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Thomas C. O'Brien is professor and director of the Teachers' Center Project at Southern Illinois University, Edwardsville, Illinois. His work in education is three-fold: teacher education, curriculum development, and research on children's thinking. As researcher, he has studied the growth of mathematical ideas in subjects from pre-school to medical school and law school. As teacher, he has worked with children from grade 7 through graduate school. As curriculum developer, he is author of twelve problem books for children, as well as author and editor of 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 in 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. Dr. O'Brien received has bachelor's degree from Iona College, New Rochelle, NY, and his Ph.D. from New York University.

Many Thanks:

Many people helped to get this work to its present state and I am pleased to say Thank You to them.

Thomas C. O'Brien III taught me that a computer is not full of dragons. Liza Loop helped to get this project from a mere idea to a pilot product. Bill Maintz contributed great goodwill, encouragement and thoughtful advice. Jeff Van Arsdale taught me not to do stupid things at the keyboard. Many local teachers--Z. Miller, Mary Steffen, Shirley Casey, especially--and their school children helped greatly with informed and constructive criticism.

Marge Kosel and Cathy McMahon brought great insight, care, and expertise to the final product.

And my family gave patient support from Dog Days to Triumphant Tryouts as the present work grew in maturity and complexity.

To all of you, my warmest thanks.

Thomas C. O'Brien
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INTRODUCTION
by Thomas C. O'Brien

Intellectual development is marked by increasing capacity to
deal with several alternatives simultaneously, to tend to
several sequences during the same period of time and to
allocate time and attention in a manner appropriate to these
multiple demands. -- Jerome S. Bruner, Toward a Theory of
Instruction, p. 6.

One of the chief complaints of teachers is that children return to school
every September seeming to have forgotten much of what they've learned during
the previous school year. "We teach 'em but they don't stay taught," say
teachers. (It's not only June to September that forgetting takes place; it's
often day to day.)

One major reason for such a situation is that schools often fail to
capitalize on and to encourage the natural ability children have to organize
and to make sense of the world that surrounds them. Up until school age,
children do an incredible amount of organizing. For example, children are
able, without systematic instruction, to make sense out of their natural
language. Then when children come to school, adults organize things for them
and their only task is to store and remember when test time comes. (And then
forget when tests are over.)

The consequence of such a practice is not only that children forget from
June to September and from day to day, but that they cease to be thinkers and
problem solvers and organizers, at least so far as school subjects are
concerned. It's far too commonplace to hear teachers say--about children as
early as third grade--"They won't think, they only want me to give them the
answer." Indeed, at the university level, the chief complaint I've heard is
not that students are unprepared in grammar and punctuation, etc. (the
so-called "basics") but that university students won't think. They won't
tackle an original problem and want only to deal with problems for which
they've stored a ready-made formula.

Sorry, folks. That's not how it should be. Present day children will
live most of their lives in the Twenty-First Century. Some of their children
will be alive in the Twenty-Second Century. We cannot afford to prepare them
with a Nineteenth Century education.

So what about the puzzles involving Tobbs? How do they fit in? There
are three aspects to the puzzle:

(1) The puzzles provide drill and practice in addition or
multiplication. The first three levels of the Addition Puzzles and
the first two levels of the Multiplication Puzzles call for children
to perform various computations (pencil and paper is OK) and to
report an answer. Without pencil and paper, the puzzles provide a
superb arena for the development of mental arithmetic skills.
For example, children are asked to compute 3 + 4 or 4 x 2. This is where math instruction often ends for many children in present day schools. It's an important issue, of course, but computational accuracy and speed are a bit less important for children (and for society) now that calculators can be purchased for as little as $3.99 and computers can perform as many as 100 million long multiplications in one second.

(2) Tobbs goes far beyond computation into reversibility. For example, in Level 4 of the Addition Puzzles, children are asked to work backward to solve problems like this:

\[
\begin{array}{c|c|c}
+ & \text{？} & 4 \\
1 & 3 & 5 \\
3 & 5 & 7 \\
\end{array}
\]

What do I add to 1 to get 3?

And in the multiplication puzzles, they are faced with:

\[
\begin{array}{c|c|c}
\times & 4 & \text{？} \\
7 & 28 & 42 \\
5 & 20 & 30 \\
\end{array}
\]

What do I multiply by 7 to get 42?

(3) Further, at the higher levels in both the addition and multiplication puzzles, children face one of the most important distinctions in all of mathematical thinking: the distinction between must be, can be, and can't be. For example, in problem 1, the answer must be 5. In problem 2, the answer can be 5 (but it need not be; it could be 7 or even 99--the computer is programmed to deal only with numbers from 0 to 99). And in problem 3, the answer can't be 5. (Try it; you'll find that the rest of the puzzle grid goes awry.)

\[
\begin{array}{c|c|c}
+ & 4 & \text{？} \\
\text{？} & 9 & 7 \\
6 & 4 \\
\end{array}
\quad
\begin{array}{c|c|c}
+ & 4 & \text{？} \\
\text{？} & 3 \\
\end{array}
\quad
\begin{array}{c|c|c}
+ & \text{？} & 11 \\
\text{？} & 9 & 10 \\
\end{array}
\]

(1) (2) (3)
(4) There are other payoffs to Tobbs, only a few of which we'll mention here. For example, children learn to work within the constraints of a problem. In this puzzle, the box that Tobbs is in cannot be any old number, even though it looks like a free choice (from 0 to 99) at first.

\[
\begin{array}{c|c}
X & 2 \\
\hline
\multicolumn{1}{c}{8} & \\
\hline
7 & \\
\end{array}
\]

If 5 is given to the computer as an answer, it will be politely rejected. The machine, however, will accept any multiple of 4 up to 99.

And the puzzles call for children to follow up the consequences of their ideas. For example, in

\[
\begin{array}{c|c}
+ & 10 \\
\hline
7 & 17 \\
\hline
41 & 51 \\
\end{array}
\]

it looks as though any number up to 99 can be placed in the box where Tobbs is. Not so. Try 90:

\[
\begin{array}{c|c|c}
+ & 83 & 10 \\
\hline
7 & 90 & 17 \\
\hline
41 & 124 & 51 \\
\end{array}
\]

The consequences of the 90 are that the computer is forced beyond its 0 to 99 limits and so 90 is politely rejected.

Further, the puzzles call for children to make one of the most important decisions in problem solving: "Where do I begin?" What's the
starting point here?

\[
\begin{array}{c|cc}
+ & \\
\hline
\times & 4 & 7 \\
8 & 9 \\
\end{array}
\]

One cannot answer the question directly. But once it's realized that the 8 and 9 force a 1, the problem is easy. Can you solve it?

\[
\begin{array}{c|cc}
+ & (1) \\
\hline
\times & 4 & 7 \\
8 & 9 \\
\end{array}
\]

In solving the puzzles, children have to construct chains of thought, another important component of problem-solving ability.

SUMMARY

So what do the puzzles do for children? In brief, the puzzles enable them to construct, organize and make sense out of addition and subtraction or multiplication and division relationships and to learn problem-solving skills which will serve them throughout life. A fruitful activity this is. A basic activity!!!

When I was charged with the responsibility of preparing these pages, it was mentioned that readers might be used to behavioral objectives and that I should take care to make clear what the payoffs of Tobbs' Puzzles would be for children. I have tried to do so above but I have tried to write so that the reader would be a participant and not a passive storer of a Tobbs laundry list. In his prize winning Godel, Escher, Bach: An Eternal Golden Braid, Douglas R. Hofstadter addresses the issue with which Teasers by Tobbs are most intimately concerned: the growth of intelligence.

"[The] essential abilities for intelligence are certainly:
- to respond to situations very flexibly;
- to take advantage of fortuitious circumstances;
- to make sense out of ambiguous or contradictory messages;
- to recognize the importance of different elements of a situation;"
to find similarities between situations despite differences which may separate them;
to draw distinctions between situations which may link them;
to synthesize new concepts by taking old concepts and putting them together in new ways;
to come up with ideas that are novel."

The growth of intelligence, particularly mathematical intelligence, is what Tobbs is all about!
THE ROLE OF THE TEACHER

What's the role of the teacher with this computer material? Commonly, the role of the teacher is to pass information and facts along to the pupils. That's NOT the situation here.

The role of the teacher is to let children experiment, to put the burden of learning in their laps, and to make them thinkers rather than memory bins.

Teachers, of course, should get familiar with the puzzles by playing with them—two or three games at each level. Beyond that, the major role of the teacher is to act as a midwife in the birth of ideas. That is, if a child comes up with a question, throw the question back with a bit of encouragement, a statement of trust in the child's ability, and a suggestion that the child try a hunch (or if no hunch, make a guess) and follow out the consequences of the hunch/guess. Trial and error very often turns into trial and success.

A second approach to children's questions is to team the questioner with a partner (or encourage them to choose a partner) and let them work together to figure things out. Whatever happens, try not to give answers to children. Knowledge is not a spectator sport.

Encourage children to come up with addition or multiplication procedures that may not be taught as a standard classroom technique. For example: adding 39 + 12, children should see that 40 + 12 is 52 and since 39 is one less than 40 then 39 + 12 = 52 - 1 or 51.

There is one specific thing that teachers can do. It is obviously essential that players know the format of the grid. Because they are familiar with vertical addition, some children may add 6 and 7 to fill the box in a situation such as this:

\[
\begin{array}{c|c|c}
+ & 6 & \\
\hline
7 & & \\
\hline
13 & & \\
\end{array}
\]

This situation requires straightforward teacher intervention, lest children make no progress at all. When such a situation occurs, swing the players back through the program instructions and make sure the format is clear to them. Also, the teacher should help the child with the mechanics of operation. Students should be taught how to operate the machine, the features of the program—N for New Grid, P for Pass, H for Help, Control E to stop, and how to End and turn off the machine.
BACKGROUND ON PLAYING

Children can play the puzzle solo or in groups. If they play in groups, they can play cooperatively by giving the machine a single name for the group, or they can play competitively. A score is kept as the number correct out of the number of tries. At the end, the player's names are printed in order from the highest score to the lowest. The students are then asked if they would like another set at the same level. If NO, the student is asked if they would like to try a new level. If YES, the same players are involved in another level.

The computer is programmed to deal only with whole numbers from 0 to 99. Anything which causes it to go beyond these limits will cause the computer to give a message to that fact. Decimals are not allowed.

At any point, players can press:

P to pass. The player will lose a turn and give the second player an advantage. If playing with a single player, there is no penalty.

N to get a new puzzle. If the puzzle is not a challenge or if it is too difficult, students can call for a new puzzle. No penalty is assessed. If the players want to end, they must use the Control E option.

H to get help. In levels 1 - 3, Tobbs will draw lines that will indicate what numbers are involved in the computation. In levels 4 and 5, Tobbs will give the students the answer. In level 6, where more than one answer will work, Tobbs will give one answer but not fill in the box. Students are encouraged to with this clue, to find a different answer.

Control E - hold the Control key and press E at any input to end the program. Choose the End option on the menu. On the TRS-80, hold the Shift Key and down arrow key while pressing the E key. After the summary score is printed, if the student would like to use a new diskette or start this diskette over, they should answer YES to the question on using a new diskette.

Students are given 4 or 5 problems per game. If there are two players, eight to ten blanks will appear before the game is over.
<table>
<thead>
<tr>
<th>Addition Puzzles</th>
</tr>
</thead>
<tbody>
<tr>
<td>______</td>
</tr>
<tr>
<td>+</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>39</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>ERIC, what should Tobbs put in the box?</td>
</tr>
</tbody>
</table>

Skills: 
- Addition and subtraction of one-digit numbers.
- Addition and subtraction of two-digit numbers.

Students Work With: 
- Addition
- Logic

Grade Level: 3 - 12

Reading Level: 3rd grade (Spache)

Time Required: 5 - 10 minutes
Background on Addition Puzzles

The Addition program has six levels of difficulty and can be played by 1 - 4 players. The levels vary in the difficulty of the problems and the difficulty of the logic involved.

Level 1 offers children mental arithmetic drill and practice in addition with addends from 0 to 9. Only one inside unknown is called for. As with all the puzzles, a player can press P for pass, N for new grid, H for help, of Control E for end. As with all the puzzles, a player gets one point for a correct answer and receives no points for an incorrect answer. Here are some possible Level 1 puzzles:

```
+  8  5
  4 12 [X]
  0  8  5
```
```
+  6  5
  5 11 10
  9 15 [X]
```

Level 2 is the same as Level 1, except that up to four inside unknowns can occur. The puzzle formats are chosen at random by the computer. Here are some Level 2 grids:

```
+  8  7
  9 17 [X]
  6 14
```
```
+  8  3
  5 [X]  8
  8 16
```

Level 3 is the same as Level 2, but this time the addends range from 0 to 48. The use of pencil and paper to reach an answer is by all means acceptable but children are almost certain (if allowed/encouraged) to come up with some very rich addition procedures such as, "17 + 35 is 52 because 20 + 35 is 55 and 17 is 3 less than 20." Here are some grids from Level 3:

```
+  37  20
  21
  39 [X]
```
```
+  35  7
  21 [X]
  39
```
In Level 4, children meet puzzles which call for them to work backwards and thus must subtract. For example, in

\[
\begin{array}{c|cc}
+ & 4 & 7 \\
\hline
3 & 7 & 10 \\
\hline
& 5 & 8
\end{array}
\]

the question is "What do you add to 4 to get 5?" (Or "What do you add to 7 to get 8"?)

Also in Level 4, children have to make decisions as to where to enter a puzzle. Having decided where to start, they sometimes have to construct complex strings of thought. For example, here is a Level 4 puzzle:

\[
\begin{array}{c|cc}
+ & & \\
\hline
5 & 7 & X \\
\hline
9 & 10
\end{array}
\]

At first glance, there is no answer. "I add 5 to something to get something. H-E-L-P." The fact is that there is additional information lying around. Using the information in the given grid, one can mentally figure out this much:

\[
\begin{array}{c|cc}
+ & (2) & (1) \\
\hline
5 & 7 & X \\
\hline
9 & (11) & 10
\end{array}
\]

And so the answer to the designated box is 6.

In Level 4, the possible outside numbers range from 0 to 9 (thus, the inside numbers must fall in the range 0 to 18).
Level 5 is the same as Level 4, except that the outside numbers range from 0 to 49. Here is a typical Level 5 puzzle and its solution:

```
+   
3   5   
17   
```

"17 plus something is something. I don't know what to do. I do know what to add to 3 to get 5."

```
+   (2)   
3   5   
17   42
```

"So I know that my original problem, though I didn't see it at the start, is 17 + 2."

```
+   (2)   
3   5   
17   19   42
```

Can you complete the entire grid?

Level 6 differs substantially from Levels 1-5. Here the range of outside numbers is 0 to 48, as in Level 5, but for the first time one has a free choice (within limits) as to the answer. For example:

```
+   3   
7   
29
```
Obviously, the left outside numbers are determined:

\[ \begin{array}{c|c|c}
\pm & 3 & \\
\hline
(4) & 7 & \text{？} \\
\hline
(26) & 29 & \\
\end{array} \]

But that's no help whatsoever so far as the designated box is concerned. The solution is that the box can be 7 or 35 or 50 or any number, so long as the puzzle is not pushed beyond its limits of whole numbers from 0 to 99. Let's try 40:

\[ \begin{array}{c|c|c}
\pm & 3 & \\
\hline
(4) & 7 & 40 \\
\hline
(26) & 9 & \text{Right!} \\
\end{array} \]

Now all the open boxes are determined. Here is the full solution:

\[ \begin{array}{c|c|c}
\pm & 3 & 36 \\
\hline
4 & 7 & 40 \\
\hline
26 & 29 & 62 \\
\end{array} \]

Of course, 40 need not have been chosen for the original puzzle. Here's another example:

\[ \begin{array}{c|c|c}
\pm & 3 & \\
\hline
 & 7 & \text{？} \\
\hline
& 29 & \\
\end{array} \]
Suppose one had chosen 2:

\[
\begin{array}{c|c|c}
+ & 3 & 7 \\
& & 2 \\
& & 29 \\
\end{array}
\]

Such a choice would force the system beyond whole numbers for 0 to 99.

\[
\begin{array}{c|c|c|c}
+ & 3 & -2 & 4 \\
& & 7 & 2 \\
& & 26 & 29 \\
\end{array}
\]

Ooops!

Would anything from 4 to 99 have been OK? Here's 97:

\[
\begin{array}{c|c|c|c}
+ & 3 & 7 & 97 \\
& & 29 \\
\end{array}
\]

\[
\begin{array}{c|c|c|c|c|c|c}
+ & 3 & 93 & 4 & 7 & 97 & 26 \\
& & 29 & 119 \\
\end{array}
\]

Ooops!

97 would not have been correct because it forced a number beyond the 0 to 99 range. The solution to the original problem is any whole number from 4 to 77. The 77 forces the following situation:

\[
\begin{array}{c|c|c|c|c|c}
+ & 3 & 73 & 4 & 7 & 77 \\
& & 26 & 29 & 99 \\
\end{array}
\]

which stretches the system to its 0 to 99 limits.
MULTIPLICATION PUZZLES

Skills: Multiplication and division of one-digit numbers. Multiplication and division of two-digit numbers.

Students Work With: Multiplication Logic

Grade Level: 4 - 12

Reading Level: 3rd grade (Spache)

Time Required: 5 - 10 minutes
Background on Multiplication Puzzles

   Multiplication, also, has six levels of difficulty and can be played by 1 - 4 players. The levels vary in the difficulty of the problems and the difficulty of the logic involved.

   Level 1 offers children mental arithmetic drill and practice in multiplication with factors from 0 to 4. Only one inside unknown is called for. As with all the puzzles, a player can press P for pass, N for a new grid, H for help, or Control E to end. As with all the puzzles, a player gets one point for a correct answer. Here are some possible Level 1 puzzles:

   X | 2 | 1
     | 4 | 8 | 3
     | 0 | 0 | 0

   X | 1 | 4
     | 2 | 2 | 8
     | 3 | 3 | 8

   Level 2 is the same as Level 1, except that up to four inside unknowns can occur. The puzzle formats are chosen at random by the computer. Here are some Level 2 grids:

   X | 1 | 0
     | 4 | 4
     | 1

   X | 3 | 2
     | 4
     | 2

   Level 3 is the same as Level 2, but this time the factors range from 0 to 9:

   X | 7 | 5
     | 1 | 5
     | 8

   X | 3 | 2
     | 5
     | 0
In Level 4, children meet puzzles which call for them to work backwards. For example, in

\[
\begin{array}{c|c|c}
\times & 4 & 1 \\
3 & 12 & 3 \\
\hline
8 & 2 \\
\end{array}
\]

the question is "What do you multiply by 4 to get 8?" (Or "What do you multiply by 1 to get 2?")

Also in Level 4, children have to make decisions as to where to enter a puzzle. Having decided where to start, they sometimes have to construct complex strings of thought. For example, here is a Level 4 puzzle:

\[
\begin{array}{c|c|c|c}
\times & \\
4 & 8 & \text{\textquestionmark} \\
3 & 9 \\
\end{array}
\]

At first glance, there is no answer. But, there is additional information lying around. Using the information in the given grid, one can mentally figure out this much:

\[
\begin{array}{c|c|c|c}
\times & (2) & (3) \\
8 & \text{\textquestionmark} \\
3 & (6) & 9 \\
\end{array}
\]

And so the designated box is 12.

In Level 4, the possible outside numbers range from 1 to 4 (thus the inside numbers must fall in the range 1 to 16).
Level 5 is the same as Level 4, except that the outside numbers range from 1 to 9. Here is a typical Level 5 puzzle and its solution:

\[ \begin{array}{c|c}
X & \\
\hline
2 & 6 \\
\hline
5 & 20 \\
\end{array} \]

"5 multiplied by something is something. I don't know what to do. I do know what I multiply 2 by to get 6."

\[ \begin{array}{c|c}
X & (3) \\
\hline
2 & 6 \\
\hline
5 & 20 \\
\end{array} \]

So I know that my original problem, though I didn't see it at the start, is \( 5 \times 3 \).

\[ \begin{array}{c|c}
X & (3) \\
\hline
2 & 6 \\
\hline
5 & 15 \ 20 \\
\end{array} \]

Can you complete the entire grid?

Here are some typical Level 5 puzzles:

\[ \begin{array}{c|c}
X & \\
\hline
5 & 30 \ 40 \\
\hline
4 & 8 \\
\end{array} \]

\[ \begin{array}{c|c}
X & \ 7 \\
\hline
20 & 28 \\
\hline \\
\end{array} \]

\[ \begin{array}{c|c}
4 & \ 8 \\
\hline
56 & \\
\end{array} \]
Level 6 differs substantially from Levels 1-5. Here the range of outside numbers is 0 to 9 and, for the first time, one has a free choice (within limits) as to the answer. For example:

\[
\begin{array}{c|c}
X & 3 \\
\hline
& 6 \\
\hline
& 24
\end{array}
\]

Obviously, the left outside numbers are determined:

\[
\begin{array}{c|c}
X & 3 \\
\hline
(2) & 6 \\
(8) & 24
\end{array}
\]

But that's no help whatsoever so far as the designated box is concerned. The solution is that the box can be 2 or 20 or 14 or any number so long as the box is filled in with a multiple of 2 and the puzzle is not pushed beyond its limits of whole numbers from 0 to 99. Let's try 14:

\[
\begin{array}{c|c}
X & 3 \\
\hline
(2) & 6 14 \\
(8) & 24
\end{array}
\]

Right!

Once 14 is chosen, all the open boxes are determined. Here is the full solution:

\[
\begin{array}{c|cc}
X & 3 & (7) \\
\hline
& 6 & 14 \\
\hline
(8) & 4 & (56)
\end{array}
\]
Of course, 14 need not have been chosen for the original puzzle:

\[
\begin{array}{c|c}
X & 3 \\
\hline
 & 6 \\
\hline
 & 24
\end{array}
\]

Suppose one had chosen 30:

\[
\begin{array}{c|c}
X & 3 \\
\hline
 & 6 \\
\hline
 & 30 \\
\hline
 & 24
\end{array}
\]

Such a choice would force the system beyond whole numbers for 0 to 99.

\[
\begin{array}{c|c}
X & 3 \ (15) \\
\hline
(2) & 6 \ 30 \\
(8) & 24 \ (120)
\end{array}
\]

What is the range of possible solutions to the original problem?
Here are some other Level 6 puzzles for you to solve. Try them. Don't be afraid of a trial-and-success approach. And don't be afraid of asking colleagues to pitch in. Mathematics has long been thought of as "Drill and Practice" or as "What's the formula?" It's NOT. It's a construction of the mind. It's the creation of relationships. Knowledge is NOT a spectator sport!!!
1. Turn on the television or 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 II. (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 light does not turn off in about 10 seconds, turn the Apple off and make sure your diskette is placed correctly in the disk drive.

6. SUNBURST will appear on the screen with the diskette name.

7. Follow directions given in the program.

**Shutting 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.
ATARI: WORKING WITH THE COMPUTER

TURNING ON THE COMPUTER:

1. Turn on the television or monitor.

2. The disk drive must be turned on before the computer. Turn on the disk drive using the switch on the front. Two lights will come on, the "PWR ON" light and the disk "BUSY" light. After about 10 seconds, the BUSY light should go off.

3. Press the rectangular release button below the disk drive door and the door will open. Insert a diskette with the exposed oval "window" inserted first and the label side up.

4. Close the door on the disk drive.

5. A menu will appear with a list of available programs. Select the program you want and press the RETURN key.

6. Follow the instructions in the program.

TURNING OFF THE COMPUTER:

1. Remove the diskette.

2. Turn off the disk drive, television and the Atari.
1. Turn on the video display if it is separate from the computer.

2. Turn on the computer. If your TRS-80 has a disk drive, hold the BREAK key down while you turn on the computer. If you have a TRS-80 Model III, type L and press ENTER when the computer ask "CASS?".

3. Choose the tape you wish to use.

4. Insert the tape in the tape recorder (the label of the program you want should be facing up).

5. Make sure the tape is rewound.

6. Press the PLAY button on the tape recorder.

7. Type CLOAD and press the ENTER key. (This starts the tape recorder.)

8. Two stars (**) will appear and blink on the top line of the screen. This indicates the program is loading.

   If you don't see the two stars (one star should be blinking) in the upper right-hand corner in about 30 seconds --
   - reset the computer (see How to Reset the Computer);
   - check the volume control (it should be set between 6 and 8);
   - make sure all the plugs are in place; and
   - try again, starting at Step 4.

9. When READY appears on the screen, press REWIND. Return the tape to its box. The program is now loaded into the computer's memory.

10. Type RUN and press ENTER.

11. Follow the instructions that appear on the screen.

How to Reset the Computer

When you press the RESET button, it resets the computer without erasing the memory. With the Model I (separate keyboard and monitor), the RESET button is located at the left rear of the keyboard (inside of a small door).

The Model III is reset by the BREAK key (on the keyboard). When you reset the computer, the word READY will appear on the screen. You are now back in control and can run the program again. Type RUN and press ENTER, or load a new program from tape.

Shutting off the System

1. Turn off the video display if it is separate from the computer.

2. Turn off the computer.
1. What happens if a program will not load or run?
   Call us on our toll-free number and we will send you a new tape or 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 or call us with the information. We will correct the error and send you a new tape or 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 a program in the middle to go on to something new?
   These programs can be ended at only time by holding the Control button and pressing the E Key. To change diskettes, select the End option on the menu and insert a new diskette.

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