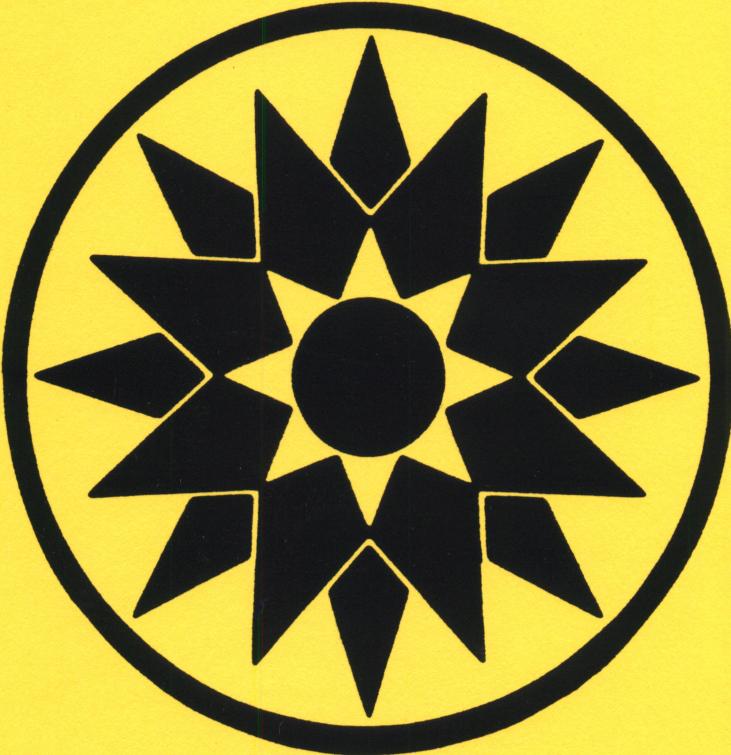




Teacher's Guide

Tip 'n Flip

Apple



SUNBURST
COMMUNICATIONS

DESIGNED BY
Donna Stanger

PROGRAMMED BY
Simon Lie

TEACHER'S GUIDE
Joe Stanich
Jim Kulzer
Mary Beth Miller
Elaine Miller

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TIP 'N FLIP

TABLE OF CONTENTS

	<u>Page</u>
Introduction	1
The Problem Solving Skill Matrix	3
Program Description	4
Ideas for Classroom Use	7
Can You See the Difference - Classroom Lesson 1	8
Puzzle Flipping - Classroom Lesson 2	12
Software Strategy Lesson - Game One	17
Software Strategy Lesson - Game Two	21
Sharing Some Field-Testing Observations	28
"What Happens If...?" SUNBURST Courseware and Warranty	29
Apple II: Working With Your Computer	30

INTRODUCTION

Problem solving has been identified as a critical issue of education in the 1980's. Today's students live in an increasingly complex world. They will need problem solving skills to deal with situations that we can only imagine. As educators, the challenge is to build these skills, exposing students to problems and a variety of strategies for their solutions.

TIP 'N FLIP and other Sunburst programs identify specific skills and strategies and then provide an environment where practice "feels like play."

As a basis for the development of problem solving material, Sunburst has adopted a Problem Solving Matrix devised by a group of teachers from Rochester, Minnesota under the direction of Donna Stanger. The Matrix (see page 3) organizes problem solving skills and strategies into four columns:

MEMORY
COGNITIVE SKILLS (Discrimination, Attributes and Rules)
STRATEGIES
CREATIVITY

TIP 'N FLIP is designed to provide practice in the second and third matrix columns, Cognitive Skills, and Strategies.

The software and classroom activities in this package involve spatial problem solving, specifically, the prerequisite skills of discrimination and mental manipulation of images. The manipulation includes:

- left and right rotation (in 90° moves)
- horizontal "flipping"
- vertical "flipping"

The strategies suggested are:

- Working backward
- Analyzing
- Problem finding

TIP 'N FLIP offers two games, each having four levels of difficulty. In Game One, the player is shown design X and two other designs, A and B. The player must determine which design, A or B, has been made by rotating left or right, vertically flipping, and/or horizontally flipping design X.

In Game Two, two designs are shown. The player must tell what moves it will take (rotating, flipping) to make the first design match the second one.

The lessons included are written in a "dialogue" style to quickly provide an idea of how they have been taught in field-testing. They could be used as written, or modified to suit the preferences of the teacher and the needs of the class.

TIP 'N FLIP is designed for a 48K Apple II with Applesoft, Apple II plus, Apple IIe, or Apple IIc. If you need assistance in operating your computer, check the sections of this guide entitled "Apple II: Working With Your Computer" and "What Happens If...?" You can also call Sunburst Communications toll-free at (800)431-1934.

Problem Solving Skill Matrix

<ul style="list-style-type: none"> • Mnemonic Systems • Visual Association • Whole to Part • Self Testing • Creating a Context • Personalization • Regrouping • Auditory Aids • Number of Items to Remember • Sequence 	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">TIP 'N FLIP</div> <ul style="list-style-type: none"> • Higher Order Rules • Rules • Defined Concepts • Concrete Concepts • Discrimination 	<ul style="list-style-type: none"> • Simultaneous Scanning • Selecting Appropriate Notation • Identifying Multiple Solutions • Examining Assumptions • Working Backward • Using a Model • Focus Gambling • Conservative Focusing • Estimating, Predicting, Projecting • Scanning for Clues, Hints • Restating the Problem • Analyzing • Making Organized Lists • Looking for a Pattern or Sequence • Brainstorming • Openness to Insight, Flexibility • Successive Scanning • Retrieval Strategies • Information Gathering • Problem Finding 	<ul style="list-style-type: none"> • Fluency • Flexibility • Originality • Elaboration
<p>MEMORY</p>	<p>COGNITIVE SKILLS [DISCRIMINATION, ATTRIBUTES AND RULES]</p>	<p>COGNITIVE CONTROL STRATEGIES</p>	<p>CREATIVITY</p>

The object of the game is to select a design (from a pair of designs) that is the same as the first design. This is done by mentally flipping the design until it matches the desired pattern.

3. Think of the designs as markings on clear glass.
The glass can be moved 4 ways:

1. Rotated right 90°	
2. Rotated left 90°	
3. Flipped horizontally	
4. Flipped vertically	

Each move can be repeated any number of times.

A SCRATCH PAD is available if a player needs help. The SCRATCH PAD lets a player rotate or flip the design before making a choice. Use of the SCRATCH PAD will cost the player one point for each move made.

5. Scratch Pad:
The scratch pad will let you rotate or flip design X up to 12 times.

Scratch Pad
On Off 12 Moves left

R= ↻ L= ↺
H= ⇄ V= ⇅

Space Bar to continue, 'B' to go back.

Upon completion of the game, the number of problems attempted, the number correct and the score are displayed. Each correct answer earns 10 points. Remember that each use of the scratch pad costs one point.

Tip 'N Flip

Game: 1	Shapes: Set 1	Level: A
Number of Problems: 5		
Number Correct: 4		
Score: 40		

Press Space Bar to continue

In Game Two, two designs are shown. The second design is the same as the first, except that it has been rotated right or left, flipped horizontally or vertically, or moved using some combination of the four (RLHV).

The object of the game is to find the moves that will make the first design match the second.

DIRECTIONS

1. You will see design A
and design B.

A

.....

B

2. Design B is the same as design A,
but it has been moved.

Space Bar to continue, 'B' to go back.

A correct answer earns a player ten points. The shortest answer earns an extra two points. Each move made with the scratch pad will cost one point.

The player uses the keys R, L, H, V to indicate Right, Left, Horizontal or Vertical moves. A combination of moves such as "RH" would mean a right rotation followed by a horizontal flip.

A SCRATCH PAD is again available if a player needs help. The SCRATCH PAD lets a player rotate or flip the design before making a choice. Use of the SCRATCH PAD costs the player one point for each move made.

Upon completion of the game, the number of problems attempted, the number correct and the score are displayed.

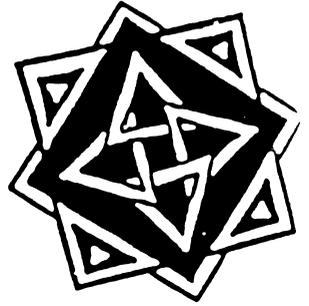
IDEAS FOR CLASSROOM USE

The lessons included are written as used in sixth grade field-testing. They should be modified to suit the needs of your students.

The following pages contain two types of activities:

1. Classroom lessons that introduce the skills involved (mental manipulation of images including left and right rotation and horizontal and vertical flipping).
2. Software strategy lessons that:
 - a. apply the skills in a problem solving "game" environment.
 - b. suggest strategies that may be used (analyzing, problem finding, working backward).

CAN YOU SEE THE DIFFERENCE - CLASSROOM LESSON 1
(TIP 'N FLIP - Game One)



SKILL OR STRATEGY: Visual Discrimination

MATERIALS NEEDED: Transparency: "Which One is Different I?"
Student Sheet: "Which One is Different II?"
Overhead projector

PREPARATION BEFORE CLASS: Prepare transparency from master provided.
Prepare student sheets from master provided.

PREREQUISITE ACTIVITY: None

Lesson:

1. Explain what is meant by visual discrimination skills (looking for differences).
2. Show the transparency, "Which One is Different I?" Cover all the figures except those in example A.
3. Ask for a volunteer to tell which design is different. (4)
4. Uncover one example at a time, asking students to identify the design that is different. (You might want to use some type of group signaling method such as holding up fingers to indicate the one that is different. This can be useful in noticing individual student differences, especially the amount of time needed for each answer.)
5. Distribute the student sheet: "Which One is Different II" and continue the activity with students working individually. Be sure to allow plenty of time. Speed should not be a factor.
6. Check answers and discuss the differences that the students found.
7. Discuss some ways in which most people use visual discrimination skills every day. Discuss some special uses for highly refined visual discrimination skills. (Examples: radiologist reading x-rays, biologist examining slides, policeman comparing fingerprints, meteorologist interpreting satellite photographs.)

WHICH ONE IS DIFFERENT I?

YOUR NAME _____ KEY _____

A

1	2	3	<u>4</u>	5

B

1	2	<u>3</u>	4	5

C

1	2	3	4	<u>5</u>

D

1	2	3	4	5

E

1	2	3	<u>4</u>	5

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WHICH ONE IS DIFFERENT III?

YOUR NAME _____ KEY _____

A

1	2	3	4	5

B

1	2	3	4	5

C

1	2	3	4	5

D

1	2	3	4	5

E

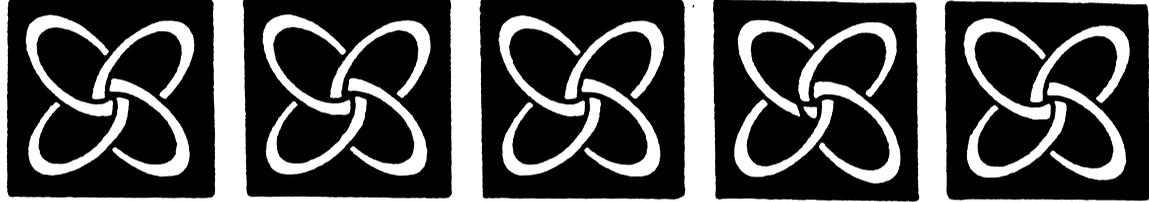
1	2	3	4	5

SUNBURST

WHICH ONE IS DIFFERENT I?

Transparency

A



1

2

3

4

5

B



1

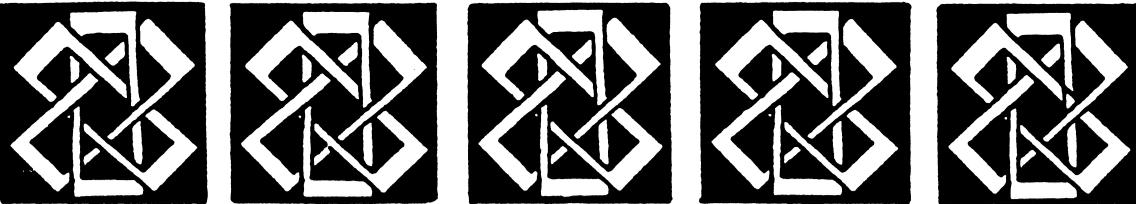
2

3

4

5

C



1

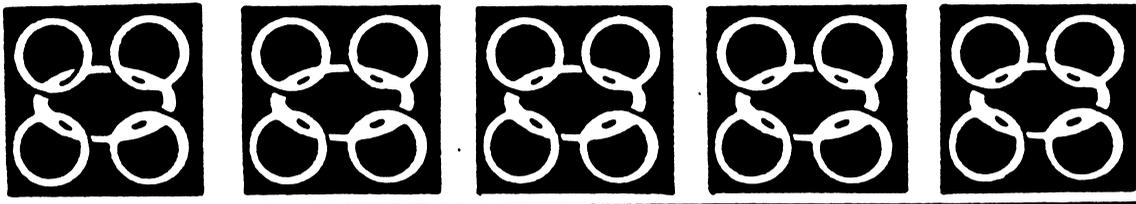
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3

4

5

D



1

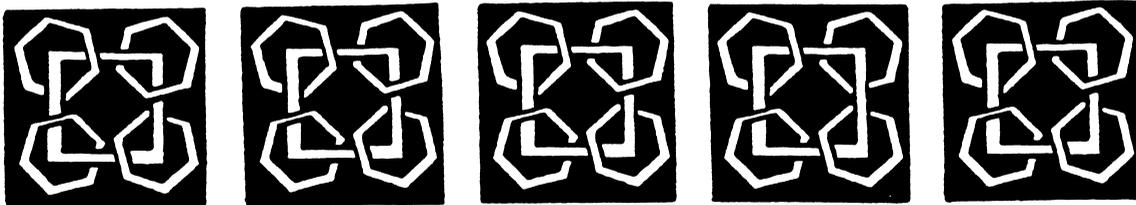
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3

4

5

E



1

2

3

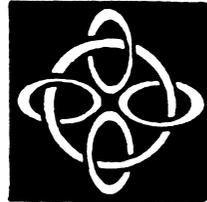
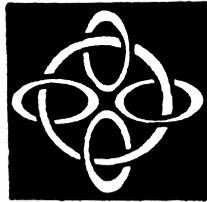
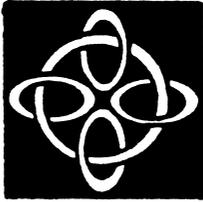
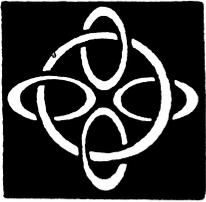
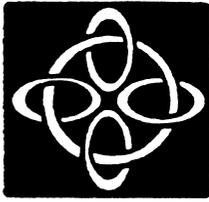
4

5

WHICH ONE IS DIFFERENT II?

YOUR NAME _____

A



1

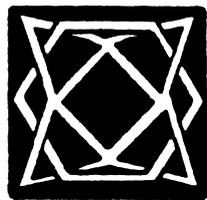
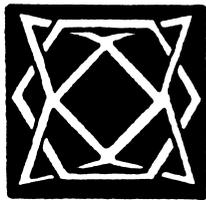
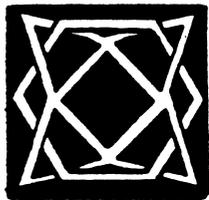
2

3

4

5

B



1

2

3

4

5

C



1

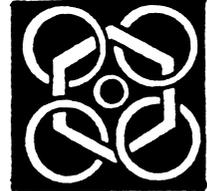
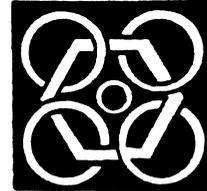
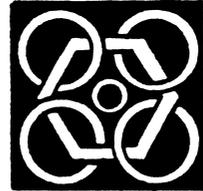
2

3

4

5

D



1

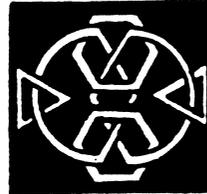
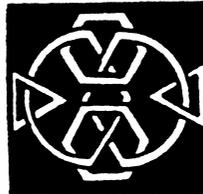
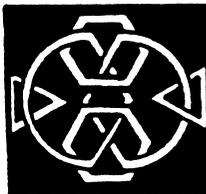
2

3

4

5

E



1

2

3

4

5

PUZZLE FLIPPING - CLASSROOM LESSON 2
(TIP 'N FLIP - Game One)

SKILL OR STRATEGY: Visual discrimination
Mental Manipulation:
rotation left, right
horizontal flipping
vertical flipping

MATERIALS NEEDED: Transparency: "Puzzles"
Student Sheet: "More Puzzles"
Student Sheet: "Tricky Puzzles" (optional)
Overhead projector

PREPARATION BEFORE
CLASS: Prepare transparency and student
sheets from masters provided.

PREREQUISITE ACTIVITY: "CAN YOU SEE THE DIFFERENCE - CLASSROOM
LESSON 1"

Lesson Plan:

1. Show the transparency, "Puzzles." Cover the second problem.
2. Discuss problem #1 with students. Suggest that they think of the designs as markings on clear glass. Ask what can be done to "A" to make it look like "B," and if the same were done to "C," what would the result be. (1 is "C" flipped horizontally.)
3. Encourage students to imagine that the object has been flipped over horizontally, not that the black part of the circle has been moved around. Be sure students understand horizontal and vertical flipping.
4. Uncover problem #2. Discuss the solution. (90° right rotation will make "A" look like "B" and "C" look like 5.) Be sure that students understand the concept of a 90° rotation.
5. Distribute student sheet, "More Puzzles."
6. Have the students complete the problems. Discuss the solutions to each example as a group.

Note: The "Tricky Puzzles" sheet is optional. In addition to rotating and flipping (used in TIP 'N FLIP) it includes other concepts. You may want to save it for use after the software, or for selected students.

TRICKY PUZZLES

YOUR NAME: _____

KEY

1.	 a	 b	 c	 1	 2	 3	 4	 5
2.	 a	 b	 c	 1	 2	 3	 4	 5
3.	 a	 b	 c	 1	 2	 3	 4	 5
4.	 a	 b	 c	 1	 2	 3	 4	 5
5.	 a	 b	 c	 1	 2	 3	 4	 5
6.	 a	 b	 c	 1	 2	 3	 4	 5

SUNBURST COMMUNICATIONS

MORE PUZZLES

YOUR NAME: _____

KEY

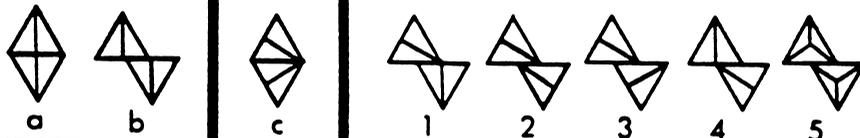
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2.	 a	 b	 c	 1	 2	 3	 4	 5
3.	 a	 b	 c	 1	 2	 3	 4	 5
4.	 a	 b	 c	 1	 2	 3	 4	 5
5.	 a	 b	 c	 1	 2	 3	 4	 5

SUNBURST COMMUNICATIONS

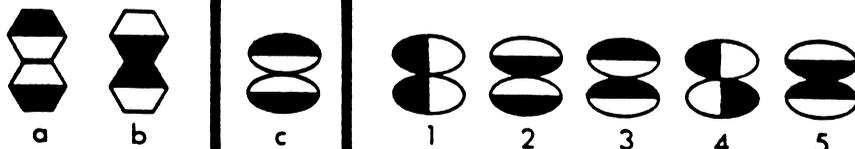
TRICKY PUZZLES

YOUR NAME: _____

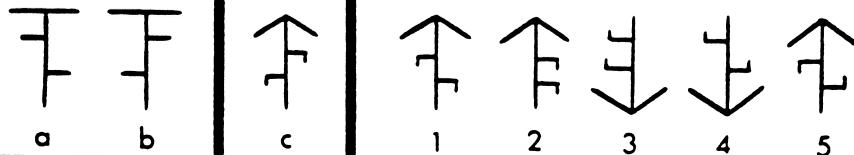
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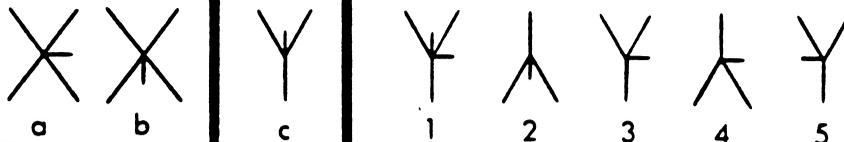
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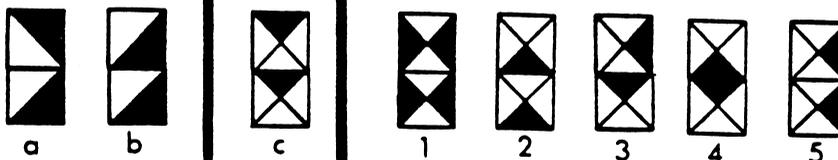
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5.



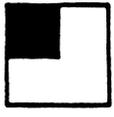
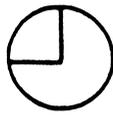
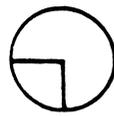
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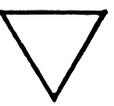
MORE PUZZLES

YOUR NAME _____

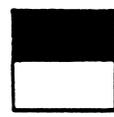
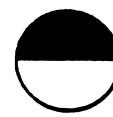
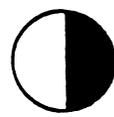
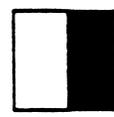
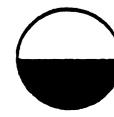
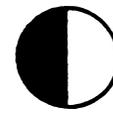
1.

							
a	b	c	1	2	3	4	5

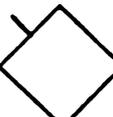
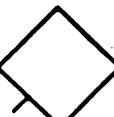
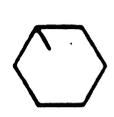
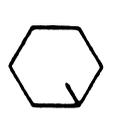
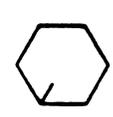
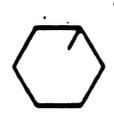
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a	b	c	1	2	3	4	5

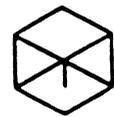
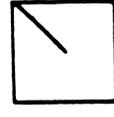
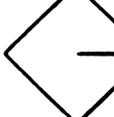
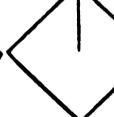
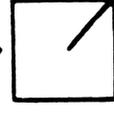
3.

							
a	b	c	1	2	3	4	5

4.

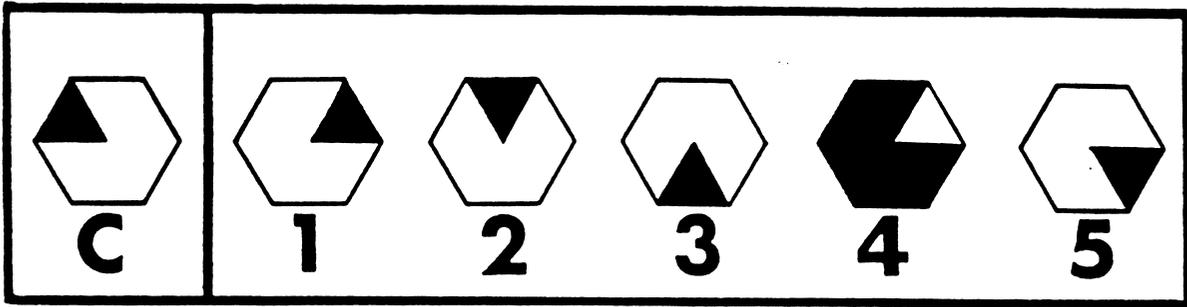
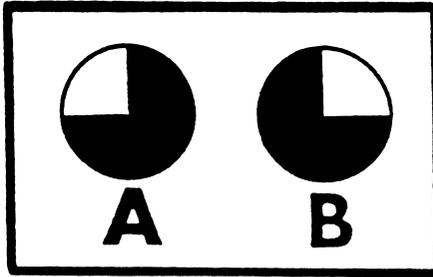
							
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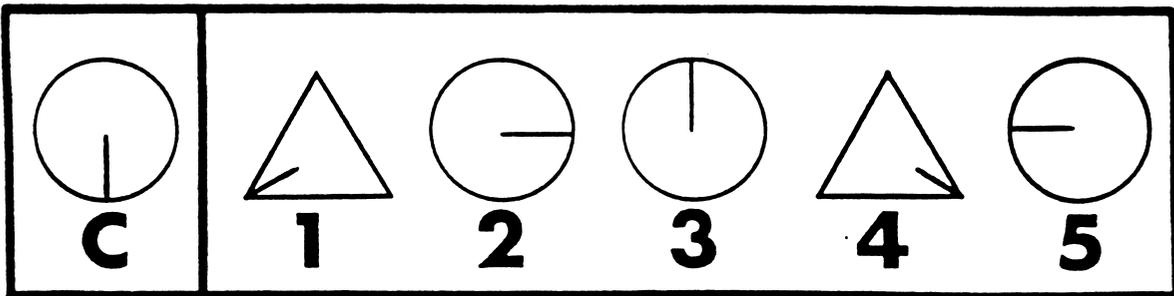
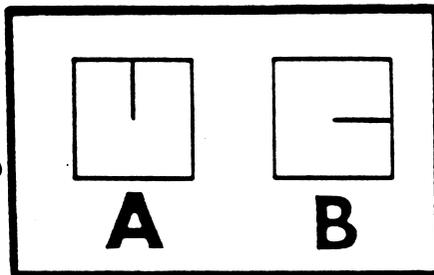
							
a	b	c	1	2	3	4	5

PUZZLES
Transparency

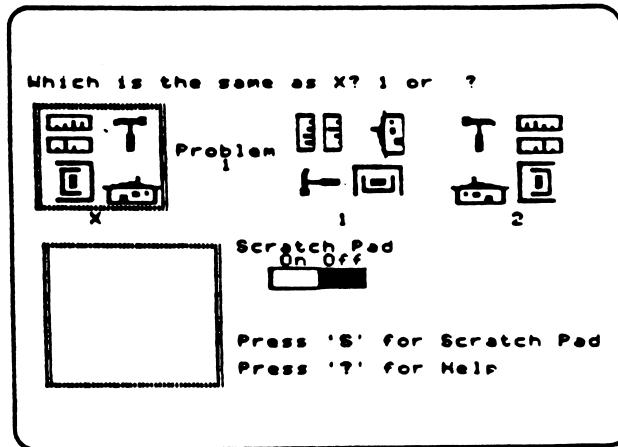
1.



2.



TIP 'N FLIP - SOFTWARE STRATEGY LESSON
(Game One)



SKILL OR STRATEGY: Visual discrimination
Analyzing
Problem Finding

MATERIALS NEEDED: TIP 'N FLIP diskette
Computer, disk drive, color monitor preferred but not required.
Student Record Sheets (if desired)
Transparency: "Analyzing - Problem Finding"
Overhead projector

PREPARATION BEFORE CLASS: Set up computer for class demonstration.
Schedule computer time for students' use.
Prepare student sheets from master provided if desired.

PREREQUISITE ACTIVITY: "PUZZLE FLIPPING - CLASSROOM LESSON 2"

Lesson Plan:

1. Run and discuss the directions for Game One.
2. Play one Level One game with the class contributing the answers.
3. Answer any questions that students might have about game play, scoring, or use of the scratch pad.
4. Explain the schedule you have established for use of the computer(s).
5. Distribute Student Record Sheets (if desired) and explain your requirements for their use.

6. Instruct each student to play at least one Level One game.

Note: You may want to divide this lesson into two parts, continuing from this point at another time.

7. Introduce two strategies that students might use.

- Analyzing - breaking the problem down and working with a smaller part.
- Problem Finding - looking for something that is not as it should be.

8. Show transparency: "Analyzing - Problem Finding." Cover all problems except A.

9. Work through problem A with students, using analyzing and problem finding.

KEY

ANALYZING - PROBLEM FINDING
Transparency

A.

B.

C.

D.

SUNBURST COMMUNICATIONS

The following is an example of the method you might use:

Point to Problem A.

- "Instead of trying to work with the whole design, let's take just one part of it."
- "Look at the upper left-hand part of design X. It looks like an 'L' or perhaps a building with windows."

Point to the part being discussed.

- "It should be easier for us to rotate and flip this one part (than it would be to manipulate all of X)."
- "Let's mentally move the 'L' to the positions it occupies in design 1 and design 2."
- "As we do this, we will look for a problem - for something that would let us know that one of the two designs (1 or 2) could not be made from X."
- "Move the 'L' to the position it occupies in design 1, by doing one left rotation. Will it end up as seen in design 1?" (yes)
- "Move the 'L' to the position it occupies in design 2 by doing a horizontal flip. Will it end up as seen in design 1?" (yes)
- "Working with just the 'L' didn't rule out either of the designs, so let's try another part."

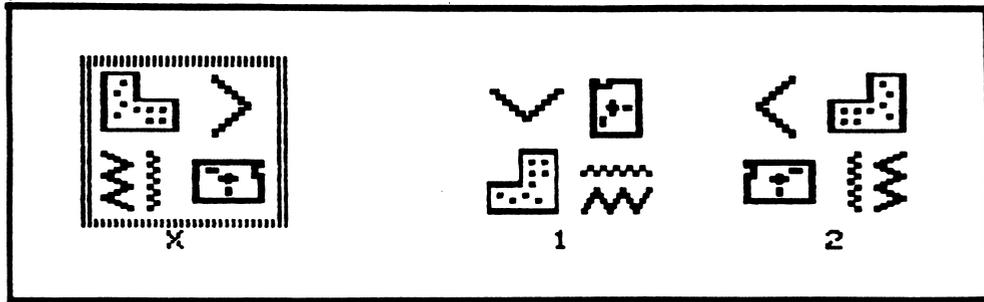
Point to the 'V' in the right corner of design X.

- "We can move the 'V' to the position it occupies in design 2 by doing a horizontal flip, so design 2 might be the one we're looking for."
- "Try to move the 'V' to the position it occupies in design 1."
- "What happens?" (It can't be done. When the 'V' is in the upper left-hand corner it would be inverted. It would not appear as seen in design 1.)
- "We know that the correct answer can not be design 1, so it must be design 2."

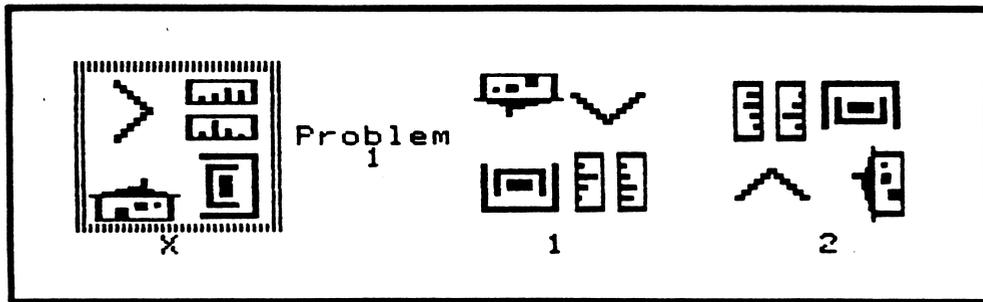
10. Work through the remaining examples on the transparency as a group.
11. Emphasize the use of analyzing and problem finding.
12. Allow ample computer time to play Game One. Spaced repetition is necessary to build skill.

ANALYZING - PROBLEM FINDING
Transparency

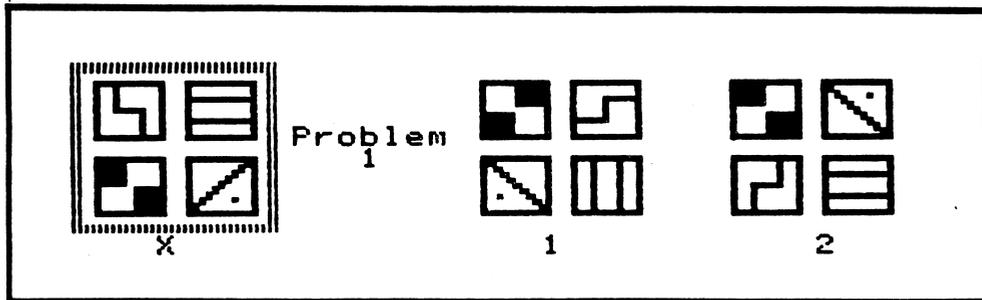
A.



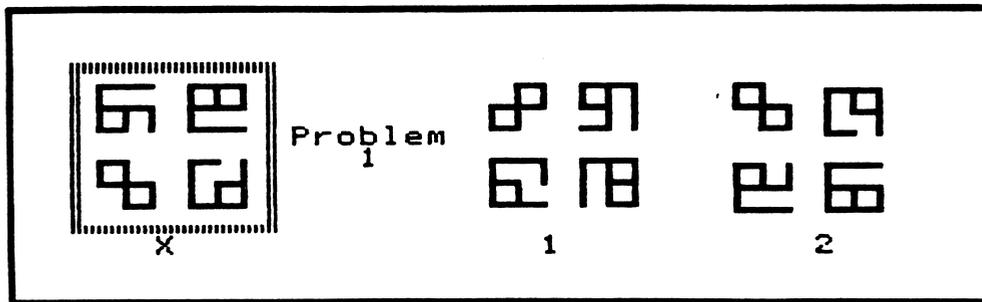
B.



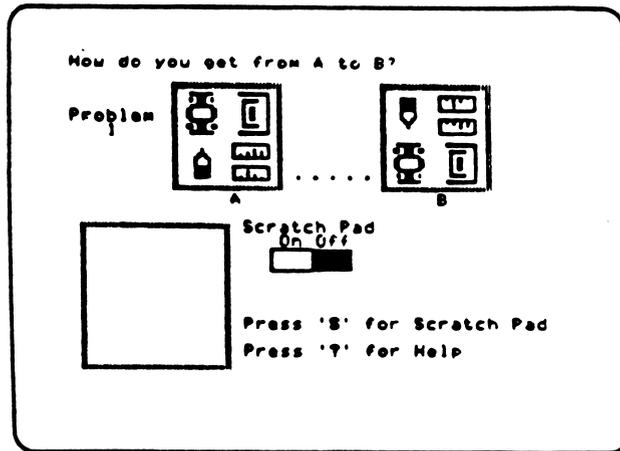
C.



D.



TIP 'N FLIP - SOFTWARE STRATEGY LESSON
(Game Two)



SKILL OR STRATEGY: Visual discrimination
Working backward
Analyzing

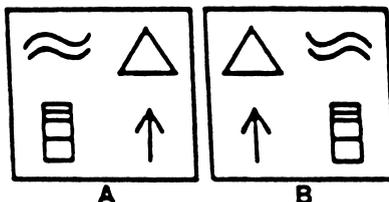
MATERIALS NEEDED: Transparency: "Game Two"
Transparency: "Working Backward"
Student Record Sheet (Game Two)
Overhead projector

PREPARATION BEFORE CLASS: Prepare transparencies and student sheet from masters provided.
Cut apart transparency pieces, "Game Two."

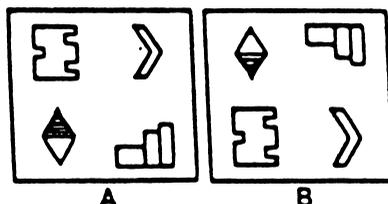
PREREQUISITE ACTIVITY: "SOFTWARE STRATEGY LESSON (Game One)"

Lesson Plan:

1. Show transparency pieces, "Game Two," EXAMPLE 1 as below:



2. Ask for a volunteer to tell what moves would be necessary to turn "A" into "B." (Flip "A" horizontally) Demonstrate with the transparency pieces.
3. Explain that turning "A" into "B" with the shortest answer (fewest moves) is the object of Game Two. Two extra points are earned for the shortest answer.
4. Show transparency, "Game Two," EXAMPLE 2 as below:



5. Ask students to tell what moves are needed to turn "A" into "B." Two solutions are possible:

- Rotate "A" to the right twice and then flip it horizontally.
- Flip "A" vertically one time.

Point out that the second answer would receive two extra points.

6. Play one Level One game with the whole class contributing the answers. (Use the directions for Game Two if reteaching is needed.)
7. Distribute the Student Record Sheet, "Game Two," (if desired) and instruct students to play at least one Level One game.

Note: You may want to divide this lesson into two parts, continuing from this point at a later time.

8. Suggest that trying a new strategy or adding a new strategy to the one being used can be helpful.
9. Introduce working backward as a strategy that can be combined with analyzing.
10. Show the transparency, "Working Backward." Cover all examples except example #1.
11. Work through example #1 with the students analyzing and then working backward.

The following is an example of the method you might use:

- "Let's try working this example backward. Instead of thinking about how to go from 'A' to 'B,' let's go from 'B' to 'A.'"
- "Look at the airplane. We want to change three things about it to make 'B' like 'A':
 - (1) the direction it is pointing - from left to up
 - (2) the side of the design it is on - from left to right
 - (3) the half of the design it is on - from bottom top top
- "What one move will make the airplane point down on the right side of the design?" (L)
- "What move will then switch it from the bottom to the top?" (V)
- "Now try those two moves (L, V) on 'A.' Does it work? (yes)
- "Solutions requiring two moves from 'B' to 'A' will work from 'A' to 'B' without revising them, but one move solutions will need to be reversed. Be sure you realize that the reverse of a flip is that same flip."

Note: You might use the transparency pieces to investigate the reversal caused by repeating two moves. For example, when you do L V L V, because the first vertical flip turns the design up-side-down, the second Left turn actually functions like a Right turn. Consequently, what you are doing in a L V L V is

- (1) tipping the design
- (2) turning it up-side-down
- (3) tipping it back
- (4) turning it right-side-up

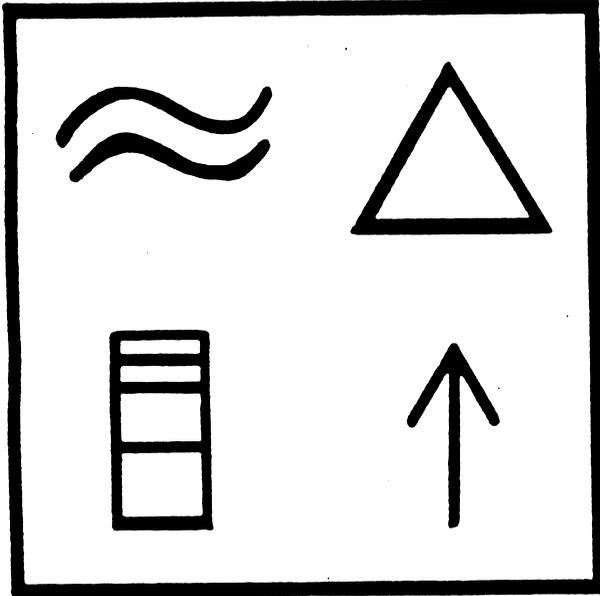
12. Work through the remaining examples on the transparency as a group.
13. Encourage students to:
 - (a) Analyze the design, selecting one part to use
 - (b) Work backwards, from "B" to "A."
 - (c) Consider whether the solution will need to be reversed
14. Suggest to the students that:
 - Working backward may not always make a problem easier but it is often a good strategy to try when other strategies are not working.
 - It is always helpful to have a variety of strategies that you can choose from when you are solving problems.

Answers for transparency, "Working Backward"

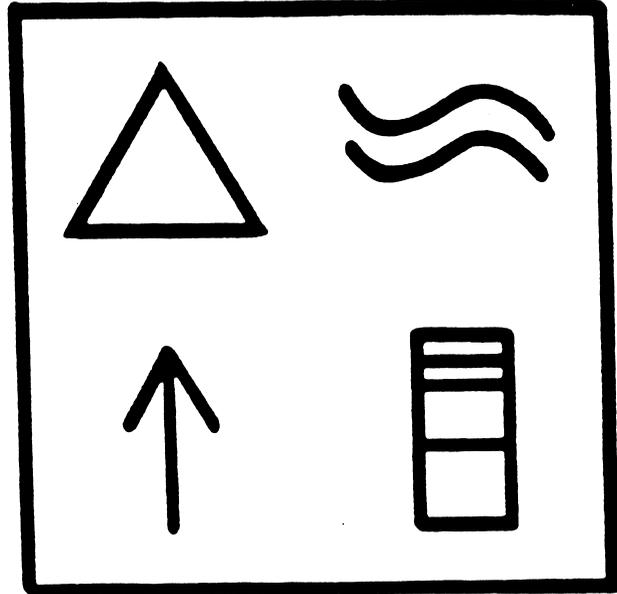
1. LV
2. RH
3. VH
4. RH

GAME TWO
Transparency

EXAMPLE 1

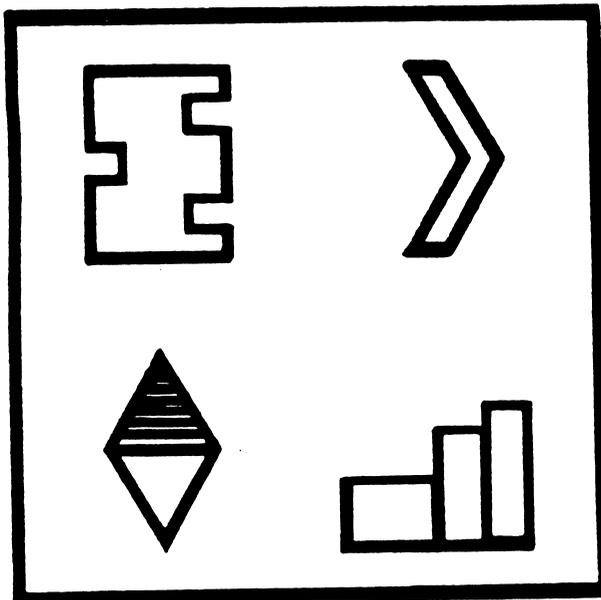


A

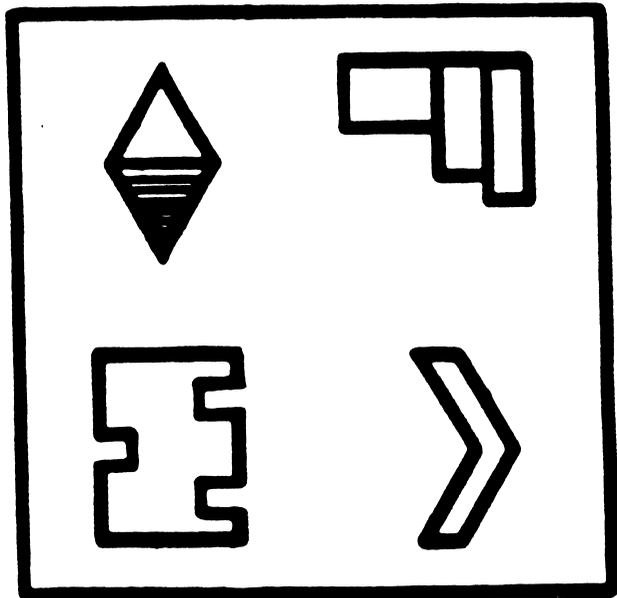


B

EXAMPLE 2

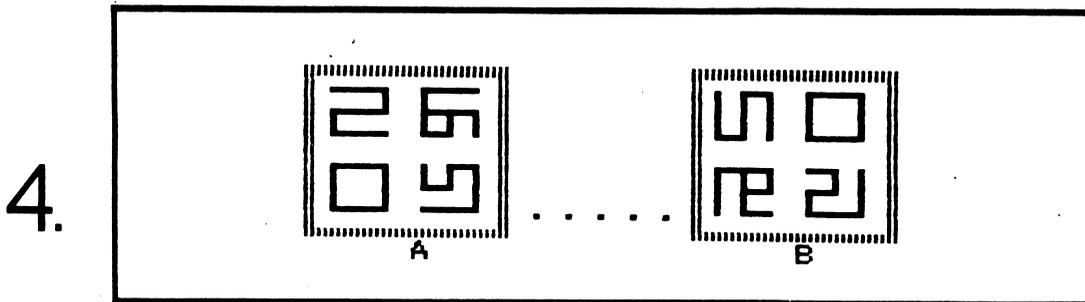
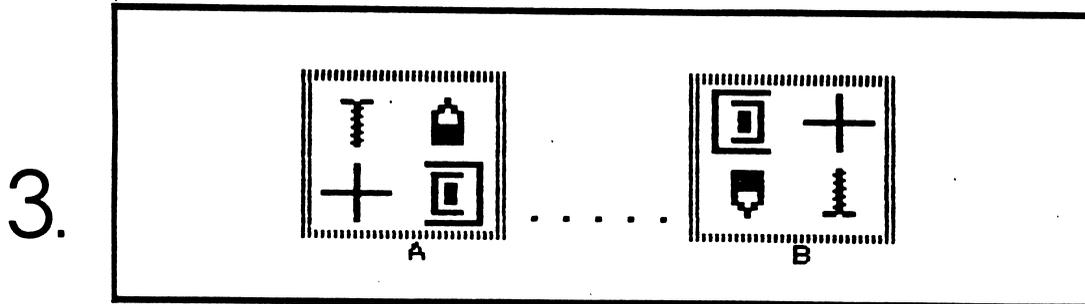
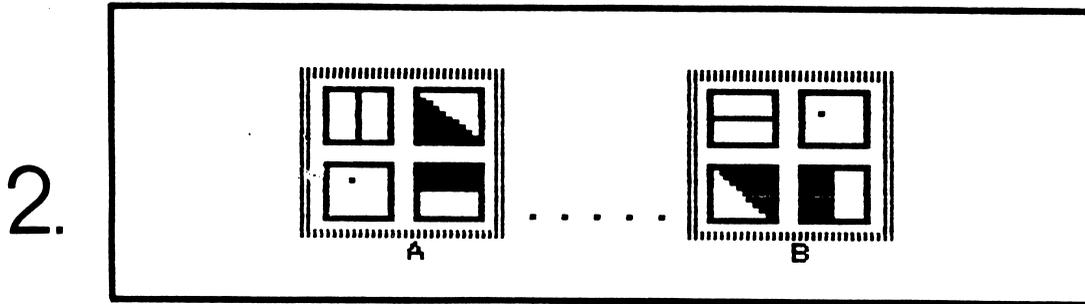
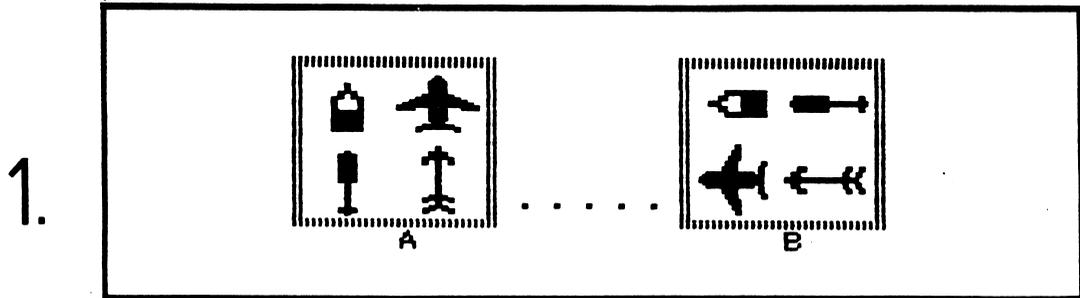


A



B

WORKING BACKWARD
Transparency



TIP 'N FLIP

STUDENT RECORD SHEET

Student's Name _____

GAME TWO

Level _____
Number of Problems _____
Number Correct _____
Score _____
Date _____

Level _____
Number of Problems _____
Number Correct _____
Score _____
Date _____

Level _____
Number of Problems _____
Number Correct _____
Score _____
Date _____

Level _____
Number of Problems _____
Number Correct _____
Score _____
Date _____

Level _____
Number of Problems _____
Number Correct _____
Score _____
Date _____

Level _____
Number of Problems _____
Number Correct _____
Score _____
Date _____

SHARING SOME FIELD-TESTING OBSERVATIONS

Many students find mental manipulation of images very difficult and are easily frustrated. Because of this it is important to make sure that there are no time limits associated with playing TIP 'N FLIP.

Field-test teachers all felt that repeated practice did produce skill gains. They stressed the need to reduce frustration by deemphasizing competition and focusing on individual growth.

In the earliest program versions tested, the three sets of shapes were used for three levels of difficulty. Many individual differences immediately became apparent. Most students found set 1 the "easiest," probably because many of the shapes resemble familiar objects. Opinions on the difficulty of set 2 and set 3 varied greatly. For this reason, the software was changed to allow students to choose the set of shapes to use.

The highest level of each game is not actually more difficult. It combines the types of problems found in each of the lower levels. During field-testing students' scores were higher when "primed" for a certain type of problem. Because of this, a final level that randomly mixes the types of problems presented was added.

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

What happens if a program will not load or run?

Call us on our toll-free number and we will send you a new diskette.

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 diskette.

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.

How do I stop a program in the middle to go on to something new?

On the Apple hold the Control (CTRL) key down and press the E key.

Can I copy this diskette?

The material on the diskette is copyrighted. You should not copy the diskette.

Can I take this diskette out of the computer after the program has been loaded and put it into another computer?

If you want to continue playing the same game at the same level, you can take the diskette out of the drive. If you want to change level, game, or see the directions, the computer must access the diskette for information.

APPLE II: WORKING WITH YOUR COMPUTER

TURNING ON THE COMPUTER:

- (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 after 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.
- (7) Follow directions given in the program.

TURNING OFF THE COMPUTER:

- (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.