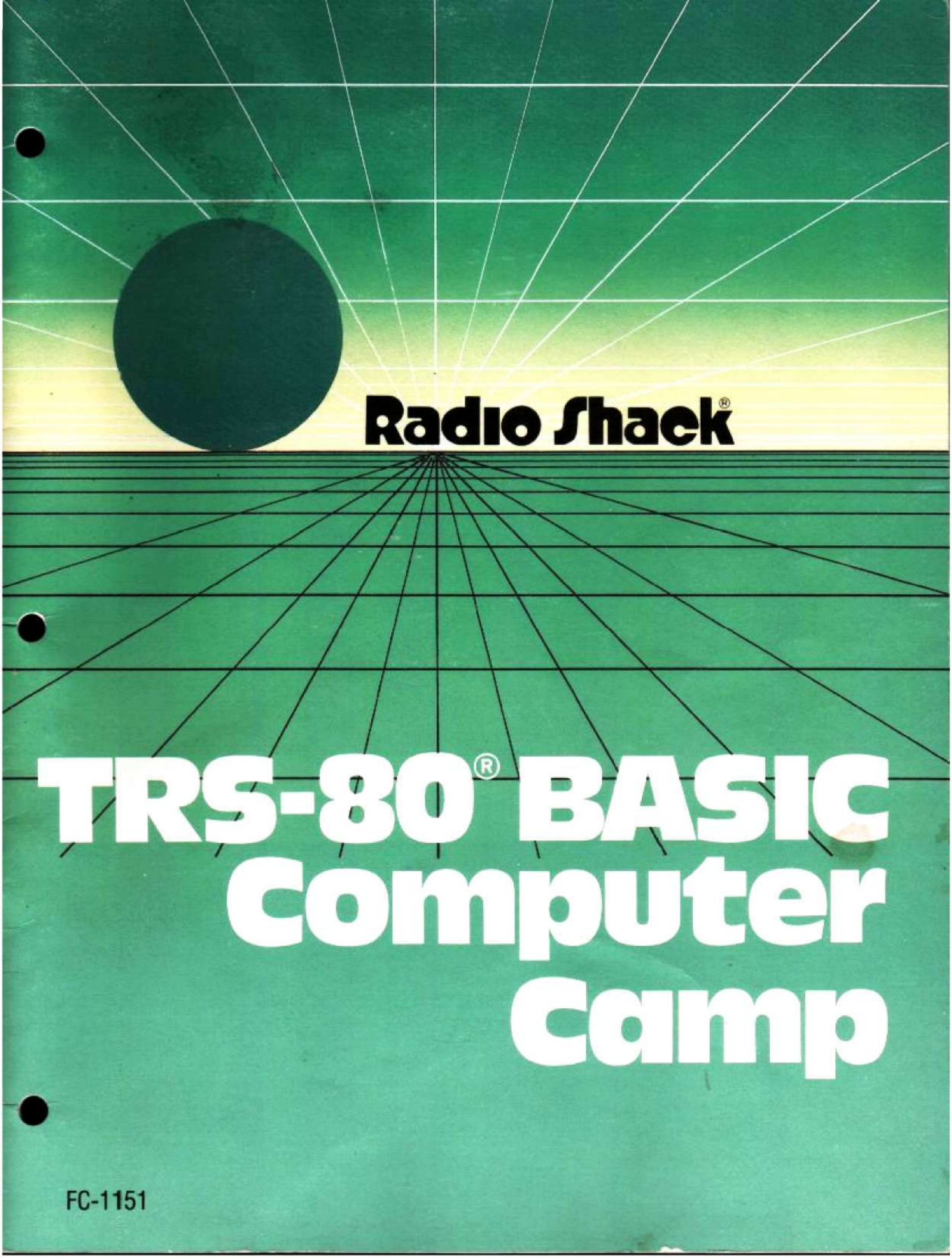

TRS-80® BASIC Computer Camp

FC-1151

STUDENT'S GUIDE

TRS-80® BASIC Computer Camp (BASIC Camp)

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Stock #FC-1151

Printed 5/83

This coordinated note-taking guide was specifically designed for use in conjunction with Radio Shack Computer Training Programs Course FC-1150.

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Fort Worth, TX 76102, U.S.A.

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COURSE OVERVIEW

This course is designed to introduce you to computers and computer programming languages. You will learn the history of computers, how to operate the TRS-80 Color Computer, and how to write simple programs in BASIC and LOGO.

BASIC PROGRAMMING

LESSON 1
OBJECTIVES

Upon successful completion of this lesson, you will be able to:

1. Explain what the word BASIC stands for.
2. Create sound on the computer.
3. Write programs that ask questions and then react to the responses.
4. Write programs that count forwards and backwards.
5. Change parts of a program line by editing.
6. Change the color of the television screen.

BASIC

BASIC stands for:

B _____

A _____

S _____

I _____

C _____

REVIEW

_____ will display information on the television screen. It may be abbreviated as **?**.

_____ will make the computer do the instructions (called a program) stored in memory.

_____ will display the program stored in memory.

_____ will erase the program stored in memory.

SOUND

Type this program into the computer. Be sure to enter **NEW** first.

```
10 T = 100
20 L = 5
30 SOUND T,L
```

The word SOUND in line 30 tells the computer to make a sound. The letters T and L tell it the kind of sound and how long to play it.

If you make T bigger, the sound gets _____ in pitch.

If you make L bigger, the sound is heard _____.

INPUT

Type this program into the computer. Be sure to enter **NEW** first.

```
10 CLS
20 INPUT "WHAT TONE"; T
30 INPUT "HOW LONG"; L
40 SOUND T, L
50 GOTO 20
```

CLS in line 10 tells the computer to _____ the screen.

INPUT tells the computer to _____ a question and _____ for the answer.

GOTO tells the computer to go to a certain _____ number.

ALL OF THE SOUNDS

This program will play all of the sounds the computer can make.

```
10 CLS
20 T = T + 1
30 SOUND T, 1
40 GOTO 20
```

This program will RUN as long as T is less than 255. Then the computer tells us we have an error.

To fix this, change line 40 to be:

```
40 IF T<255 THEN 20
```

The new line 40 tells the computer to _____ line 20 as long as T is

_____ than 255.

SOME OF THE SOUNDS

Write a program that will play the sounds 5, 10, 15, etc.

_____

_____

_____

_____

Enter this program into the computer and then RUN it to see if it will work.

COUNTING WITH SOUNDS

Type this program into the computer. Be sure to enter **NEW** first.

```
10 CLS
20 FOR T = 1 TO 255
30 PRINT T;
40 NEXT T
```

This program will count from _____ to _____.

Now add this line to the program:

```
35 SOUND T, 1
```

When the program is RUN, the computer will display the _____ and

then play the _____.

COUNTING BACKWARDS

Retype line 20 of the program to be:

```
20 FOR T = 1 TO 255 STEP 2
```

When the program is RUN, the computer now counts by _____

Try this:

```
20 FOR T = 1 TO 255 STEP 14
```

And this:

```
20 FOR T = 255 TO 1 STEP -1
```

When this program is RUN, the computer counts _____ by 1's.

EDITING

Type in this one line program. Be sure to enter **NEW** first.

```
10 PRINT "THIS IS A TEST"
```

This line can be changed without being retyped by editing. To enter the Edit Mode on this line,

enter EDIT 10 .

The keyboard will act differently while editing. Pressing a single key (without pressing ENTER) will perform most functions. Try these keys and see what they will do. Remember, do not press ENTER.

L SPACEBAR ←

EDITING
(CONT'D)

You should still be in the Edit Mode, and line 10 should look like this:

```
10 PRINT "THIS IS A TEST"
```

Follow these steps to add the word GOOD before the word TEST.

1. Press the SPACEBAR or the ← to bring the flashing cursor to the T at the beginning of TEST. (The cursor will cover the T.)

2. Press I (this means Insert).

3. Type the word GOOD and then press the SPACEBAR once to separate the words. Do not press ENTER.

4. Press SHIFT ↑ together. (This will tell the computer to stop inserting.)

5. Press L to list the new line.

You should still be in the Edit Mode, and line 10 should look like this:

```
10 PRINT "THIS IS A GOOD TEST"
```

This time, put the word VERY before the word GOOD using the same procedure as before.

Line 10 should look like this when you are done:

```
10 PRINT "THIS IS A VERY GOOD TE
ST"
```

You should still be in the Edit Mode, and line 10 should look like this:

```
10 PRINT "THIS IS A VERY GOOD TE
ST"
```

Follow these steps to remove THIS IS from the line.

1. Press the (SPACEBAR) or the (←) to bring the flashing cursor to the T at the beginning of THIS. (The cursor will cover the T.)

2. There are four letters in THIS, two letters in IS, and one space after each word. By adding 4 + 2 + 1 + 1, there are 8 characters to be deleted.

3. Type (8) (D). Do not press (ENTER).

4. Press (L) to list the new line.

You should still be in the Edit Mode, and line 10 should look like this:

```
10 PRINT "A VERY GOOD TEST"
```

This time, delete the word VERY using the same procedure as before.

Line 10 should look like this when you are done:

```
10 PRINT "A GOOD TEST"
```

To exit from editing and to return to the Command Mode, press (ENTER).

COLORS

Type in this program. Be sure to enter **NEW** first.

```
10 INPUT "WHAT COLOR (0-8)"; C
20 CLS (C)
30 FOR A = 1 TO 1000
40 NEXT A
50 GOTO 10
```

CLS all by itself tells the computer to clear the screen.

CLS (C) will clear the screen and _____ the color.

How many colors are there? _____

LESSON 2
OBJECTIVES

Upon successful completion of this lesson, you will be able to:

1. Explain what the READ and DATA statements do.
2. Explain what PCLEAR, PCLS, and PMODE do in the TRS-80 Color Computer.
3. Explain the system of points on the television screen.
4. Explain the two color sets available for graphics.
5. Write programs to create lines on the television screen.
6. Write programs to create circles on the television screen.
7. Use the PAINT statement to color in large areas on the screen.

REVIEW

Enter this program from the previous lesson. Be sure to enter **NEW** first.

```
10 CLS
20 INPUT "WHAT TONE"; T
30 INPUT "HOW LONG"; L
40 SOUND T, L
50 GOTO 20
```

RUN the program and answer the questions with:

89, 5, 133, 5, 159, 5,
176, 10, 159, 5, 176, 10
(BREAK)

Would it be easy to play a song doing this? _____

READ/DATA

This program will play the song the other program couldn't. Type in this program. Be sure to enter **NEW** first.

```
10 DATA 89,5, 133,5, 159,5
20 DATA 176,10, 159,5, 176,10
30 FOR N = 1 TO 6
40 READ T, L
50 SOUND T, L
60 NEXT N
```

The computer will store answers to questions in a _____ line and will

get those answers with a _____ line.

P WORDS

_____ will set aside a portion of memory for one to eight graphic segments; e.g., PCLEAR 8 will reserve eight graphic segments.

_____ will clear the graphic screen in the same way CLS clears the regular screen; e.g., PCLS 2 will clear the graphic screen and set the background to color number 2.

_____ will tell the computer how much detail and how many colors are wanted on our graphic pages as well as the desired page number; i.e.,

x:	*y*:	resolution:	colors:	segments:
0	1-8	low	two	one
1	1-4	low	four	two
2	1-4	medium	two	two
3	1-2	medium	four	four
4	1-2	high	two	four

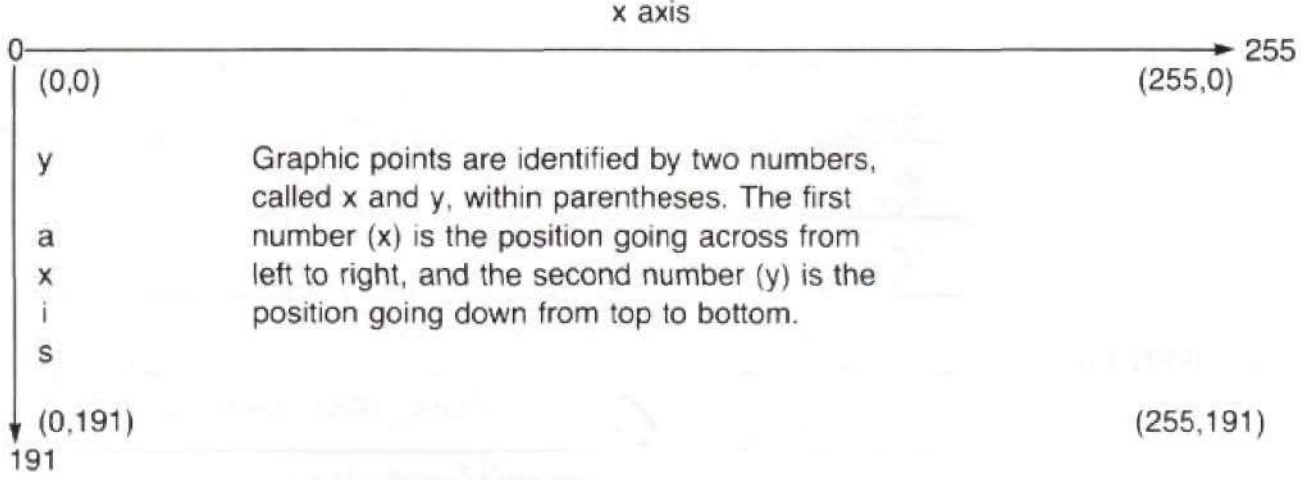
SCREEN & COLORS

The *x* will tell the computer to display a text page or a graphics page, and *y* will select the colorset to use; e.g., SCREEN 1,1 will display a graphic page using colorset 1.

x:	*y*:	text screen:	2-color graphics:	4-color graphics:
0	0	Black/Green		
0	1	Red/Orange		
1	0		Black/Green	Green/Yellow Blue/Red
1	1		Black/Buff	Buff/Cyan Magenta/Orange

SCREEN DIMENSIONS

The television screen is set up like a grid when used for graphics.



Graphic points are identified by two numbers, called x and y, within parentheses. The first number (x) is the position going across from left to right, and the second number (y) is the position going down from top to bottom.

The top left corner of the screen is called (_____ , _____).

The top right corner is (_____ , _____), bottom left is

(_____ , _____), and the bottom right corner is

(_____ , _____).

LINES

Type in this program that will demonstrate the graphic statements used so far. Be sure to enter **NEW** first.

10 PCLEAR 4

20 PMODE 0,1

30 PCLS

40 SCREEN 1,0

50 LINE (0,0) – (255,191),PSET

60 GOTO 60

BOXES

Change line 50 in our program to be:

```
50 LINE (50,40)-(200,150),PSET
```

This will draw a line starting at point _____ and ending at point

_____.

Change line 50 to be:

```
50 LINE (50,40)-(200,150),PSET,B
```

The B at the end of line 50 changes the line into a _____.

Change line 50 to be:

```
50 LINE (50,40)-(200,150),PSET,BF
```

The BF at the end of line 50 changes the line into a _____.

TWO BOXES

Write a program that will draw two boxes on the screen, one of them inside the other. Hint: one box will have its far corners at (50,40) and (200,150), and the other box will have its far corners at (100,80) and (150,100).

CIRCLES

Type in this program. Be sure to enter **NEW** first.

```
10 PCLEAR 4 : PMODE 3,1
20 PCLS : SCREEN 1,0
30 X = 128 : Y = 96
40 CIRCLE (X,Y), 75
50 GOTO 50
```

When this program is RUN, it will draw a circle on the screen.

In line 40, the X and the Y tell the computer where the _____ of the circle

is. The 75 tells the computer _____ from the center to draw the circle.

CIRCLES AND COLORS

Add these lines to our program:

```
35 FOR R = 0 TO 90 STEP 10
40 CIRCLE (X,Y), R
45 NEXT R
```

This will draw several circles on the screen. The center of each circle is the same, but the Radius (distance from the center) increases by 10's.

Change line 40 to be:

```
40 CIRCLE (X,Y), R, 3
```

The number after the R in line 40 tells the computer the _____ to use when drawing the circle.

This chart shows which colors are assigned to which numbers:

Number	Colorset 0	Colorset 1
0	Red	Orange
1	Green	Buff
2	Yellow	Cyan
3	Blue	Magenta

PAINT

Type in this program. Be sure to enter **NEW** first.

```
10 PCLEAR 4 : PMODE 3,1
20 PCLS : SCREEN 1,0
30 LINE (0,0) - (255,191),PSET
40 LINE (0,191) - (255,0),PSET
90 GOTO 90
```

What will this program do? _____

Add this line to the program:

```
50 PAINT (100,0), 3, 0
```

This line will paint an area of the screen using color 3 (blue) until it reaches a color 0 (red) border. The number within the parentheses tells the computer where the painting is to begin.

MORE PAINT

Add these lines to the program:

```
60 PAINT (255,100), 2, 0
70 PAINT (100,191), 1, 0
80 PAINT (0,100), 0, 0
```

When this program is RUN, the computer should paint each of the triangles a different color.

Is the bottom triangle painted? _____

What color is it painted? _____

PAINT EXERCISE

Write a program that will draw a circle with a radius of 70 on the screen. Then have the computer paint the inside of the circle blue and the outside of the circle red. Hint: blue is color 3 and red is color 0.

Enter this program into the computer and then RUN it to see if it will work.

LESSON 3
OBJECTIVES

Upon successful completion of this lesson, you will be able to:

1. Explain the use of a subroutine.
2. Use string-packing to create special characters.
3. Create animation on the TRS-80 Color Computer.

SUBROUTINES

A subroutine is a little program within a larger program. To tell the computer to go to the subroutine, the _____ statement is used.

Type in these program lines. Be sure to enter **NEW** first.

```
100 INPUT "WHAT COLOR (0-8)"; C
110 CLS(C)
120 FOR X=1 TO 1000: NEXT X
130 RETURN

200 INPUT "WHAT TONE"; T
210 INPUT "HOW LONG"; L
220 SOUND T,L
230 RETURN

300 PCLS: SCREEN 1,0
310 CIRCLE(128,96),70
320 PAINT(128,96),3,0
330 PAINT(0,0),0,0
340 FOR T = 1 TO 1000: NEXT T
350 RETURN
```

SUBROUTINES
(CONT'D)

Add these lines to the program in memory:

```
10 PCLEAR 4: PMODE 3,1
15 CLS : PRINT TAB(10) "MENU"
20 PRINT : PRINT "1 - COLOR TEST"
25 PRINT "2 - SOUND TEST"
30 PRINT "3 - GRAPHIC TEST"
35 PRINT "4 - END"
40 PRINT : INPUT "ENTER YOUR CHOICE"; A
45 IF A=1 THEN GOSUB 100
50 IF A=2 THEN GOSUB 200
55 IF A=3 THEN GOSUB 300
60 IF A=4 THEN END
65 GOTO 15
```

These lines add a menu to the program and tie the subroutines together. **RUN** the program to see how it works.

STRINGS

A string variable is one that contains a "string" of characters instead of numeric values. This type of variable is identified by a **$** after the variable name.

Type in this program. Be sure to enter **NEW** first.

```
10 INPUT "WHAT IS YOUR NAME"; A$
20 A$ = A$ + " "
30 PRINT A$;
40 GOTO 30
```

STRING PACKING

Type in this program. Be sure to enter **NEW** first.

```
10 A$ = "CAMP "
20 B$ = "FUN "
30 C$ = "IS "
40 D$ = "COMPUTER "
50 E$ = D$ + A$ + C$ + B$
60 PRINT E$
```

Line 50 connects the words to form _____.

ANIMATION

Type in this program. Be sure to enter **NEW** first.

```
 10 PCLEAR 8
 20 FOR P = 1 TO 8
 30 PMODE 0,P
 40 PCLS
 50 LINE (128,0)-(138,10+(P-1)*15), PSET
 60 CIRCLE(128,P*15),15
 70 NEXT P
200 INPUT "WHAT PAGE (1-8)";P
210 PMODE 0,P: SCREEN 1,0
220 FOR T = 1 TO 500: NEXT T
230 GOTO 200
```

When this program is RUN, lines 10 through 70 create a different picture on each of the eight graphic pages. Lines 200 through 230 will display those pages one at a time.

Add these lines to the program in memory:

```
 80 FOR P = 1 TO 8: GOSUB 110: NEXT P
 90 FOR P = 7 TO 1 STEP -2: GOSUB 110: NEXT P
100 GOTO 80
110 PMODE 0,P
120 SCREEN 1,0
130 FOR T = 1 TO 10: NEXT T
140 RETURN
```

Lines 80 and 90 tell the computer which pages to display. Lines 110 through 140 display the pages on the screen.

COLOR LOGO

LESSON 4
OBJECTIVES

Upon successful completion of this lesson, you will be able to:

1. Answer the question "What is LOGO?"
2. Explain the four modes of LOGO operation.
3. Understand the meaning of a procedure.
4. Enter and run a LOGO procedure.

INTRODUCING LOGO

LOGO is a _____ that can be used to draw pictures with a shape called a _____.

We give the _____ instructions to move in different ways. The instructions to the TURTLE are called a _____.

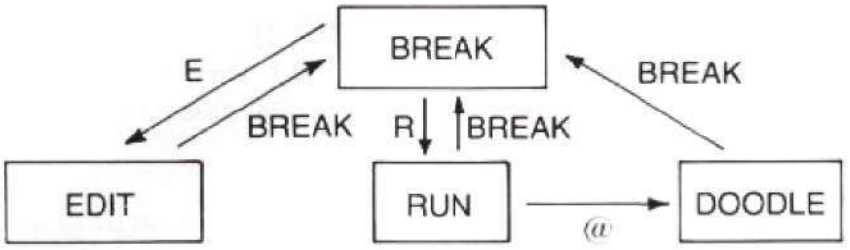
MODES IN LOGO

LOGO is divided into sections that do specific jobs.

These sections are called _____.

The MODES are called _____, _____,

_____, and _____.



STARTING LOGO

Turn on the television set.

Select the proper channel (3 or 4).

Set the antenna switch to "COMPUTER."

Insert the _____ into the slot on the

right side and with the _____.

Turn on the computer.

LOGO will be executed automatically.

INTRODUCING THE TURTLE

Your screen should display:

COLOR LOGO COPYRIGHT 1982
LARRY KHERIATY & GEORGE GERHOLD
LICENSE TO TANDY CORP
ALL RIGHTS RESERVED

LOGO:

To get into the RUN MODE, press _____.

SOME TURTLE COMMANDS

Enter each of the following commands:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

PROCEDURES

Press _____ to enter the EDIT MODE.

Enter _____ on one line.

Enter _____.

Enter _____ on a line by itself to end the procedure.

Press _____.

Press _____ to enter the RUN MODE.

Enter _____ to execute the procedure.

Enter _____ several more times.

PROCEDURES
(CONT'D)

Press _____ to enter the EDIT MODE.

Press _____ until you see END on the screen.

Press _____ to enter a blank line.

Enter _____.

Enter _____.

Enter _____.

Press _____.

Press _____.

Enter _____.

PROCEDURES
(CONT'D)

Press _____ to enter the EDIT MODE.

Enter _____.

Enter _____.

Enter _____.

Press _____.

Press _____.

Enter _____.

THE DOODLE MODE

The DOODLE MODE lets you _____ with special keys.

From the RUN MODE, press _____ to enter the DOODLE MODE.

When you see a " = " sign, enter a _____ for the procedure.

KEY:	MEANING:
1	Clear Screen
2	Home TURTLE
3	Pen Up (no trail)
4	Pen Down (leave trail)
5	Sharp Right Turn
6	Sharp Left Turn
7	Forward Small Amount
8	Forward Large Amount
9	Small Right Turn
0	Small Left Turn

OTHER FEATURES

Some additional features of COLOR LOGO are:

Variables

Multiple TURTLEs

Speed control

Different COLORSETs

Different PEN colors

Make the TURTLE visible or invisible

Use input from the joysticks

Define a different TURTLE shape

F and ELSE conditional statements

And much, much more!

THANK YOU FOR ATTENDING

TRS-80

BASIC COMPUTER CAMP

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