

A professional development course for elementary and middle school teachers

3 graduate credits

Place Value

Look at place value systems based on numbers other than 10. Examine the base two numbers and learn uses for base two numbers in computers. Explore exponents and relate them to logarithms. Examine the use of scientific notation to represent numbers with very large or very small magnitude. Interpret whole numbers, common fractions, and decimals in base four.

Divisibility Tests and Factors

Explore number theory topics. Analyze Alpha math problems and discuss how they help with the conceptual understanding of operations. Examine various divisibility tests to see how and why they work. Begin examining factors and multiples.

This course examines the three main categories in the Number and Operations strand of the NCTM Principles and Standards of School Mathematics. The video programs cover the real number system, place value, the behavior of zero and infinity, meanings and models of basic operations, percentages, and modeling operations with fractions. Topics are explored in-depth, with both practical examples and more abstract concepts providing teachers with the higher mathematics behind the basic topics they teach. Produced by WGBH Educational Foundation. 2003.

30-MINUTE PROGRAMS

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

- 11. Classroom Case Studies, 3–5
- 12. Classroom Case Studies, 6-8

For individual program descriptions, visit www.learner.org/resources/series171.html

PRICES

- DVD-R @ (LMNDVDRK] = \$310.00 12 half-hour programs on 4 discs, 1 quide
- ADDITIONAL PROFESSIONAL DEVELOPMENT COURSE GUIDE [LMNSGF] = \$39.95

WEB SITE

www.learner.org/courses/ learningmath/number

INSIGHTS INTO ALGEBRA 1: TEACHING FOR LEARNING

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

For individual program descriptions, visit www.learner.org/resources/series196.html

PRICES

- DVD-R C (IADVDRK] = \$220.00 8 one-hour programs on 4 discs, 1 guide
- ADDITIONAL PROFESSIONAL DEVELOPMENT WORKSHOP GUIDE [IASGF] = \$39.95

WEB SITE

www.learner.org/workshops/algebra



2 graduate credits



Patricia Valdez helps a student interpret a graph and solve a linear programming problem.

ALGEBRA: IN SIMPLEST TERMS

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 visual textbook, students and adult learners will grasp the concepts behind the abstract equations and learn the language of algebra. This series has applications in geometry and calculus instruction. *Produced by the Consortium for Mathematics and Its Applications and Chedd-Angier. 1991.*

- An instructional series for high school, college, and adult learners
- Ø Distance learning course

30-MINUTE PROGRAMS

- 1. Introduction
- 2. The Language of Algebra
- 3. Exponents and Radicals
- 4. Factoring Polynomials
- 5. Linear Equations
- 6. Complex Numbers
- 7. Quadratic Equations
- 8. Inequalities
- 9. Absolute Value
- **10. Linear Relations**
- 11. Circle and Parabola
- 12. Ellipse and Hyperbola

- 13. Functions
- 14. Composition and Inverse Functions
- 15. Variation
- **16. Polynomial Functions**
- **17. Rational Functions**
- **18. Exponential Functions**
- **19. Logarithmic Functions**
- 20. Systems of Equations
- 21. Systems of Linear Inequalities
- 22. Arithmetic Sequences and Series
- 23. Geometric Sequences and Series
- 24. Mathematical Induction

- 25. Permutations and Combinations
- 26. Probability

For individual program descriptions, visit www.learner.org/resources/series66.html

PRICES

- DVD-R © (ALDVDR) = \$389.00 26 half-hour programs on 7 discs
- TEXTBOOK PLUS CD-ROM [ALST] = \$129.95 College Algebra, by Lial and Miller, 10th ed., HarperCollins, 2009
- STUDY GUIDE/SOLUTIONS MANUAL [ALSGS] = \$56.95 College Algebra, *HarperCollins, 2002*
- **TEACHER GUIDE** [ALSGT] = \$20.00

Learning Math DATA ANALYSIS, STATISTICS, AND PROBABILITY



This course introduces statistics as a problem-solving process. Increase your understanding through investigations of different ways to collect and represent data and to analyze and interpret variation in data. Through practical examples, come to 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.

- A professional development course for K–8 teachers
- 3 graduate credits



K-12 teachers use the question "Do you have ESP?" to collect data in studying the binomial probability model.

Probability

Investigate some basic concepts of probability and the relationship between statistics and probability. Learn about random events, games of chance, mathematical and experimental probability, tree diagrams, and the binomial probability model.

Random Sampling and Estimation

Learn how to select a random sample and use it to estimate characteristics of an entire population. Learn how to describe variation in estimates, and the effect of sample size on an estimate's accuracy.

Classroom Case Studies, Grades K-2

Explore how the concepts developed in this course can be applied through a case study of a K-2 teacher, Ellen Sabanosh, a former course participant who has adapted her new knowledge to her classroom.

30-MINUTE PROGRAMS

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

For individual program descriptions, visit www.learner.org/resources/series158.html

PRICES

- DVD-R C [LMDDVDRK] = \$240.00 12 half-hour programs on 4 discs, 1 quide
- **ADDITIONAL PROFESSIONAL DEVELOPMENT** COURSE GUIDE [LMDSGF] = \$39.95

WEB SITE

www.learner.org/courses/ learningmath/data

Data Organization and Representation

Explore different ways of representing, analyzing, and interpreting data, including line plots, frequency tables, cumulative and relative frequency tables, and bar graphs. Learn how to use intervals to describe variation in data. Learn how to determine and understand the median.



A line plot helps teachers visualize variation in data.

The Five-Number Summary

Investigate various approaches for summarizing variation in data, and learn how dividing data into groups can help provide other types of answers to statistical guestions. Understand numerical and graphic representations of the minimum, the maximum, the median, and quartiles. Learn how to create a box plot.

Variation About the Mean

Explore the concept of the mean and how variation in data can be described relative to the mean. Concepts include fair and unfair allocations, and how to measure variation about the mean.

> ★ More on Statistics at www.learner.org/interactives

*Learning Math*GEOMETRY

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*.

30-MINUTE PROGRAMS

- 1. What Is Geometry?
- 2. Triangles and Quadrilaterals
- 3. Polygons
- 4. Parallel Lines and Circles
- 5. Dissections and Proof
- 6. The Pythagorean Theorem
- 7. Symmetry

- 8. Similarity
- 9. Solids
- 10. Classroom Case Studies, K-5
- 11. Classroom Case Studies, 6–8, Part 1
- 12. Classroom Case Studies, 6–8, Part 2

For individual program descriptions, visit www.learner.org/resources/series167.html

- A professional development course for elementary and middle school teachers
- 3 graduate credits
- More on 3D Shapes at www.learner.org/interactives

PRICES

- DVD-R C (LMGDVDRK] = \$310.00 12 half-hour programs on 4 discs, 1 guide
- ADDITIONAL PROFESSIONAL DEVELOPMENT COURSE GUIDE [LMGSGF] = \$39.95

WEB SITE

www.learner.org/courses/ learningmath/geometry

*Learning Math*MEASUREMENT

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.*

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

30-MINUTE PROGRAMS

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

For individual program descriptions, visit www.learner.org/resources/series184.html

PRICES

- DVD-R @ (LMMDVDRK) = \$310.00 12 half-hour programs on 4 discs, 1 guide
- ADDITIONAL PROFESSIONAL DEVELOPMENT COURSE GUIDE [LMMSGF] = \$39.95

WEB SITE

www.learner.org/courses/ learningmath/measurement





THE MISSING LINK: ESSENTIAL CONCEPTS FOR MIDDLE SCHOOL MATH TEACHERS

This workshop explores four concepts identified by TIMSS (the Third International Mathematics and Science

that involve students in their own learning. In the "Discovery" session of each topic pair, Master Teacher

Study) as crucial to students' future success. Learn about these math topics through instructional techniques

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 professional development workshop for middle school teachers
- 2 graduate credits

60-MINUTE PROGRAMS

1. Proportionality and Similar Figures: Discovery

A-Plus Communications and Lavine Production Group. 2000.

- 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

For individual program descriptions, visit www.learner.org/resources/series119.html

PRICES

- DVD-R @ [MLDVDRK] = \$220.00 8 one-hour programs on 4 discs, 1 guide
- ADDITIONAL PROFESSIONAL DEVELOPMENT WORKSHOP GUIDE [MLSGF] = \$39.95

WEB SITE

www.learner.org/workshops/missinglink



Teachers experience group work before introducing it to their students.

TEACHING MATH: A VIDEO LIBRARY 5-8

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.*

15-MINUTE PROGRAMS

- 1. Fraction Tracks
- 2. Hexominoes 🕨
- 3. The Location 🕨
- 4. Building Viewpoints 🕨
- 5. The Largest Container 🕨
- 6. Building Rafts With Rods

PRICES

- DVD-R @ (TM5DVDRK] = \$125.00 6 fifteen-minute programs on 1 disc, 1 guide
- ADDITIONAL PROFESSIONAL DEVELOPMENT LIBRARY GUIDE [TM5SG] = \$17.00

Fraction Tracks

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

Hexominoes

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

The Location

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

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. A professional development library for middle school teachers



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.

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.

MATHEMATICS

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.

WEB SITE

www.learner.org/courses/teachingmath/index.html

2 graduate credits MATH Second and a second

TEACHING MATH: A VIDEO LIBRARY K-4

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.*

15-MINUTE PROGRAMS

1. Introduction

CONTENT STANDARDS (15 MINS.)

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. 1–2 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. 2–3 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. 2–3 A Rocket Shape
- 22. 4 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

A professional development library for elementary school teachers

- 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

For individual program descriptions, visit www.learner.org/resources/series32.html

PRICES

- DVD @ @ [TM4DVDRK] = \$375.00 52 programs (varying lengths) on 11 discs, 1 guide
- ADDITIONAL PROFESSIONAL DEVELOPMENT LIBRARY GUIDE [TM4SG] = \$39.95



MATHEMATICS ASSESSMENT: A VIDEO LIBRARY K-12

This video library portrays the Assessment Standards 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.*



A professional development library for K–12 teachers

PROGRAMS

1. Introduction-10 mins.

SCHOOL-LEVEL VIDEOS (60 MINS.) ►

- 2. Elementary Assessment
- 3. Middle School Assessment
- 4. High School Assessment
- 5. Beyond Testing–30 mins.

For individual program descriptions, visit www.learner.org/resources/series31.html

PRICES

- DVD @ @ [TMADVDRK] = \$220.00 5 video programs (varying lengths) on 3 discs, 1 guide
- ADDITIONAL PROFESSIONAL DEVELOPMENT LIBRARY GUIDE [TMASG] = \$39.95

School-Level Videos

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

Beyond Testing

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.

TEACHING MATH: A VIDEO LIBRARY 9-12

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.*

A video library for grade 9–12 teachers



PROGRAMS

1. Introduction

Content Standards

- 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

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

For individual program descriptions, visit www.learner.org/resources/series34.html

PRICES

- DVD @ (TM9DVDRK] = \$250.00 20 video programs on 4 discs, 1 guide
- ADDITIONAL PROFESSIONAL DEVELOPMENT LIBRARY GUIDE [TM9SG] = \$25.00



Bungee Jump

Students work with functions and statistics while they investigate the mathematics of bungee jumping.

Connections

In excerpts from eight classrooms, students make connections within mathematics, to other disciplines, and to situations in the real world.

MATHEMATICS

PRIVATE UNIVERSE PROJECT IN MATHEMATICS

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.

A professional development workshop for K–12 educators

2 graduate credits

60-MINUTE PROGRAMS

- 1. Following Children's Ideas in Mathematics
- 2. Are You Convinced?
- 3. Inventing Notations

- 4. Thinking Like a Mathematician
- 5. Building on Useful Ideas
- 6. Possibilities of Real-Life Problems

For individual program descriptions, visit www.learner.org/resources/series120.html

PRICES

- DVD-R C (PMDVDRK] = \$149.00 6 one-hour programs on 3 discs, 1 guide
- ADDITIONAL PROFESSIONAL DEVELOPMENT WORKSHOP GUIDE [PMSGF] = \$39.95

WEB SITE

www.learner.org/workshops/pupmath

SURPRISES IN MIND

Many people-in and out of school-find mathematics frustrating. 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 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.

A video documentary for K–8 teachers and administrators



• DVD-R C (URDVDRK] = \$39.95 1 one-hour program on 1 disc

Surprises in Mind

PRICE

ONE 60-MINUTE PROGRAM





EDUCATION

41

LEARNER EXPRESS is a gallery of short video modules chosen from classroom content and professional development series in the Annenberg Learner Collection. Use the videos to enhance classroom explanations, to see targeted examples of teaching and learning standards, or for a discussion starter in professional development sessions.

MATHEMATICS: COMMON CORE STANDARDS PROFESSIONAL DEVELOPMENT MODULES



Excerpts from the *Teaching Math K–4 Video Library* illustrate teaching and learning goals from the Common Core Standards for mathematics. NCTM President Linda Gojak and Life LeGeros, a state-level mathematics supervisor, explain how each classroom scene (from K to grade 4) captures the intent of the eight Common Core Practice Standards and helps teachers to fine tune lessons and to develop students' analytical and problem solving skills. *Produced by WGBH Boston. 2012.*

Professional development modules for elementary teachers

MODULE TOPICS

Problem Solving • 2 modules / 7:48 minutes Reasoning • 4 modules / 19:27 minutes Construct Arguments 3 modules / 15:52 minutes Modeling • 2 modules / 6:48 minutes Strategic Tool Use • 3 modules / 13:06 minutes Attend to Precision • 3 modules / 17:46 minutes Structures Use • 1 module / 4:41 minutes Repeated Reasoning 2 modules / 8:56 minutes

PRICE

DVD @ (XPMDVD) = \$39.95
20 programs of varying lengths, module description book

WEB SITE www.learner.org/series/modules/express

Problem Solving: Bubble Gum Contest

Students work on an activity where they gather data for a bubble gum contest, as part of a larger activity involving recording data on a number line and writing up results.



Reasoning: Cranberry Estimation

In this estimation lesson, students are asked to predict and record how many scoops of cranberries fit into a jar. Actual scoop counts and discussions help students understand measures of central tendency, and hone their estimation skills.

Modeling: Domino Math

A teacher uses dominoes to help students explore properties of addition. The dominoes are a concrete representation of the lesson's mathematical ideas. This tool helps students develop an abstract understanding of addition.



Construct Arguments: Fractions and Geoboards

Students work with geoboards to explore the concept of "halves." This requires them to explain their reasoning and justify their findings to their classmates.

Structures Use: Products and Sums

Students use array structures to reason and conjecture about relationships between sums and products. They seek patterns using concrete and pictorial models.

