STOP !

### Before you use this program . . .

you must add DOS (IBM/TANDY) to your diskette.
It's a simple procedure and need only be done
once. After you've finished, throw this page
away and enjoy the courseware!

NOTE: The IBM PC requires 128K, a
double-sided disk drive and DOS 2.0 or higher.
PCjr requires 128K and DOS 2.1 or higher.
Tandy 1000 requires 128K and DOS 2.11.22.

ADDING DOS WITH ONLY ONE DISK DRIVE:

1. Put the DOS diskette into the disk drive. Close the door and turn on the computer and monitor.

2. Press ENTER (⬅) in response to the "date" and "time" requests given by the computer.

3. When "A>" appears on the screen, remove the DOS diskette and insert the program diskette into the drive (don't forget to remove the write-protection sticker from the edge of the program diskette).

4. Type START-1 and press ENTER (⬅).

5. Follow the disk-switching instructions given by the computer. After you have finished, the program will start automatically.

ADDING DOS WITH TWO DISK DRIVES:

1. Put the DOS diskette into Drive A (Left on IBM/Bottom of Tandy). Close the door and turn on the computer and monitor.

2. Press ENTER (⬅) in response to the "date" and "time" requests given by the computer.

3. When "A>" appears, remove the DOS diskette from Drive A and put it into Drive B (Right on IBM/Bottom on Tandy). Then put the program disk into Drive A (don't forget to remove the write-protection sticker from the edge of the program diskette).

4. Type START-2 and press ENTER (⬅). The program will begin automatically.

Safari Search:

Problem Solving and Inference

Apple
Commodore 64
IBM PC/PCjr
Tandy 1000
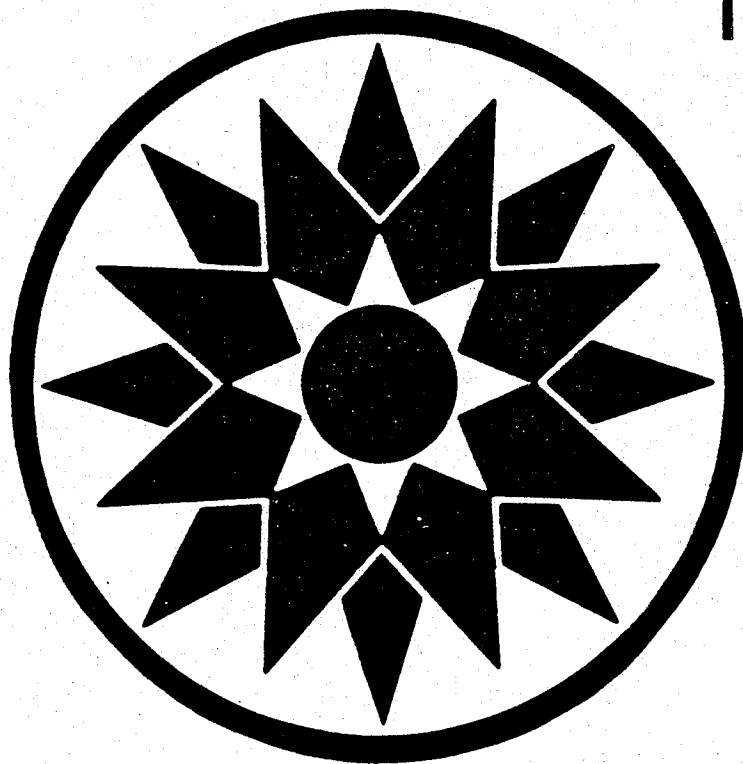
SUNBURST
COMMUNICATIONS

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Designer: Thomas C. O'Brien

Thomas C. O'Brien is a professor and director of the Teachers' Center Project
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cal ideas in subjects from pre-school to medical school and law school. As a
teacher, he has worked with students from grade 7 through graduate school. As
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children, as well as authored and edited some eighty papers on children's
thinking and education published through the Teachers' Center Project.

In addition, Dr. O'Brien has published and delivered some 100 papers on
children's thinking, mathematics education, intellectual development and
educational change. His papers and presentations have taken place in the USA,
Canada, Great Britain, Holland, France, Switzerland, Hungary and Brazil. Dr.
O'Brien was named a North Atlantic Treaty Organization (NATO) Senior Research
Fellow-in-Science in 1978. He received his bachelor's degree from Iona
College, New Rochelle, NY, and his Ph.D. from New York University.

Other programs designed by Thomas O'Brien include: Teasers by Tobbs, Tobbs
Learns Algebra, Counters, Targets, King's Rule, Puzzle Tanks, The Royal Rules.

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SAFARI SEARCH

Table of Contents

INTRODUCTION TO SAFARI SEARCH .
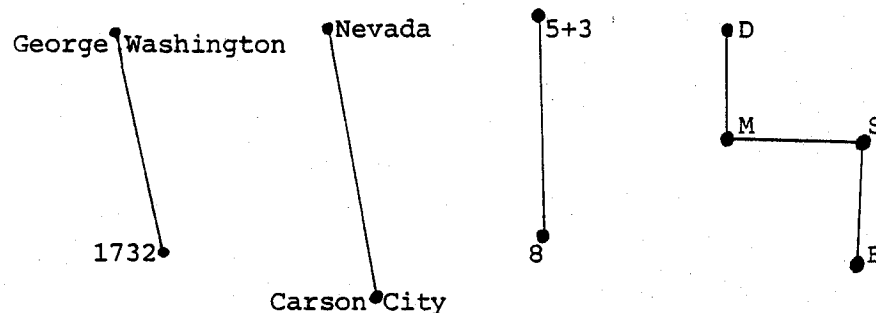by Thomas C. O'Brien

Background

Much of present-day school education amounts to the transmission of
associations or lists. In science, children learn Roy. G. Biv for the colors
of the rainbow. (Red, Orange, Yellow, Green, Blue, Indigo, Violet)

In social studies, they connect names with names and names with dates.
Nevada? Carson City. George Washington? 1732. Lightning rod? Benjamin
Franklin. Even the complex causes of the Civil War get reduced to four or
five items on a laundry list.

In spelling, children learn long lists of phonic rules. "Memorize these lists
and you will be a good speller." Teachers report that it doesn't work very
well.

In math, things are much the same. As early as first grade, children chant
out number facts and memorize them for speed tests. In second grade, they
tackle the procedural steps of subtraction (a nightmare for most teachers),
and later on they take on longer procedural lists, such as "Dead Mice Smell
Bad" (i.e. Divide, Multiple, Subtract, Bring down)--used for long division.

In general, the widespread pictures of knowledge in American education looks
something like this:

George Washington   •Nevada   •5+3   •D

                                                          •M   •S

1732•   8•   •B

        Carson•City

Now stop a minute and think about something you really know--your
neighborhood, how to fix your Plymouth, playing bridge or poker, writing a
computer program, planning a nutritious breakfast.

Knowledge doesn't amount to isolated connections and lists and procedures,
although such connections are sometimes useful. Rather, knowledge is a
fabric, a network, a web of information and relationships and hunches and
inferences in interaction with one another and with the world.

Here is a better picture of knowledge.
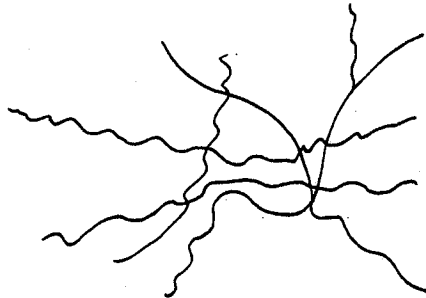
This fabric tends toward coherence, stability, economy, and generalizability.
It is NOT a bunch of atomistic connections or lists stored in an inert memory
bin. While knowledge of the list-type is achieved by copying (from the
teacher, the textbook, one's neighbor, one's crib-notes, etc.), fabric
knowledge comes from one's own actions--actions on one's present knowledge or
on one's environment.

It is unfortunate that schools spend so much time on the memorization of lists
and procedures. The National Council of Teachers of Mathematics in late 1984
recommended that "Much of the instructional time currently devoted to
acquiring proficiency with paper-and-pencil algorithms should be reallocated
to support a range of new or previously neglected topics that have a valid
place in the K-12 curriculum....computational skills of arithmetic, algebra,
geometry, trigonometry, and calculus dominate the K-12 curriculum....Although
these well-known mathematical procedures originated as essential aids to
efficient problem solving, most of the algorithms of school mathematics have
now been programmed for rapid execution by calculators and computers."

Purpose of SAFARI SEARCH

1. The first purpose of SAFARI SEARCH is to cause children to construct
complex mathematical thinking, that is, to construct a fabric. The fabric
here involves one of the most basic of mathematical activities--inference.

In their interaction with the SAFARI games, children gather information and
use that information to infer with logical certainty the whereabouts of
llamas, cats and various other SAFARI animals on a 5 by 5 SAFARI array.

Inference, widely ignored in the elementary school curriculum and often taught
as a bunch of rote procedures at the secondary level, is one of the most
important aspects of mathematical thinking. Did I say mathematical? Is
inference a math-only ability? Certainly not. It pervades all of knowledge.

Note that no teaching takes place in SAFARI SEARCH. But a lot of learning
takes place. The learning is a result of children's actions--their guesses
and their hunches and the beginning bits of fabric they weave as they gain
feedback and evolve primitive approaches into complex thought.

Learning also takes place as children work with one another in interacting with SAFARI SEARCH. Collaborative work (three children at a time, for example) is by all means to be encouraged.

2. The games range from very simple (in fact, random guessing) to very, very difficult. Each of the games calls for children to invent tactics to solve a problem. One major purpose of SAFARI SEARCH is to provide an arena in which children invent and extend problem-solving tactics.

3. A third purpose of SAFARI SEARCH is to call upon children to collect, organize, and use information. The Safari Search Worksheets (see page 34) should be reproduced for the students to aid them in their data collection. Much of present-day education has children storing information, but they rarely organize the information they've stored. Each of the games involves the collection of evidence, the judging of the importance of the information, the weaving of that information in with already-collected data, and the production of new information--namely the conclusion that a SAFARI animal is in box such-and-such.

4. SAFARI SEARCH is an arena in which children learn that their own thinking is important, that they are not mere memory bins, and that they are, in fact, capable of extremely complex mathematical invention. This is especially so of what I call "doormat" kids, those who have had very little success in school. Since school is often a matter of memory, many kids fail at what they see as meaningless, rote tasks. Given the chance to think rather than regurgitate, many children really soar for the first time! A major purpose of SAFARI SEARCH is that players see themselves as able and inventive organizers of the complex buzzing confusion that surrounds us all.

5. The experience of generating and trying out and sharing one's ideas is a lot more interesting and fruitful in the long run than what commonly takes place in classrooms. A fifth purpose of SAFARI SEARCH is to enable children to work collaboratively with rich and powerful ideas and to enjoy themselves while doing so. That is--dare I say it?--a major purpose of SAFARI SEARCH is to enable kids to have fun.

The Games

All the SAFARI SEARCH activities are search games on a 5 by 5 SAFARI layout. In each of the twelve games, one or more animals hide and the object is to search them out. To do so often involves very complex tactics and thoughtful decision-making.

For example, in Search Out the Seal, a seal hides on a 5 by 5 array. Players are asked to guess where the seal is hiding.

In response to each guess, the player is told the rectilinear distance from the guess to the seal's hideout. NOTE: IN ALL ACTIVITIES WHERE DISTANCE IS

INVOLVED, IT IS THE RECTILINEAR DISTANCE, THAT IS, THE UP-DOWN AND LEFT-RIGHT DISTANCE, THAT IS USED. For example, in the grid below, the rectilinear distance from the 1 box to the 3 box is 5 units since there are 2 units from the 1 box to the 2 box and 3 units from the 2 box to the 3 box, giving a total of 5 units.
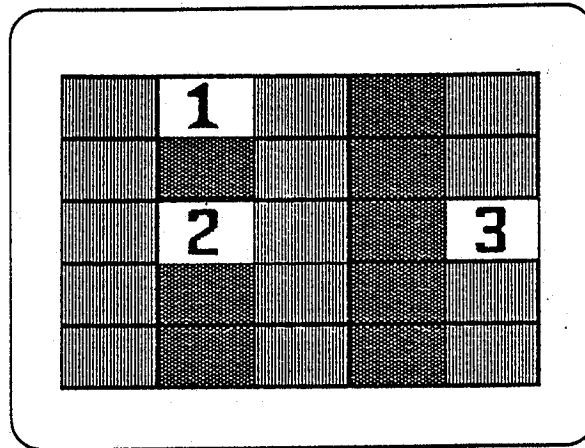
Suppose the seal hides and a player selects a box as shown:
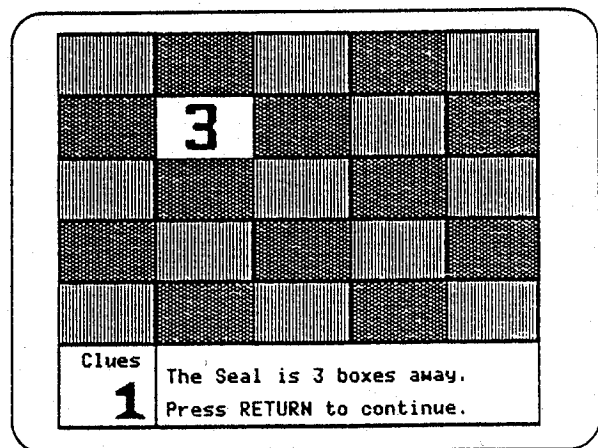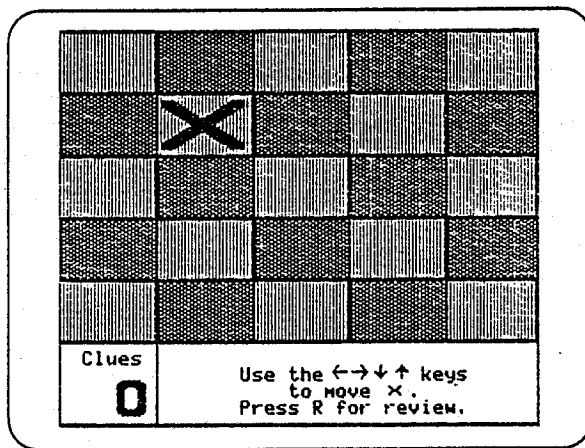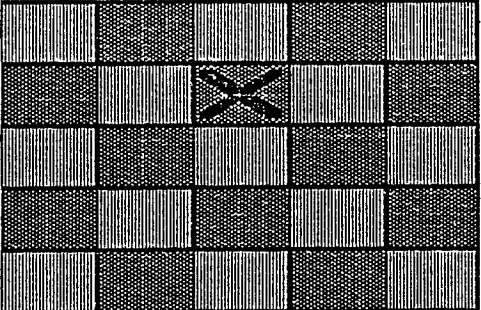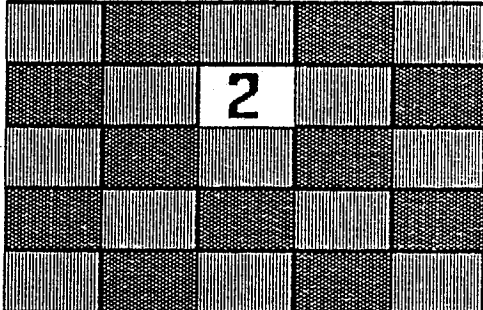
And suppose the response is that the seal is 3 boxes away.

Here are the possible hiding spots for the seal:
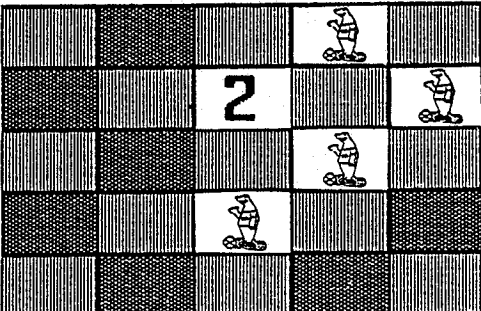
Now suppose the next move and response are as follows:

Now the possibilities are limited as shown:

What box would you choose in order to get enough information to Search Out the Seal?

SAFARI SEARCH

```
       Safari Search
      One Animal Safari
  (1) Intuit the Iguana
   2  Find the Flamingo
   3  Search Out the Seal
   4  Locate the Loon
   5  Discover the Dragon
   6  Detect the Donkey

   7  Next Page
```

```
       Safari Search
      Two Animal Safari
  (1) Catch the Kittens
   2  Round up the Rhinos
   3  Sight the Snails
   4  Collect the Kangaroos
   5  Capture the Cats
   6  Locate the Llamas

   7  Previous Page
   8  Overview
   9  END
```
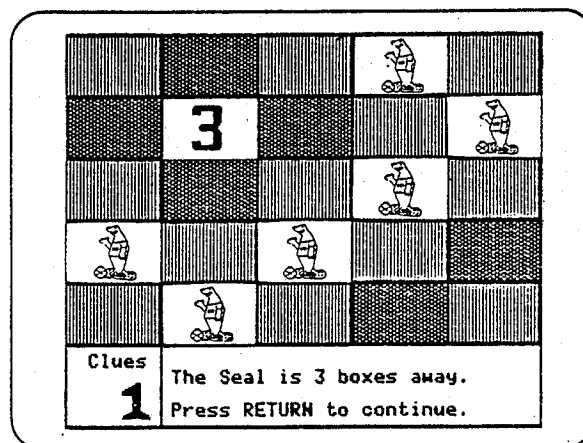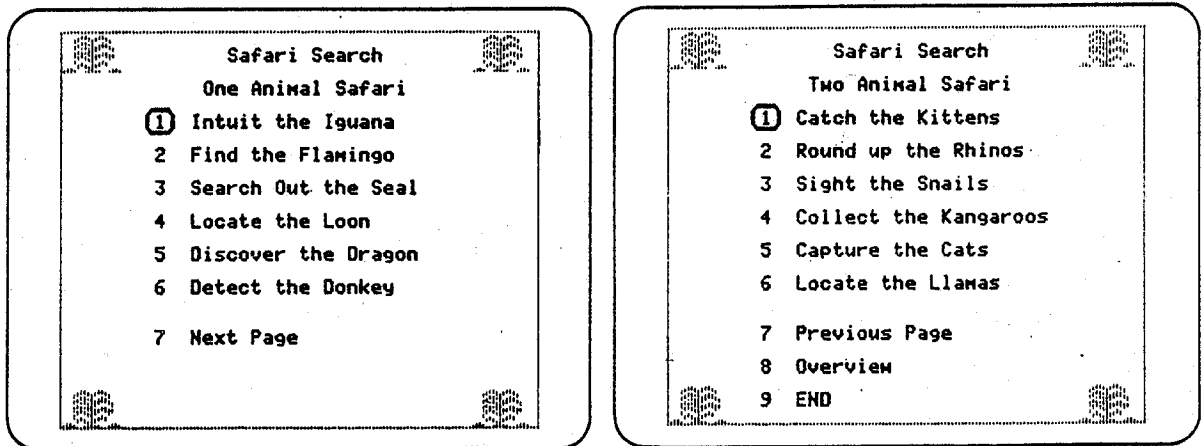
Skills: Making inferences
                     Inventing tactics
                     Collecting and organizing information

Grade Level: 2-adult

Time Required: 2-10 minutes per game

There are twelve programs included in SAFARI SEARCH. These programs are
listed on two pages of menus. The first six programs deal with the player
finding one animal in the grid; the next six programs involve finding two
animals. The Safari Search Worksheet (see page 34) should be reproduced and
handed out to the players to aid them in their data collection. An overview
of all of the programs begins on page 8.

INTUIT THE IGUANA

```
┌─────────────────────────────────────────┐
│  ┌──────────────────────────────────┐    │
│  │ NOT  ▓▓▓▓│ NOT  ▓▓▓▓│ NOT    │    │
│  │ HERE!▓▓▓▓│ HERE!▓▓▓▓│ HERE!  │    │
│  ├──────────────────────────────────┤    │
│  │▓▓▓▓│▓▓▓▓│    │▓▓▓▓│▓▓▓▓│    │    │
│  ├──────────────────────────────────┤    │
│  │▓▓▓▓│ NOT ▓▓▓│ NOT ▓▓▓│    │    │
│  │▓▓▓▓│ HERE!   │ HERE!  │    │    │
│  ├──────────────────────────────────┤    │
│  │▓▓▓▓│▓▓▓▓│    │▓▓▓▓│▓▓▓▓│    │    │
│  ├──────────────────────────────────┤    │
│  │ NOT  ▓▓▓▓│▓▓▓▓│ NOT    │    │
│  │ HERE!▓▓▓▓│▓▓▓▓│ HERE!  │    │
│  ├──────────────────────────────────┤    │
│  │ Clues │ Here's what you've seen   │    │
│  │       │        so far.            │    │
│  │   7   │ Press RETURN to continue. │    │
│  └──────────────────────────────────┘    │
└─────────────────────────────────────────┘
```

Instructions:

An Iguana is going to hide in one of the boxes.
Your job is to find it.
If the box you choose is the Iguana's box, you are a winner!!
If the box you choose is not the Iguana's box, you will get to try again.

Commentary:

Intuit the Iguana is the simplest of SAFARI SEARCH activities. There's no
strategy, just random guessing. Suppose you choose a box as follows:

```
┌─────────────────────────────────────────┐
│  ┌──────────────────────────────────┐    │
│  │▓▓▓▓│▓▓▓▓│    │▓▓▓▓│▓▓▓▓│    │    │
│  ├──────────────────────────────────┤    │
│  │▓▓▓▓│    │  ✕  │    │▓▓▓▓│    │    │
│  ├──────────────────────────────────┤    │
│  │▓▓▓▓│▓▓▓▓│    │▓▓▓▓│▓▓▓▓│    │    │
│  ├──────────────────────────────────┤    │
│  │▓▓▓▓│▓▓▓▓│    │▓▓▓▓│▓▓▓▓│    │    │
│  ├──────────────────────────────────┤    │
│  │▓▓▓▓│▓▓▓▓│    │▓▓▓▓│▓▓▓▓│    │    │
│  ├──────────────────────────────────┤    │
│  │ Clues │   Use the ←→↓↑ keys       │    │
│  │       │      to move ✕.           │    │
│  │   0   │   Press R for review.     │    │
│  └──────────────────────────────────┘    │
└─────────────────────────────────────────┘
```

And suppose you get the following result:


```
                    NOT
                    HERE!



         ┌──────────────────────────────────
         │ Clues │ No, the Iguana is not here.
         │   1   │ Press RETURN to continue.
```

All you know is that the Iguana is elsewhere. It's only "hunt and peck" that
will lead you to the Iguana. (Or luck. Players can test their luck and
intuition and compare their results. Who's the best guesser in the class?)

But the only logical tactic players can use is to systematize their search--
perhaps by hunting along the top row first, then the second row, then the
third, etc., in order not to choose a box they've chosen before.

Intuit the Iguana provides a counterpoint to all the other SAFARI SEARCH
activities. What lack of power there is in random guessing! How important
are the search strategies and complex thinking children develop in their
interactions with the later games!

FIND THE FLAMINGO
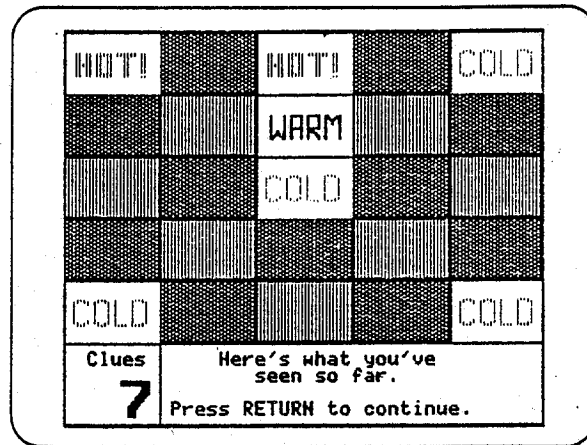
Instructions:

    Fred the Flamingo is going to hide in one of the boxes. Your job is to
    find him!
    If the box you choose is the Flamingo's box, you are a winner!
    If the box you choose touches sidewise to the Flamingo's box, you are
    hot.
    If your box touches the Flamingo's box cornerwise, you are warm.
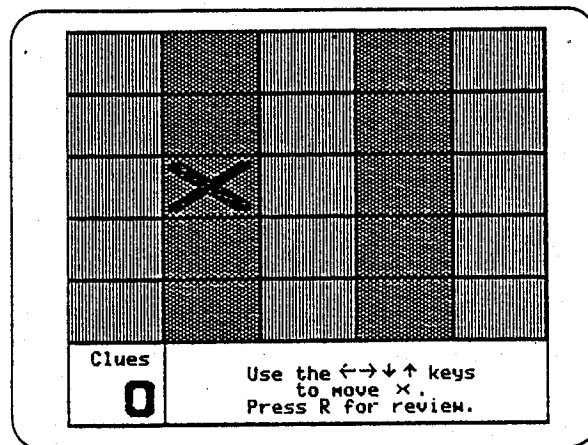   If the box you choose does not touch the Flamingo's box, you are cold.
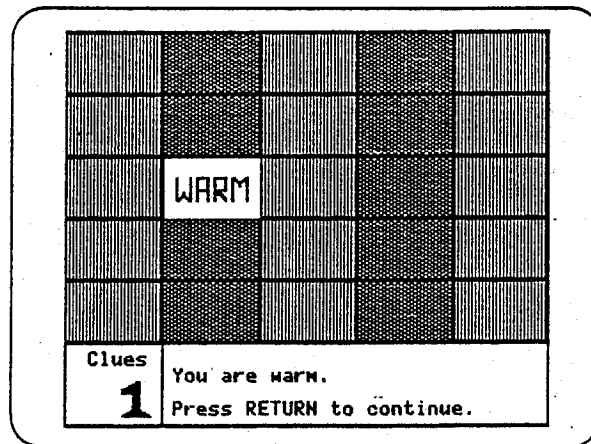   You have as many chances as you need to Find the Flamingo.

Commentary:

Find the Flamingo contrasts strongly with Intuit the Iguana. Here, the
feedback is extremely useful in suggesting powerful, economical search
tactics.

Suppose you begin by searching as follows:

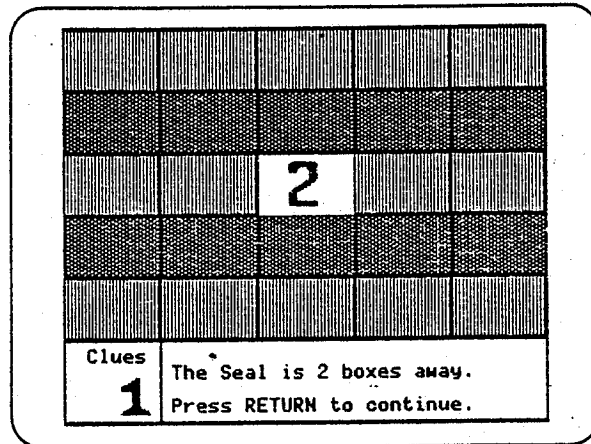And suppose you get the following response:

Clues
1

You are warm.
Press RETURN to continue.

What do you know? You know with certainty that the Flamingo is in one of
these boxes:

Clues
1

You are warm.
Press RETURN to continue.
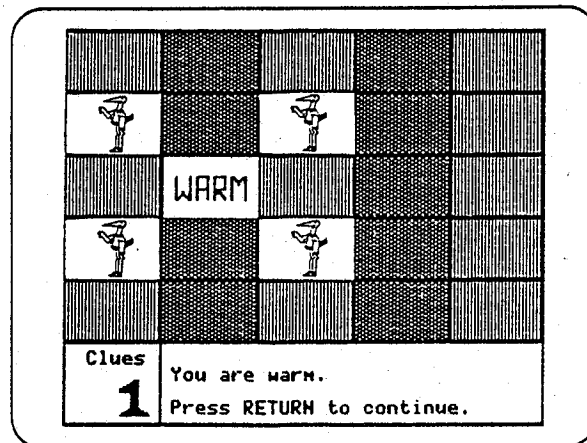
What's your next move?

SEARCH OUT THE SEAL


```
Clues      The Seal is 2 boxes away.
  1        Press RETURN to continue.
```

Instructions:

A Seal will hide in one of the boxes.
Your job is to Search Out the Seal.
For each choice you make, you will begin the distance from the box you
choose to the box where the Seal is hiding.
You will not be given diagonal distances, only left-right and up-down.
You have as many chances as you need to Search Out the Seal.

Commentary:

Remember "locus" problems from your high school math?   (Show all the points on
this paper which are 10mm from a given point.   Answer: A circle with radius of
10mm whose center is the original point.)

Search Out the Seal is an activity bringing together all the richness of
traditional locus problems, while remaining within the scope of third and
fourth graders.

(One simple definition of thinking is "generating alternatives."   One simple
definition of logic is "generating and cancelling alternatives, sometimes such
that there is only one alternative remaining.   Search Out the Seal, as all
SAFARI SEARCH activities, involves thinking and logic in this sense.)

Suppose you Search Out the Seal as follows:


```
Clues        Use the ←→↓↑ keys
  0             to move X.
             Press R for review.
```
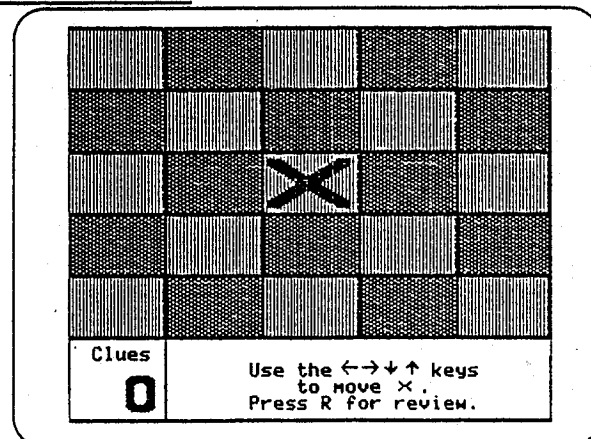
And suppose this is the result:
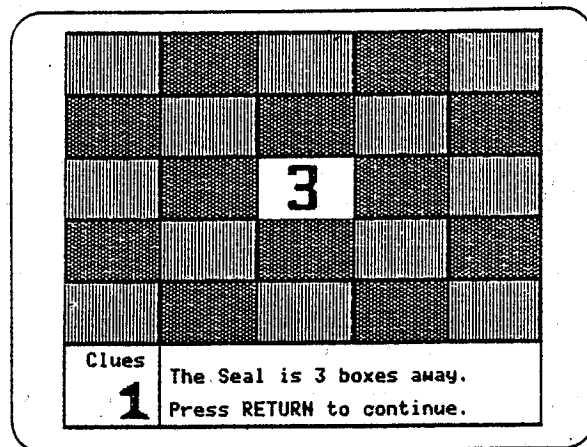
What do you know? You know that the Seal is in one of these spots.
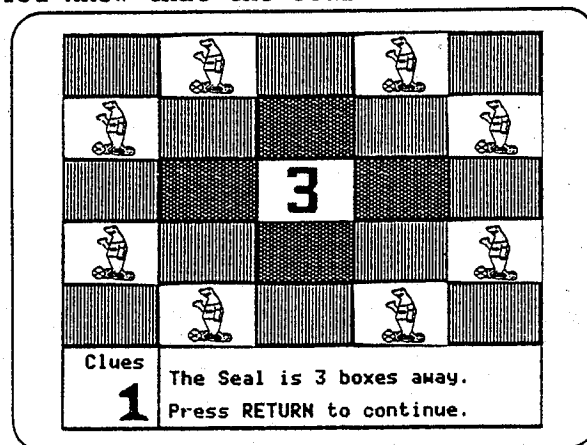
What's your next move? In general, without luck, how many bits of information do you need to Search Out the Seal? Is this the same as Intuit the Iguana, where you had nothing but random guessing as a search tactic?

LOCATE THE LOON
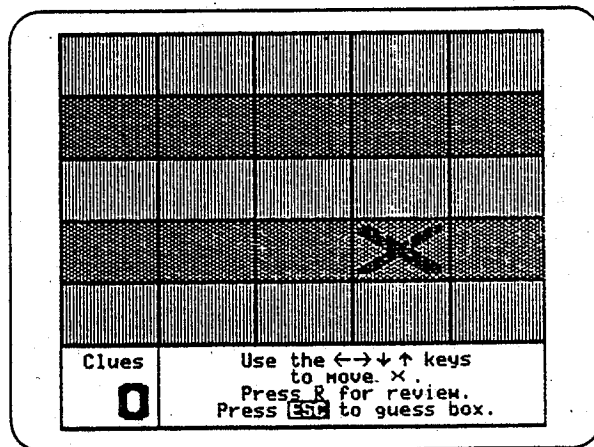
Instructions:

    Your job is to find out which box the Loon is hiding in.
    You choose a box. If the Loon's box is in your box or touching your box
    sidewise or cornerwise, the Loon can be seen.
    When you think you know where the Loon is, press ESC (Commodore 64: press
    CLR). You will have only one chance to find the Loon.

Commentary:

Suppose you ask about this box:
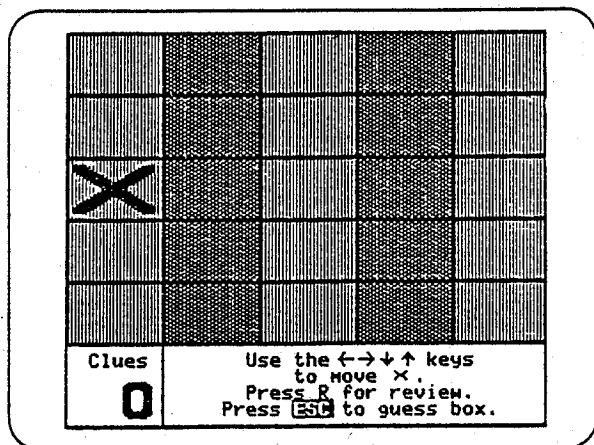
And suppose you get this response:
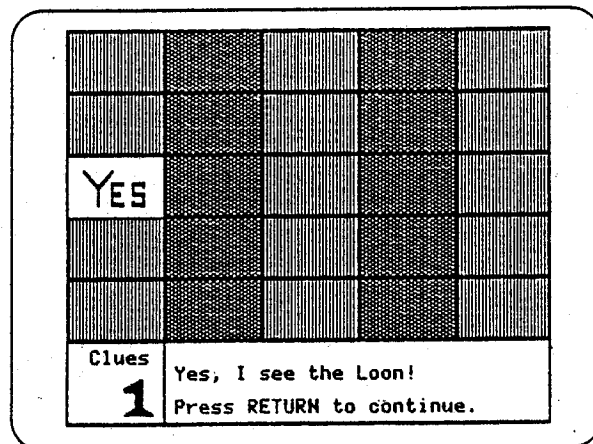
The feedback tells you that the Loon is lurking in one of these boxes:
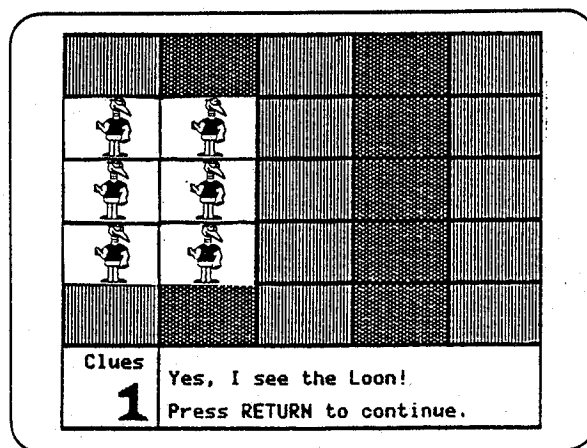
What's your next move? You might try this:

Suppose you get the following response:
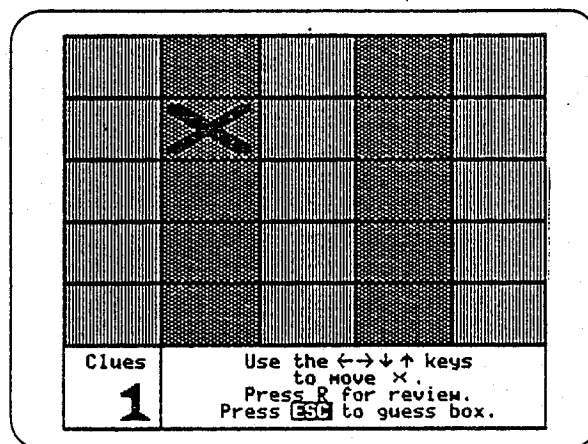
Clues
2
Yes, I see the Loon!
Press RETURN to continue.
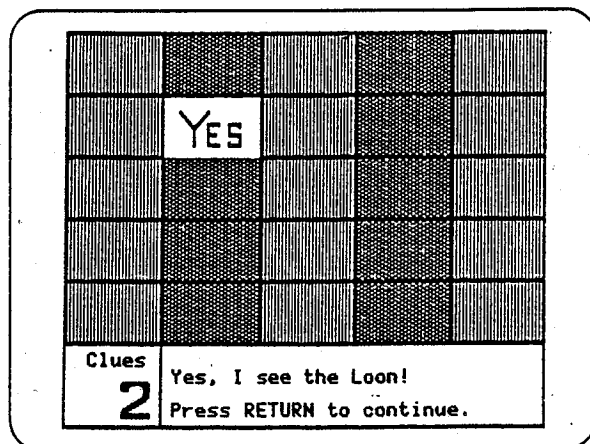
You'd know that the Loon lurks in one of the following boxes:

Clues
2
Yes, I see the Loon!
Press RETURN to continue.

What's your next move?

Instructions:

    Delores the Dragon is going to hide in one of the boxes.
    Your job is to find her.
    You choose a box.
    The computer will look in your box's row (left-right) and column
    (up-down).
    You will be told how many Dragons (∅ or 1) are seen.
    When you are ready to Discover the Dragon, press ESC (Commodore 64: press
    CLR).
    You have only one chance (Repeat: Only One Chance) to Discover the
    Dragon.

Commentary:

Suppose that you have played for several moves and have obtained information
as shown in the following review:

A zero (∅) in any box tells you that the Dragon cannot be in the row and column of that box. A 1 says that the Dragon is in the row or column of the box. Thus, here are the possibilities:


```
Clues    Here's what you've
  4         seen so far.
         Press RETURN to continue.
```
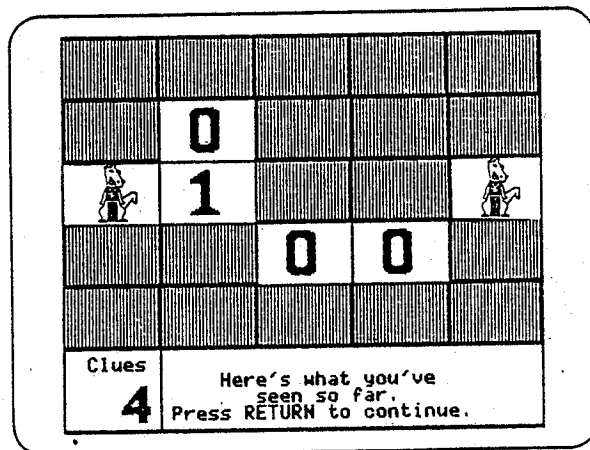
What's the next move to make?

DETECT THE DONKEY

Clues

3

Here's what you've
seen so far.

Press RETURN to continue.
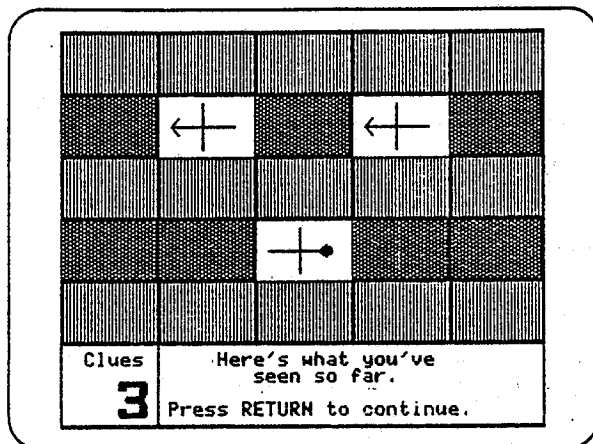
Instructions:

Your job is to find the Donkey hiding in one of the boxes.
You can ask questions such as:
        "Is the Donkey left of a certain box?"
        "Is the Donkey below a certain box?"
You ask the questions in this form:
        Above
        Below
        Left of OR
        Right of a particular box.

Each of your questions will receive a Yes or No.
When you have enough information to Detect the Donkey, press ESC
(Commodore 64: press CLR).

Commentary:

Suppose you have asked whether the Donkey is to the right of this box:

Clues

1

Pick direction.   Above
                   Left (Right)
                   Below
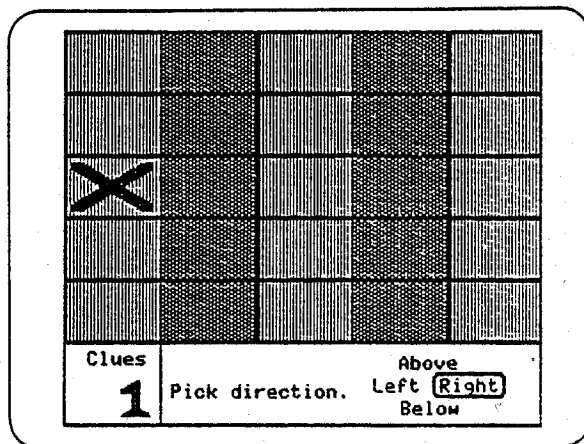
And suppose you get a "no." You know, then, that the Donkey must be in the first column.
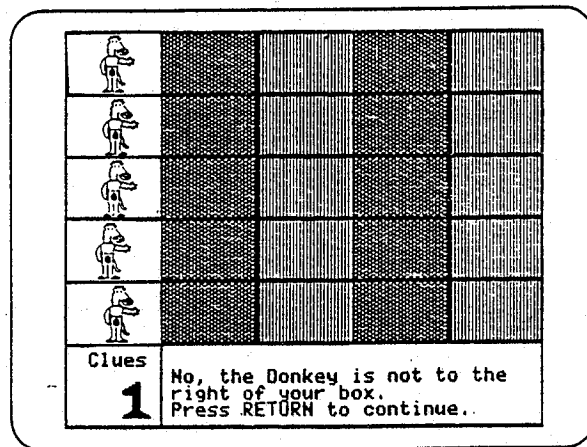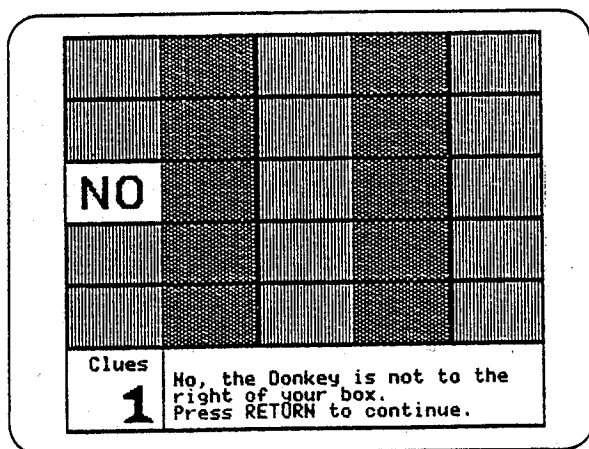
Suppose you play a bit more and the review shows this:
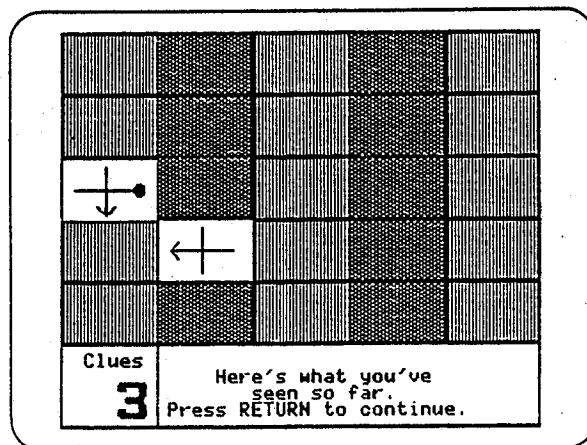
A word of explanation about the review:

means that no Donkey is to the right of the box and the Donkey is below the box. Left and above haven't been asked.
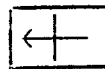
means that the Donkey is to the left of the box. Above, below, and right haven't been asked.

Given the review, what's the next move to make?

CATCH THE KITTENS

```
┌──────────────────────────────────────┐
│  ┌────────────────────────────────┐   │
│  │  3 ▓▓▓ ▓▓▓ ▓▓▓  5 │            │   │
│  │ ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓ │            │   │
│  │  1 ▓▓▓  3  ▓▓▓ ▓▓▓ │            │   │
│  │  0 ▓▓▓ ▓▓▓ ▓▓▓  6 │            │   │
│  │ ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓ │            │   │
│  ├──────┬─────────────────────┤       │
│  │Clues │ Here's what you've   │       │
│  │      │    seen so far.      │       │
│  │  7   │ Press RETURN to continue.. │ │
│  └──────┴─────────────────────┘       │
└──────────────────────────────────────┘
```

Instructions:

Two Kittens are going to hide in the boxes.
When you select a box, you will be given the distance from your box to
one of the Kittens.
It won't be the same Kitten every time and you won't be told which
Kitten it is.
The distances given are left-right and up-down (not diagonal).
You can try as many boxes as you want. When you are ready, press ESC
(Commodore 64: press CLR) to Catch the Kittens.

Commentary:

Catch the Kittens is similar to Search Out the Seal, but here two Kittens are
hiding. You need to evaluate the feedback to determine which of the Kittens
each number refers to. For example, suppose you obtain, after four clues, the
following results:

```
┌──────────────────────────────────────┐
│  ┌────────────────────────────────┐   │
│  │  6 │ 2 ▓▓▓ ▓▓▓ ▓▓▓ │          │   │
│  │ ▓▓▓  3  ▓▓▓  1  ▓▓▓ │          │   │
│  │ ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓ │          │   │
│  │ ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓ │          │   │
│  │ ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓ │          │   │
│  ├──────┬─────────────────────┤       │
│  │Clues │ Here's what you've   │       │
│  │  4   │    seen so far.      │       │
│  │      │ Press RETURN to continue. │  │
│  └──────┴─────────────────────┘       │
└──────────────────────────────────────┘
```

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What do you know? Three possible Kitten 1's are determined by box 6. Kitten 2 is in the only box which can be one away from box 1, two away from box 2, and three away from box 3. Therefore, you know for sure where one Kitten is, and you know three possible spots for the second one.
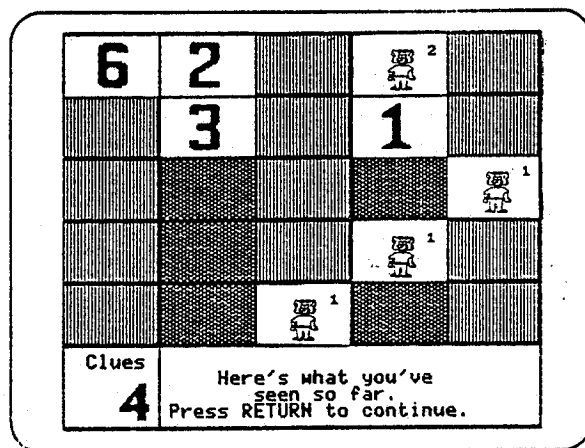
You would not be ready to press ESC (Commodore 64: press CLR) and Catch the Kittens. You need more information. What's your next move?
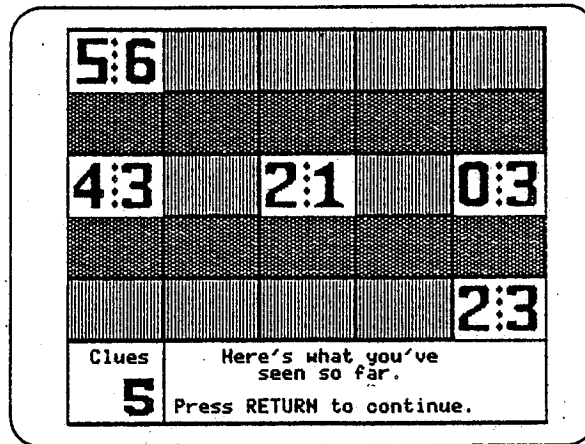
Instructions:

    You must find the two Rhinos hiding in the boxes.
    You will be given the distance from your box to each of the Rhinos.
    That is, you will get two distances. (Sometimes the smaller distance
    first, sometimes the larger.)
    The distances are left-right and up-down, not diagonal.
    You have only one chance (Repeat: Only One Chance) to Round up the
    Rhinos.
    When you are ready to Round up the Rhinos, press ESC (Commodore 64: press
    CLR).
    If you guess wrong, you are finished and you will have to start a new
    game.

Commentary:

Round Up the Rhinos is again similar to Search Out the Seal, but two animals
are hiding. Suppose, after your first play, you get feedback as follows:
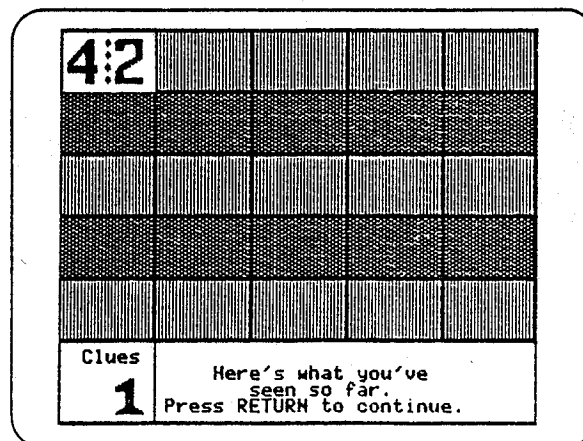
You know that the Rhinos are situated as shown:
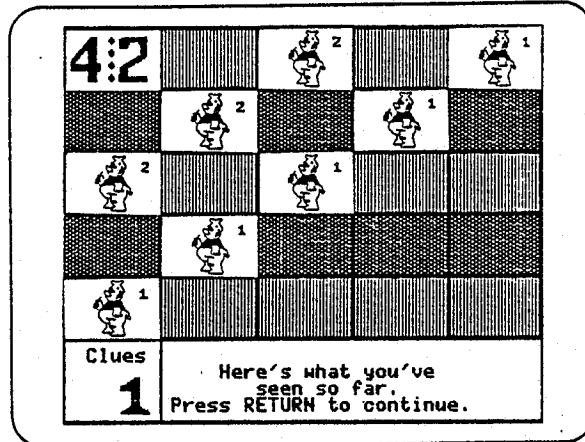
Now suppose after your second play, you obtain the following:
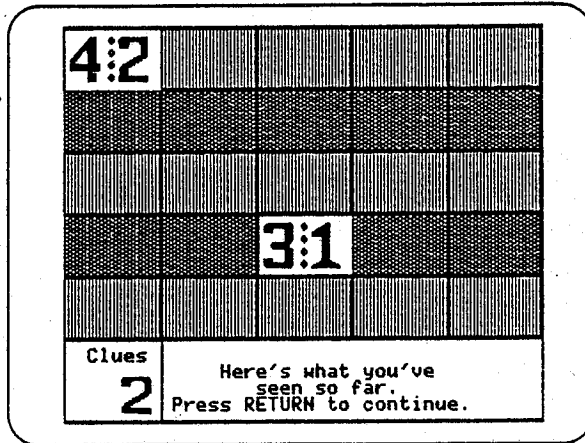
Here is how the possibilities have changed:
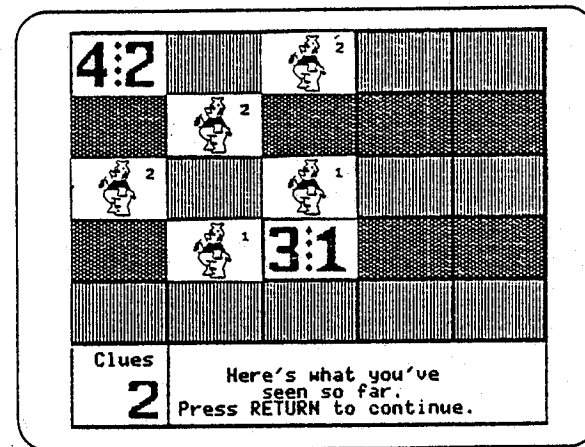
What's your next move?

SIGHT THE SNAILS


```
Clues
  4    My scan shows 2 Snails!
       Press RETURN to continue.
```

Instructions:

   Two Snails, Suzie and Sammy, are going to hide in the boxes.
   After selecting a box, you will be told how many Snails (0,1, or 2) are
   seen in the row and column your box is in.
   You many select as many boxes as you wish.
   When you are ready to Sight the Snails, press ESC (Commodore 64: press
   CLR).

Commentary:

Sight the Snails is a follow-up to Discover the Dragon, except that here, two
animals are hiding. Zeros cancel out a row and column. Feedback of 1 keeps a
row and column alive. A 2 is especially important, indicating that you have
sighted both Snails.

Suppose after several plays you get the following feedback:


```
  2     1
  1     0
  1  0  0
        1
Clues
  8       Here's what you've
              seen so far.
          Press RETURN to continue.
```

Here are the possibilities:

Where would you search next to <u>Sight the Snails</u> with logical certainty?

COLLECT THE KANGAROOS
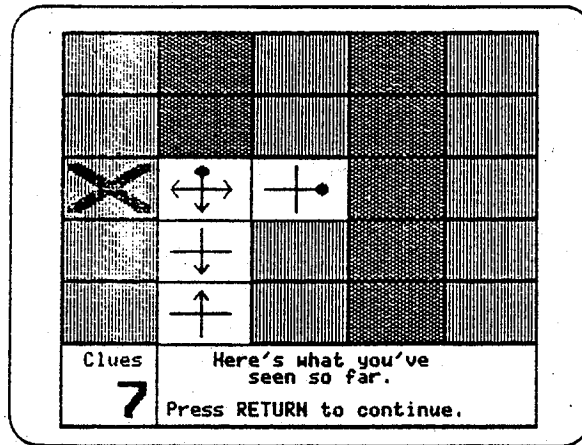
Instructions:

Two Kangaroos are going to hide in the boxes.
You can ask questions such as:
"Is there a Kangaroo left of a particular box?"
"Is there a Kangaroo below a particular box?"
You ask the questions in this form:
Above
Below
Left of OR
Right of a particular box.

When you have enough information to Collect the Kangaroos, press ESC
(Commodore 64: press CLR).
You will then have to identify the location of each Kangaroo.

Given the nature of this game, there are sometimes two possible solutions to a
given problem. Therefore, either solution will be accepted as correct.

Commentary:

Collect the Kangaroos is an advanced game of Detect the Donkey. Here TWO
Kangaroos are hiding. Suppose you make several moves and obtain the following
review:
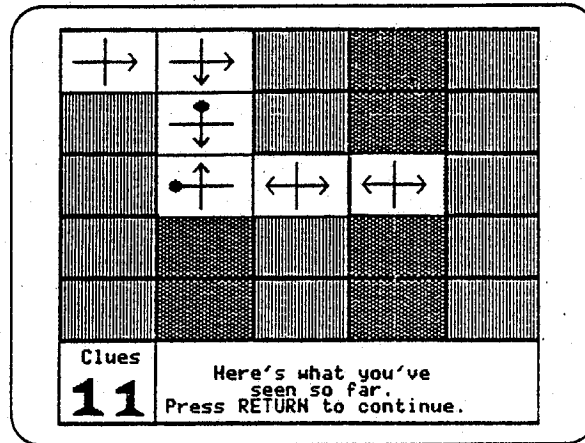
Here are the only places the Kangaroos could be hiding:
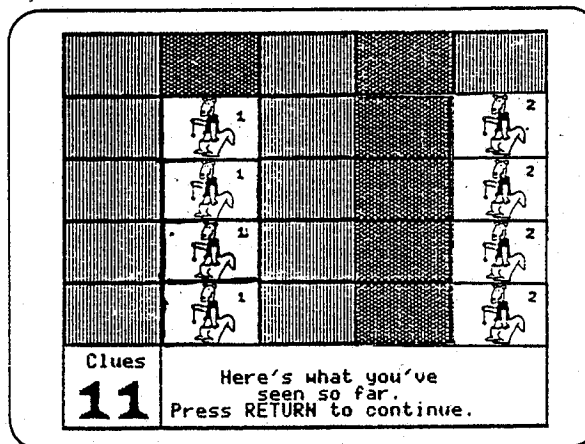
You may reach a point where either of the two situations below are possible
correct answers; either answer is an acceptable solution.

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CAPTURE THE CATS


```
Clues    Both cats below your box? No.
  1      Press RETURN to continue.
```
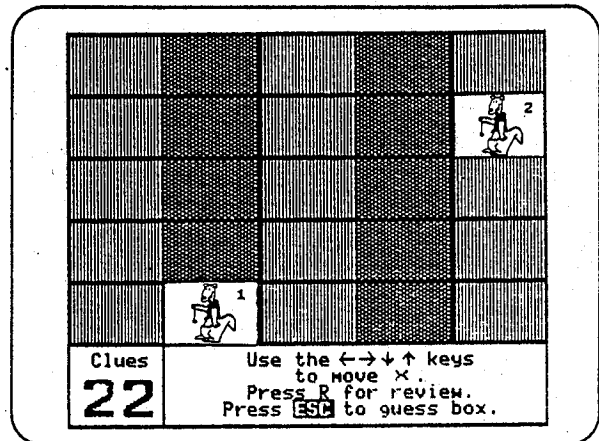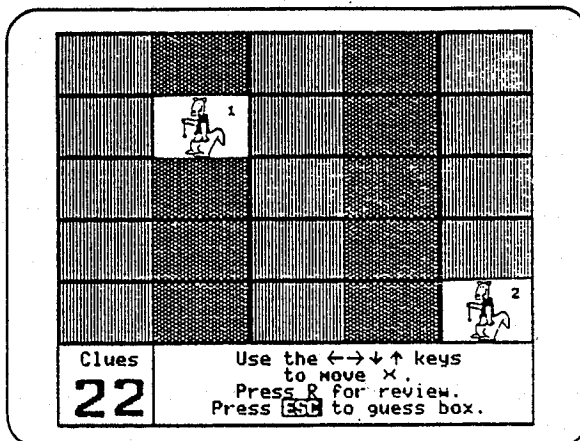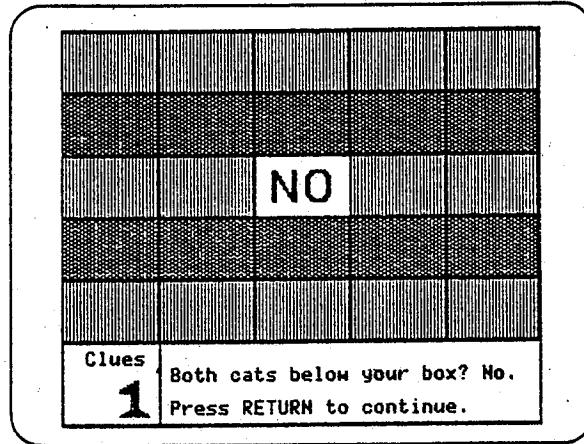
Instructions:

Two Cats are going to hide in the boxes.
You can ask questions such as:
"Are both Cats left of a particular box?"
"Are both Cats below a particular box?"
You ask the questions in this form:
Above
Below
Left of OR
Right of a particular box.

When you have enough information to Capture the Cats, press ESC
(Commodore 64: press CLR).
You will have one chance (Repeat: Only One Chance) to Capture the Cats.

Given the nature of this game, there are sometimes two possible solutions to a
given problem. Therefore, either solution will be accepted as correct.

Commentary:

Capture the Cats is the same as Collect the Kangaroos, except that you get a
Yes only when two Cats are sighted by your question. For example, suppose you
have the following review:

Clues
2
Here's what you've
seen so far.
Press RETURN to continue.
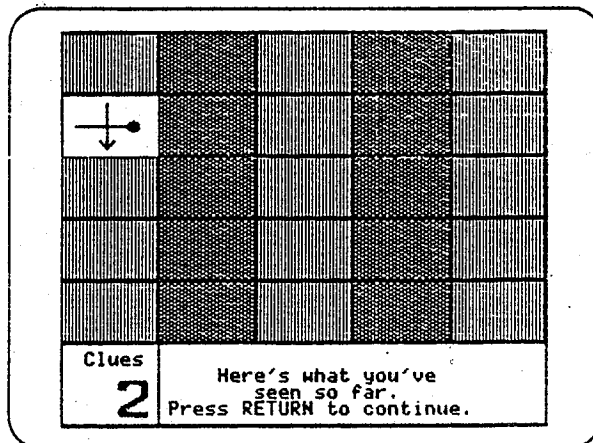
You know that one of the Cats is in the left column and that both Cats are
hiding somewhere in the third, fourth, and fifth rows. What's a good move to
follow up?

```
          ┌─────────────────────────────────────┐
          │  ███    ░░░    ███    ░░░    ███      │
          │      ┌────┬────┬────┬────┐            │
          │  ███ │ 3  │ 2  │ 1  │ 2  │            │
          │      ├────┼────┼────┼────┤            │
          │  ███ │ 4  │ 3  │ 2  │ 3  │            │
          │      ├────┼────┼────┼────┤            │
          │  ███ │ 5  │░░░ │ 3  │ 4  │            │
          │      └────┴────┴────┴────┘            │
          │  ███    ░░░    ███    ░░░    ███      │
          │ ┌──────┬──────────────────────┐       │
          │ │ Clues│ ` Here's what you've  │       │
          │ │      │     seen so far.      │       │
          │ │  12  │ Press RETURN to continue.│    │
          │ └──────┴──────────────────────┘       │
          └─────────────────────────────────────┘
```

Instructions:

Two Llamas are going to hide in the boxes.
Select a box and you will be given the sum of distances from your box to
the nearest Llama and from that Llama to the second Llama.
The distances are left-right and up-down, not diagonal.
When you are ready to Locate the Llamas, press ESC (Commodore 64: press
CLR).

Commentary:

Locate the Llamas is similar to Search Out the Seals, except that two Llamas
are hiding and the information embedded in the feedback is very difficult to
evaluate. One way of Locating the Llamas is to look for the smallest
distances. Below is a review after 15 plays. Can you Locate the Llamas?

```
          ┌─────────────────────────────────────┐
          │  ┌────┬────┬────┬────┬────┐          │
          │  │ 5  │ 4  │ 3  │ 4  │ 5  │          │
          │  ├────┼────┼────┼────┼────┤          │
          │  │ 4  │ 3  │ 2  │ 3  │ 4  │          │
          │  ├────┼────┼────┼────┼────┤          │
          │  │ 3  │ 2  │ 3  │ 4  │ 5  │          │
          │  ├────┴────┴────┴────┴────┤          │
          │  │ ███  ░░░  ███  ░░░  ███ │          │
          │  │                          │          │
          │  │ ███  ░░░  ███  ░░░  ███ │          │
          │  ├──────┬──────────────────┘          │
          │  │ Clues│  Here's what you've │        │
          │  │      │    seen so far.     │        │
          │  │  15  │ Press RETURN to continue.│   │
          │  └──────┴─────────────────────┘        │
          └─────────────────────────────────────┘
```

Can you find ways to Locate the Llamas in fewer tries?

EVALUATION

In active learning situations such as SAFARI SEARCH, the learner knows best
where he or she stands. Teachers and parents can be a great help in moving
children toward richer experiences and getting them unstuck when they ask for
help. What is a teacher? According to the author of classic books on problem
solving, Professor George Polya, "A teacher is the midwife in the birth of
ideas."

To effectively use SAFARI SEARCH:

First, the teacher or parent should have played the games in SAFARI
SEARCH.

Second, the teacher or parent should be a sensitive and unobtrusive
observer of the actual work of children--not just the end result.

Here are some things to look at:

Does the child engage SAFARI SEARCH with eagerness? (It's commonly the
case that kids will forego recess and lunch to play learning games such
as these.) If not, turn to other issues.

Do Johnny and Suzie act coherently in their SAFARI SEARCH? That is, are
they just pecking around at random or do they have a plan? Is their plan
sensible (even if they cannot explain it to you and you have to infer it
from their play)? Do they sometimes seem puzzled and even moderately
frustrated? Good! These are signs that real learning is taking place.

Do their tactics evolve as they get more and more experienced at a game?

Do they use information appropriately--judging redundant, useless, and
valuable feedback, then acting upon their judgment? Do they show the
need for further information when appropriate?

Do they become more and more adept at constructing complex arguments
(though the arguments may only be acted out in their play and not
verbalized)? Can they verbalize their arguments?

Do they generalize or modify a tactic to accommodate new situations and
recognize when such generalizing may be fruitless?

Do they recognize differences between situations despite apparent
likenesses? And likenesses despite apparent differences?

What about their sense of confidence? Their sticking power? Their
ability to say, "I've got that squared away. I'm moving on to higher
ground."

There are several things teachers and parents can do to help children.

One major thing to do is to discourage children's tendency to rush through the activities. Some children--especially children who have little experience with active approaches to learning (and whose views are that learning involves "stuff to be covered") tend to zip through educational activities without engaging them. SAFARI SEARCH is not "stuff to be covered" but rather activities to engage thoughtfully, carefully, and slowly.

Once children have engaged a game, teachers and parents can make small suggestions. For example, "What box might be best to look at first? How come?" (In making such suggestions, please bear in mind that it's the children's construction, not the teacher's teaching, that counts.) One specific thing teachers and parents can do is to encourage children to keep notes on their data. Scrap paper--or dittos of 5 by 5 grids--can be immensely helpful in keeping track of the data and, more important, keeping track of one's flow of thought in engaging the SAFARI SEARCH activities.

Have the children replay the same level and see if they can do it in fewer tries. Ask the question, "Is there a number of tries in which the answers can be always found?"

More general--and perhaps more important--is the teacher's or parent's guidance regarding the level at which the children are playing. The games occur roughly in order of complexity and it may be that a child having difficulty is simply way over his or her head. Then the wise thing to do is to back up to a point where the child is moderately challenged. One can either choose an earlier game, so that the player feels comfortable and able, or one can quit the present game (by pressing Control E) and begin the same game or a new game at the same level.

Most important--especially at a time when children are increasingly treated as pawns in schools (tested, grouped, force-fed, tested, etc.)--is to leave the learning in the child's hands. Teachers should be midwives, not list-givers, in the birth of an idea.

Safari Search Worksheet

APPLE: WORKING WITH THE COMPUTER

1. Turn on the television monitor.

2. Insert the diskette into the disk drive with the label facing up and on the right.

3. Close the door to the disk drive.

4. Turn on the Apple. (The on-off switch is on the back left side of the computer.)

5. You will see a red light on the disk drive turn on. If the disk drive does not turn on in about thirty seconds, turn the Apple off and make sure your diskette is placed correctly in the disk drive.

6. The SUNBURST logo will appear, followed by the opening screen.

7. Follow the instructions in the program.

8. If at any time during the program you want to stop, hold the CONTROL (CTRL) key and press the E key.

Turning Off the System

1. Remove the diskette from the disk drive and return it to its place of storage.

2. Turn off the Apple.

3. Turn off the television or monitor.

Apple IIGS: Control Panel Settings

To allow your Apple IIGS to work properly with Sunburst software, certain Control Panel settings should be selected. The Apple IIGS retains these settings even after the power is turned off.

To Use the Control Panel:

- Turn on the Apple IIGS and monitor.
- Enter the Control Panel main menu by holding down the CONTROL and OPTION keys, and then press RESET (the rectangular key located above the number keys). If your Apple IIGS is in an Apple //e case, use the closed-apple (⌂) key instead of OPTION.
- Press the 1 key to enter the Control Panel.
- Use ↓ and ↑ to highlight the feature you want to change and press RETURN. Again use ↓ and ↑ to highlight a specific option and change it by using the ← and → keys.
- After you have finished making changes, select Quit to use the Apple IIGS.

To Change the Display:

- Highlight **Display** and press RETURN.
- Set **Type** to **Color**.
- Set **Text** to **White**.
- Set **Background** to **Black**.
- Set **Border** to **Black**.
- Press RETURN to save the changes and to go back to the Control Panel.

To Change the System Speed:

- Highlight **System Speed** and press RETURN.
- Set **System Speed** to **Normal**.
- Press RETURN to go back to the Control Panel.

If you use a 5.25-inch drive connected to the disk drive port:

- Highlight **Slots** and press RETURN.
- Set **Slot 6** to **Disk Port**.
- Set **Startup Slot** to **Scan**.
- Press RETURN to go back to the Control Panel.

If you use a 5.25-inch drive connected to a controller card in Slot 6:

- Highlight **Slots** and press RETURN.
- Set **Slot 6** to **Your Card**.
- Set **Startup Slot** to **Scan**.
- Press RETURN to go back to the Control Panel.

COMMODORE 64: WORKING WITH THE COMPUTER

1. Turn on the television or monitor.

2. <u>The disk drive must be turned on before the computer.</u> Turn on the disk
    drive (the switch is located at the back right side of the drive.)

3. Open the door of the drive by pressing in on the door. Insert the
    diskette with the exposed oval "window" inserted first and the labelled
    side up.

4. Close the door of the disk drive.

5. Turn on the computer. You will see the words--

            ****COMMODORE 64 BASIC V2****
         64K RAM SYSTEM 38911 BASIC BYTES FREE
         READY.

6. Type LOAD "Ø:*",8 and press the RETURN key. The red light on the disk
    drive will come on. The computer will print--

            Searching for Ø:*
            LOADING
            READY

7. Type RUN and press RETURN.

8. The SUNBURST logo will appear, followed by the opening screen.

9. Follow the instructions in the program.

10. If at any time during the program you want to stop, hold down the CTRL
    (CONTROL) key and press the E key.

Turning Off the System

1. Remove the diskette from the disk drive and return it to its place of
    storage.

2. Turn off the disk drive.

3. Turn off the computer.

4. Turn off the television or monitor.

1. Place the diskette in the computer's disk drive with the label facing up
    and on the right. (If there are two disk drives, place the diskette in
    the one on the left.) Close the door of the disk drive.

2. Turn on the graphics monitor.

3. Turn on the computer. In several seconds, you will see the red light on
    the disk drive light up and you will hear the disk drive spinning.

4. The SUNBURST logo will appear, followed by the opening screen.

5. Follow the instructions in the program.

6. If at any time during the program you want to stop, hold down the CTRL
    (Control) key and press the E key.

Turning Off the System

1. Remove the diskette from the disk drive and return it to its place of
    storage.

2. Turn off the computer.

3. Turn off the monitor.

1. Place the diskette in the computer's disk drive with the label facing up and on the right. (If there are two disk drives, place the diskette in the one on the bottom.) Close the door of the disk drive.

2. Turn on the monitor.

3. Turn on the computer. In several seconds, you will see the red light on the disk drive light up and you will hear the disk drive spinning.

4. The SUNBURST logo will appear, followed by the opening screen.

5. Follow the instructions in the program.

6. If at any time during the program you want to stop, hold down the CTRL (CONTROL) key and press the E key.

Turning Off the System

1. Remove the diskette from the disk drive and return it to its place of storage.

2. Turn off the computer.

3. Turn off the monitor.

"WHAT HAPPENS IF...?" -- SUNBURST COURSEWARE AND WARRANTY

1. What happens if a program will not load or run?
   Call us on our toll-free number and we will send you a
   diskette.

2. What if I find an error in the program?
   We have thoroughly tested the programs that SUNBURST carries
   so we hope this does not happen. But if you find an error,
   please note what you did before the error occurred. Also,
   if a message appears on the screen, please write the message
   down. Then fill out the evaluation form and call us with the
   information. We will correct the error and send you a new
   diskette.

3. What happens if the courseware is accidentally destroyed?
   SUNBURST has a lifetime guarantee on its courseware. Send
   us the product that was damaged and we will send you a new
   one.

4. How do I stop the program in the middle to go on to something new?
   A program can be ended at any time by holding the CONTROL
   (CTRL) key and pressing the E key.

5. Can I copy this diskette?
   The material on the diskette is copyrighted. You should not
   copy the courseware.

6. Can I remove the diskette while using the program?
   No. Throughout the program the computer accesses the diskette
   for information.