Creativity, Unlimited

Apple

SUNBURST
COMMUNICATIONS

PERMISSIONS

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INTRODUCTION

"Here and elsewhere we shall not obtain the best insight into
things until we actually see them growing from the beginning."

Aristotle

CREATIVITY, UNLIMITED unlocks the beauty of symmetry and the imagination of the
user. You can create intricate designs and "see them growing from the beginning."
You can reproduce the works of M.C. Escher or duplicate the fascinating patterns of
nature. But *CREATIVITY, UNLIMITED* lets you go beyond. Through the power of the
computer, you can take a pattern and place it on top of itself creating new and
intriquing designs...never before did such possiblities exist in art or mathematics.

Thinking is a skill that teachers need to encourage. The highest level of thinking is
creativity. Torrance has defined four skills involved in creative or divergent thinking.*

- Fluency - Flowing thought processes which produce a quantity of relevant
  responses (producing a large number of ideas with words).

  Producing many ideas in a given amount of time. In brainstorming a
  problem-solving situation, fluency produces a lengthy list of alternatives.
  The goal is to think of as many responses as possible.

  CREATIVITY, UNLIMITED develops fluency by encouraging students to vary an
  action - like rotate or mirror - and do the pattern again. Each time different
  results are formed. New patterns of steps or shapes can also be used.

- Flexibility - Versatile thinking which produces a variety of responses.

  Using a different approach in order to produce varied, numerous strategies or
  ideas. The goal is to think of different things - the wider the variety, the better.

  The applications of *CREATIVITY, UNLIMITED* are only limited by one's mind.
  The lessons in this guide are designed to be a beginninng. Hopefully, students
  and teachers will be flexible and think of new applications.

- Originality - Clever, unique ideas that extend beyond the obvious or established.
  Novel, relevant responses.

* E. Paul Torrance, <u>Guiding Creative Talent</u> (Englewood Cliffs, NJ: Prentice-Hall, Inc.
  1962).

Producing ideas that are not commonplace, conforming, or obvious; unusual personal resposes; effective use of imagination. Producing novel, meaningful responses - new information. The goal is uniqueness of response.

CREATIVITY, UNLIMITED encourages students to be original. Slight variations on a design will produce an entirely new effect.

- Elaboration - Expanding an idea with additional detail - embellishing.

Adding necessary detail to produce a new thought. Stretching a thought or idea. The goal is detailed responses.

CREATIVITY, UNLIMITED encourages students to expand the ideas presented and create a new idea.

And CREATIVITY, UNLIMITED produces new ideas in art and mathematics.

"One can hardly overestimate the depth of geometric imagination and inventiveness reflected in these patterns. Their construction is far from being mathematically trivial. The art of ornament contains in implicit form the oldest piece of higher mathematics known to us."

Herman Weyl

CREATIVITY, UNLIMITED is designed to operate on a 64K Apple IIe or IIc. If you need assistance in operating your computer, check the section of this Teacher's Guide entitled "Apple: Working with the Computer", or call Sunburst toll-free at 800-431-1934.

CREATIVITY, UNLIMITED

```
CREATIVITY, UNLIMITED
    (CREATIVITY)
    SHAPE EDITOR
    DISK MENU
    PRINT DESIGN
    CREATE DISK
  ?  HELP
    QUIT

Press the arrow keys to move the box.
Press RETURN to select.
```
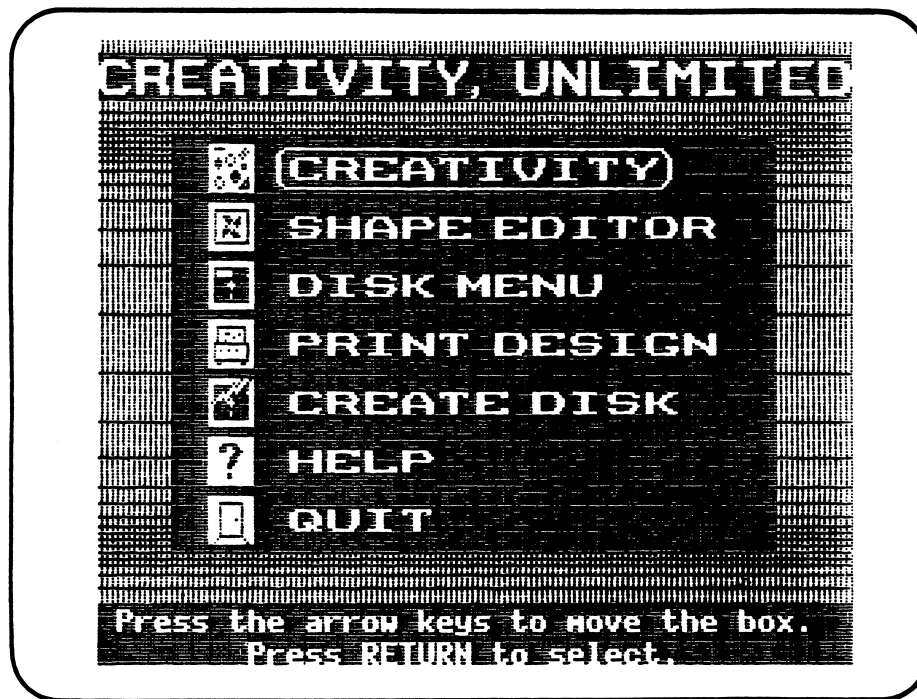
SKILLS: Fluency
Flexibility
Originality
Elaborations

STUDENTS WORK WITH: Rotation
Patterns
Mirrors

GRADE LEVEL: 3 - adult

TIME REQUIRED: Depends on activity

OBJECTIVES: 1. To develop students' fluency in creating
visual images.
2. To increase flexibility in thinking.
3. To expand students' originality.

Individual lessons emphasize other subject-related skills.

PROGRAM DESCRIPTION

OVERVIEW

In *CREATIVITY, UNLIMITED*, you start with an object called a SHAPE.

SHAPE
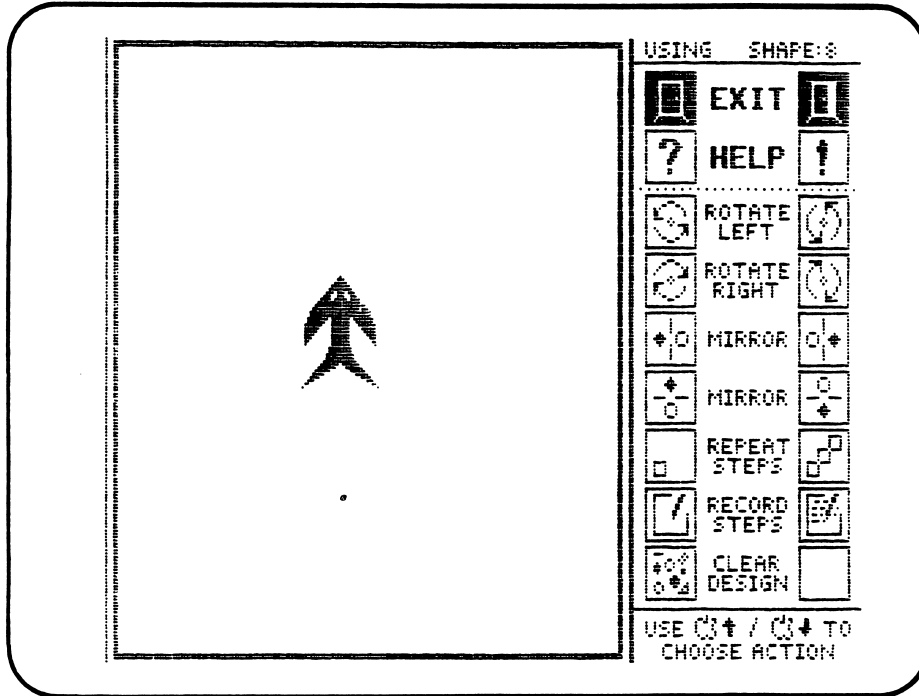
You can move the shape around the screen and place it down in order to create a design.

A SHAPE creates DESIGNS.
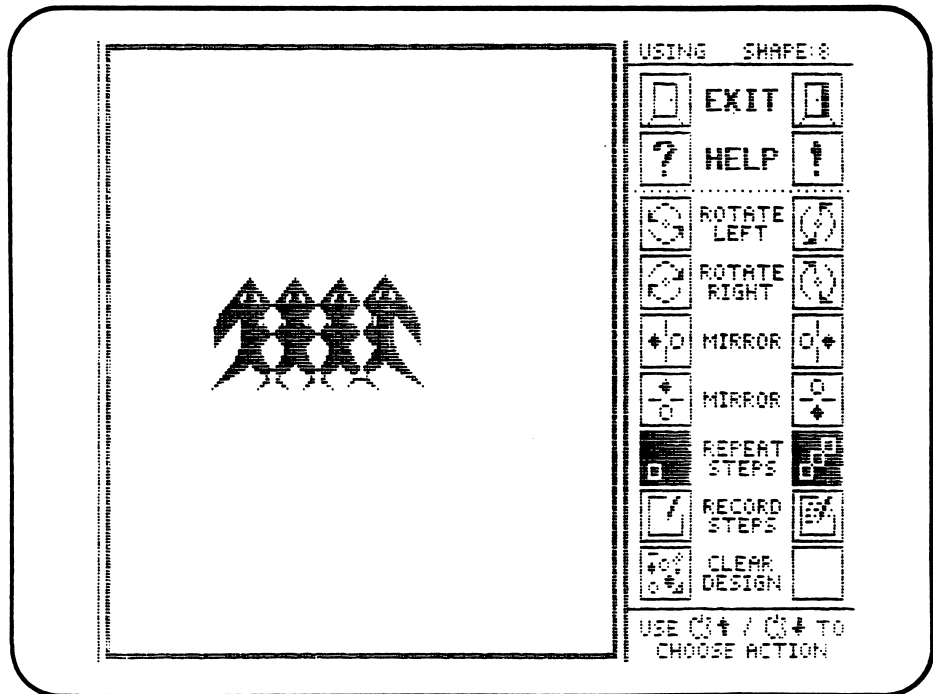
Designs can be created by moving the shape step-by-step, or by using a prerecorded PATTERN OF STEPS.

DESIGNS can be made by PATTERNS OF STEPS.

And you can alter the existing shapes, or create new ones. You can save shapes, designs, or patterns of steps and print designs.

PROGRAM DESCRIPTION

The main menu gives you 5 options, along with HELP and QUIT:

```
CREATIVITY, UNLIMITED

      (CREATIVITY)
      SHAPE EDITOR
      DISK MENU
      PRINT DESIGN
      CREATE DISK
      HELP
      QUIT

Press the arrow keys to move the box.
      Press RETURN to select.
```

CREATIVITY

This is the main part of the program, for it is in *Creativity* that you can create designs and patterns. Designs are created by selecting a basic shape, and then moving that shape around the screen. A pattern of steps or movements can be stored and repeated, giving you interesting effects.
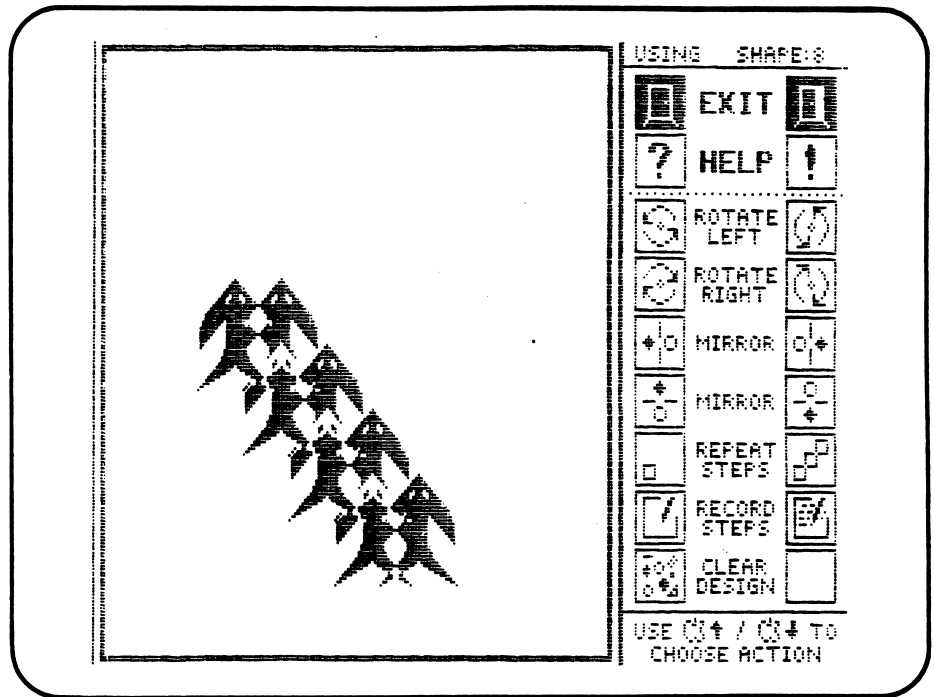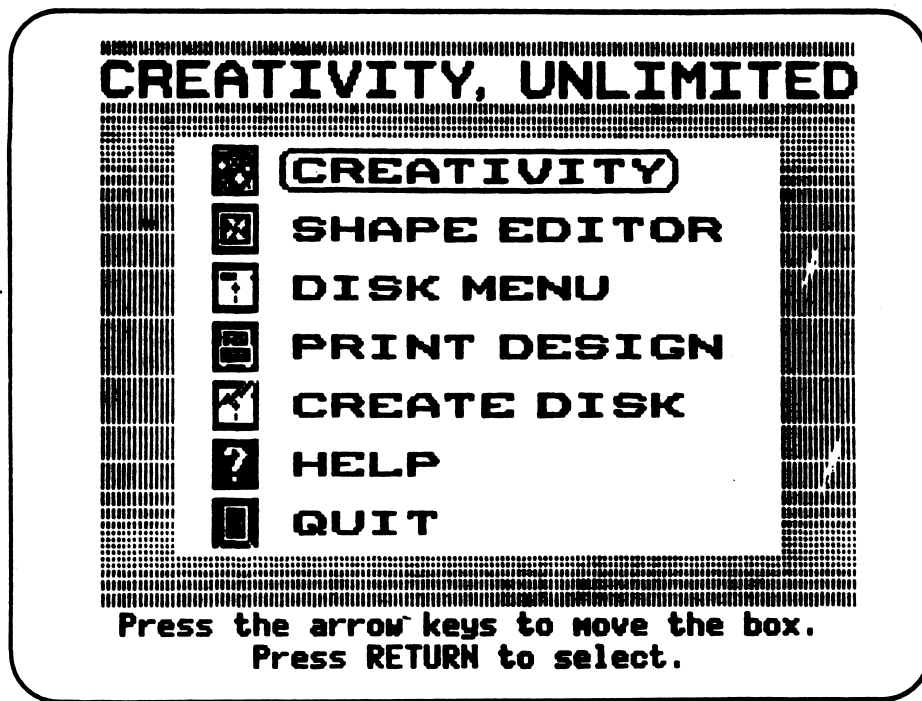
SHAPE EDITOR

The *Shape Editor* allows you to change the shapes available in *Creativity*. There are 10 shapes in memory at all times. You can switch to any of those 10 in either *Creativity* or the *Shape Editor* by pressing the numbers 0-9. With the *Shape Editor*, you can modify the current shape, make a totally new shape, or get a new shape that you have created in your *Creativity* design.

The new shape will stay in memory until you turn off the machine, or load in a different set of shapes. You can save the set of shapes in the *Disk Menu* .

DISK MENU

The *Disk Menu* allows you to save, load, or delete sets of shapes, patterns of steps, or designs.

PRINT DESIGN

Print Design allows you to print your design if you have a graphics printer. You must set your printer type in the *Change Option* before the program can print (see page 22).

CREATE DISK

Create Disk allows you to create a new data diskette which will store designs, shapes, and patterns of steps.

CREATIVITY

Description

Creativity allows you to create designs. A set of ten shapes is available for you to work with in creating your design. (Later on you'll learn how to modify these shapes or create your own.)

Selecting a Shape

Look at the top right-hand side of the screen. The number of the shape you are using is listed:

USING SHAPE: 1

Press the number 2, 3, 4, 5, 6, 7, 8, 9, or 0 to see other shapes that are available to work with.

Choosing Actions

On the right-hand side of the screen is a list of "actions." Actions are the various manipulations you can perform on your shape.

To move from action to action, find the Ć key on the keyboard. This is called the Open Apple key. Hold it down and press the ↓ ↑ keys. Watch the highlighter move from action to action. When you have the action you want, press RETURN.
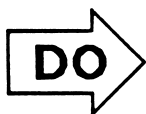
DO	
	• Put Shape 8 in the design area by pressing an 8.
	• Move to the Rotate Left action using the Ć key and the ↓ key.
	• Press RETURN.
	• See what happens to the shape.
	• Now rotate the shape to the right.
	• Mirror it both vertically and horizontally.

Now that you understand how each action works, you are ready to start creating!

Creating a Design

To create a design, press the SPACE BAR. This will place the image of your current shape on the design area. When you do this, the shape will disappear.

Use the arrow keys (↓ ↑ → ←) to move the shape. When the shape moves off the image you placed on the design area, you will see both the image and the shape itself. The image is a permanent part of your design; the shape can be moved in order to create more images.

> **DO**
> * Select a shape by pressing a number.
> * Press SPACE BAR to place the image of the shape on the design area.
> * Use the → key and move to the right several steps. Press SPACE BAR again.
> * Continue to move the shape and press SPACE BAR.
> * Watch your design change.
> * Move to the Clear Design action using the ⌖ key and the ↓ ↑ keys and press RETURN. This will clear your design area.

The hardest concept in *CREATIVITY, UNLIMITED* to grasp is that when you press the SPACE BAR, both the image and the shape disappear. This, however, is the essence of the graphic effects you get in the program. (The program uses a concept called exclusive-or: XOR -- see Lesson 11 for an explanation.)

To help you with this concept, keep in mind the following: Whatever pattern you get in the design area while you are moving the shape around, *that's* what your design will look like after you place the image down with the SPACE BAR. When you press the SPACE BAR, the design changes temporarily, for the shape disappears. You must move the shape (using the arrows) totally off the spot that you placed the image to see what your design looks like.

If you want to move your shape larger steps, hold the key and press the arrow keys.

> **DO**
>
> - Play for a while. Create designs.
> - Rotate and Mirror your shape.
> - When you want to clear the design area, hold the ⌃ key and press the ↓ key to move to the Clear action.
> - Then press RETURN. (You can also press the DELETE key, which will automatically move you to the Clear action).
> - To move the shape larger steps, hold the and press the ↑ ↓ ← → keys.

Record and Repeating a Pattern of Steps

Creativity allows you to record and then repeat a pattern of steps. (You can also save your patterns using the *Disk Menu* -- see page 17.)

To record a series of steps, move to the Record Steps action. Press RETURN. The action will change to Storing/Stop. Everything you now press on the keyboard will be saved in your recording. You can:

>   -- move the shape using the arrows.
>   -- place its image on the design area with the SPACE BAR.
>   -- move to an action like MIRROR, press RETURN and mirror the image.
>   -- clear the design.
>   -- change the shape by typing a number key.

When you are done recording steps, make sure the action is on Storing/Stop and press RETURN.

Your pattern is now saved. This pattern can be used over and over again until you either define a new pattern through Record Steps, or you load a new pattern from the *Disk Menu.*

To repeat a recorded pattern of steps, move to the Repeat Steps action and press RETURN. Your pattern will start repeating. Notice the Repeat Steps action has changed to Stop Repeat. To stop the pattern from repeating, press RETURN while Stop Repeat is highlighted.

Recording a Single Series of Steps

To record a single series of steps that will not repeat continually, go through the following procedure:

DO ▷
- Move to Record Steps.
- Press RETURN.
- Record your series of steps.
- Now press ESCape to exit Record Steps.

By pressing ESCape to exit Record Steps rather than RETURN, the pattern will only repeat once when you Repeat Steps. You can then move the shape to a new starting position or change the shape and press Repeat Steps again to see the pattern again.

Stepping Through a Pattern

If you want to step through a pattern when you select Repeat Steps, follow this procedure:
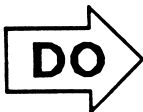
DO ▷
- Choose a shape.
- Move the shape to a starting position on the design area.
- Move to Record Steps.
- Record your pattern of steps.
- Move to Storing/Stop and press RETURN.
- Clear the screen if necessary and move your shape to a starting position.
- Move to Repeat Steps and press RETURN. Now press the SPACE BAR, and you'll be able to move the pattern step-by-step, with each press of the SPACE BAR.
- Press RETURN to stop the repeat.

Use the Record Steps feature and play with different shapes. See Lessons 2 and 9 for more ideas.

Getting a New Shape

When working in *Creativity*, you might have an image in your design area that you want to use as your basic shape. You can "get" that image and use it as your shape.

To get a shape, set the shape number to the shape you want to redefine. Then hold the CONTROL key and press G for Get.

You will see a box appear in the design area. Use the arrow keys (↑ ↓ ← →) to move the box over the new image that you want to define as the new shape. Press RETURN. Your new shape is now on the design area. If you want the old shape back, press the shape number again. The new shape will not replace the old shape in memory until you select another shape number, or you exit to the menu.

Advanced Features of Creativity

In using *Creativity*, you can use letter keys to select the actions. By pressing the letter, the action will be highlighted and automatically done. This is faster than using the Open Apple and arrow keys.

The letters for the actions are:

H or ?	for Help
U	for Rotate Left
O	for Rotate Right
M	for Mirror Horizontally
,	for Mirror Vertically
R	for Repeat Steps
	(SPACE BAR during Repeat Steps single steps pattern)
Control R	Starts or Stops Recording
	(ESCape stops recording and does not repeat the pattern)
DELETE	Clear design
Control E	Exit

OTHER KEYS:

I, J, K, L	Moves the figure small steps (same as ↑ ← ↓ →)
, I, J, K, L, or E, S, D, F	Moves the figure large steps (same as  ↑ ← ↓ →)
0-9	Selects a shape
Control G	Gets a new shape off the design area

SHAPE EDITOR

Description

The *Shape Editor* allows you to create the shapes that will be used in *Creativity*.

Selecting a Shape

Look at the top right-hand side of the screen. The shape number you are working on is listed:

<div align="center">EDITING SHAPE: _____</div>

That shape is enlarged in the edit area and is shown in actual size below the enlargement.
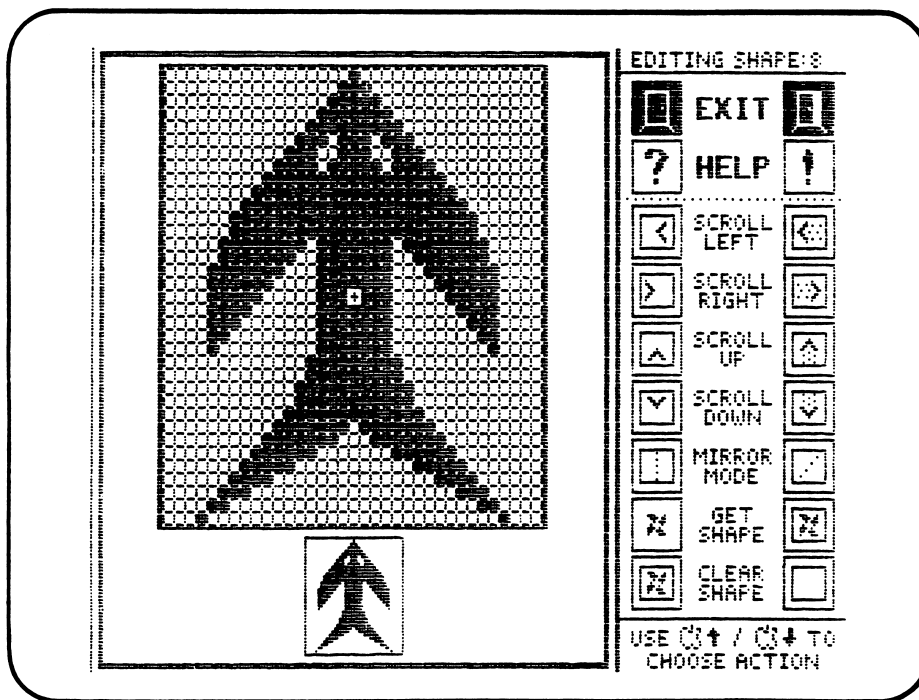
You can choose the shape you want to edit by pressing the number keys 0-9.
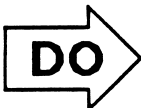
DO > • Press the number keys to choose the shape you want to replace or change.

Choosing Actions

On the right-hand side of the screen is a list of actions:
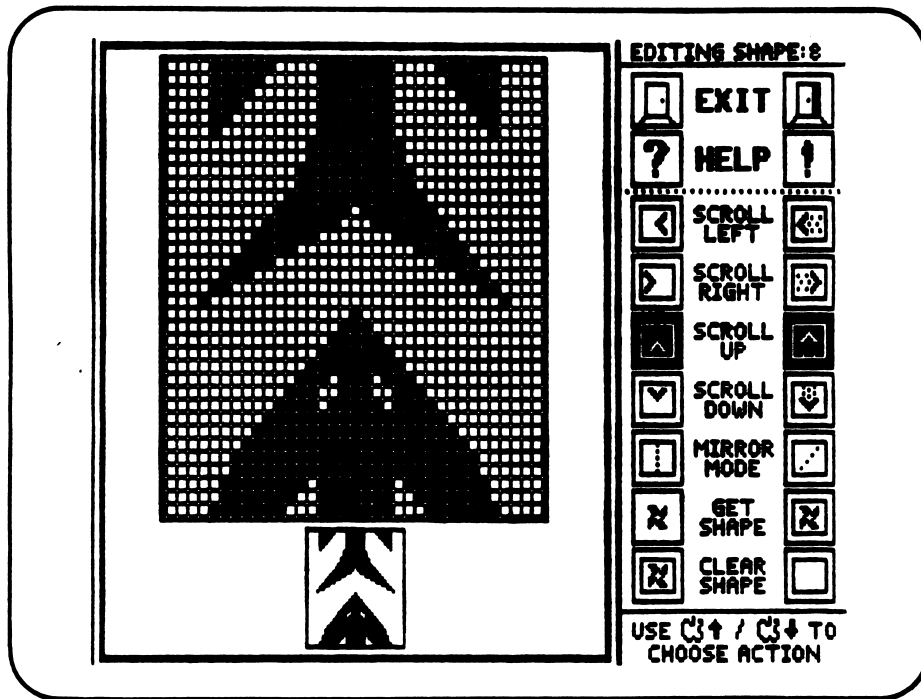
To move from action to action, hold down the ⌂ key and press the ↑ or ↓ keys. Each action will be highlighted. When you have the action you want, press RETURN.

DO ▷
- Using the ⌂ key and the ↑↓ keys, move to HELP and press RETURN.
- Read the instructions.

Scrolling a Shape

The next four actions--scroll left, scroll right, scroll up, and scroll down--will move all the points in the shape in the direction indicated.

DO ▷
- Using the ⌂ and ↑ ↓ keys, move to Scroll Left.
- Press RETURN.
- Press RETURN again and again.
- Move to Scroll Right, Scroll Up, and Scroll Down. Press RETURN.
- Watch the enlarged shape move while looking at the small shape below it.

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Making a Shape

To make or modify a shape, move the flashing dot on the enlarged grid with the arrow keys. Place a dot by pressing the SPACE BAR.

To create a whole new shape:

DO
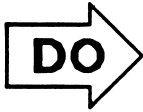
- Clear the shape area by moving the highlighter to Clear and pressing RETURN.
- Move the dot using the arrow keys.
- Press SPACE BAR to place a dot.

Mirroring a Shape

If you choose Mirror Mode, you will see a selection of possible mirrors listed across the bottom of the screen. Use the arrow keys to select the mirror you want. The first mirror will turn all mirrors off and give you the dot you placed on the enlarged grid.

After you select your mirror, you will see it appear to the left of the shape.

DO

- Clear the shape.
- Using the ⌘ key and ↑ ↓ keys, move to Mirror Mode and press RETURN.
- Select a Mirror.
- Try placing dots. As a dot is placed, it will also reflect across the mirror.
- Try all the mirrors. Clear the shapes in between.

Getting a Shape

As in *Creativity*, you can get a shape from the design area. When you select Get Shape, the design area from *Creativity* will appear with a box on the design area. Move the box to cover the image you want to define. Press RETURN. You will be returned to the *Shape Editor* with the new shape.

NOTE: Your new shape is not stored in your list of shapes until you:

> -- get a new shape by pressing a number, or
> -- exit the *Shape Editor*.

As long as you keep working on the same shape you can recall the old shape by pressing the shape number again. For example, if you are editing shape 6 and modify the shape, if you press 6 again, the old shape will reappear. If you press 7 or another number, the shape defined in the shape area as 6 when you pressed the 7 will become 6 in your set of shapes.

Remember, your shapes are not saved to the disk. If you turn off your computer, you will lose your current set of changed shapes. You must use *Disk Menu* to save the shapes.

Advanced Features of Shape Editor

In the *Shape Editor*, you can use letters to select the actions. By pressing the letter, the action will be highlighted and automatically done.

The letters for the actions are:

H or ?	for Help
S or J	for Scroll Left
F or L	for Scroll Right
E or I	for Scroll Up
D or K	for Scroll Down
M	for Mirror Mode
Control G	Get Shape
Delete	Clear Shape
Control E	Exit
I, J, K, L	Move the dot like the arrow keys
0 - 9	Selects a shape

Description

The *Disk Menu* allows you to save or load designs, shapes, or patterns of steps. You must save products of *Creativity* on a data disk. You can make a data disk through *Create Disk* (see page 19.)

Choosing Actions

On the right-hand side of the screen is a list of actions:
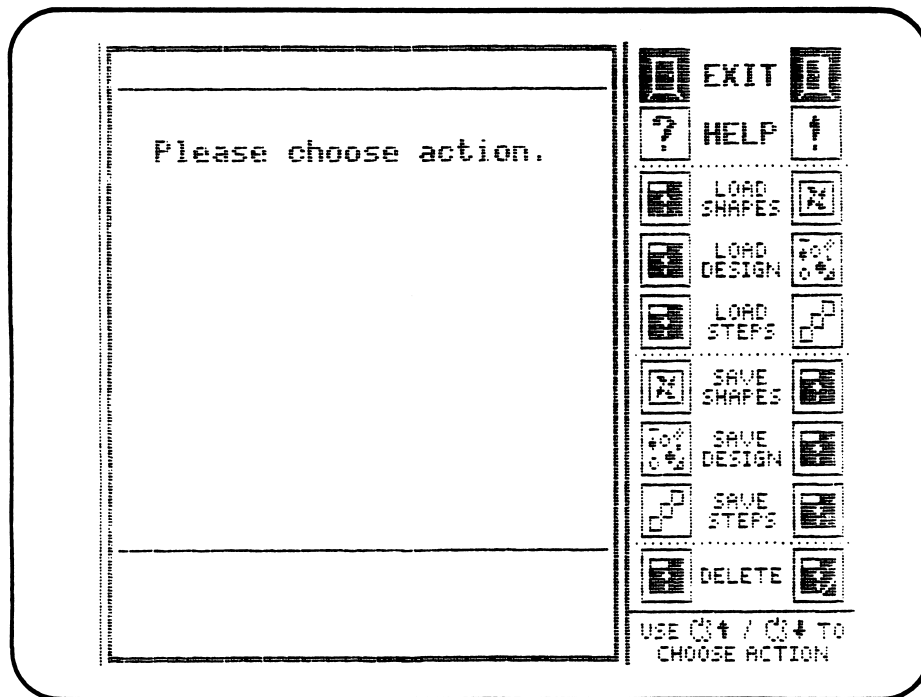
To move among the action choices, use the ☼ key and press the ↑ or ↓ key. When you have the action you want, press RETURN.
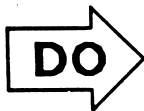
* Using the ☼ key and the ↑ ↓ keys, move to Help.
* Press RETURN.
* Read the Help instructions.

You can either load shapes, designs, patterns of steps, or save shapes, designs, or patterns of steps.

Loading

If you move to a load action and press RETURN, you will see a list of the shapes, designs, or patterns of steps that are saved on the disk you have in the drive. If nothing is saved, you will see END. If shapes, designs, or steps are saved, a list of names will be shown. Using the arrow keys, choose the set you want and press RETURN. That set will be loaded and you will return to the list of actions. If you don't have anything saved or want to exit, move the pointer to END and press RETURN.

Saving

To save a set of shapes, design, or pattern of steps, move to a save action and press RETURN. You will be asked if this is a new file. If you want to replace an old file, say "NO"; otherwise, answer "YES."

If "YES", you must name your file (the name can be 15 letters long). Periods and numbers are allowed but not as the first letter of the name. The Delete key or the key will erase letters. RETURN will accept the name. Make sure the data disk is in the disk drive and press RETURN again.

Deleting

If you choose DELETE, you can erase a set of shapes, designs, or patterns of steps from a disk. A list of files on the disk will appear on the screen. This time all files, whether dealing with shapes, designs, or steps, will be listed. Move the pointer to the file you want to delete and press RETURN. You will verify that you want to delete that file, and then the file will be deleted. If you do not want to delete a file, go to END or press CONTROL E.

Advanced Features of Disk Menu

In the *Disk Menu*, you can use numbers or other keys to select actions. By pressing the keys below, the action will be highlighted and automatically performed:

H or ?	for Help
1	for Load Shapes
2	for Load Design
3	for Load Steps
4	for Save Shapes
5	for Save Design
6	for Save Steps
DELETE	Delete
Control E	Exit

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PRINT DESIGN

Description

If you choose *Print Design*, whatever is in your design area will be printed on your printer. Make sure that your printer is connected and that you have set your printer and interface in the *Change Option* (see page 22 for instructions). If your printer is not set or turned on, you will get an error message and you will be asked if you want to continue or exit.

CREATE DISK

Description

If you choose *Create Disk*, you will be asked to name your new disk. Your name can be 15 characters long. Periods and numbers can be used, but not as the first letter of the name. When you press RETURN, you will be instructed to insert the new disk and press RETURN again. To copy a data disk, see the instructions in the *Change Option*.

TECHNICAL FEATURES

Below are some limits and advanced features for your reference when working with *CREATIVITY, UNLIMITED.*

1. When recording steps, it is more efficient to repeat a direction several times rather than change direction. For example: If you want to move down and to the right to place an image again, it is better to move

$$\rightarrow\downarrow \quad \text{or} \quad \downarrow\rightarrow \quad \text{rather than}$$
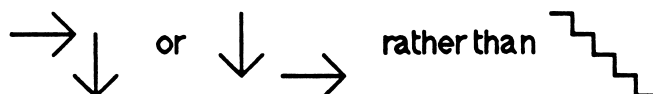
   You can store up to 255 steps in a pattern. Any direction or action takes one byte of storage. If you repeat the last direction, it does not take more storage but just increments the counter on that byte. By using repeating directions you may be able to store up to 2,825 steps.

2. You are allowed to store up to 52 files on a data disk before it will fill up. If you are storing designs you will only be able to store 16 designs maximum. You can store up to 45 shape files or 52 step (pattern) files.

3. If you have Prodos versions of software life KoalaPaint ™ or MousePaint ™, you can load in designs from those programs. When loaded into *CREATIVITY, UNLIMITED, Creativity* will load the middle part of the screen designs done in those programs. You can use *Creativity* to enhance the design, put a frame around the design, and print the design. You can also achieve color on the screen by using one of these programs.

CHANGE OPTION

The *Change Option* allows the teacher to set the sound, the printer, the background color, or copy a data disk. The *Change Option* is accessed by holding the CONTROL key and pressing a T key at the menu.

```
CREATIVITY, UNLIMITED

       CHANGE MENU

    (SOUND) IS ON

    BACKGROUND ▪

    PRINTER

    INTERFACE

    COPY DISK

    EXIT


Press the arrow keys to move the box.
      Press RETURN to select.
```
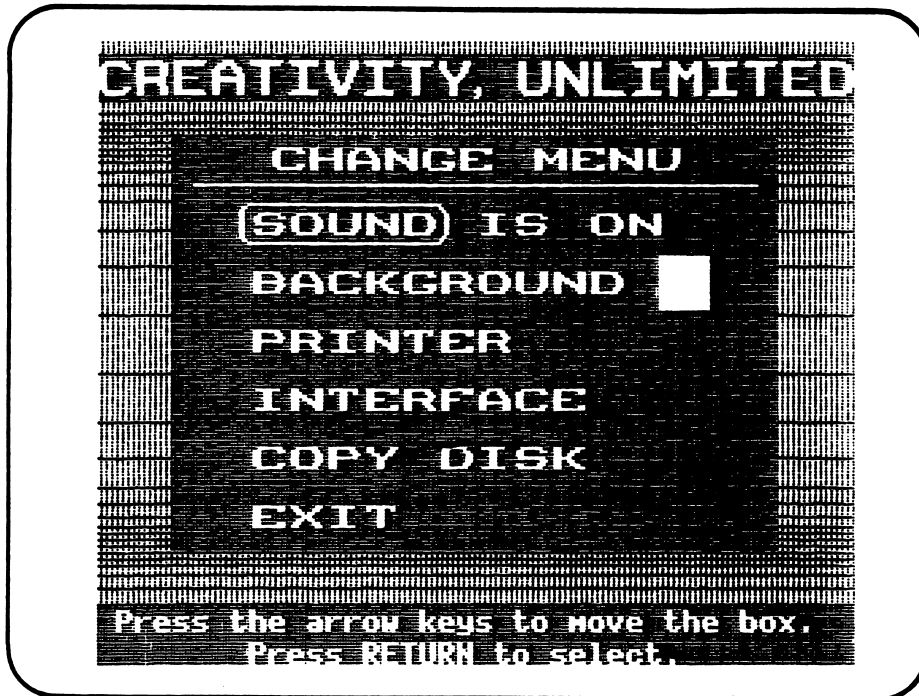
Sound

To change the sound from on to off, press RETURN when Sound is highlighted.

Background

You can change the background on the design area from white to black, or black to white. To change the background, select Background and press RETURN.

Printer/Interface

In order to use *Print Design* on the menu, you must first set both your printer type and the interface card you are using.

To set the printer, select PRINTER. If a printer has been set before, you will see the current printer setting. If you want to change it, answer "YES." A list of printers will appear. Go through the list until you see your printer. Move the box using the arrow keys to the printer and press RETURN.

To set the interface, select INTERFACE. If the interface has been set before, you will see the interface that is current. If you want to change it, answer "YES." Select your interface card from the list. If you have a IIc, select Apple IIc. Next, you must set the slot or port in which the printer is connected. Choose the correct slot and press RETURN.

Copy Disk

To copy a data disk, select this option. You'll be asked which drive is the source (the drive that has the information to be copied), and which is the destination (the disk to be copied on). Enter this information and press RETURN. The computer will now copy all the information on the disk in the "source" drive to the disk in the "destination" drive.

Saving Your Changes

None of your changes are made until you exit the *Change Option*. When you choose Exit, you will be asked if you want to make the changes permanent. If you choose "YES," make sure your *CREATIVITY, UNLIMITED* disk is in the drive.

INTRODUCTION TO LESSONS

CREATIVITY, UNLIMITED can be used in many different ways. The set of lessons in this manual is intended to give you and your students a starting point. The ideas are designed to be expanded upon.

The first four lessons are designed to introduce the features of the *CREATIVITY, UNLIMITED* disk.

- Lesson 1 demonstrates *Creativity*.
- Lesson 2 explains the repeat a pattern of steps option.
- Lesson 3 works with mirrors and patterns. It also includes a discussion of symmetry.
- Lesson 4 demonstrates the *Shape Editor*.

Lessons 5 - 10 cover art, mathematics and problem-solving concepts. These lessons are designed to show you how you can incorporate the teaching of *Creativity* into a subject area.

- Lesson 5 is a short lesson on using *CREATIVITY, UNLIMITED* to do animation.
- Lesson 6 deals with patterns and making a game.
- Lesson 7 gives the students a visual puzzle to solve. Sequence is important.
- Lesson 8, 9, and 10 look at mathematical concepts of symmetry, tessellations and rotation.

Lesson 11 explains the concept of XOR. The images in *CREATIVITY, UNLIMITED* are based on using the ability of the computer to XOR one shape or another. This lesson could be used in a computer session or mathematics class.

LESSON 1

TITLE: EXPLORING CREATIVITY

SUBJECT AREA: Art
        Creativity

MATERIALS: *CREATIVITY, UNLIMITED*
        Blank Disk

GRADE LEVEL: 3 - adult

OBJECTIVES: 1. To become familiar with *CREATIVITY, UNLIMITED.*
   2. To create original art.
         3. To save the art.

LESSON PLAN:

1. Show students *CREATIVITY, UNLIMITED.* Demonstrate how to move a shape in the design area using the arrow keys.

2. Change shapes using the number keys (1-9 and 0).

3. Select shape 5, 6, or 7.

4. Place an image of the shape on the design area by pressing the SPACE BAR. Move the shape by using the arrow keys. When you see another image you like press the SPACE BAR. Show students how to make intricate designs using *Creativity.*

5. When done with a design, you can either:
  - Clear the design area (move to Clear Design and press RETURN) or
  - Save the design (see step 7).

6. Show them how to make their own data disks to save their designs on. Exit *Creativity.* Choose *Create Disk* from the menu and make a data disk.

7. Put the *CREATIVITY, UNLIMITED* disk in the drive. Choose *Creativity.* Put the data disk in the drive. Point out to the students that they have not lost their design.

8. To save a design:
  • EXIT *Creativity*
  • Choose *Disk Menu*
  • Go to Save Design
  • Name the design and press RETURN.

Show students how to save their designs. Also clear the design area in *Creativity* and load a saved design from the *Disk Menu*.

9. Let students play with *Creativity*. Have them use *Create Disk* to create disks to store their designs on.
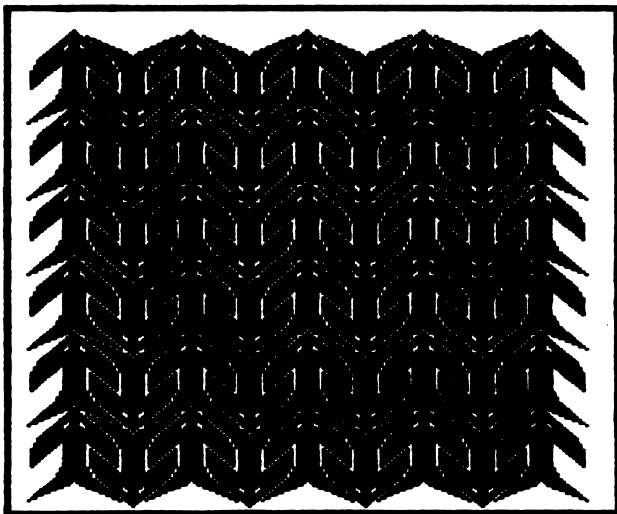
LESSON 2

|	
TITLE:	EXPLORING PATTERNS
SUBJECT AREA:	Art Creativity
MATERIALS:	*CREATIVITY, UNLIMITED* Data Disk
GRADE ·LEVEL:	4 - adult
OBJECTIVES:	1. To learn about the Record Steps and Repeat Steps options in *Creativity*. 2. To save patterns. 3. To create original art.

LESSON PLAN:

1. After students have completed Lesson 1, introduce Record Steps and Repeat Steps.

2. Start with a square (Shape 2) in the design area. Move the square to the top left part of the design area using the arrow keys.

3. Move to action Record Steps using the ○ key and the arrow keys.

4. Press RETURN. You are now recording all the movements that you make.

5. Press SPACE BAR to place an image of the square on the design area. Move the square over 2, down 3.

6. Turn off Record Steps (now Storing/Stop) by pressing the RETURN key.

7. Clear the design area.

8. Move the shape to the top left part of the design area again.

9. Move to Repeat Steps using the ○ key and the arrow keys. Press RETURN.

10. Watch your pattern execute. Press RETURN to stop the pattern. Point out to the students that this pattern will stay in the computer until you define a new pattern with Record Steps, load new steps in the *Disk Menu*, or turn the computer off.

11. Show them how to Save and Load Steps in the *Disk Menu*. You may want to load a pattern of steps off the Creativity.Data Disk as an example.

12. Let students record and save their own patterns. Have a demonstration showing each student's work.
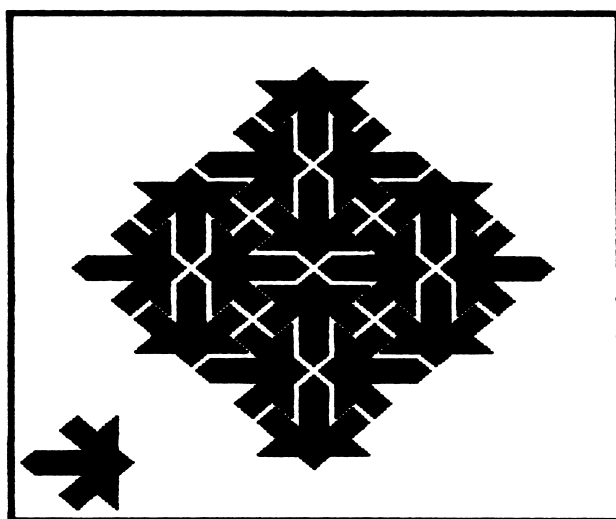
LESSON 3

TITLE: EXPLORING MIRRORS AND ROTATIONS

SUBJECT AREA: Art
Mathematics
Creativity

MATERIALS: *CREATIVITY, UNLIMITED*
Creativity.Data Disk
Student copies of <u>Rotate and Mirror</u>

GRADE LEVEL: 3 - adult

OBJECTIVES: 1. To understand a mirror over the x-axis (horizontal line) and the y-axis (vertical line).
2. To understand rotation.
3. To define symmetrical figures.
4. To create original art.

LESSON PLAN:

1. Select Shape 8.

2. Move to the action Rotate Left using the ⌃ and arrow keys. Press RETURN. Ask students what will happen.

3. Move to Rotate Right. Press RETURN. Ask students what will happen.

4. Select Mirror — and mirror the shape over a horizontal line by pressing RETURN. Mirror it back by pressing RETURN again.

5. Mirror the object over a vertical line (Mirror |) .

6. Select Shape 2. Select the action Rotate Left and press RETURN. Why did it appear that nothing happened? Mirror the object.

7. Divide students into small groups. Have other students try rotating and mirroring all the shapes in *Creativity* and record their data on the activity sheets called <u>Rotate and Mirror</u>.

8. Try to generalize what kind of shapes looked the same as they were rotated and which ones looked the same after you mirrored them. With older students, define rotational symmetry. A shape will look the same as it is rotated. (In the case of *CREATIVITY, UNLIMITED*, the shapes are rotationally symmetric to 90°.) Define symmetry about an x or y axis. The shape can be folded in half (either horizontally or vertically) and will match. This type of symmetry is called reflection or mirroring.

9. After students have collected their data, discuss it.

10. Go into the *Disk Menu* and go to Load Shapes using the Ć key and arrow keys. Press RETURN. Load SYMMETRY (this contains the set of shapes on the bottom of the activity sheet, <u>Rotate and Mirrors</u>).

11. Check student answers to the problems on their activity sheets <u>Rotate and Mirrors</u> either individually or as a group by using *Creativity.*

VARIATIONS

Have students use mirrors and rotations as part of their designs.

Have students use mirrors and rotations in their pattern of steps. While in Record Steps, move using the Ć and the arrow keys to Mirror. Press RETURN. Move back to Record Steps (now Storing/Stop). Continue until you have completed the desired pattern.

ROTATE AND MIRROR

DOES IT LOOK THE SAME?

Shape	Rotate ⤵	Rotate ⬇	Mirror —	Mirror |
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Why do you think a shape did not change?

Predict whether these shapes would change?

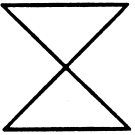| Shape	Rotate ⤵	Rotate ⬇	Mirror —	Mirror |
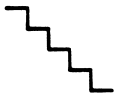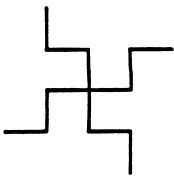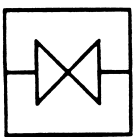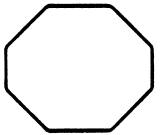
LESSON 4

TITLE: EXPLORING THE SHAPE EDITOR

SUBJECT AREA: Art
                      Mathematics

MATERIALS: *CREATIVITY, UNLIMITED*
                      Data Disk

GRADE LEVEL: 5 - adult

OBJECTIVES: 1. To learn how to use the *Shape Editor.*
                      2. To explore symmetry.
                      3. To create original art.

LESSON PLAN:

1. Show students how to use the *Shape Editor.* Go into the *Shape Editor* and type the number 1 to get Shape 1, the line.

2. Clear the shape by moving to Clear using the ○ key and arrow keys and then pressing RETURN.

3. Press SPACE BAR to place a dot. Use the arrow keys to move the flashing dot. Using the arrows and the SPACE BAR , create a shape.

4. Type the number 2 to call up Shape 2, the square.

5. Clear the shape again.

6. Move to Mirror Mode using the ○ key and arrow keys. Press RETURN.

7. A list of available mirrors will show. Experiment with the different mirrors or reflections. The [•] mirror reflects your dot through the center point. The last mirror [⊗] rotates the point 90˚, 180˚, and 270˚.

8. Have students discuss the difference between the mirror over a horizontal and vertical axis ([⊡]) and the rotation of 90˚, 180˚, and 270˚. What if they divide the shape area in quarters and put a figure in there. How will it look when mirrored horizontally and vertically compared to when rotated?

9. Demonstrate the scrolling option.

10. Exit the *Shape Editor.* Go to *Creativity.* Make sure you have a design in the design area. Create one with your new shapes (1 or 2).

11. Go back to the *Shape Editor.* (Exit *Creativity* and select the *Shape Editor.*)

12. Select Shape 3. Clear the *Shape Editor.*

13. Move to the Get Shape action. Press RETURN.

14. Point out to students that they are seeing the design area of *Creativity.* Move the box and capture a new shape. Press RETURN.

15. Edit a few points on your new shape in the *Shape Editor.*

16. Exit the *Shape Editor.* Go to the *Disk Menu* and show students how to save their shapes.

17. Have the students create a set of shapes and save them on their data disks.
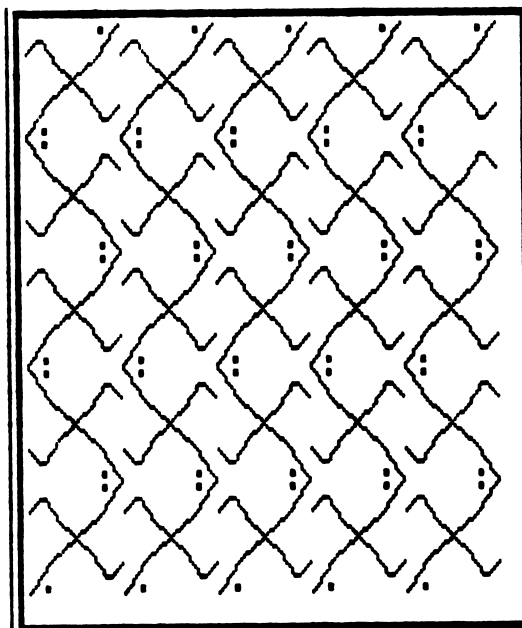
LESSON 5

TITLE:	ANIMATION
SUBJECT AREA:	Art
MATERIALS:	*CREATIVITY, UNLIMITED* Creativity.Data Disk Student copies of <u>Make Me Wink and Smile</u>
GRADE LEVEL:	3 - adult
OBJECTIVES:	1. To create an animation sequence. 2. To develop sequential thinking.

LESSON PLAN:

1. Show students how to do animation using *CREATIVITY, UNLIMITED* by using an example from the Creativity.Data Disk.

   • Go into *Disk Menu*. Make sure the Creativity.Data Disk is in the drive.
   • Using the ⌂ and the arrow keys, move to LOAD SHAPES; press RETURN.
   • Load the set of shapes called FACE.
   • Move to Load Steps; press RETURN.
   • Load the pattern called FACE.PATTERNS.
   • Exit the *Disk Menu*.
   • Go to *Creativity*.
   • Using ⌂ and arrow keys, move down to Repeat Steps.
   • Press RETURN.

2. You will see the shape of the face, then the eyes, nose, mouth, and finally, the face will smile and wink.

3. Clear the design area.

4. Show the students the different shapes that are stored in each of the shape numbers. Press 1, 2, 3, 4, 5, 6, 7, 8, 9, 0. You may want to put the shapes along the top of the design area. Move Shape 1 to top-left of the design area. Press 2; press SPACE BAR; move to the right; press 3; press SPACE BAR; move to the right; (repeat the sequence).

5. Ask the students how <u>they</u> would make a pattern to have the faces wink and smile at them.

6. Move the Shape 2 to the middle of the design area. Using the ⌘ and the arrow keys, go to Record Steps and press RETURN. Record the following pattern of steps:

     1. Press 2 about 6 times.
     2. Press 3 about 6 times.
     3. Press 4 about 6 times.
     4. Press 5 about 6 times.
     5. Press 6 about 6 times.
     6. Press 7 about 6 times.
     7. Press 8 about 6 times.
     8. Press 9 about 6 times.
     9. Press 8 about 6 times.
   10. Press 7 about 6 times.

Explain to the students the reason for typing the number for each shape several times is to slow down the sequence. You can determine the speed of the sequence by the number of times you repeat each number.

7.   Press RETURN to get out of Record Steps.

8.   Move to Repeat Steps and see your animation.

9.   Ask the students how you would make it wink first, then frown.

10.   Hand out the activity <u>Make Me Wink and Smile</u>. Instruct students to go to the computer and load in FACE.MIX and put the pictures in sequence. This could be done as a group activity.

EXTENSIONS:

Have students make their own animation sequences using the *Shape Editor*. Have them show their results to the class.

MAKE ME WINK AND SMILE

1. Start *CREATIVITY, UNLIMITED.*

2. Choose *Disk Menu.*

3. Put in the Creativity.Data Disk.

4. Holding the ⌂ and pressing the ↓ key, go to Load Shapes and press RETURN.

5. Load in FACE.MIX.

6. Holding the ⌂ and pressing the ↑ key, go to Exit.

7. Choose *Creativity.*

8. Press the 1 key, then the 2, 3, 4, 5, 6, 7, 8 keys.

9. Make the face wink and smile
   Which step should come

first? _____	sixth? _____
second? _____	seventh?_____
third? _____	eighth?_____
fourth? _____	ninth? _____
fifth? _____	tenth? _____

(Press the 1, 2, 3, 4, 5, 6, 7, 8 keys if you need to see the picture again.)

CHALLENGE:

• Record Steps to make your shape wink and smile.

• Go to the *Disk Menu* and save your steps (Save Steps).

• What was the pattern of steps you recorded?

_____

_____

• Can you make the shape wink and frown? How?_____

_____

LESSON 6

TITLE: MAZES AND MEMORY

SUBJECT AREA: Problem Solving; Left-right-up-down
Pattern Recognition

MATERIALS: *CREATIVITY, UNLIMITED*
Creativity.Data Disk

GRADE LEVEL: 2 - 8

OBJECTIVES: 1. To move an object through a maze.
                           2. To memorize the movement of the object.
                           3. To be able to recognize a pattern.

LESSON PLAN:

Demonstrate to students how you can use *CREATIVITY, UNLIMITED* in a maze game.

1. Go to *Disk Menu.* (Make sure the Creativity.Data Disk is in the drive.)

2. Using the ⌂ and arrow keys, move to Load Shapes. Press RETURN.

3. Load the set of shapes called SQUARES.

4. Move to Load Design and load the design called MAZE.

5. Exit the *Disk Menu* and go to *Creativity.*

6. Using the arrow keys, or the ⬤ key with the arrow keys, or E, S, D, F keys, move the
   small dot to the upper left-hand corner.

With younger children, just move through the maze, using the arrow keys. Have them
tell which direction they should go next.

The maze is constructed so that you can make it through by entering a pattern. Have
students find the pattern and go into Record Steps to enter the pattern of steps. As they
are entering the pattern, have them press SPACE BAR to leave a trail behind them.
When finished entering the pattern, move the square to the top and choose Repeat
Steps. If the pattern does not go through the maze correctly, go back and adjust your
steps. (You may want to Load Design again if the design gets too full of dots.)

After students are familiar with the maze, place the square someplace on the maze (in the middle of the design would be a good place). Tell them to memorize a way out of the maze. (Remember where you set the dot.)

- Next, Clear the design.
- Turn on Record Steps and see if they can remember how to get the dot through the maze. Turn off Record Steps when they think they have made it through.
- Exit *Creativity* and go to the *Disk Menu.*
- Go to Load Design and load MAZE again.
- Go back to *Creativity* and place the small dot where you set it before.
- Go to Repeat Steps and see how close the students got to going through the maze.

EXTENSIONS:

- Have students make their own mazes to challenge other students in the class. Use the sets of shapes in SQUARES to help them construct the mazes.
- Make pictures with or without patterns to their mazes (look at design MAZE.1 for more complicated patterns).
- Discuss with students how they would change the set of shapes in SQUARES to make it easier.
- Challenge students to make other types of games and puzzles using *CREATIVITY, UNLIMITED.*
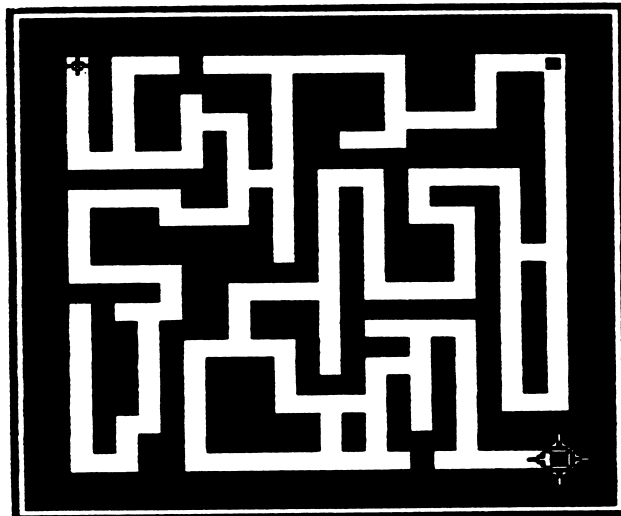
TITLE: PUZZLE

SUBJECT AREA: Problem Solving
                        Visual Perception
                        Sequencing

MATERIALS: *CREATIVITY, UNLIMITED*
                        Creativity.Data Disk
                        Student copies of Solving the Puzzle

GRADE LEVEL: 4 - 8

OBJECTIVES: 1. To be able to see how to solve a puzzle.
                        2. To determine the sequence of visual effects.

LESSON PLAN:

1. Explain to students that you are going to try to solve a puzzle. The puzzle is finding how you get from one shape to another.

2. Load the necessary items to start the puzzle.
    *   Go into the *Disk Menu* and move to Load Shapes.
    *   Load the set of shapes called PUZZLE.
    *   Go back to *Creativity*.
    *   Locate Shape 1 in the upper right-hand side of the design area.
    *   Place the image with the SPACE BAR.
    *   Move over so that the shape is not on top of the image.
    *   Change to Shape 2 and place it on the design area. Place all 8 shapes (1,2,3,4,5,6,7,8) across the top of the design area.

3. Now move the middle of the design area. Start with Shape 1. See if you can create Shape 2 from Shape 1.

    Answer: To change Shape 1 to Shape 2, press SPACE BAR to place the image. Move over 3 places to the right, press SPACE BAR again. You now have Shape 2.

4. Try to make your image into Shape 3.

    Answer: Move up 3 spaces, press SPACE BAR.

5. Try to create Shape 4.

    Answer: Move left 3 spaces, press SPACE BAR.

6. Try to create Shape 5.

   Answer: Move left 2 spaces, press SPACE BAR.

7. Try to create Shape 6.

   Answer: Move right 7 spaces, press SPACE BAR.

8. Try to create Shape 7.

   Answer: Move down 10 spaces, press SPACE BAR.

9. Try to create Shape 8.

   Answer: Move left 7 spaces, press SPACE BAR. Move the shape off your new image.

10. Have students load in the set of shapes PUZZLE.1 and try to create all of the shapes. Record their results on the activity sheet Solving the Puzzle.

EXTENSIONS:

Have students make up their own puzzles. Restrict them to two moves between the images. They will need to repeat the sequence in a new part of the design area to get the next shape. After all parts are defined, they can go into the *Shape Editor* and use Get Shape. Then, go to the *Disk Menu* and Save Shapes. Have students try to solve each other's puzzles.

SOLVING THE PUZZLE

1. Start with *CREATIVITY, UNLIMITED.*

2. Choose the *Disk Menu.*

3. Put in the Creativity.Data Disk.

4. Holding the ⌂ key and pressing the ↓ key, go to Load Shapes. Press RETURN.

5. Load in PUZZLE.1.

6. Go to Exit and press RETURN.

7. Choose *Creativity.*

8. Place all the shapes on the top of the design area. Choose Shape 1; press SPACE BAR. Move right. Select Shape 2; press SPACE BAR. Move right. Continue until you get all 7 shapes on the design area.

You start with Shape 1. Record what you have to do to get Shape 2, Shape 3, Shape 4, Shape 5, Shape 6, and Shape 7.

What actions did you take to get:

Shape 2:_____

_____

Shape 3:_____

_____

Shape 4:_____

_____

Shape 5:_____

_____

Shape 6:_____

_____

Shape 7:_____

_____

LESSON 8

TITLE: TESSELLATIONS OR MOSAICS

SUBJECT AREA: Art, Mathematics

MATERIALS: *CREATIVITY, UNLIMITED*
                      Creativity.Data Disk
                      Transparencies of:
                      • What is a Tessellation?
                      • How Do You Make Tessellations?
                      Student copies of More Tessellations

GRADE LEVEL: 7 - 12

OBJECTIVES: 1. To experiment with figures.
                      2. To understand what a tessellation is.
                      3. To create artistic patterns with tessellations.

LESSON PLAN:

1. Explain to students what a tessellation is using What is a Tessellation? on an overhead projector. Talk about which figures are tessellations and which are not.

2. Explain to students that in *CREATIVITY, UNLIMITED* you can create tessellations.

3. Show students How Do You Make Tessellations? on an overhead. Discuss how a tessellation is constructed.

4. Go into the *Disk Menu*. Make sure you have the Creativity.Data Disk in the drive.

5. Load the pattern of steps, FISH.PATTERN.

6. Go back to *Creativity*.

7. Type 8 for Shape 8 - it should look like a fish. If it does not, turn the computer off. Start *CREATIVITY, UNLIMITED* again. Repeat steps 4 - 6.

8. Go to Repeat Steps. Press RETURN.

9. Have students do the activity More Tessellations on their own or do it as a class activity.

EXTENSIONS
   • Have students make their own tessellations using the *Shape Editor*.
   • Have students find examples of tessellations in the school or at home.
   • Have students study the works of M. C. Escher.

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EXTENSIONS

1. Find at least ten examples of tessellations in the world around you. List their locations and make a small sketch of each pattern you found. What patterns were the most unusual?

2. Investigate the art work of M.C. Escher. Create an "Escher" type drawing by altering geometric figures.

3. Could a house or wall be built of bricks that do not tessellate? Explain your answer.

4. Make different types of quadrilaterals (e.g., rectangles, parallelograms, rhombuses, trapezoids, kites, and some that have no special shape) in the *Shape Editor.* Which ones can be tessellated? Choose your favorite and create a design.

5. Investigate what shape bees make the cells of their hives. How about wasps? Draw a picture of a bee hive or wasp nest using *CREATIVITY, UNLIMITED.* Where else in nature can you discover tessellations?

6. Investigate the work of architect Moshe Safdie. What shapes did he use in his designs? Build a model of a modular house or apartment based on Safdie's work.

7. Investigate the work of R. Buckminster Fuller. Create a miniature geodesic structure based on Fuller's work.

8. Research ancient mosaics. What shapes were used most often? Create a mosaic on *CREATIVITY, UNLIMITED.*
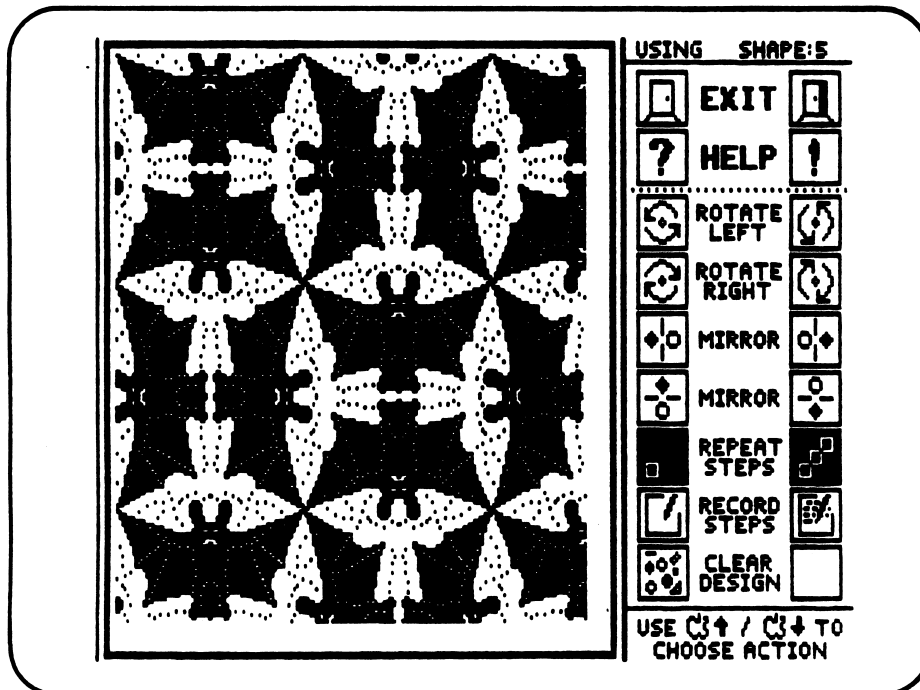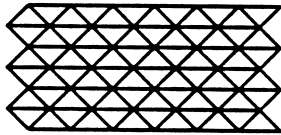
TESSELLATIONS

Tessellations are shapes that when put together have no spaces in between.
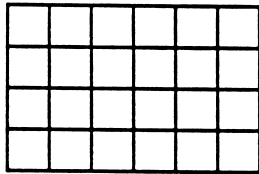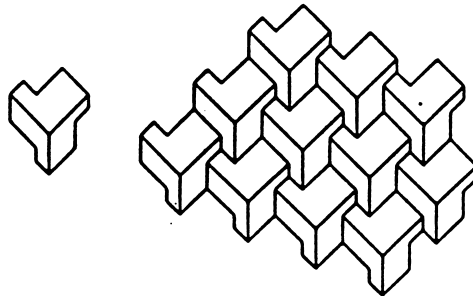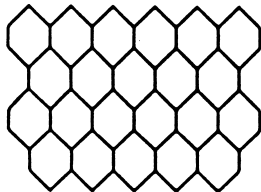
Most things are not tessellations.
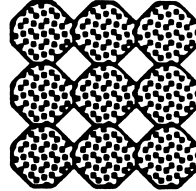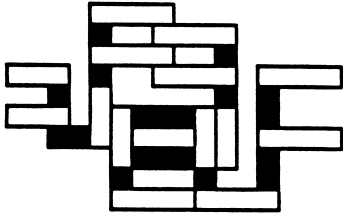
The simplest tessellation shapes are polygons.
All triangles are tessellation shapes.
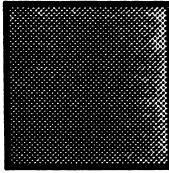
All quadrilaterals are tessellation shapes.

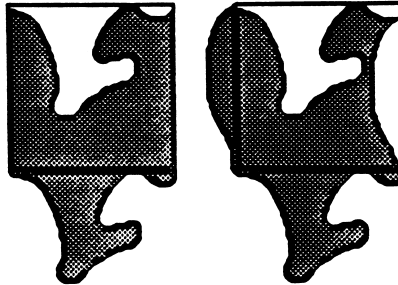Some hexagons are tessellation shapes.
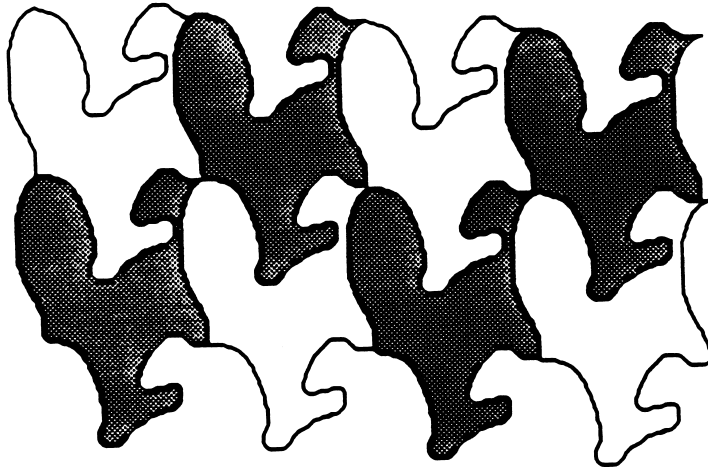
HOW DO YOU MAKE A TESSELLATION?

Start with a basic figure, like a square.

Cut out a section, like the white part in the example below. Attach it to another side of the figure. For example, the white part was attached to the bottom of the square. Continue the same process until you have a figure you like.

Check and make sure you have a tessellation.

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MORE TESSELLATIONS

1. Go to the *Disk Menu* and Load Shapes: TESSELLATIONS. (Make sure you have the Creativity.Data Disk in the drive.)

2. Look at the following shapes with the correlated patterns. Load the steps of the pattern from the *Disk Menu*.

3. Make sure the shape starts in the upper left hand corner.

Shape	With Steps	What Happened
1	FISH.PATTERN	_____
2	TESS2.PATTERN	_____
3	TESS3.PATTERN	_____
4	TESS4.PATTERN	_____
5	TESS5.PATTERN	_____
6	TESS6.PATTERN	_____
7	TESS7.PATTERN	_____
8	TESS8.PATTERN	_____
9	TESS9.PATTERN	_____

Mix the patterns with different shapes. What happens?

Which was your favorite shape and pattern?

Try making your own tessellation.

TITLE:	PRINTS
SUBJECT AREA:	Art
MATERIALS:	*CREATIVITY, UNLIMITED* Creativity.Data Disk Student copies of <u>Prints</u>
GRADE LEVEL:	4 - adult
OBJECTIVES:	1. To create original art. 2. To increase flexibility in thinking.

LESSON PLAN:

1. Show students some of the potentials of what they can do with *CREATIVITY, UNLIMITED* and how they can use it to make prints or drawings. Discuss how an artist would go about making a print. Discuss different types of art work.

2. Go into the *Disk Menu* and Load Shapes: PRINTS. Load Steps: PRINTS.PAUSE.

3. Go into *Creativity*. Move your shape (any one of the ten shapes) to the top left of the design area.

4. Go to Repeat Steps, press RETURN.

5. When the shape returns to its starting position, it will disappear.
   Use: Rotate left.
              Rotate right.
              Mirror horizontal.
              Mirror vertical.

6. When you see something in the corner that looks interesting, move to Repeat Steps and press RETURN.

7. Keep experimenting. Try moving a few steps over or a few steps down and repeat . Try different shapes.

8. Have students do the activity sheet, PRINTS. Have them guess what shape 5 will create.

EXTENSIONS

Have students experiment and make their own designs using the *Shape Editor*.

PRINTS

1. Go to the *Disk Menu* and Load Shapes: PRINTS. (Make sure you have the Creativity.Data Disk in the drive.)

2. Load Steps: PRINTS.PAUSE

3. EXIT to *Creativity.*

4. Move your shape to the top left corner of the design area.

5. Go to Repeat Steps, and press RETURN.

6. Try Rotating or Mirroring. When you see a design you like, Repeat Steps.

7. Save and Print your designs.

8. Continue to Rotate or Mirror.

9. Create your own shapes in the *Shape Editor* or Get Shapes off the design area. Repeat the patterns or your shapes.

10. Save and Print your design.

MYSTERY PRINT

1. Go to the *Disk Menu.*

2. Load Steps: PRINT5.PATTERN

3. Go back to *Creativity.*

4. Type 5 for shape 5.

5. Go to Repeat Steps. Press RETURN.

6. What did you see?_____

_____

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LESSON 10

TITLE: SYMMETRY

SUBJECT AREA: Art
                    Mathematics

MATERIALS: *CREATIVITY, UNLIMITED*
                    Creativity.Data Disk;
                    Student copies of <u>Symmetry</u>
                    Transparency of <u>Basic Operations of Symmetry</u>

GRADE LEVEL: 5 - adult

OBJECTIVES: 1. To teach students about symmetry.
                    2. To experiment with symmetrical figures.
                    3. To create original art.

LESSON PLAN:

1. Discuss with students the concept of symmetry. What is a symmetrical figure? A symmetrical figure is one that has repetitive parts.

2. Look at the activity sheet <u>Symmetry</u> and circle the figures that are symmetrical.

3. Discuss with students how you can repeat parts of the figure. There are four basic operations which create symmetrical figures. All two-dimensional symmetrical figures are repeated in one of these four ways. Use the activity sheet <u>Basic Operations of Symmetry</u>.

    <u>Translation</u>:   Moving the figure up, down, left, or right keeping the same orientation. In *Creativity*, can figures be translated?

    <u>Rotation</u>:   Turning the figure a certain number of degrees. In *Creativity*, the figure can be rotated at 90° intervals. You cannot rotate 60° or 45°.

    <u>Reflection</u>:   The shape is reflected over a mirror. That mirror can be placed at many different angles. In *Creativity*, the mirrors are horizontal or vertical so horizontal or vertical reflections can happen. In the *Shape Editor*, mirrors are placed at 45° angles.

   <u>Glide Reflection</u>: A figure which is both translated and reflected.

4. Have students look at the activity sheet <u>Symmetry</u>. For each figure that is symmetrical, have them classify the symmetry as a translation, rotation, reflection, or glide reflection.

5. Create symmetrical patterns in *CREATIVITY, UNLIMITED.* Have students classify them as Translations, Rotations, Reflections or Glide Reflections.

EXTENSIONS

Have students bring symmetrical patterns to class and make a bulletin board which emphasizes the four basic operations.
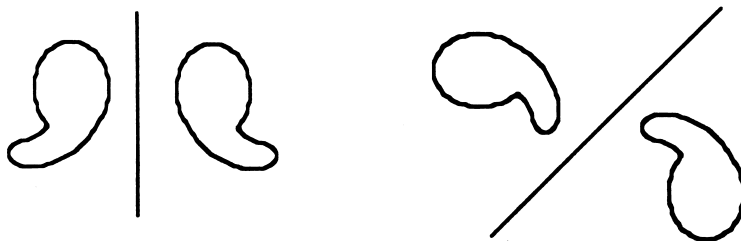
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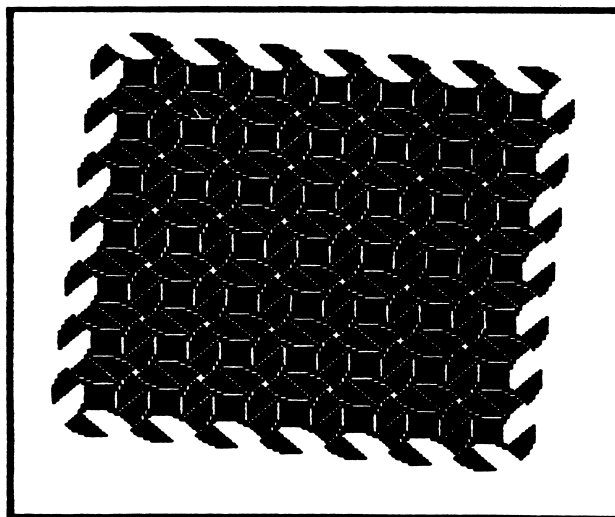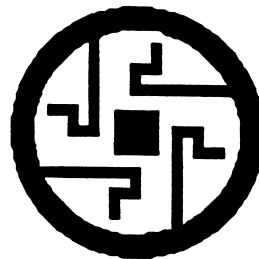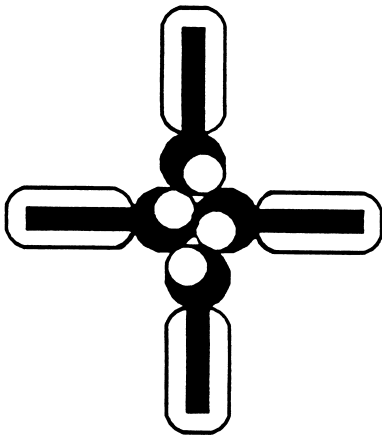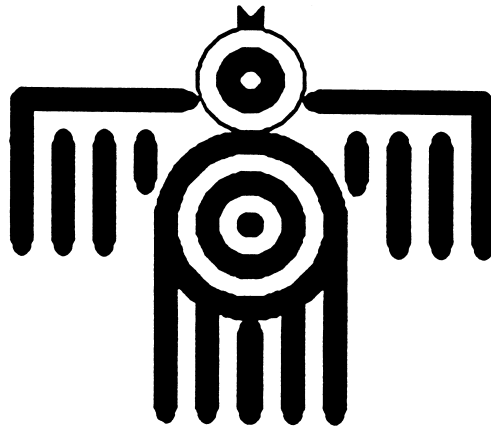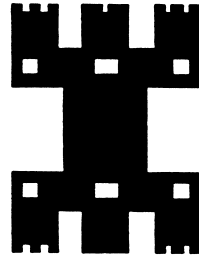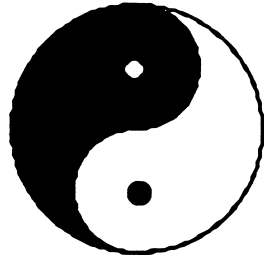
BASIC OPERATIONS OF SYMMETRY

TRANSLATION:

ROTATION:

REFLECTION:

GLIDE REFLECTION:

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LESSON 11

TITLE: BINARY LOGIC, XOR

SUBJECT AREA: Mathematics
Computer Science

MATERIALS: *CREATIVITY, UNLIMITED*
Student copies of GRID

GRADE LEVEL: 7 - 12

OBJECTIVE: To teach students binary logic; in particular, the concept of
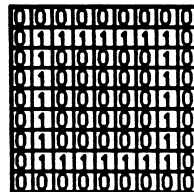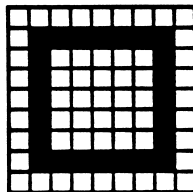"exclusive-or" -- XOR.

LESSON PLAN:

Introduce the unit by explaining that *CREATIVITY, UNLIMITED* makes use of a fundamental concept of computers called "exclusive -or," which is symbolized by XOR. The reason the object "disappears" when you stamp the image in, and then reappears as you move it is because the computer is "exclusive - or-ing" the shape onto its image. Also, the reason it disappears when you move the shape back on its identical image is because of "exclusive-or".

Demonstrate to the class using a shape. Show them how when you press SPACE BAR the image "disappears", then reappears as you move it off. Move the shape alongside its image in the design area. Now take the shape and move it back on the image. The shape and its image will "disappear" again. Tell students that today you are going to learn why this happens.

Use pencil-and-paper activities to help your students understand more about binary logic and the "exclusive-or" concept.

Make transparencies of GRID.

1. Explain to students how the square shape is represented on the grid. First show the squares darkened on the grid. Then explain that for every place there is color, a 1 is placed; for every blank, there is a 0. The drawing of a square would look something like this:

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2. Tell students the "arithmetic" of binary numbers when doing an "exclusive-or" is as follows:

$$0 + 0 = 0$$
$$0 + 1 = 1$$
$$1 + 0 = 1$$
$$1 + 1 = 0$$

Any dot on the screen (pixel) can either be designated as a 1 (on) or a 0 (off), but not both. When a pixel is turned on (1) and you place another pixel on top of it that is turned on (1), it will go off (1 + 1 = 0). When you have a pixel that is off and you place a pixel that is on (0 + 1), the pixel will be on. What happens, then, when a figure is placed on top of itself? All of the 1's are added to other 1's, resulting in 0's. And all the 0 + 0 = 0. The figure disappears. Make a second copy of the grid and place them over each other on the overhead. Remember, only if there is a 0 below and 1 above, will a dot be turned on.

Now move the drawing of the top grid to the right one space.

Take all the 1's that are over 0's and make 1. The 0 + 0 and 1 + 1 make 0. What would the new drawing look like? Fill in the grids at the bottom of the activity sheet GRID.

Now, change that back to a graphic representation.

0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	1	0
0	1	1	0	0	0	1	1	0
0	1	1	0	0	0	1	1	0
0	1	1	0	0	0	1	1	0
0	1	1	0	0	0	1	1	0
0	1	1	0	0	0	1	1	0
0	1	0	0	0	0	0	1	0
0	0	0	0	0	0	0	0	0
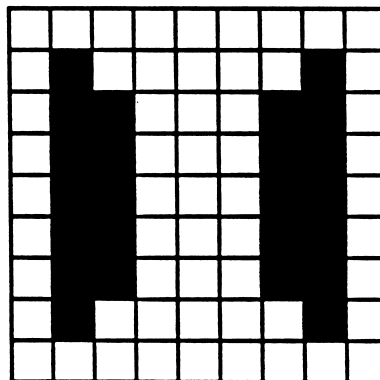
Use Shape #2 on *Creativity* to show students how this works on the screen.

- Get the square by pressing the number 2.
- Move the square on the design area. Press SPACE BAR. Notice the square disappears.
- Move the square one space to the right. Look at the *Creativity* design area compared to the drawings on the overhead.

Have students anticipate what the screen will look like if:

You press SPACE BAR and move one space to the right.

You move one space to the right without pressing the SPACE BAR.

EXTENSIONS

Have the students draw a shape in the *Shape Editor*. Draw the shape also on graph paper. Try to anticipate what will happen to the figure. Can they make their shape disappear? Can they make it look 3-dimensional? Can they make it look lacier? or more solid?

After each student has had a turn using the program, discuss binary logic and the "exclusive-or" concept once again. Your students should understand the concept more clearly. They should also have a better understanding of how this concept makes *CREATIVITY, UNLIMITED* possible. They'll be ready to use the program in new and more complex ways.

GRID
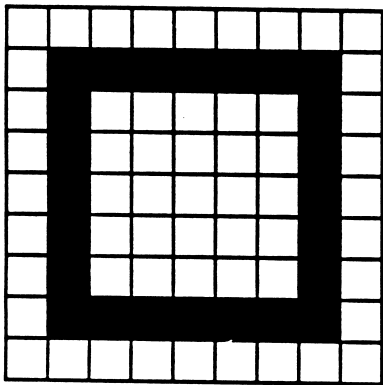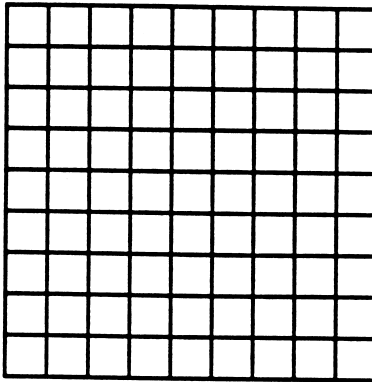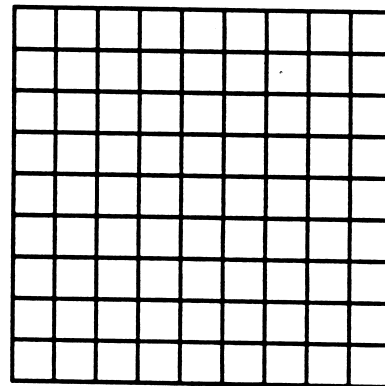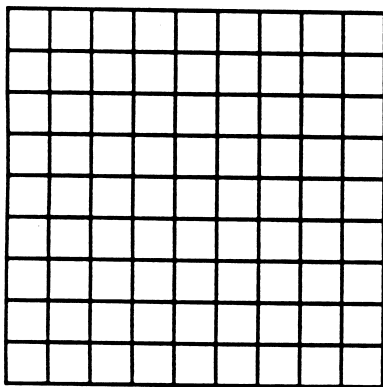
SOME OBSERVATIONS FROM FIELD TESTING

1. The students may have some difficulty in using the Open-Apple keys in the beginning. They will become adept with it over time.

2. Students' imaginations and creativity is amazing. Let them go.

3. Students will have difficulty understanding why the image disappears when you press Space Bar. You need to explain this to them.

4. When students have a pattern in the design area, try moving the shape a few spaces·over or rotating it and seeing the effect it makes.

5. Have students invent games they can play with *Creativity*.

APPLE: WORKING WITH THE COMPUTER

TURNING ON 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 off in about ten seconds, turn the Apple off and make sure your diskette is placed correctly in the disk drive.

6. The SUNBURST logo will appear on the screen.

7. Follow directions given in the program.

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

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.

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 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.