

Four units created by
Education Development Center, Inc.

The Language of Numbers

Designing Spaces: Visualizing,
Planning, and Building

From the Ground Up:
Modeling, Measuring,
and Constructing Houses

Chance Encounters: Probability
in Games and Simulations

Reviewed by

Edith H. Maxwell
State University of West Georgia

These four units offer middle level students an opportunity to explore mathematical concepts through physical and pictorial models and to use these concepts in projects and other investigations. The material is in line with current recommendations in mathematics education for the middle grades as put forth by NCTM's Curriculum and Evaluation Standards of School Mathematics. Both teachers and students can enjoy using these materials in an exploratory setting.

The Language of Numbers includes lessons on the "Mystery Device" (students build devices consisting of beads and movable arms and use them to invent and compare systems of numeration), the Chinese abacus, additive systems, and place-value systems. Through the presentations in this unit, students have the opportunity to gain a better understanding of systems of numeration in general as well as our own base-ten system.

The lessons covered in Designing Spaces: Visualizing,

Planning, and Building focus on the students' using mathematics to (1) analyze and describe houses from around the world, (2) plan and build their own models of homes, and (3) create models from other students' plans. Early lessons involve the student in building cube structures and representing them through isometric and orthogonal drawings. Later lessons use string shapes to develop properties of sides and properties of angles. In the final lessons, the focus is on visualization and representation of a range of polyhedra; drawings of prisms and pyramids are emphasized, and several "Mystery Structures" games involving shapes and clues are offered. There is a final project in the last lesson that is aimed at evaluating the unit in a cumulative fashion.

From the Ground Up: Modeling, Measuring, and Constructing Houses focuses on floor plans, site plans, and walls; roofs and nets; area and cost; and designing a home within a budget. These lessons offer a nice exploration of a number of fundamental concepts in geometry and measurement: scale drawings and three-dimensional models, area of various polygons, measurement and estimation using metric units, compass and ruler constructions, the design of nets for prisms and pyramids, and percent. A final project is aimed at assessing the cumulative learning in the unit.

In Chance Encounters: Probability in Games and Simulations students investigate fundamental concepts in probability and statistics by analyzing games and simulations, making revisions for improvement, and designing their own games and simulations. Experiments making use of number cubes, coins, and spinners can help students gain a better understanding of the law of large numbers, randomness, and natural variability. Students learn to express probabilities as fractions, percents, decimals, and ratios. Collection, organization, and representation of data are emphasized. A final project allows the student to apply the concepts learned in the unit as well as make extensions.

The lessons in each unit are thorough. Homework possibilities and extensions for further investigation as well as variations in instruction are suggested. "From the Classroom" vignettes from teachers who have taught the unit are included. Reproducible blackline masters are included in both English and Spanish. The units feature a variety of innovative assessment

techniques such as global scoring rubrics, portfolios, and student journals.

Each unit contains a letter to families that may be used to help explain the purpose and focus of the unit; activities that may be carried out at home are suggested. The letter is available in both English and Spanish.

All units are designed for about 25 class periods of at least 45 minutes each, with the exception of Designing Spaces: Visualizing, Planning, and Building which requires about 30 class periods. However, suggestions for shortening the units are included, if needed.

The units are very hands-on in nature and offer interesting and exciting avenues of inquiry and exploration in mathematics for the middle level student. The spirit of the NCTM standards is evident throughout these materials. In addition to their potential usefulness in the middle school classroom, these units can be especially helpful in college/university courses that emphasize methods and materials for mathematics instruction at the middle school level. Both undergraduate and graduate students will benefit from reviewing these units.

The Language of Numbers (ISBN: 0-435-08349-X), 1994

Designing Spaces: Visualizing, Planning, and Building (ISBN: 0-435-08350-3), 1995

From the Ground Up: Modeling, Measuring, and Constructing Houses (ISBN: 0-435-08360-0), 1994

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361 Hanover Street, Portsmouth, NH 03801-3912