



minnesota educational computing consortium[©]

FOR USE WITH THE APPLE II™ MICROCOMPUTER

A large, thick black oval frame that encloses the title text.

**MIND
PUZZLES/CHALLENGES**

PRINTED AND DISTRIBUTED BY:
SOUTHWESTERN OHIO INSTRUCTIONAL
TELEVISION ASSOCIATION, INC.
MIAMI UNIVERSITY
OXFORD, OHIO 45056

IMPORTANT NOT

We are an Institutional Member. If new computer programs are added to our library, we will be apprising members of those offerings and their instructional objectives.

MIND

PUZZLES/CHALLENGES

TABLE OF CONTENTS

Introduction	1
Background Information	2
Programs	
MAZES OF RODENTIA	
Description	5
Learning Objectives	5
Program Preview	6
Use in an Instructional Setting	10
Preparation	10
Using the Program	12
Follow Up	15
Student Handouts	17-20
1a. Tournament's Path	17
1b. Tournament's Path	18
2. Knight's Log	19
3. Royal Mazes	20
QUEEN BEE OF MENTA	
Description	25
Learning Objectives	25
Program Preview	26
Use in an Instructional Setting	29
Preparation	29
Using the Programs	33
Student Handouts	36-38
1a. Data Recorder Sheet	36
1b. Data Recorder Sheet	37
1c. Data Recorder Sheet	38

INTRODUCTION

Mind Puzzles is a package which helps students develop a variety of problem-solving skills that apply to virtually all curriculum areas. Mind Puzzles is process- rather than subject-matter-oriented and can be used wherever the objective is to develop thinking skills and processes rather than to acquire knowledge. The programs are designed for individual or small group use by students in grades 6 - 9. The emphasis is on a discovery approach to problem solving, encouraging students to use the computer as an exploratory tool.

MAZES OF RODENTIA presents students with a number of mazes of varying complexity. Students must successfully navigate the mazes in order to win in a tournament. There are three different winning categories. To succeed, students must exit a maze with the fewest number of moves.

In QUEEN BEE OF MENTA, students explore the programs to discover the secret code which involves a 4 x 4 matrix of symbols and their associated screen displays. Screen displays include characteristic borders, movements, formations, and sounds. The exhibition of each type of characteristic is determined by the order in which the symbols are selected.

A Top Ten Scores frame is part of each program. A Teacher Option enables teachers to view or delete the names of the ten top-scoring players in each category. This option is available for both MAZES OF RODENTIA and QUEEN BEE OF MENTA.

Students can exit the program at any time by pressing ESCAPE twice in a row (ESC/ESC) when the program is waiting for input.

© Minnesota Educational Computing Consortium
3490 Lexington Avenue North
St. Paul, MN 55112

October 1, 1983

APPLE IITM and ApplesoftTM are registered trademarks of Apple Computer, Inc. of Cupertino, California. The Apple II, Apple II+, and Apple //e are referenced hereafter in this manual as the Apple. All diskettes are protected with an anti-copy software component, copyright © MECC, 1983. U.S. Copyright Law prohibits the reproduction of computer software. Permission is granted to duplicate classroom sets of student materials contained in this manual.

BACKGROUND INFORMATION

Cognitive Skills and the Curriculum

The increased emphasis on the study of the works of Jean Piaget, Jerome Brunner, and other learning theorists on the development of thought and cognition in children has generated a great deal of interest among educators. From the study of these theories several principles have emerged:

- Everybody can be taught how to be a better problem solver.
- There are identifiable stages of cognitive development in children. As part of their maturation process, all children go through the same developmental stages, although their rate of appearance and style may vary. Because of this, there are wide variations in cognitive development among individuals of the same age.
- It is generally recognized that there is a hierarchy in the quality of thought processes. Several taxonomies have been developed (e.g., Bloom's Taxonomy of Educational Objectives) that attempt to explain the differences in complexity among various thought processes.

The application of these principles to the classroom situation has far-reaching implications for the enrichment of the educational experience of students and for the improvement of the quality of education in general. As a result, greater efforts are being made to incorporate the teaching of problem-solving strategies into the school curricula.

Rationale for This Package

In response to the demands by those involved in the educational process to address the need to develop higher-level thinking skills in students, many units of study, courses, and programs have been developed that focus on the problem-solving process. Most of the materials deal with concepts and procedures commonly associated with math and science topics. While the value of these materials is recognized, a more general treatment of the subject is needed that focuses on the application of problem-solving skills in all areas of the curriculum, not just math and science.

The programs included in this courseware are an attempt to address such a need. With this objective in mind, the following criteria were established to define the scope for the package.

- The topics of the programs and the concepts they present should be applicable for use in a variety of subject matters.
- The aim of the programs is to help students become more aware of their performance as problem solvers. In order to accomplish this objective, the programs do not present a procedure that must be followed systematically. Instead, students are given ample opportunities to explore and discover divergent ways of performing a task successfully.

BACKGROUND INFORMATION (continued)

- Several levels of complexity are built into each problem situation. This enables teachers to individualize the students' learning experience by allowing them to work at a level appropriate to their ability. It also allows students to select a level of difficulty they are comfortable with. In doing so, the chances for students to experience success and develop positive attitudes towards problem solving and towards themselves as problem solvers are increased.
- The programs should enable students to work individually if necessary. However, working together in pairs or small groups is strongly encouraged.

Figure A illustrates the areas of the curriculum where use of the programs would be relevant. Figure B shows the range of commonly recognized problem-solving strategies that the programs support.

Program	Applicable Curriculum Areas
MAZES OF RODENTIA	<ul style="list-style-type: none"> • Mathematics (Problem-Solving Strategies) • Social Studies (Geography: follow instructions, know directions) • Science (Scientific Method)
QUEEN BEE OF MENTA	<ul style="list-style-type: none"> • Mathematics (Problem-Solving Strategies) • Language Arts (Language Encoding/Decoding) • Science (Scientific Method, Attribute Identification)

Figure A

BACKGROUND INFORMATION (continued)

MIND PUZZLES
Scope of Skills Chart

PROBLEM-SOLVING STRATEGY/SKILL	Programs	
	MAZES OF RODENTIA	QUEEN BEE OF MENTA
Spatial Relations	x	
Directionality	x	
Visual Memory	x	x
Auditory Memory		x
Rule Application	x	x
Identifying Attributes		x
Decision Making	x	x
Using a Model		x
Looking to Sequence		x
Examining Assumptions	x	x
Seeing Cause and Effect		x
Guess and Revise	x	x
Use of Symbols	x	x
Dividing a Problem into Less Complex Parts		x
Using Charts, Tables	x	x
Predicting	x	x
Labeling	x	x
Making Choices	x	x
Looking for Pattern		x
Risk Taking	x	x

Figure B

DESCRIPTION

A maze tournament in which students attempt to exit complex mazes with the fewest number of moves is the scenario for this program. Various aids, each providing a different type of clue, are available. The difficulty level of the task is determined by the size or complexity of the maze that students choose to navigate and the type of aid they take along.

Curriculum Area: Problem Solving
Subject: Interdisciplinary
Topic: Logic, Evaluation, Analysis
Type: Educational Game
Grade Range: 6 - 9
Reading Level: 6 (Fry)
Classroom Use: Individual, Small Groups

LEARNING OBJECTIVES

After using this courseware, the student should be able to:

- evaluate and select information that is relevant to the solution of a problem;
- determine strategies and formulate a plan to solve a maze;
- scan a visual pattern for pertinent information;
- follow instructions which use directional commands;
- describe the advantage offered by each of the aids available in the program;
- devise an efficient, easily interpreted way of recording directions through a maze.

MAZES OF RODENTIA


PROGRAM PREVIEW

Optional instructions give students information about the nature of the competition (Figure 1) and its rules (Figures 2-4).

MAZES OF RODENTIA

Welcome to the Kingdom of **Rodentia** and its traditional tournament to select the new **Knights of the Royal Order of Camembert**.

Membership in the Royal Order of Camembert is the highest honor bestowed upon anyone in the Kingdom of Rodentia.



Press SPACE BAR to continue

Figure 1

MAZES OF RODENTIA

There are three ranks within the Royal Order

**Knights of Cheddar
Knights of Havarti
Knights of Brie**

These ranks correspond to three levels of difficulty within the competition. Acceptance to any of the ranks of the Royal Order is determined by the competitors' performance.

Press SPACE BAR to continue

Figure 2

MAZES OF RODENTIA

The competitors with the **ten highest scores** within each of the ranks will be sworn in as Knights and their names will be inscribed on the Royal Scrolls.

As a competitor, your task is:


**TO NAVIGATE ELABORATE MAZES
WITH THE FEWEST NUMBER OF MOVES**

You can choose how difficult a maze you want to travel and what type of aid to take along.

Press SPACE BAR to continue

Figure 3

MAZES OF RODENTIA



Do not be afraid of the royal observers. They will be stationed throughout the mazes to ensure the fairness of the tournament.

Press SPACE BAR to continue

Figure 4

MAZES OF RODENTIA

PROGRAM PREVIEW (continued)

On the Tournament Entry Form students supply information which the computer will use to generate the correct maze and to determine the level of difficulty they will pursue (Figures 5-6). By selecting a maze level and number, students can generate the same maze again. They also decide if they want to take an aid along, and select the aid.

```
TOURNAMENT ENTRY FORM
What level maze do you want to
attempt (1-7)? 4

Do you want the Royal Maze
Master to select a maze for
you? NO

What maze number in level 4 do
you want (1-250)? 175

Press SPACE BAR to continue
```

Figure 5

```
TOURNAMENT ENTRY FORM
You may choose to take any of
these aids along

A. Take a set of directions
B. Wear muddy boots to
leave tracks along your
path
C. Take a ball of string to
unroll as you go
D. Take chalk to write on
the walls
E. Take no aid

Which letter? B

Press SPACE BAR to continue
```

Figure 6

The difficulty of the maze is determined by the maze size and type of aid chosen by the student. The maximum score attainable is related to the difficulty of the maze. Students can take a brief timed peek at the maze they are working on, but it costs half of their total points (Figures 7-8).

```
JANE BEST
is officially competing to
become a

Knight of Havarti

MAZE LEVEL: 4
TYPE OF AID: BOOTS
MAZE ENTRY NUMBER: 175

Press SPACE BAR to continue
```

Figure 7

```
If you get lost traveling the maze

Press P

to take a peek at the maze and see where
you are. But be careful! Seeing the
whole maze costs you a lot of points.

Press SPACE BAR to continue
```

Figure 8

PROGRAM PREVIEW (continued)

Choosing not to take an aid allows achievement of the highest score. It requires that the students devise strategies of their own to navigate the maze (Figure 9). Taking chalk gives more help to the student but requires them to think of a coding system (Figure 10).

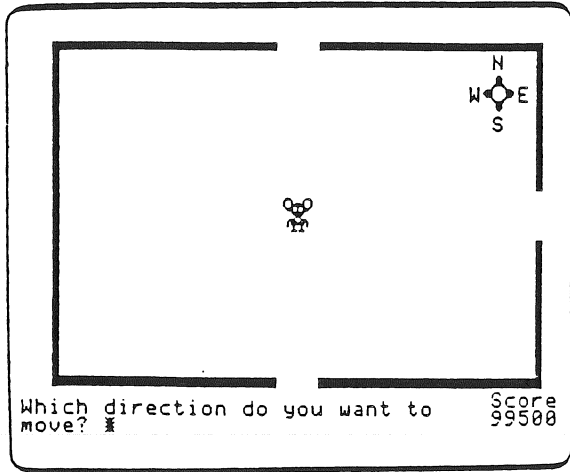


Figure 9

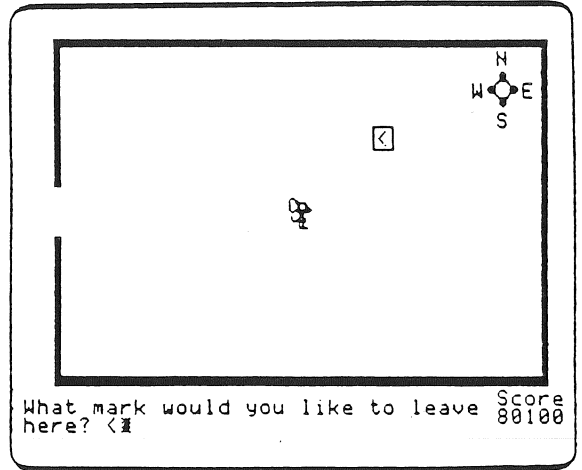


Figure 10

Students choosing the ball of string receive more aid than the chalk provides (Figure 11). Muddy boots as an aid gives them the same advantages of string but also shows direction of movement (Figure 12).

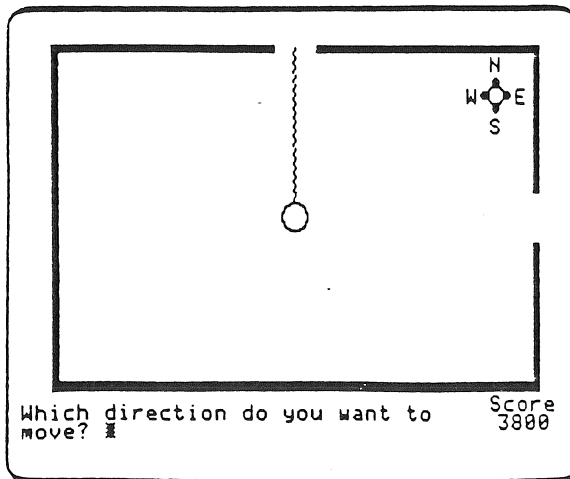


Figure 11

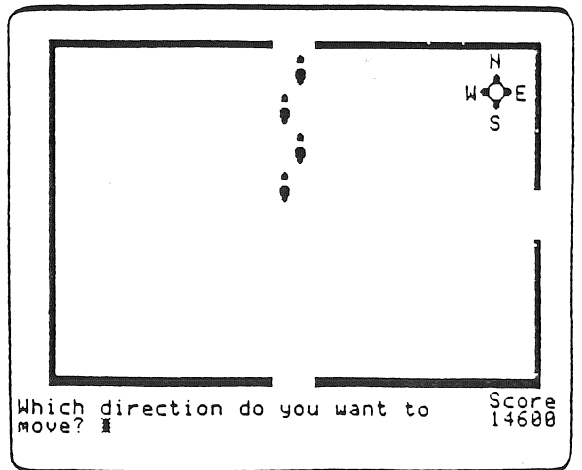


Figure 12

MAZES OF RODENTIA

PROGRAM PREVIEW (continued)

The most aid is provided by taking the set of directions. A list of directions is given for the student to copy down. They follow these directions to find their way through the maze. The Peek option is not allowed when directions are taken (Figures 13-14).

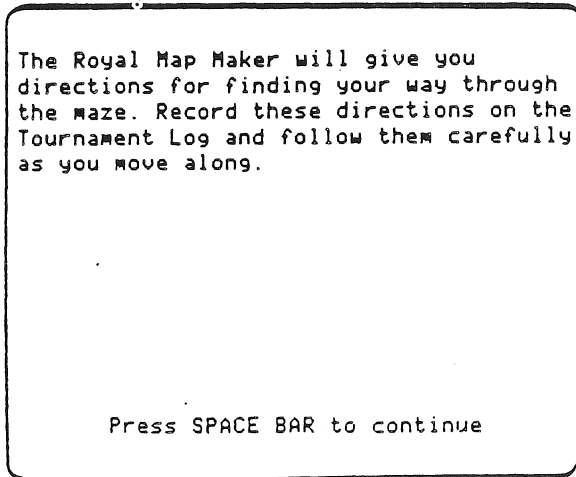


Figure 13

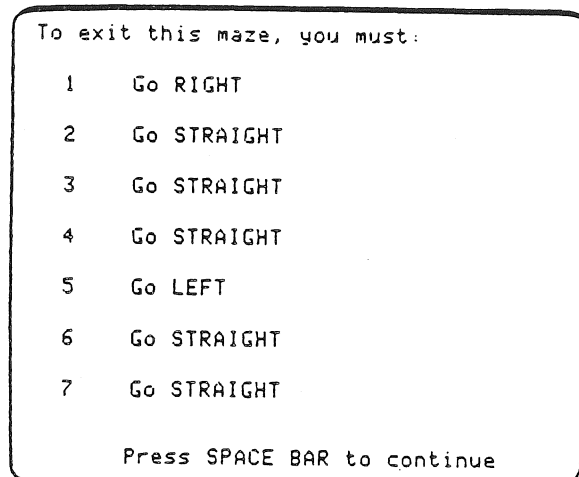


Figure 14

When students exit the final cell, the entire maze is displayed (Figure 15). They are told whether they succeeded in becoming knights and their names are added to the appropriate list (Figure 16).

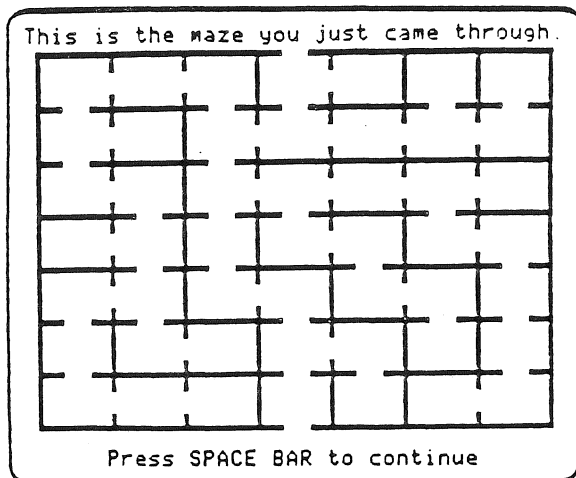


Figure 15

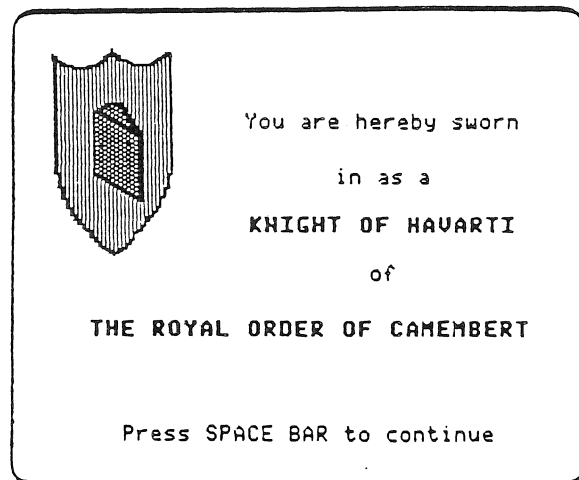


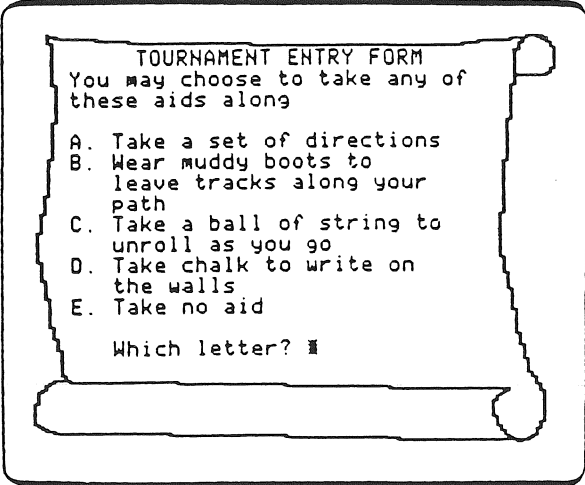
Figure 16

MAZES OF RODENTIA

USE IN AN INSTRUCTIONAL SETTING

Preparation

MAZES OF RODENTIA has several options which allow students to develop different problem-solving skills and strategies. The frame in Figure 1 shows these options:



TOURNAMENT ENTRY FORM
You may choose to take any of these aids along

- A. Take a set of directions
- B. Wear muddy boots to leave tracks along your path
- C. Take a ball of string to unroll as you go
- D. Take chalk to write on the walls
- E. Take no aid

Which letter? █

Figure 1

The chart on the following page indicates how each problem-solving strategy or skill is used by each of these options (Figure 2).

M A Z E S O F R O D E N T I A

USE IN AN INSTRUCTIONAL SETTING (continued)

PROBLEM-SOLVING STRATEGY/SKILL	TASK	OPTION NUMBER
Spatial Relations Directionality	<ul style="list-style-type: none"> • Follow/Give directions to exit mazes. 	All
Visual Memory	<ul style="list-style-type: none"> • Remember route through maze. • Visualize route through maze. 	2-5
Formulate Original Procedures (Synthesis)	<ul style="list-style-type: none"> • Develop own record-keeping system. • Develop own movement strategies. 	2-5
Use of Symbols	<ul style="list-style-type: none"> • Invent a code system to maximize the amount of information provided by a single symbol. 	5
Decision Making	<ul style="list-style-type: none"> • Evaluate the relevance and worth of the information provided by the aid or other maze hints. • Evaluate a move and decide what to do next. • Determine the degree of difficulty of a maze based on its size and type of aid used. 	All All All
Rule Application	<ul style="list-style-type: none"> • Devise and apply a rule for moving in a repetitive pattern throughout the maze. 	2-5
Examine Assumptions	<ul style="list-style-type: none"> • Use the maze PEEK function to verify/revise assumptions. 	All
Revising a Guess	<ul style="list-style-type: none"> • Examine results of a move and revise. 	2-5
Using Charts/Tables	<ul style="list-style-type: none"> • Efficiently using the PEEK function. • Keeping and referencing records. 	2-5
Predicting	<ul style="list-style-type: none"> • Making predictions about correct routes based on records or movement strategies. 	All
Labeling	<ul style="list-style-type: none"> • Using a symbol to label maze cells. • Developing labels for records kept while using maze. 	5 2-5
Making Choices	<ul style="list-style-type: none"> • Choosing between several possibilities. 	2-5
Risk taking	<ul style="list-style-type: none"> • Using the PEEK option even though it costs points. • Deviating from established strategies on chance of moving more quickly through maze. 	2-5 2-5

Figure 2

USE IN AN INSTRUCTIONAL SETTING (continued)

Because there are great variations in ability level and mastery of cognitive strategies, it is recommended that you establish in advance what activities would be better for each student or group of students and in what order they should be done. Using Handout 1a, "Tournament's Path," you can assign students a map showing what they are to do and what their learning objectives are.

If you have students who can route themselves through the program options and difficulty levels, you could give them the alternative Handout 1b, "Tournament's Path," on which they can keep a record of their progress.

Using the Program

Briefly introduce the theme of the program. Explain to students that the three ranks of knighthood represent three different levels of difficulty. The rank that they compete for as well as the beginning score for any maze are determined through a formula that takes into account the size of a maze and the amount of information provided by the aid.

The initial score for a maze is always higher than the highest possible score a student can get. In order to exit a maze, a student has to make a minimum of moves. With each move, the score diminishes a certain number of points. Thus, the student with the best score will be the one who takes the most direct route. Inform students of the possibility of two routes through a maze, but only one exit. Consequently, students may be able to take one of the routes and exit without difficulty or they may get caught in a looping route.

Handout 3, "Royal Mazes," can be used by students to keep track of their routes through the mazes.

The program can be used as an enrichment activity with gifted students. Projects that you can assign to them may range from working with the most difficult mazes to analyzing and evaluating certain programming aspects, such as the scoring algorithm used. Allow them to freely explore and discover the capabilities and limitations of the program. Gifted students may want to start with the most difficult level maze and work backwards.

M A Z E S O F R O D E N T I A

USE IN AN INSTRUCTIONAL SETTING (continued)

The program is designed so that students can work through a range of difficulty levels (Figure 3). The difficulty levels are determined by the interaction of two factors: the size or level of the maze and the type of aid. Obviously, it is easier to traverse and keep track of the movements through a Level 1 maze than through a Level 7 maze. Similarly, it is easier to traverse a maze when you have directions than when you elect not to take an aid along (Figure 4).

MAZE LEVEL	T Y P E O F A I D				
	Directions	Boots	String	Chalk	No Aid
1	Cheddar	Cheddar	Cheddar	Cheddar	Havarti
2	Cheddar	Cheddar	Cheddar	Havarti	Havarti
3	Cheddar	Cheddar	Havarti	Havarti	Havarti
4	Cheddar	Havarti	Havarti	Havarti	Brie
5	Cheddar	Havarti	Havarti	Brie	Brie
6	Cheddar	Havarti	Brie	Brie	Brie
7	Cheddar	Brie	Brie	Brie	Brie

Difficulty levels: (Cheddar = Easy) (Havarti = Medium) (Brie = Difficult)

Figure 3

USE IN AN INSTRUCTIONAL SETTING (continued)

TYPE OF AID	INFORMATION PROVIDED
Directions	Specify every step needed to exit the maze.
Boots	Point out direction where students have been.
String	Points out places where students have been without giving directionality clues.
Chalk	Students are free to devise their own coding system and to leave a one-character clue in each maze cell.
No Aid	None.

Figure 4

M A Z E S O F R O D E N T I A

USE IN AN INSTRUCTIONAL SETTING (continued)

After students have worked independently for a while, assign them to work in pairs. Using the chalk option, each member of a pair is to travel a maze, taking chalk. Their task is to develop an efficient code system to leave information in each cell as they travel through the maze and to prepare a set of instructions using the code system. Each student is to write the instructions on Handout 2, "Knight's Log." When both members of a pair have finished traveling the maze and have written and reviewed the instructions, they should exchange handouts. At this point their objective will be to analyze the code system, figure it out, and follow the instructions to exit the maze. Students can follow up this activity by evaluating and discussing the efficiency of the code system and accuracy of the instructions they were given. It is necessary that they keep track of their maze number in the space provided on the handout.

Handout 2 can also be used by students who choose the Directions aid in the program.

Students can work in groups while they participate in a competition. Assign the same maze to each group by making use of the maze number. The group with the highest score will be the winner.

Teacher Option

There is a Teacher Option available which enables you to erase the current names in the Top Ten lists or to view the names in them. To access the Teacher Option, type Control A when the menu appears. To type Control A, hold down the Control Key and then press A (CTRL-A).

Follow Up

After all students have had an opportunity to work with a variety of mazes, bring them together and discuss their approaches to problem solving. The following questions can be used as a starting point:

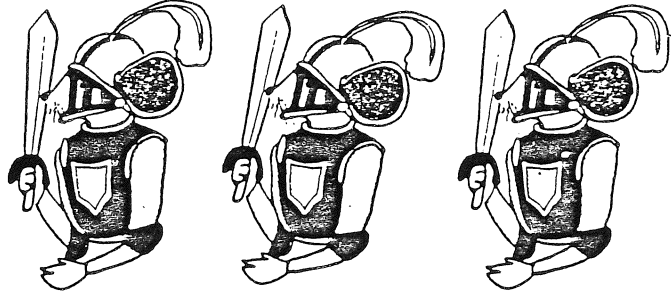
- What approach did they follow to travel through the mazes?
- What was the value of each type of aid?
- How did they use them?
- What record systems were used to keep track of their moves?

After they have shared their experiences by answering the above or similar questions, guide them to make generalizations regarding the approaches that people use to solve a problem and the advantages and/or disadvantages of working in groups to solve a problem.

Student Handouts
for
MAZES OF RODENTIA

Tournament's Path

Name _____



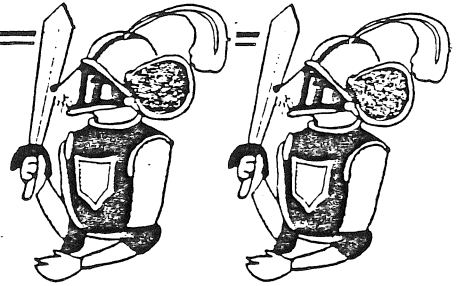
As you work with the program MAZES OF RODENTIA, choose the mazes indicated by your teacher in the chart below.

Maze	Type of Aid				
	Directions	Boots	String	Chalk	Aid
1					
2					
3					
4					
5					
6					
7					

Notes:

Tournament's Path

Name _____



As you work with the program MAZES OF RODENTIA, show which mazes you chose to do on the chart below. Indicate the order in which you did them with numbers. (first = 1, etc.)

Maze	Type of Aid					
	Level	Directions	Boots	String	Chalk	Aid
1						
2						
3						
4						
5						
6						
7						

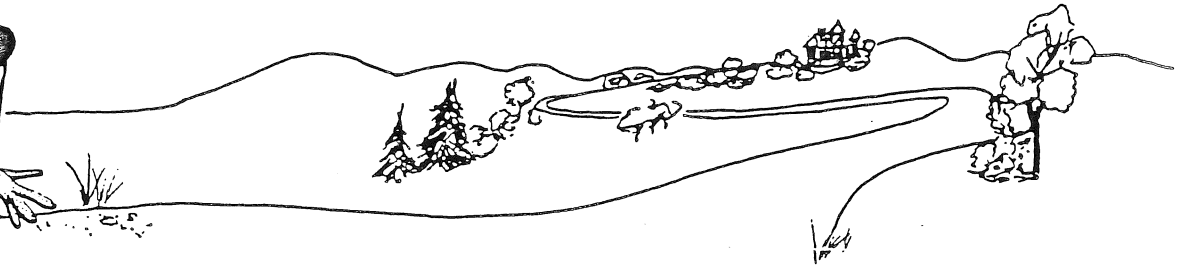
Notes:

Knight's Log

2



Name _____



The Royal Map Maker will give you instructions on how to find your way through a maze. Copy them below and then follow them carefully.

Maze Level: _____

Maze Number: _____

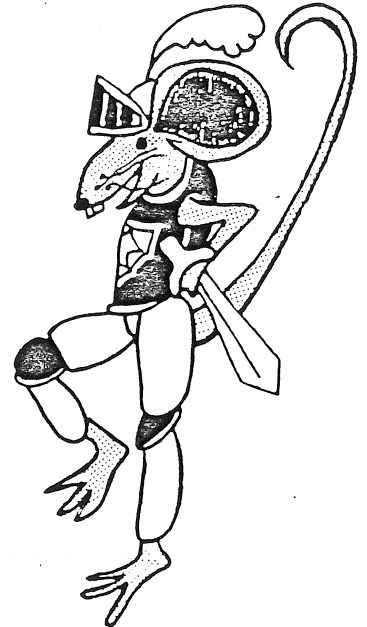
- | | | | | | |
|----|-------|-----|-------|-----|-------|
| 1. | _____ | 9. | _____ | 17. | _____ |
| 2. | _____ | 10. | _____ | 18. | _____ |
| 3. | _____ | 11. | _____ | 19. | _____ |
| 4. | _____ | 12. | _____ | 20. | _____ |
| 5. | _____ | 13. | _____ | 21. | _____ |
| 6. | _____ | 14. | _____ | 22. | _____ |
| 7. | _____ | 15. | _____ | 23. | _____ |
| 8. | _____ | 16. | _____ | 24. | _____ |

Royal Mazes

Name _____

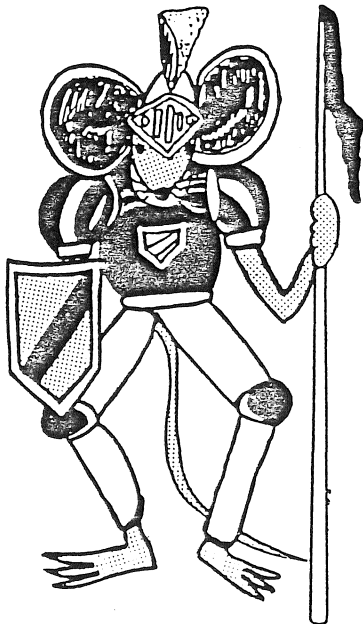
MAZE LEVEL 1

Maze number _____ Type of Aid _____ Score _____



MAZE LEVEL 2

Maze number _____ Type of Aid _____ Score _____

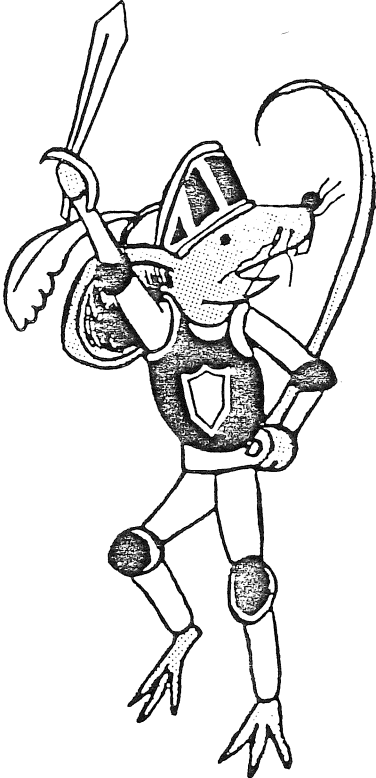
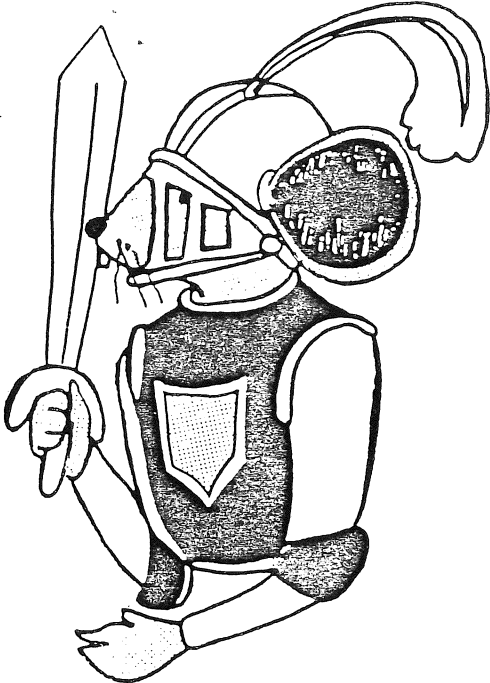


Royal Mazes

MAZE LEVEL 3

Name _____

Maze number _____ Type of Aid _____ Score _____



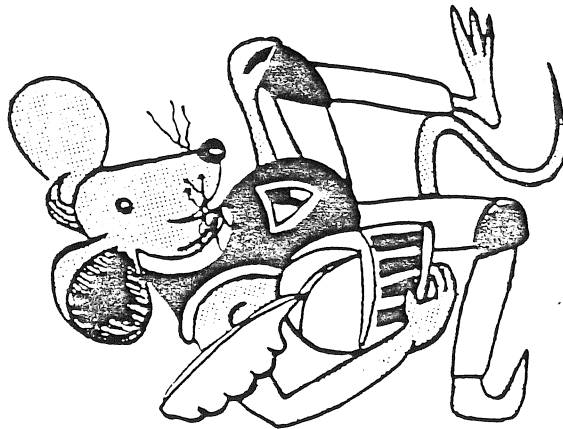
MAZE LEVEL 4

Maze number _____ Type of Aid _____ Score _____

Koyal Mazes

Name _____

MAZE LEVEL 5
 Maze number _____ Type of Aid _____ Score _____

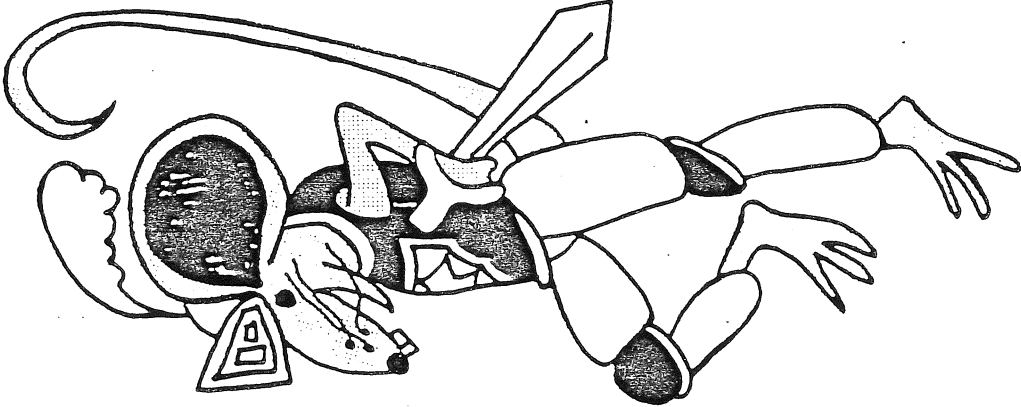
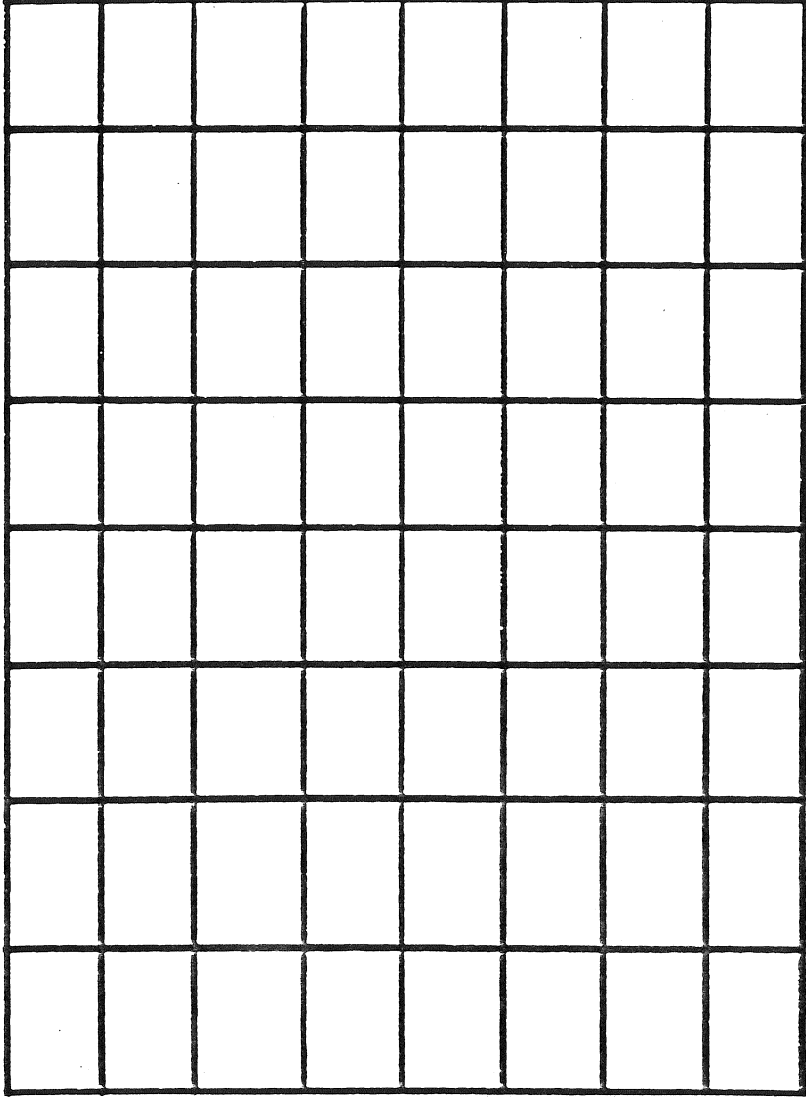


Royal Mazes

Name _____

MAZE LEVEL 6

Maze number _____ Type of Aid _____ Score _____



3d

Koyal Mazes

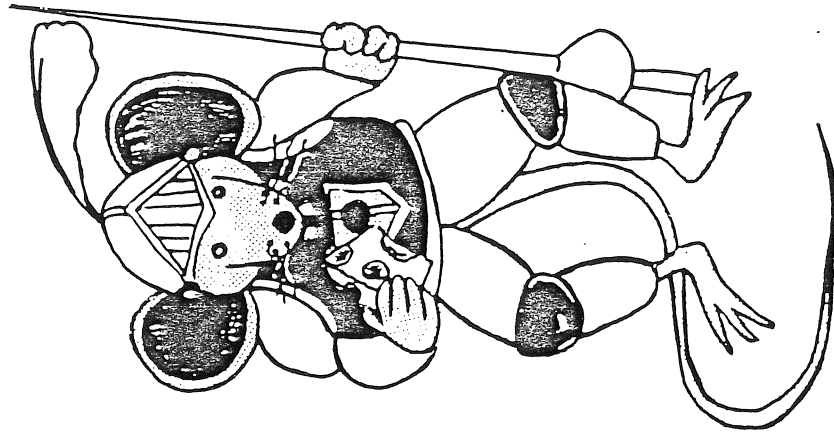
MAZE LEVEL 7

Maze number

Type of Aid

Score

Name



MINNESOTA EDUCATIONAL COMPUTING CONSORTIUM

DESCRIPTION

The QUEEN BEE OF MENTA programs require use of a variety of problem-solving strategies to discover a secret code made up of screen borders, movements, arrangements of objects on the screen, and sounds. A set of four symbols with unique characteristics in each of these areas is used. Students explore the programs to discover the 4 x 4 matrix of symbols and their associated screen displays. Screen displays include characteristic borders, movements, formations, and sounds. The exhibition of each type of characteristic is determined by the order in which the symbols are selected. A "Queen Bee and Magic Honey" story theme is used.

Curriculum Area: Problem Solving

Subject: Interdisciplinary

Topic: Logic, Rule Application

Type: Educational Game

Grade Range: 6 - 9

Reading Level: 6 (Fry)

Classroom Use: Individual, Small Group

LEARNING OBJECTIVES

After using this courseware, the student should be able to:

- analyze a matrix problem presented by the computer;
- determine strategies for solving the matrix problem presented by the computer;
- evaluate their strategies and accept or reject them based on their results;
- use the computer to explore a problem and arrive at a solution;
- develop a matrix of symbols and characteristics where the order of the symbols determines the display of characteristics;
- use their records to duplicate a display of characteristics.

QUEEN BEE OF MENTA

PROGRAM PREVIEW

Optional Instruction frames describe the Queen Bee of Menta ritual (Figures 1-2).

Each day a new field of magical flowers grows and blooms someplace in the kingdom of Menta. The nectar from these blossoms must be quickly gathered and taken to the hive to be made into Menta honey. The Queen Bee's scouts search out these fields and report back to the Queen.

Each day the Queen Bee and her Scouts perform a ritual which directs the worker bees to the flower field.

Press SPACE BAR to continue

Figure 1

During the mysterious ritual the Queen Bee and her scouts show:

- the type of flower containing the Royal Nectar
- the flight pattern to follow to the flowers
- the formation the nectar gatherers must keep
- the sound transmitted by the flowers which aids in their location

Press SPACE BAR to continue

Figure 2

Problem-solving strategies which will help solve the puzzle are listed and summarized (Figures 3-4).

It is important that you concentrate closely on the ritual and

Keep a Record of what you observe.

Have a Data Recorder sheet or a piece of paper on hand.

Press SPACE BAR to continue

Figure 3

As you decode the ritual remember to:

Keep a Record
Make Guesses and Predictions
Look for Patterns
Break the Ritual into Smaller Parts

Press SPACE BAR to continue

Figure 4

QUEEN BEE OF MENTA

PROGRAM PREVIEW (continued)

Decoding the ritual is a difficult task for many students; therefore two lead-in programs are offered which give students practice and suggest approaches for solving the ritual itself: Level 1 (Figure 5) and Level 2 (Figure 6).

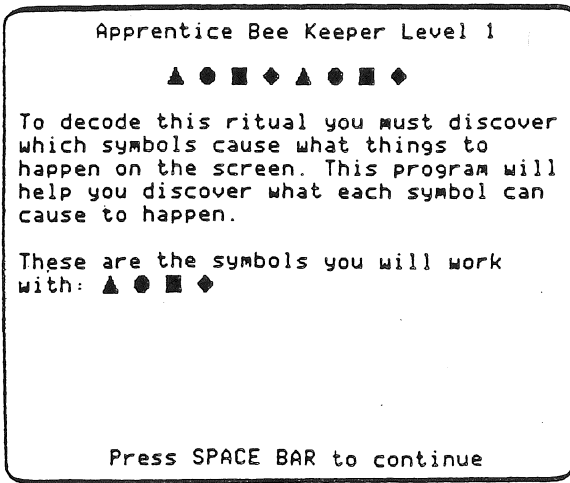


Figure 5

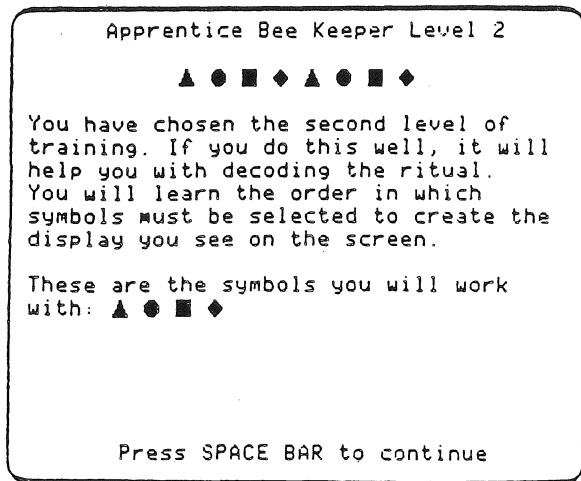


Figure 6

The Queen Bee's Ritual is the key program. If students are good problem solvers they should be encouraged to go directly to this program (Figure 7). This program, unlike the training programs, is scored (Figure 8).

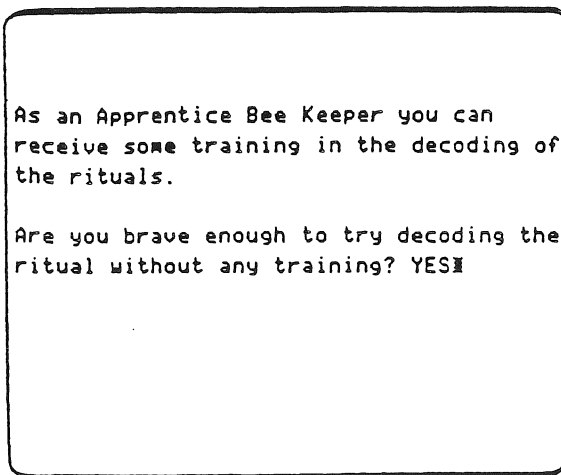


Figure 7

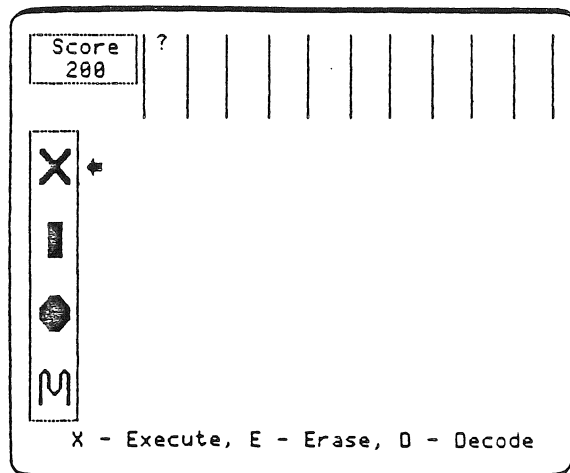


Figure 8

QUEEN BEE OF MENTA

PROGRAM PREVIEW (continued)

By using a systematic trial and error approach students can solve the ritual without having used the training programs (Figure 10). The puzzle code could be solved in as few as three frames (Figures 11-12). The names of the top ten decoders appear on the final frame (Figure 13).

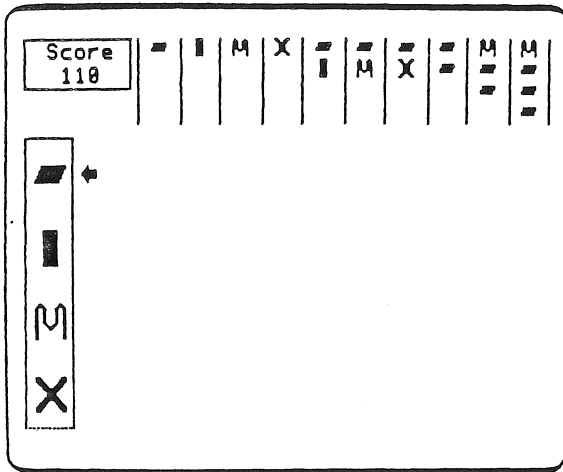


Figure 9

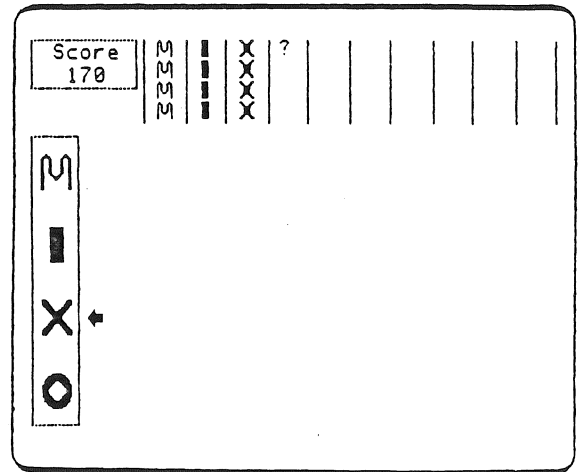


Figure 10

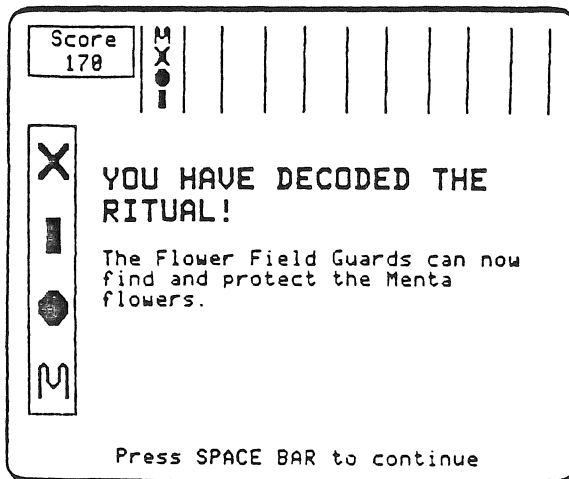


Figure 11

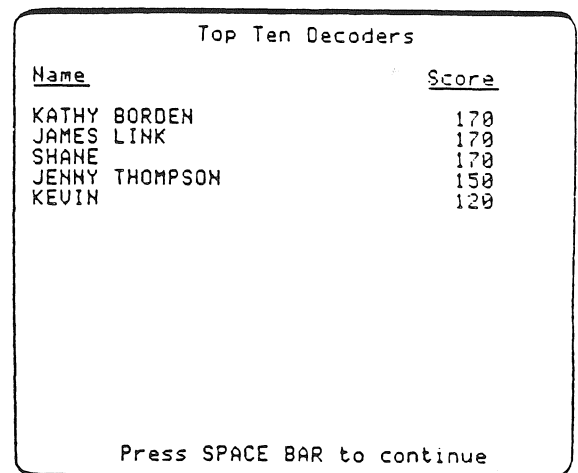


Figure 12

QUEEN BEE OF MENTA

USE IN AN INSTRUCTIONAL SETTING

Preparation

The QUEEN BEE OF MENTA programs offer the student three options of varying levels of difficulty (Figure 1).

As an apprentice your training can be introductory (level 1) or advanced (level 2).

Choose:

1. Apprentice Bee Keeper, Level 1
2. Apprentice Bee Keeper, Level 2
3. Or... No Training (go directly to the ritual)
4. Return to menu

Which number? █

Figure 1

Q U E E N B E E O F M E N T A

USE IN AN INSTRUCTIONAL SETTING (continued)

The following chart indicates how each problem-solving strategy or skill is used by each of these options.

PROBLEM-SOLVING STRATEGY/SKILL	TASK	OPTION NUMBER
Visual Memory	<ul style="list-style-type: none"> Students remember visual data in the form of patterns, movements, and symbols. 	1-3
Auditory Memory	<ul style="list-style-type: none"> Students remember auditory patterns. 	1-3
Rule Application	<ul style="list-style-type: none"> Students discover and use a rule for decoding a puzzle. 	3
Identifying Attributes	<ul style="list-style-type: none"> Characteristics are assigned to symbols. 	1-3
Decision Making	<ul style="list-style-type: none"> Based on exploration of the programs, students decide what the code is. 	1-3
Using a Model	<ul style="list-style-type: none"> A model is developed in Options 1 and 2 which must be applied in the third program. 	3
Looking for Sequence	<ul style="list-style-type: none"> The sequence of events in a display is an important part of the code. 	2-3
Examining Assumptions	<ul style="list-style-type: none"> Two programs allow students to use the computer to test out their assumptions. 	2-3
Seeing Cause and Effect	<ul style="list-style-type: none"> Students create displays which they think will result in a certain predicted display. 	2-3
Revising a Guess	<ul style="list-style-type: none"> Exploring these programs by the guess-and-revise method is a successful strategy. 	1-3
Use of Symbol	<ul style="list-style-type: none"> Symbols represent sequences of events in a display. 	1-3
Dividing a Problem into Less Complex Parts	<ul style="list-style-type: none"> The most successful solution to the puzzle requires use of this strategy. 	3
Using Charts and Tables	<ul style="list-style-type: none"> Charts are created. Charts and records are used to solve the problem. 	1 2-3
Predicting	<ul style="list-style-type: none"> Programs allow students to predict the symbols and the order of symbols for duplicating displays. 	2-3
Labeling	<ul style="list-style-type: none"> Use of the record section of the work screen. Creation of their own records. 	2-3
Making Choices	<ul style="list-style-type: none"> Choose between many possible symbols and orders of symbols. 	1-3
Looking for Pattern	<ul style="list-style-type: none"> Patterns of displays and symbols are determined by students. 	2-3
Risk Taking	<ul style="list-style-type: none"> Students have the option of guessing on the chance of attaining a higher score. 	3

Figure 2

QUEEN BEE OF MENTA

USE IN AN INSTRUCTIONAL SETTING (continued)

Students who have good problem-solving skills might be encouraged to start out with the second- or third-level programs. If they have difficulty solving the problem they should do Levels 1 and 2 and then attempt the third level again.

You may use the information in the Figure 2 chart to determine which students are ready to use the programs and which program they should start with. Once students have worked through Level 1 and kept good records, the second program should be much easier to do. The second program introduces sequencing of symbols as a determinant of what characteristic is displayed. The matrix is shown below (Figure 3).



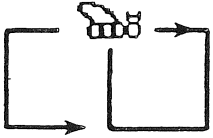







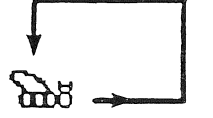
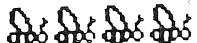

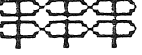
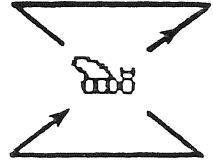

Symbol	Flower	Flight Pattern	Formation	Sound
				high
				low
				descending
				ascending

Figure 3

USE IN AN INSTRUCTIONAL SETTING (continued)

The "ritual" option randomly selects four symbols which are different from those found in the training programs. With the added dimension of randomness and unfamiliar symbols, this third-level program should present a challenge to the students who have worked through the first two programs and to students repeating the program.

"The Queen Bee's Ritual" is the central program in the set and can be decoded without doing the first two by students willing to do some systematic exploration of the program. A record sheet, "Data Recorder," version 1b or 1c, helps students keep track of their explorations. The sheet with the most complete labeling provides the most hints to decoding the ritual. High-ability students might be given the 1c version without labels or might be asked to devise their own record sheets on blank paper.

The Ten Top Scorers List can be deleted or looked at by the teacher by using the Teacher Option. At the main menu frame hold down the Control Key while pressing the A Key (CTRL-A). This will give you the frame shown below (Figure 4).

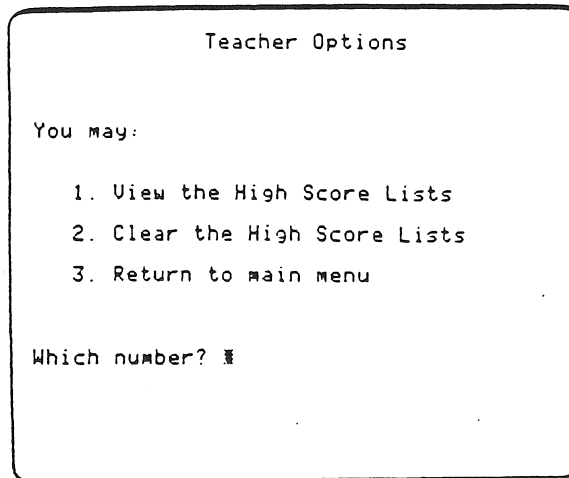


Figure 4

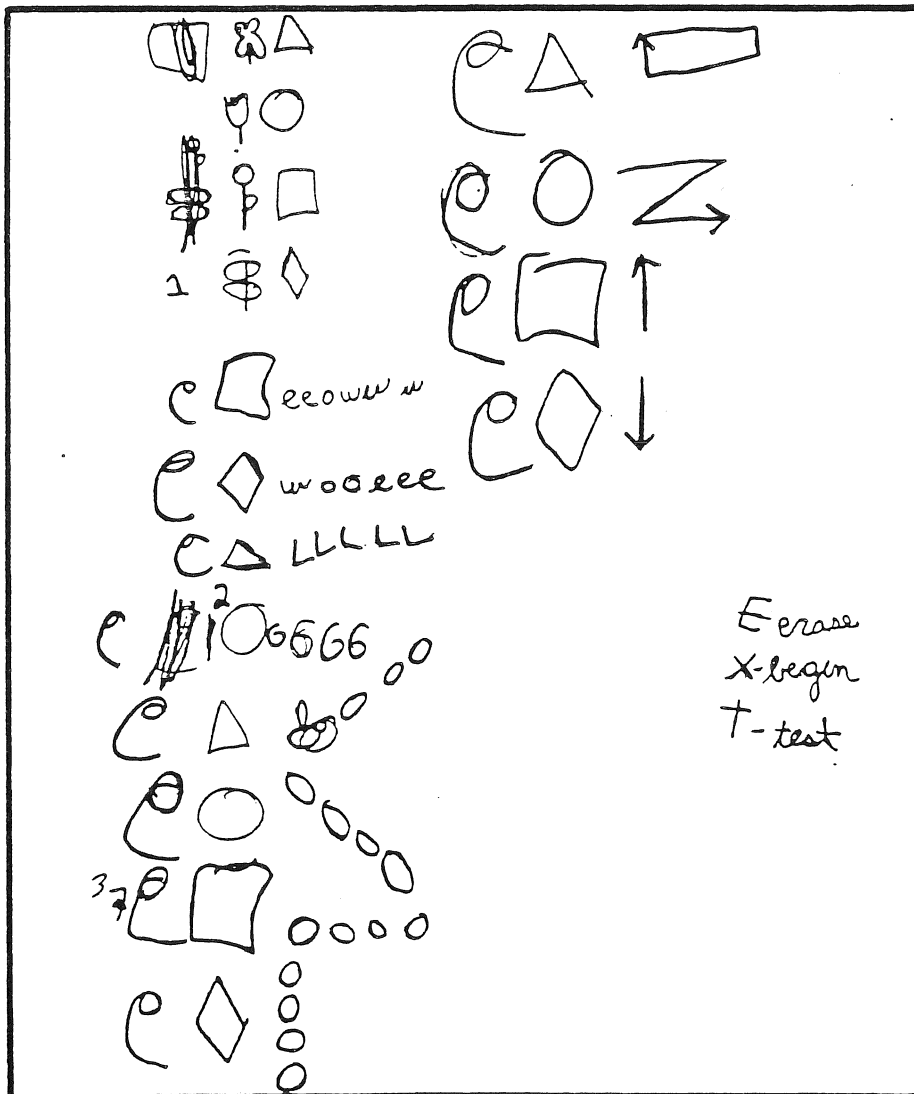
QUEEN BEE OF MENTA

USE IN AN INSTRUCTIONAL SETTING (continued)

Using the Programs

A discussion of other decoding activities that students have done helps to orient them to the problem. Most students have done paper and pencil "break the code" activities in clubs or in school. You could have the class do a few of these activities prior to trying QUEEN BEE OF MENTA.

Emphasize the importance of exploration and recordkeeping. The students are investigators and should freely explore the code in an attempt to break it. They will need to keep good records of the evidence they find. Select a version of the "Data Recorder" sheet to give to the students or have them devise their own recordkeeping system. The record below is unintelligible to anyone but the student who made it, but it worked very well for him.



USE IN AN INSTRUCTIONAL SETTING (continued)

Alternative forms of the "Data Recorder" sheet have been included. The first of these forms provides the most hints about what information the students are to collect and how they are to collect it. The last form provides the least help.

These programs work best with average- to high-ability students. In developmental testing with low-ability students, the teacher had to lead the students through the activities.

Student Handouts
for
QUEEN BEE OF MENTA

Data Recorder

Name _____

While using Queen Bee of Menta, record your observations on this matrix. Later on, when you try to duplicate a display you can refer to this matrix to help you make the correct decisions.



		Ritual			
		Flower	Flight Pattern	Formation	Sound
Symbols					

Observations:

Data Recorder

Name _____

While using Queen Bee of Menta, record your observations on this matrix. Later on, when you try to duplicate a display you can refer to this matrix to help you make the correct decisions.



		Ritual			
Symbols					

Observations:

Data Recorder

Name _____

While using Queen Bee of Menta, record your observations on this matrix. Later on, when you try to duplicate a display you can refer to this matrix to help you make the correct decisions.



Observations:
