RESOURCES...Decision Mathematics

by Alistair Carr

The standard network problems -- shortest path, network inspection, shortest connections, traveling salesperson -- and problems of choosing a team or a sequence of actions to optimize a quality -- these are all challenging problems, yet are easily within the grasp of any secondary school student with an inquiring mind and rudimentary arithmetical skills.

With this in mind, The Spode Group (Britain) was motivated to create and publish *The Decision Maths Pack*, worksheets for teachers, and *Decision Mathematics*, an A-level textbook for an Oxford University examination, both in 1986.

Later, Prof. Peter Galbraith and I adapted the material for Australian students. The texts have now been used for introductory graph theory with senior secondary school students as well as general problem solving classes on the middle school level, and to introduce some of these topics in a college-level Operations Research course.

The Decisions Maths Pack begins with problems that can be solved by trial and error, then progresses to more complicated problems where it is hoped that students will search for general methods, strategies, and perhaps a polished algorithm. (See the box at the right for an example.)

Teaching notes in the pack outline some theory, but more important, the notes suggest possibilities for adaptation of local examples, e.g., milk delivery, a postal carrier route, gas, telephone or cable TV networks, etc. Our text deliberately avoids a didactic approach, instead focusing on motivating mathematical learning via applications. It is a method which many students respond well to, and one that many teachers enjoy doing.

Project PAM (Practical Applications of Mathematics) has published a companion volume to *The Decision Maths Pack*, called *The Problem-Solving Pack, Australian Edition*. It was created for younger students, aged 11-14, and includes network and packing problems, as well as other discrete math topics. It has been used by a variety of students at levels from grades 6-10.

Inquiries about *The Decision Maths Pack* (UK Edition) may be made to Prof. David Burghes, Centre for Innovation in Mathematics Teaching, School of Education, University of Exeter, St. Luke's, Exeter EX1 2LU, Devon, England. Inquiries about Project PAM for secondary school students, may be made to Prof. Alistair Carr, School of Applied Science, Monash University College -- Gippsland, Switchback Road, Churchill, Victoria 3842, Australia.

Stamp Books

With Christmas approaching, Australia Post decides to try selling booklets of stamps. Ordinary letter stamps cost 36 cents and Christmas card stamps cost 30 cents.

1. Design a book of stamps costing $3.00. It must contain both 36 cent and 30 cent stamps and the total value of the stamps must be $3.00. What is the total number of stamps in the book?

2. Design a book of stamps costing $6.00, containing 36 cent and 30 cent stamps.

3. Find other designs for a $6.00 book of stamps.

4. Which of these books is likely to be the most practical? Why?

5. Suppose postage increases to 40 cents for letters and 35 cents for cards. Design a book of 20 stamps costing between $7.00 and $8.00 that has more ordinary stamps than card stamps and at least one of each. How many such books are possible?

(See "Solutions..." on page 6.)

RESOURCES... Drawing Pictures With One Line: Exploring Graph Theory; and Ethnomathematics: A Multicultural View of Mathematical Ideas...

reviewed by Susan Picker

Drawing Pictures With One Line: Exploring Graph Theory by Darrah Chavey, HistoMap Module #21, COMAP. This new module in the HistoMap series takes teachers and students through the historical beginnings of graph theory as recreational puzzles, to the array of applications for which graph theory is used today. Included are multicultural aspects of graph theory as it exists in cultures in Africa and Oceania as part of a heritage of sophisticated story-telling.

The historical sections of Chavey's module are excellent, providing a richer background on graph theory than I have seen before in a text meant for the secondary school level. In addition, many exercises are provided (although without solutions) along with the continuous relation of theorems and their proofs to real life problem solving. The module should prove a valuable resource for teachers and can introduce educators to the fascinating presence of graph theory in non-western mathematics.

The many examples of non-western graph theory in *Drawing Pictures With One Line* come from Chapter 2 of a new text by Marcia Ascher, *Ethnomathematics: A Multicultural View of Mathematical Ideas*, published by Brooks/Cole, 1991. In this chapter titled "Tracing Graphs in the Sand," the principles of graph theory are introduced in