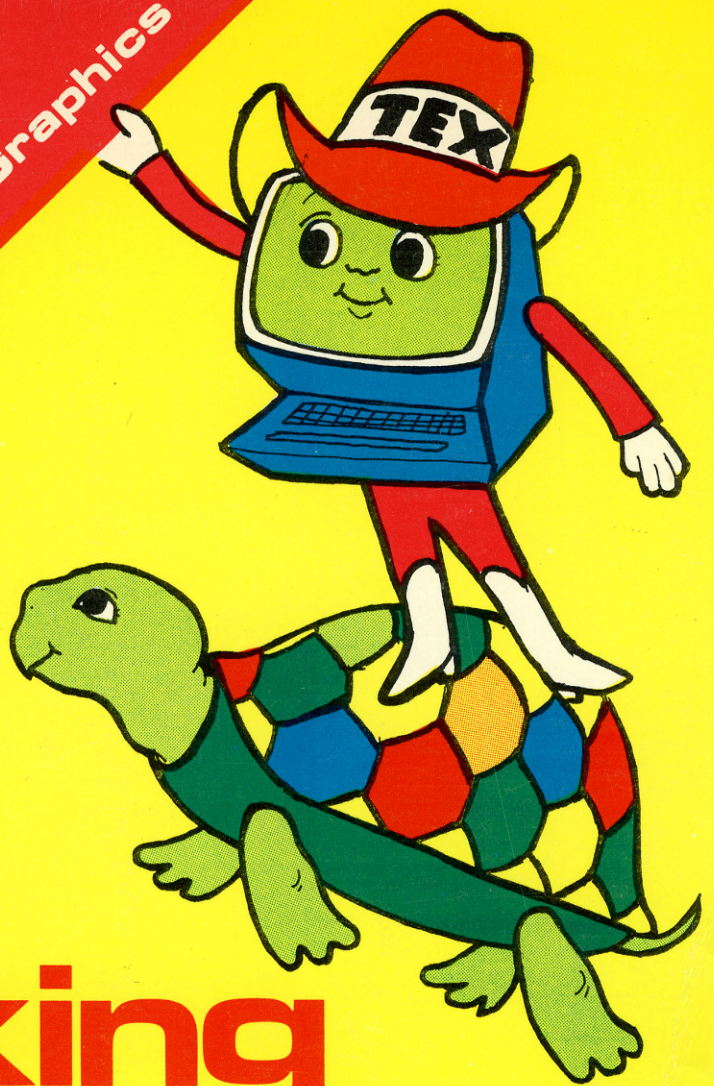


The
**Texas
Instruments
LOGO**
Manual For Turtle & Sprite Graphics



kids working with computers

**Lynne Mass
Joseph Kuffler
Michael Rubin
Debbie Toll**

TRILLIUM
PRESS

KIDS WORKING WITH COMPUTERS

**A Texas Instruments LOGO
Manual for Graphics**
(TI 99/4A)

**Lynne Mass
Joseph Kuffler
Michael Rubin
Debbie Toll**

Trillium Press
New York

This manual is dedicated to Michael Goldberg, a high school student at Abington Friends School, Jenkintown, PA. In his tenth and eleventh grade years, Michael was our mentor and inspiration as we began learning programming skills. Without his help and selfless guidance, this book would not have been possible!

A note about the authors and the manual:

Joe, Michael, and Debbie were 11 years old and had just finished fifth grade at Abington Friends School, Jenkintown, PA., when we developed this manual. I was their science teacher, who learned LOGO with them. Some things I learned first and taught them; some things they learned first and taught me.

We have included the most basic elements of turtle graphics for your enjoyment, intending that this manual should be used flexibly, consistent with the philosophy of LOGO. Explore the computer with it, as you would the outdoors with a compass. Go in different directions as you experiment with color graphics. Skip around and through the pages. YOU are in charge in the world of LOGO.

Cover and illustrations by Lori Schlendorf & Lynne Mass
Illustration assistance by Suzanne Rubin

Special thanks to Tom Lough, Editor of the National LOGO Exchange, for permitting us to cite the address of the National LOGO Exchange and for his extensive and helpful comments.

Trillium Press is indebted to Texas Instruments Inc. for supplying an advance copy of LOGO II.

We wish to thank particularly Bill Barniea of TI for his support and help in the preparation of this and other TI books.

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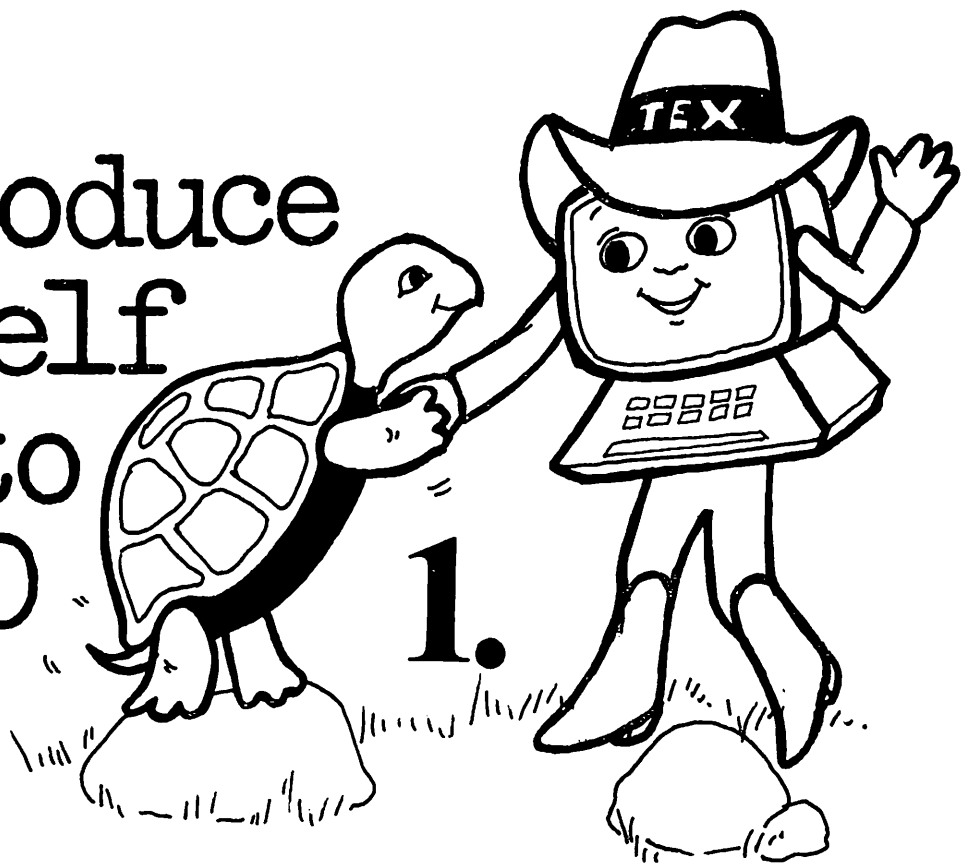
Trillium Press
Box 921
New York, N.Y. 10159
(212) 505 1440/1

Printed in U.S.A.
ISBN: 0-89824-074-3

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Introduce Yourself to LOGO



TO START:

1. Place the "LOGO" cartridge in the cartridge slot.
2. Turn on Peripheral Expansion System.
Turn on computer. Turn on monitor.
3. Screen will tell you to press any key to begin.
4. Next screen will tell you to press

1 FOR TI BASIC
2 FOR TI LOGO II

5. Press 2 and the screen will show you

WELCOME TO TI LOGO!
?_

When you see the ?_ , you can start typing.

IMPORTANT KEYS

? is the prompt.

When it shows, it means you can start typing.

FCTN 3 is the erase key.

When **FCTN** and 3 are pressed at the same time, you can go back over mistakes and correct them.

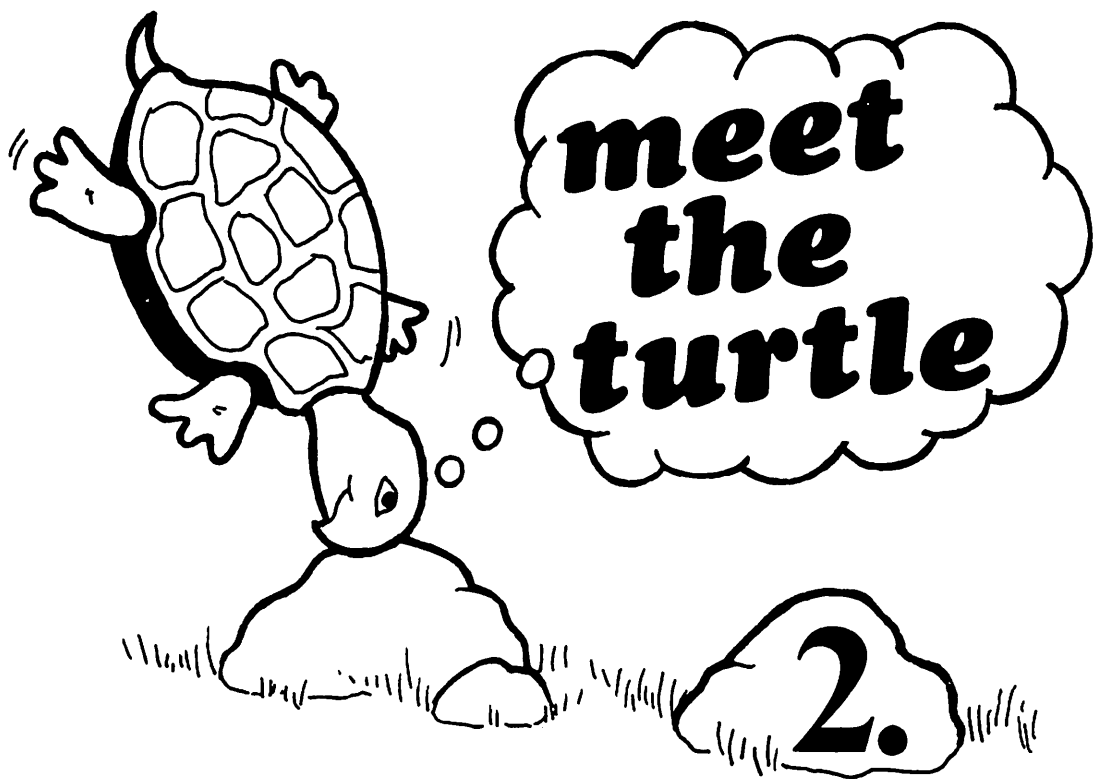
ENTER allows the cursor (blinking line) to go to the starting position and tells the computer it should try to obey the commands.

FCTN (Function) allows you to type the symbols on the front side of the keys. For example:

FCTN + R = [

FCTN + T =]

For a list of functions, see pp. 27 & 28.



In order to meet your turtle, type:

TELL TURTLE

You now have a triangle pointing up
on your screen that looks like this 

It can draw things
that you command it
to draw... try this:

FORWARD 30 then press **ENTER**.

What happens?

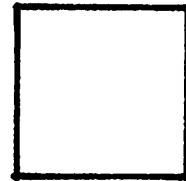
What happens if you don't put a space between `FORWARD` & the number?

- Try other numbers.
- Try `LEFT` & `RIGHT` commands with different numbers.

To get rid of everything you have drawn on the screen, type:

`CLEARSCREEN` or `CS`

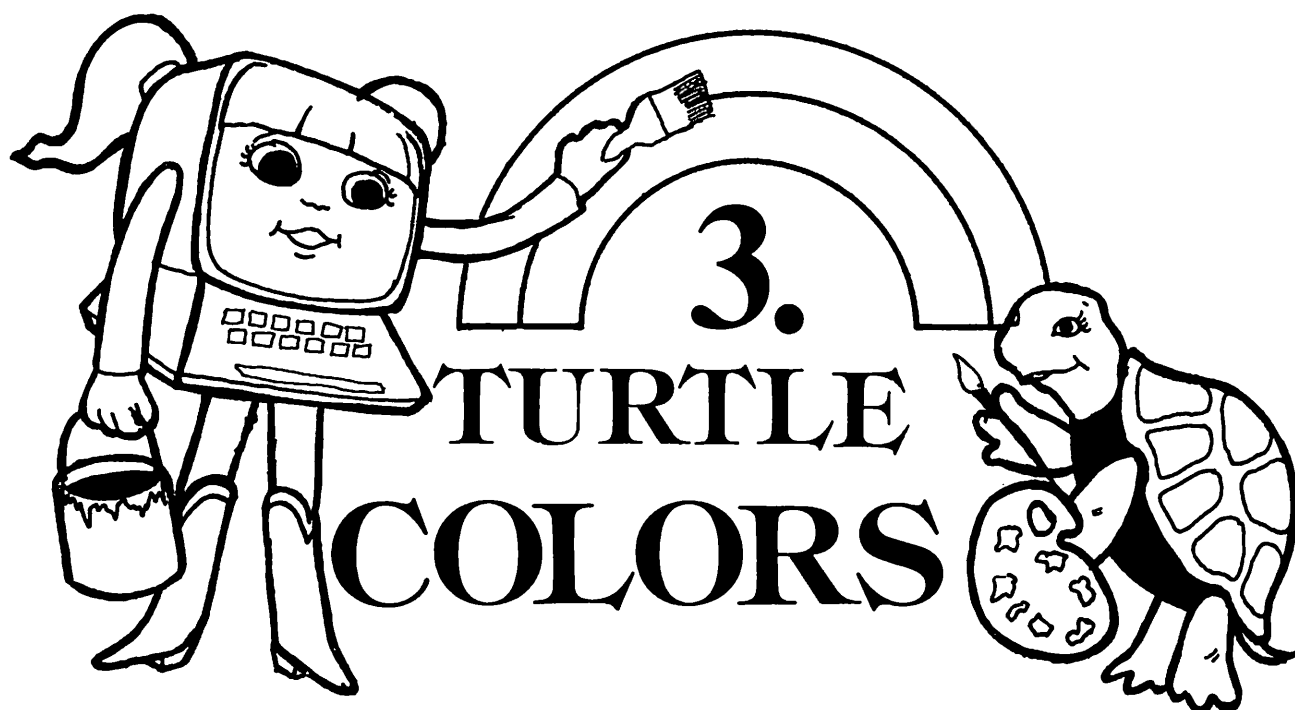
PRACTICE THIS LESSON
AND TRY TO DRAW A SQUARE



WHAT CAN YOUR TURTLE DO?

Your LOGO turtle can move:

forward	} these have abbreviations...	FD
back		BK
right		RT
left		LT



Can turtle drawings be colorful?
Oh, yes!

If you have a color monitor, you can have a background color and a pencolor using code numbers for the colors.

The <u>color codes</u> are:		
0 = CLEAR	6 = RED	12 = OLIVE
1 = BLACK	7 = CYAN	13 = PURPLE
2 = GREEN	8 = RUST	14 = GRAY
3 = LIME	9 = ORANGE	15 = WHITE
4 = BLUE	10 = YELLOW	
5 = SKY	11 = LEMON	

You can use short-cut codes for background color and pen colors, also.

Try this:

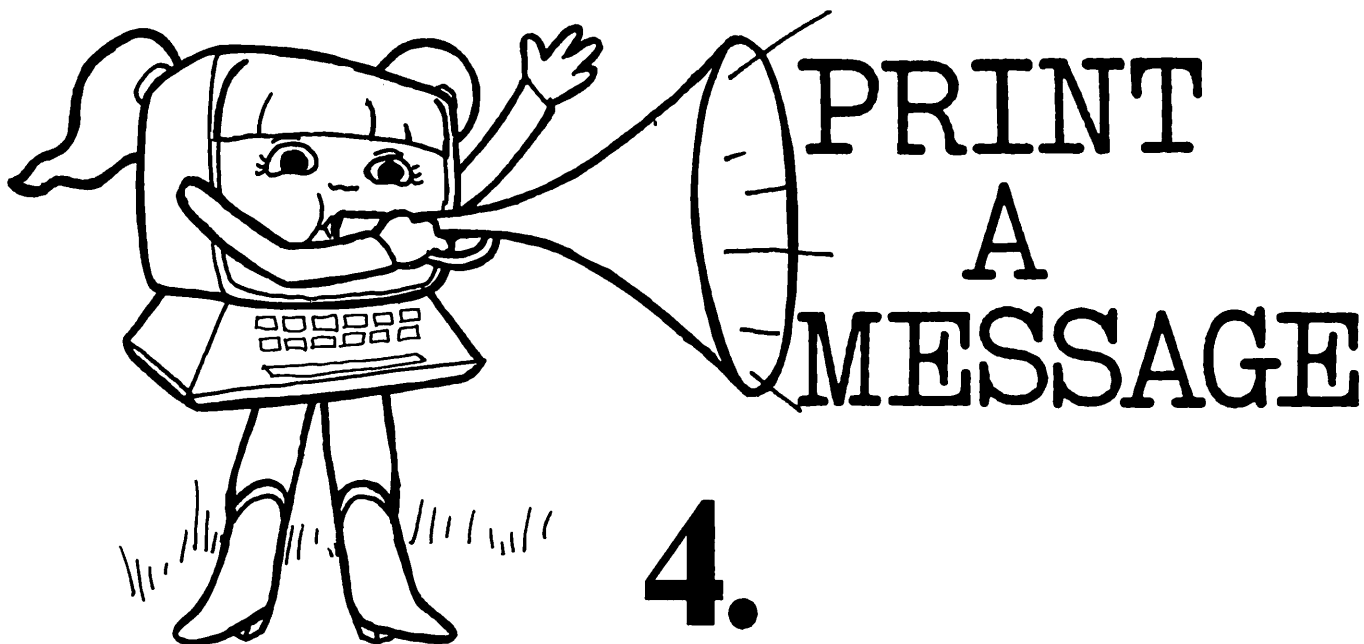
```
?CB 4  
?SC 6 (OR SC :RED)  
?RT 120  
?FD 40  
?RT 120  
?FD 40  
?RT 120  
?FD 40  
?RT 120  
?FD 40
```

YOU MUST USE THE COLON
IF YOU USE THE WORD

What did you see?

- CB is the short-cut for
"COLOR OF BACKGROUND"
- SC is the short-cut for
"SET PEN COLOR"

Now try experimenting with your own color programs.



LOGO does more than graphics.
This lesson & the next one will give you
a brief introduction to words (text) and
numbers... for more detailed work, refer to the
bibliography.

First, type `NOTURTLE` .
Then try this by typing exactly what
you see:

```
PRINT [HELLO THERE]  
[FCTN] R      [FCTN] T
```

Push `[ENTER]` ... what do you see?
Try this with your own message.

LOGO has a clever way for you to invent your own program – it is called a PROCEDURE in turtle-talk.

Type: TO SING

What happened to the color of the screen?

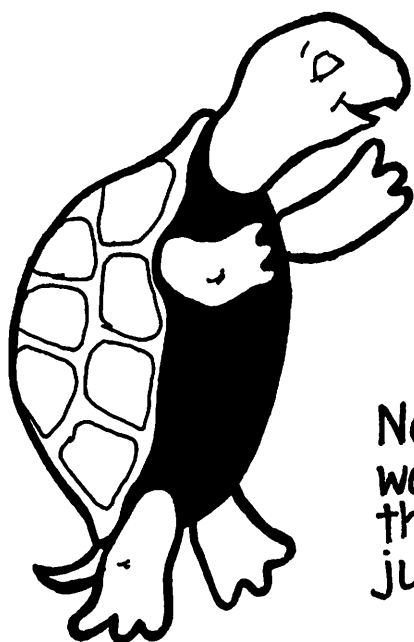
Hit **ENTER** again.

Now you can write your first procedure.

Type exactly what you see:

```
PRINT [OPEN MOUTH]
PRINT [LA-LA-LA]
END
```

DID YOU HIT **ENTER** AFTER EACH LINE?



La-
La-Laaa

You have finished your procedure! If you want to see it work, press **FCTN** and **9** at the same time.

Now every time you want the steps in the procedure "SING," just type SING and **ENTER**.

Type SING **ENTER**. What happens?

This is called defining a procedure.

- **FCTN** 9 signals that you have finished the procedure.
- **CLEARSCREEN** clears the screen.

If you want to repeat a procedure, try this:

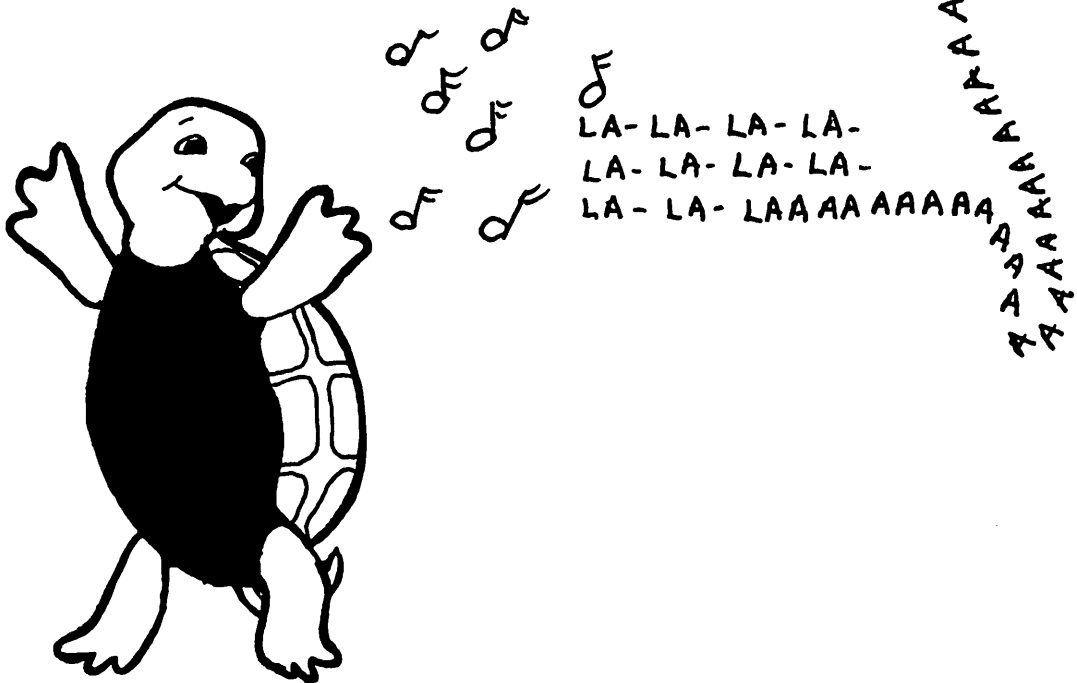
?REPEAT 5 [SING]

Press **FCTN** 9.

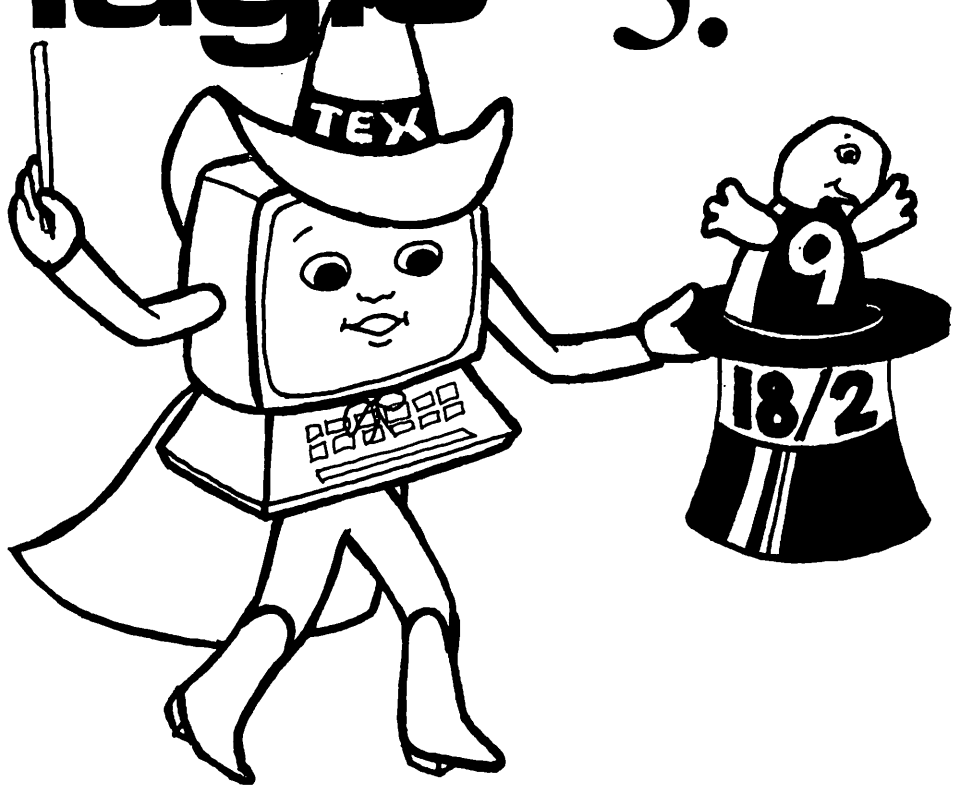
What happens?

How could you run this procedure 1000 times?

- Try it –
- To stop, press **FCTN** 9.



magic 5.



LOGO has easy ways to do math.

Try this... ?PRINT 10 + 9

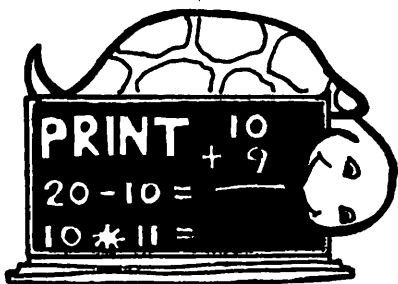
Now press **ENTER**

What do you see?

Now try these:

?PRINT 20 - 10
?PRINT 10 * 11
?PRINT 18/9

DON'T FORGET TO
PRESS **ENTER**
AFTER EACH LINE.



Can you figure out which signs are for:

- addition
- multiplication
- subtraction
- division

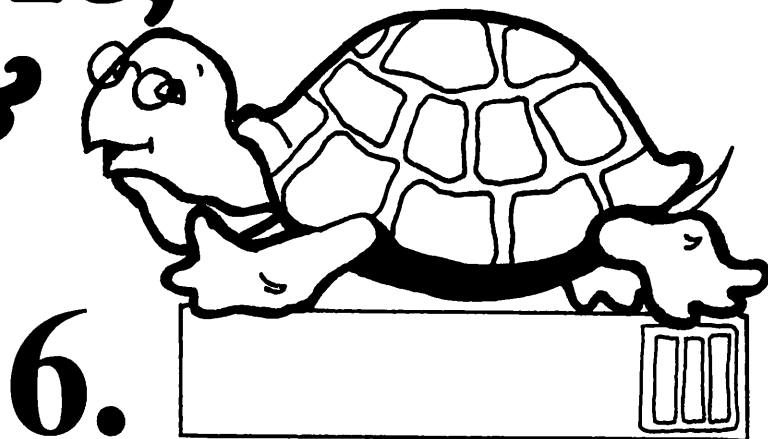
Try out your own ideas.

To get back to graphics, type

TELL TURTLE

WHAT DO THESE
DO?
TELL TURTLE
NOTURTLE

Initialize, Save, & Load



To Initialize:

Load "DISK MANAGER 2" solid state cartridge in cartridge slot on computer.

Turn on Expansion System

Turn on Monitor and Computer.

Press any key, then press 2 for Disk Manager.

Disk Manager asks you for a choice :

1. FILE COMMANDS
2. DISK COMMANDS
3. DISK TESTS
4. SET ALL COMMANDS FOR SINGLE DISK PROCESSING

If you have one disk drive, press 4.

The computer will tell you:

SINGLE DISK PROCESSING HAS BEEN INITIALIZED.

Press 2 for Disk Commands.

Press 4 for "INITIALIZE A NEW DISK".

You will see:

```
MASTER DISK (1-3)? 1
NEW DISK NAME? (WE NAMED OURS LOGO 1)
TRACKS PER SIDE? 40
SINGLE SIDED (Y/N)?
SINGLE DENSITY (Y/N)?
```

```
INITIALIZING NEW DISK
WORKING... PLEASE WAIT
```

```
COMMAND COMPLETED
PRESS: PROC'D, REDO, BEGIN, OR BACK
```

Now your diskette is initialized. To get to LOGO, turn off machine & load LOGO cartridge.

To save, type **SAVE** and screen will change to:

```
                SAVE
PRESS          FOR
1              PROCEDURES
2              SHAPES AND TITLES
3              BOTH 1 AND 2
PRESS 'BACK' FOR TI LOGO
```

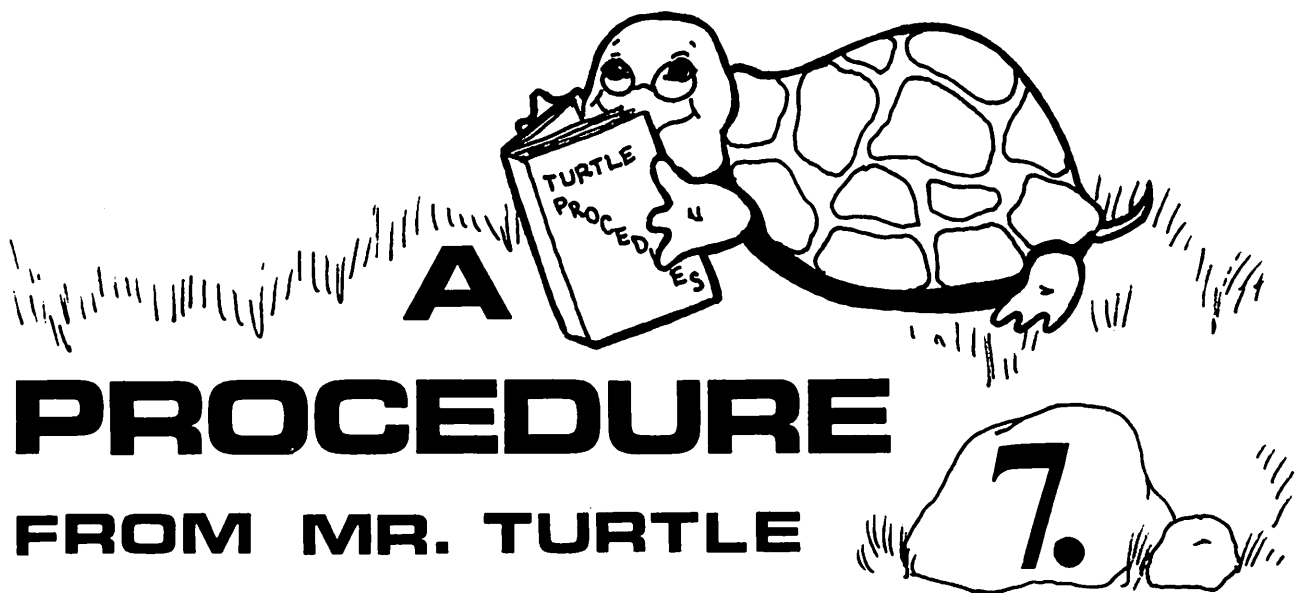
When you have made your choice, a new screen will appear:

```
                DEVICE
PRESS          FOR
1              CASSETTE
2              DISKETTE
3              OTHER
PRESS 'BACK' FOR TI LOGO
```

Then a third screen will ask you to name the file you have just created.

To recall, type **RECALL**

The same two screens as **SAVE** will appear, then the third screen will ask you to type in the name of the file that you want to recall.



To teach the LOGO turtle how to write a program (a procedure) you type the word to and some step-by-step instructions.

For example, you can write a procedure for a `SQUARE`. Try this:

<code>?TO SQUARE</code>	← FIRST TYPE... TO TITLE
<code>>FD 40</code>	
<code>>RT 90</code>	
<code>>FD 40</code>	
<code>>RT 90</code>	← THEN TYPE THE STEPS IN YOUR PROCEDURE
<code>>FD 40</code>	
<code>>RT 90</code>	
<code>>FD 40</code>	
<code>>RT 90</code>	
<code>>END</code>	← THEN PRESS BACK FCTN 9

After you typed `to` procedure name, what happened to the color of the screen?

Once you have defined a procedure, the computer's memory will not let you use that name for a different SQUARE unless you erase the memory by typing `?ERASE SQUARE`.

Type `CLEARSCREEN (CS)` to clear the screen.

Now you can define a SQUARE in a different way. For example, a shorter way to do the same square is:

```
?TO SQUARE  
>REPEAT 4 [FD 40 RT 90]  
>END
```

What does the screen say?

You can use your SQUARE procedure as a command, over & over. Try this:

```
?SQUARE  
?FD 10  
?SQUARE
```

What happens? Experiment with many SQUARES.

One of the most important ways you can use procedures is to build other procedures.

Try this:

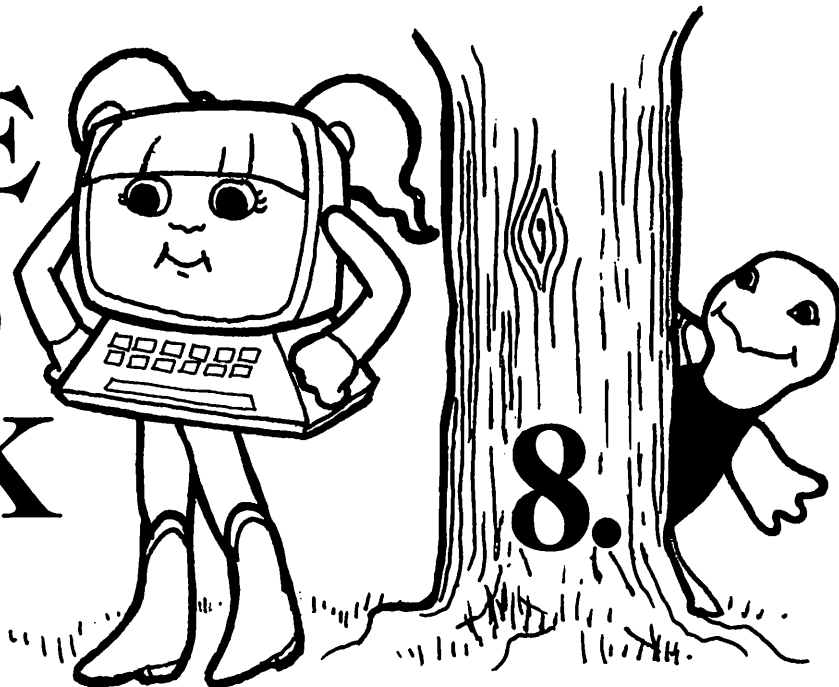
```
?TO RSQUARE  
>REPEAT 12 [RT 45 SQUARE]  
>END
```

Now let's build a procedure from

RSQUARE:

```
?TO SQUAREWHEEL  
>FD 30  
>RSQUARE  
>RT 30  
>RSQUARE  
>RT 30  
>RSQUARE  
>END
```


HIDE & SEEK



It sometimes gets boring watching "the turtle" move in every direction.

This command will make drawing on the screen faster... it hides the turtle!

It is called `HIDETURTLE` or `HT`

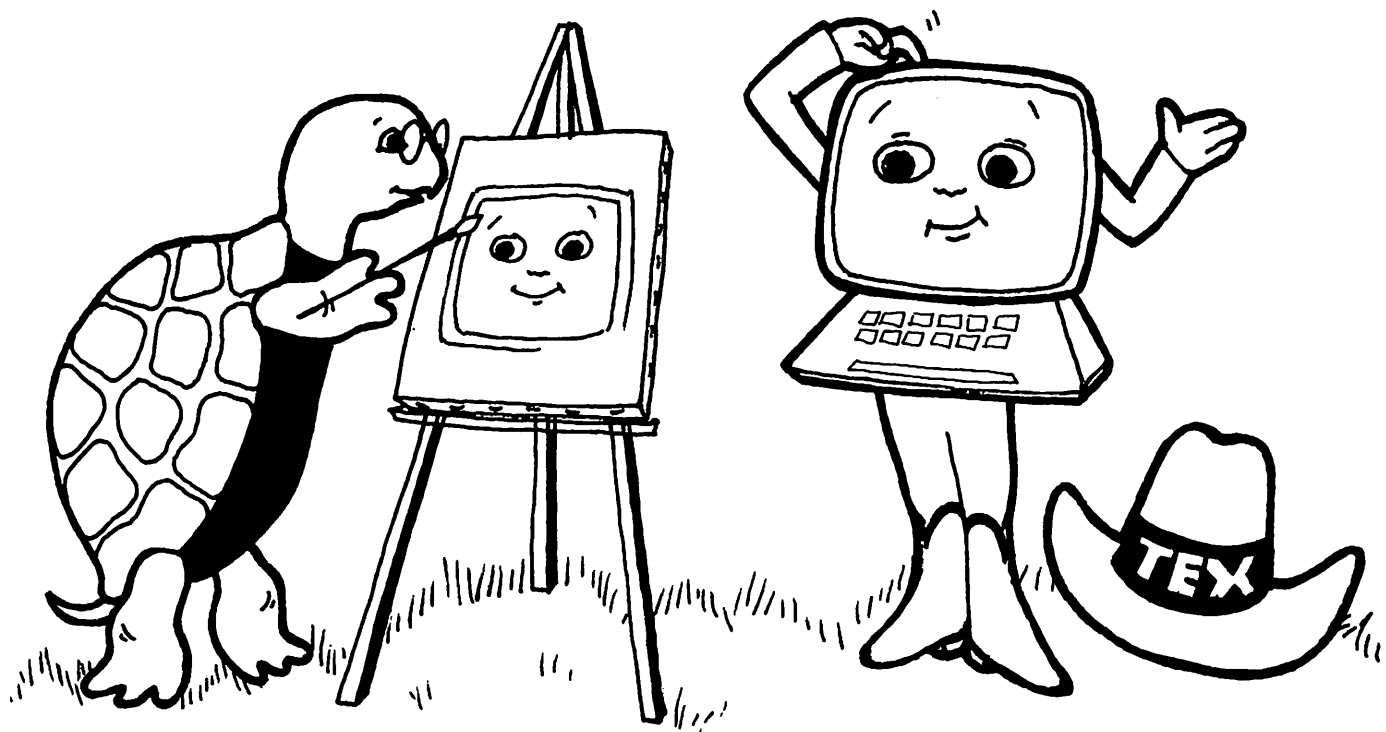
Try this: `?REPEAT 4 [RT 90 FD 50]`

*** BEFORE GOING TO NEXT STEP, TYPE `CS`**

Now try this: `?HT`
`?REPEAT 4 [RT 90 FD 50]`

Did you notice the lines were drawn faster the second time?

Now add colors to get a nice procedure.
(ST RETURNS "TURTLE")



9. can I draw my face?

Drawing a face on paper is easy. It can be easy in LOGO, too. All you have to do is to be able to lift up the pen & to put it down again.

You can do this
with the commands

PENUP	(PU)
PENDOWN	(PD)

Now try this:

?RT 90 FD 15
?PU
?FD 15
?PD
?FD 15

Did you draw 2 lines for eyes?

- Try to add a nose and a mouth.
- Add colors.

REVIEW

What do
these mean?

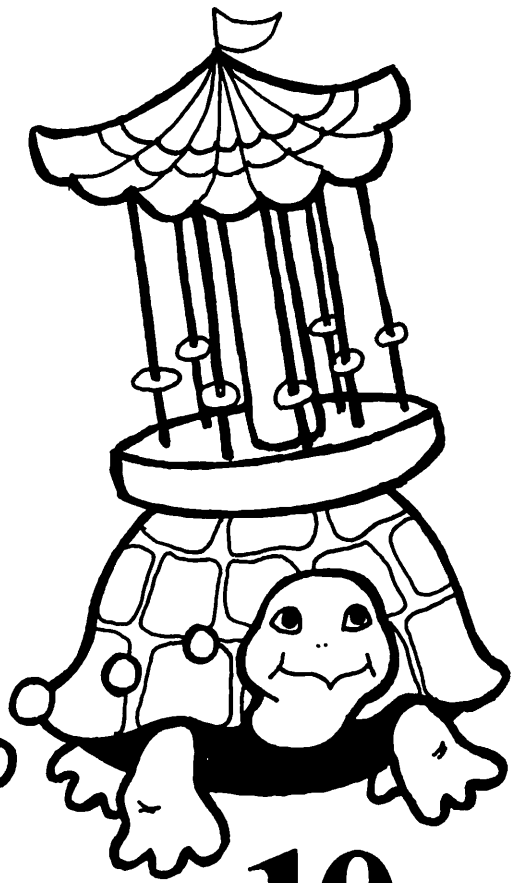
CB

SC

HT

ST

MR. TURTLE'S merry- go- round



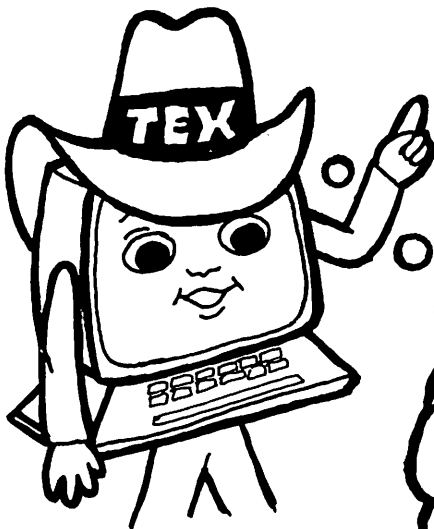
Have you thought
about drawing a circle?

10.

It is very easy.
All you have to do is
use your REPEAT
command. Try this:

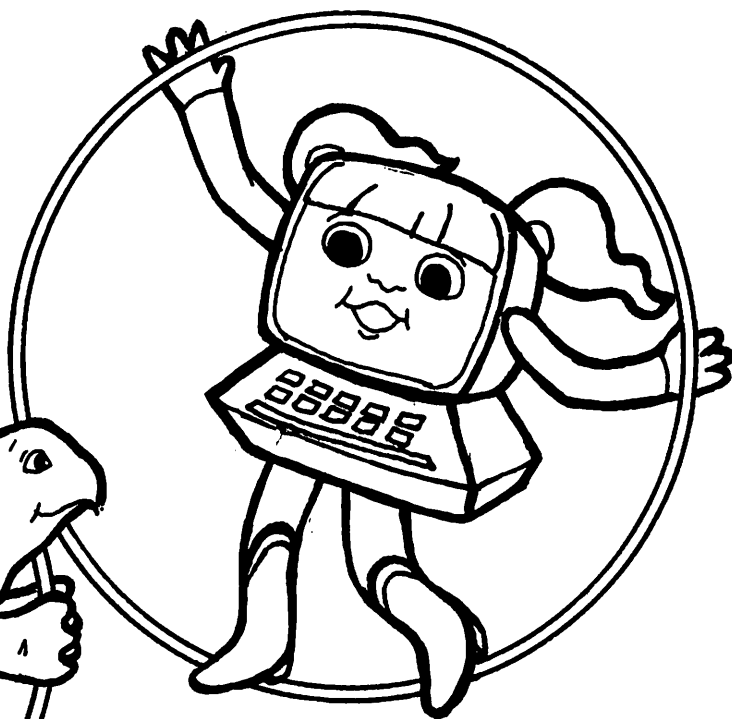
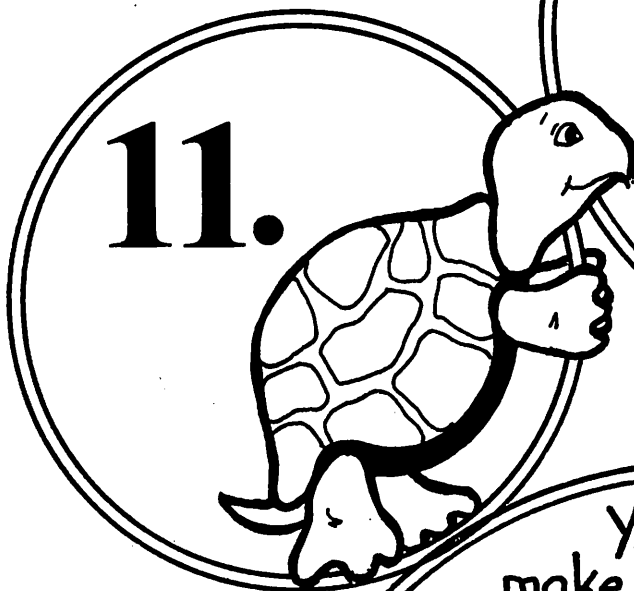
```
REPEAT 360 [RT 1 FD 1]
```

What happened?
Why do you think you
put 360 after REPEAT?



Now that you have made a
circle, turn the page to
learn an easier way to do it!

Easy Circles



You can
make your own
circle program.

SPACE BEFORE COLON
NO SPACE HERE
?TO CIRCLER :JUMP ← THIS MEANS THAT TO RUN
THE PROCEDURE YOU MUST
PUT IN A NUMBER
>HT
>REPEAT 36 [RT 10 FD :JUMP]
>ST
>END

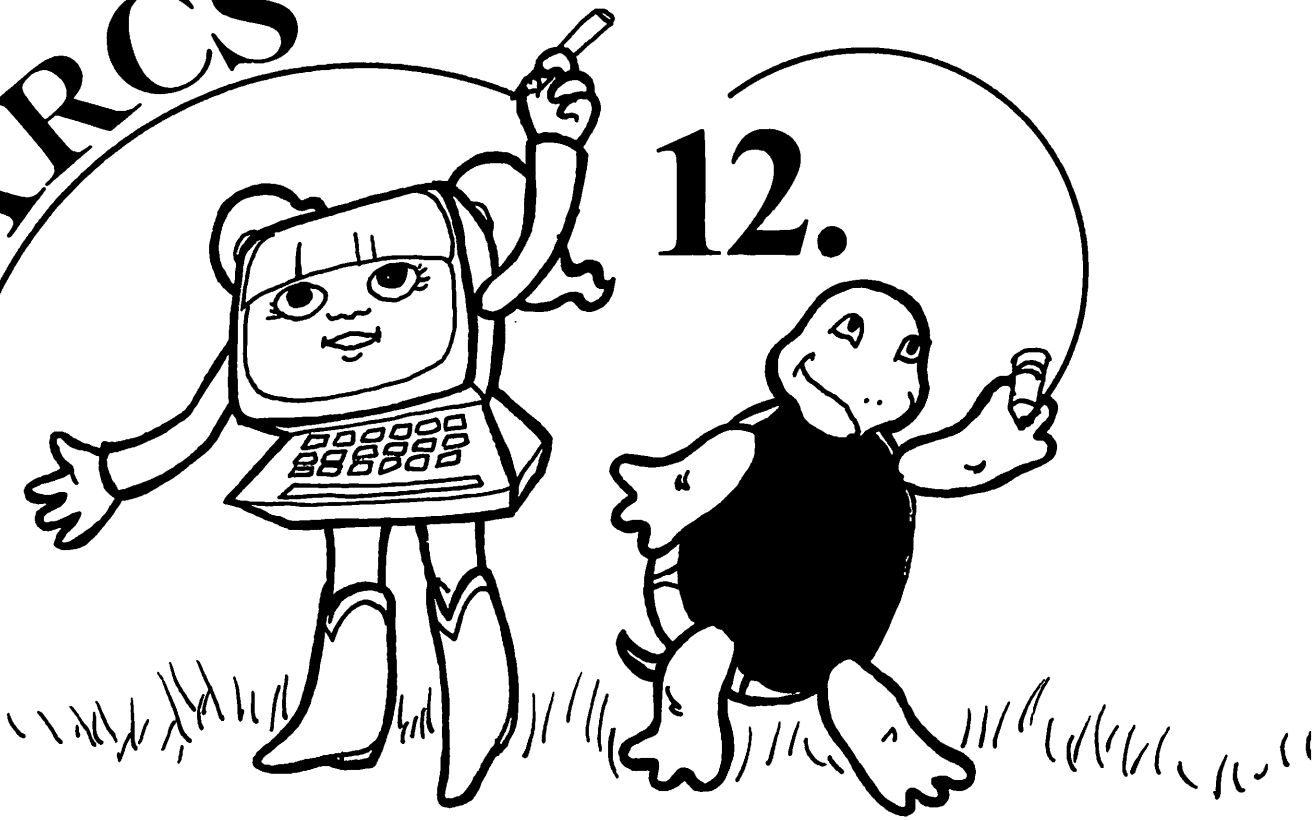
?TO CIRCLEL :JUMP
>HT
>REPEAT 36 [LT 10 FD :JUMP]
>ST
>END

Try CIRCLER 4
CIRCLEL 4

Try other numbers.

ARCS

12.



If you can draw circles, you can also draw parts of circles.

All you have to do is change the circle procedure by taking out the 36 and by telling the computer how many times to turn.

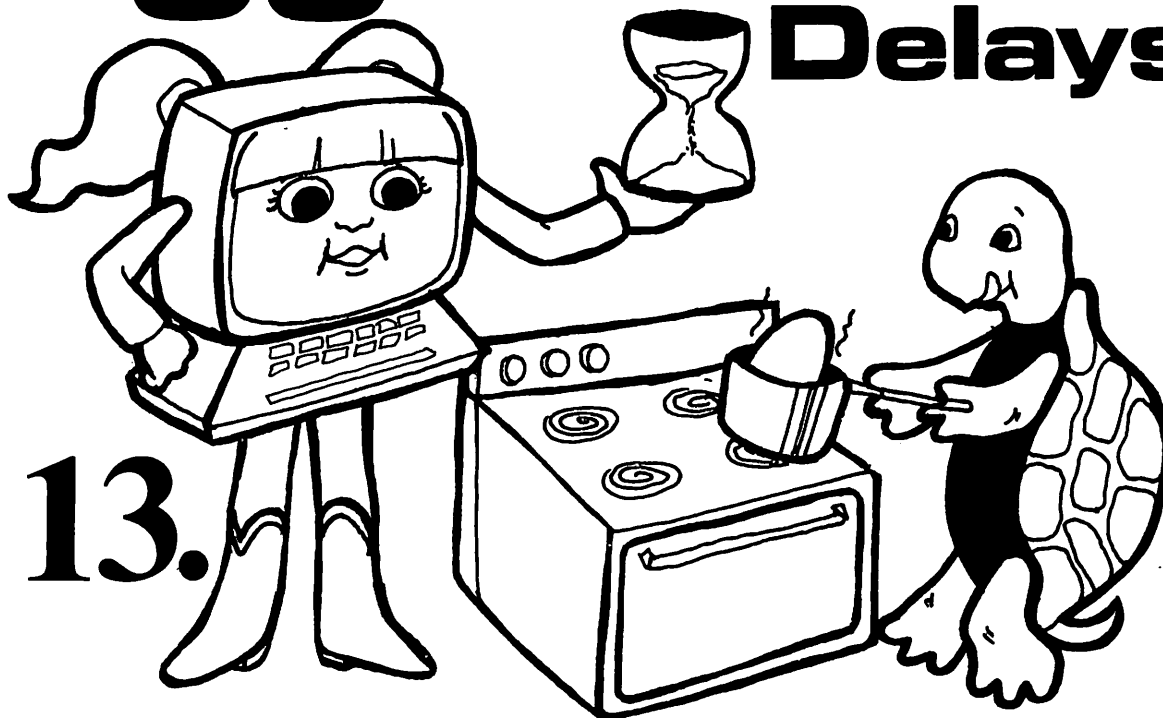
Try this:

```
?TO ARCL :TIMES :JUMP  
>HT  
>REPEAT :TIMES [LT 10 FD :JUMP]  
>ST  
>END
```

```
?TO ARCR :TIMES :JUMP  
>HT  
>REPEAT :TIMES [RT 10 FD :JUMP]  
>ST  
>END
```

Experiment.
Draw a face.

the egg timer or Delays



Train your turtle to slow down
with the command `WAIT`.

Try this:

```
?FD 50
?RT 90
?FD 50
?RT 90
?WAIT 100
?FD 50
```

What happened?

Did your drawing have a pause in it?
See if you can make up some
procedures with the command `WAIT`.

Try this procedure using our
CIRCLEL & CIRCLER procedures.

```
?TO DOUBLECIRCLE  
>CIRCLER 6  
>WAIT 100  
>CIRCLEL 6  
>WAIT 50  
>CIRCLER 4  
>WAIT 25  
>CIRCLEL 4  
>END
```

Can you draw a pair of
eyeglasses?

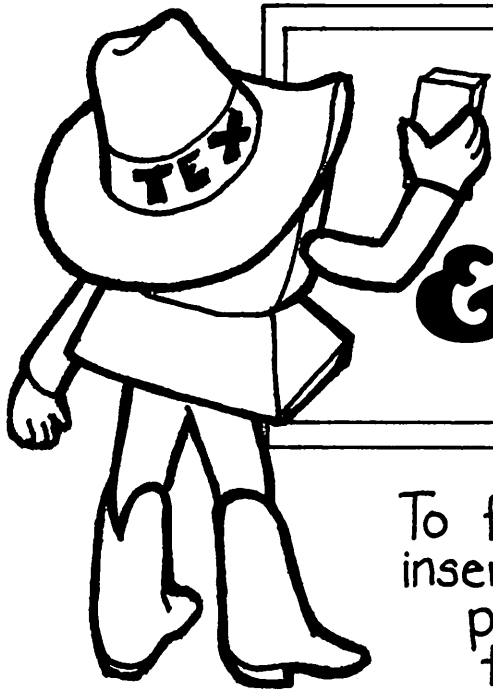
IDEA TIME...



You have learned a lot so far!
So let's have fun... here are some ideas—
If you have made a procedure
for SQUARE, LOAD it and type:

```
?TO MANYSQUARE  
>REPEAT 4 [RT 90 SQUARE]  
>END
```

Did you remember to press **BACK**
FCTN 9 to
end your procedure?



CATALOG & ERASE

To find out what is on a disk,
insert Disk Manager 2 and
press: 2 DISK COMMANDS
then: 1 CATALOG DISK

15.

MASTER DISK (1-3)? (enter number)

CATALOG DISK

DISK NAME = _____


WHERE DO YOU WANT LISTING?

1. SCREEN
2. SOLID STATE PRINTER
3. RS232 INTERFACE
4. OTHER

YOUR CHOICE?

and you will get a catalog of the disk.

To erase a file, insert Disk Manager 2 and
press: 1 FILE COMMANDS
then: 3 DELETE FILE

SELECTIVE (Y/N)?  This asks if you want
to delete all the files,
MASTER DISK (1-3)? 1 or just one.

The screen will then show you the name of each
file and ask if you want to delete it. If you do,
press **Y** and **ENTER**; if you do not, press **N**
and **ENTER**.



THE FIXER... EDITING

16.

If you make a mistake while writing a procedure, don't worry! It is easy to fix.

Suppose you typed this:

```
?TO ME
>FD 45
>RT 90
>FD 45
>RT 90
>FD 45
>RT 90
>FD 25
>RT 90
>END
```

← WHOOPS...
YOU MEANT TO PUT 45

Go to next page to find out how to fix this...

To correct the mistake, type ?EDIT ME

Did the screen turn green? Did the cursor turn orange?

You will see the steps of the procedure called ME

Then you may use any of the following commands:

FCTN 5
BEGIN

moves the cursor to the beginning of the line.

FCTN 6
PROC'D

moves the cursor to the end of the line.

↑

moves the cursor up 1 line.

←

moves the cursor 1 space to the left.

→

moves the cursor 1 space to the right.

↓

moves the cursor down 1 line.

ENTER

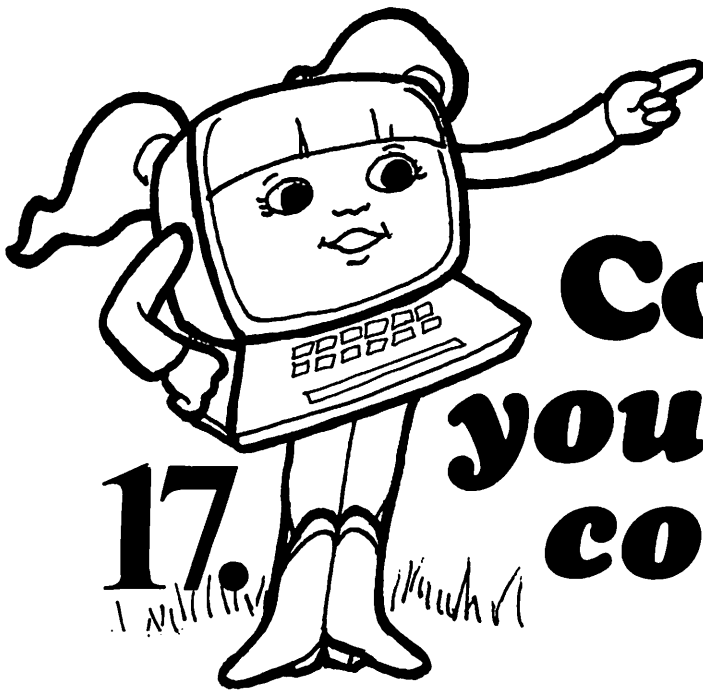
makes a blank row between the line the cursor is on & the next line (if the cursor is at the end of a line).

FCTN 3
ERASE

erases the character or space 1 space to the left of the cursor.

- FCTN** 1 erases the character or space above the cursor & moves the cursor right
- FCTN** 4
CLEAR clears the line to the right of the cursor, including the character above the cursor
- BACK
FCTN 9 leaves the Edit Mode

Now you can correct the mistake in
ME by pressing **FCTN** ↓ until the
cursor is at the right line, then **FCTN** ←
until it is under the 2, now press 4
and then **FCTN** 1.



Command your computer

COMMAND	WHAT COMMAND DOES
?ERASE TITLE	clears the procedure from the memory
?NOTURTLE	makes the screen all text
?TELL TURTLE	gets you in the turtle mode
?HT	hides the turtle
?ST	shows the turtle
?CS	clearscreen erases what is drawn or typed

COMMAND**WHAT COMMAND DOES****?HOME**

moves the turtle to the
center of the screen

?PP

prints the names of the
procedures the computer
knows

?PA

prints all the procedures
& names

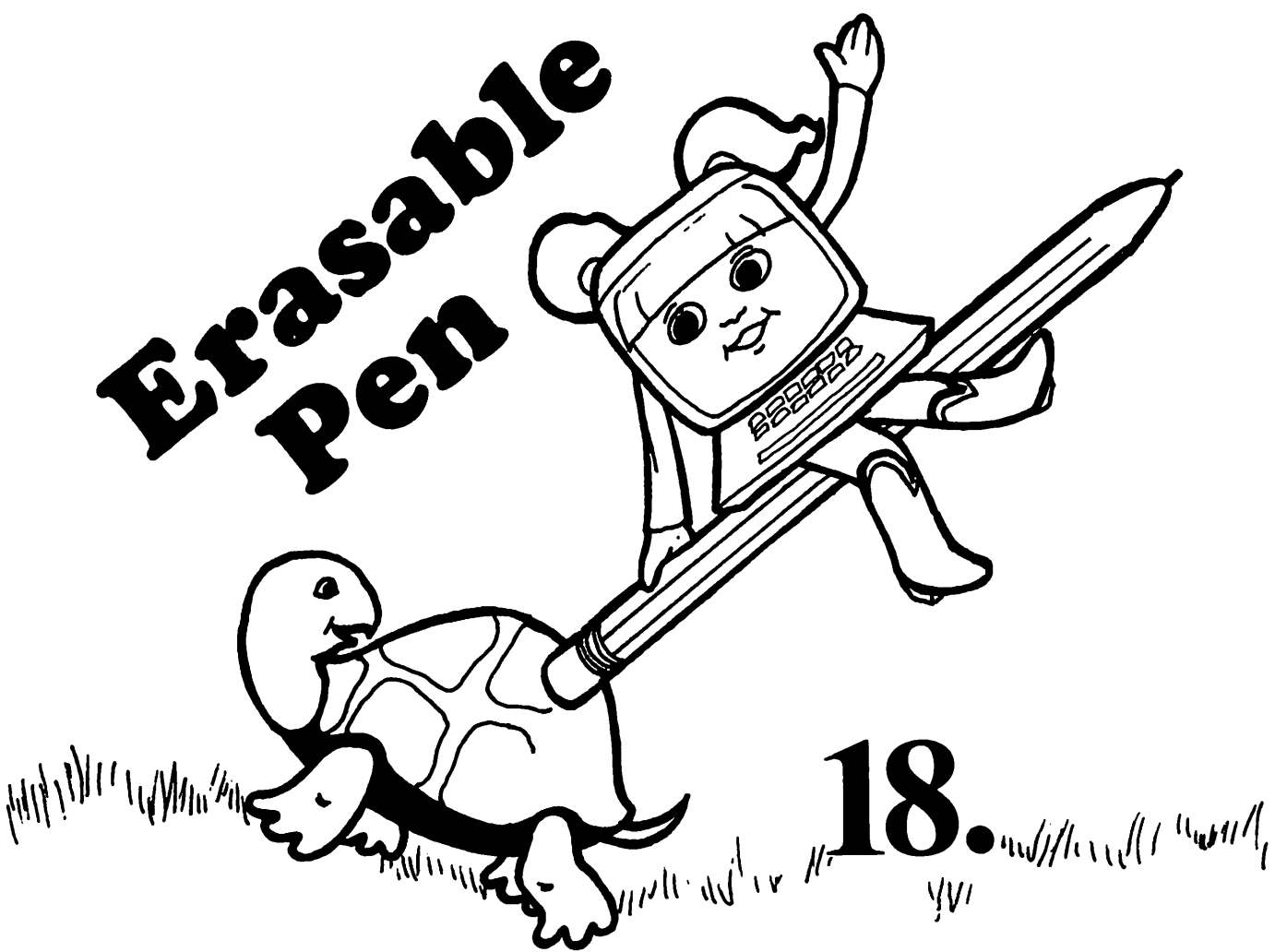
?PN

prints all the names

?PO

prints out the procedure
named

Erasable Pen



Do you have an erasable pen?
Now you can have an
erasable turtle!

To find out how to make your
turtle erase, go to the next
page...

Suppose you wanted
to type:

?FD 30
?RT 45
?FD 18

but you accidentally
typed:

?FD 30
?RT 45
?FD 180
ENTER

You could type:

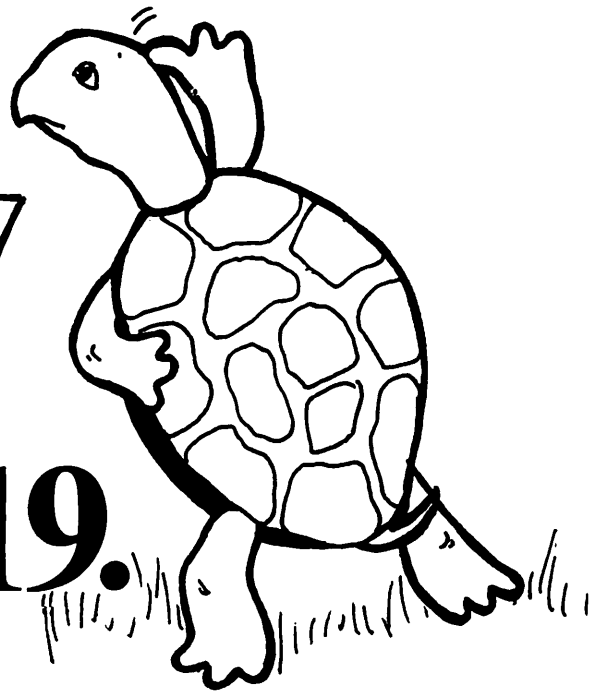
?PENNERASE or (PE)
?BK 180
?PR ← THIS STOPS THE ERASE
 & REVERSES IT. IT STANDS
 FOR PENREVERSE.

Is everything O.K. now?

Has
your
turtle
lost his
way?



19.

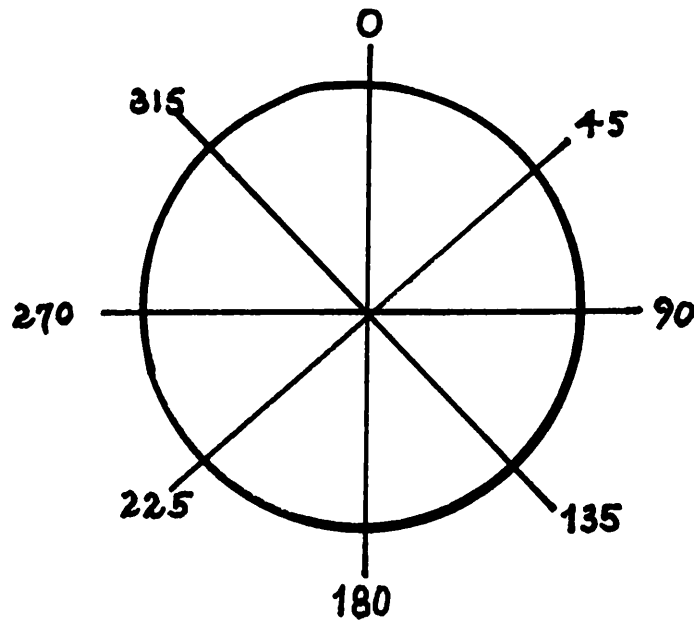


If your turtle has lost its way and you can't see what direction it is heading, type ...

?PRINT HEADING

LOGO responds with a number such as 180. This means the turtle is pointing 180° away from straight up.

Go to next page to see how a circle would look if you trace it around the outside edge for 360°...

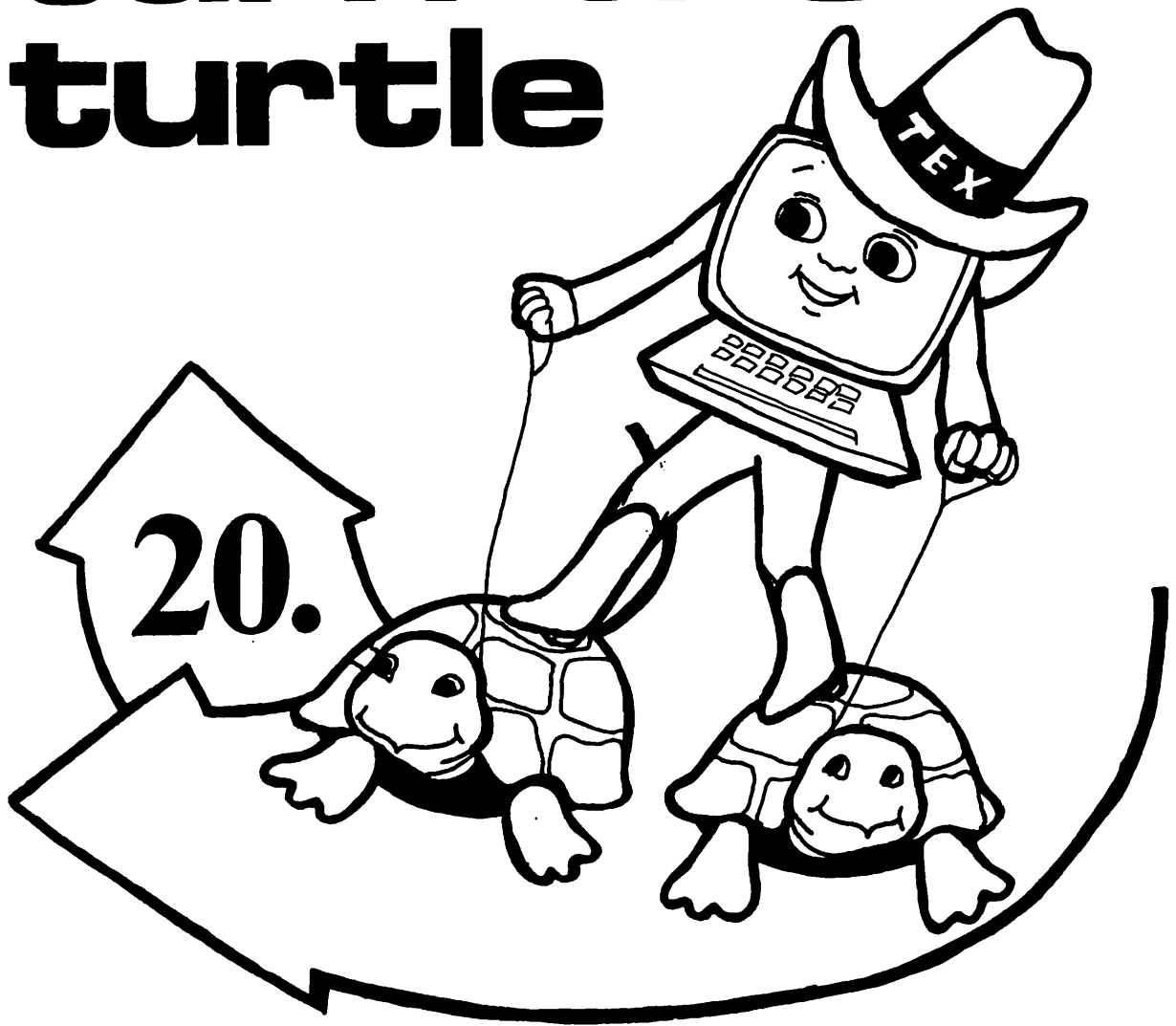


What if LOGO answered 270?
Where would the turtle be pointing?

How could you turn
the turtle to 0°?

Turn the page to
find an easy way
to turn the turtle.

turn the turtle



You have already learned that you can turn the turtle by typing `RT` or `LT` and how many 'degrees' you want to turn.

You can also turn the turtle with another simple command...

- `SH 0` can be very useful.

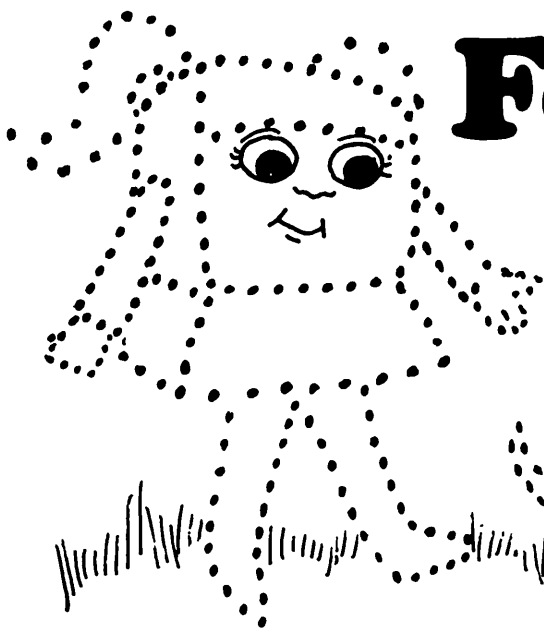
Suppose the turtle is pointing straight down (toward 180°) and you want it to point straight up.

Look on the circle on page 34. What number is straight up?

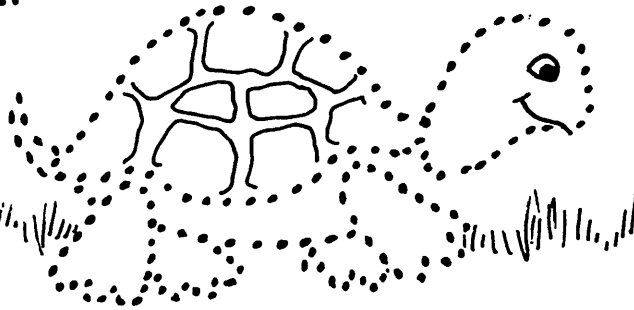
If you type `SH 0` what happens?

How could you point the turtle to the right 135° ?

If you want to return the turtle to the center of the screen facing 0° , type `HOME`.



Follow the Dots



21.

The command `DOT` will place
a dot on the screen without
moving the turtle.

Try this:

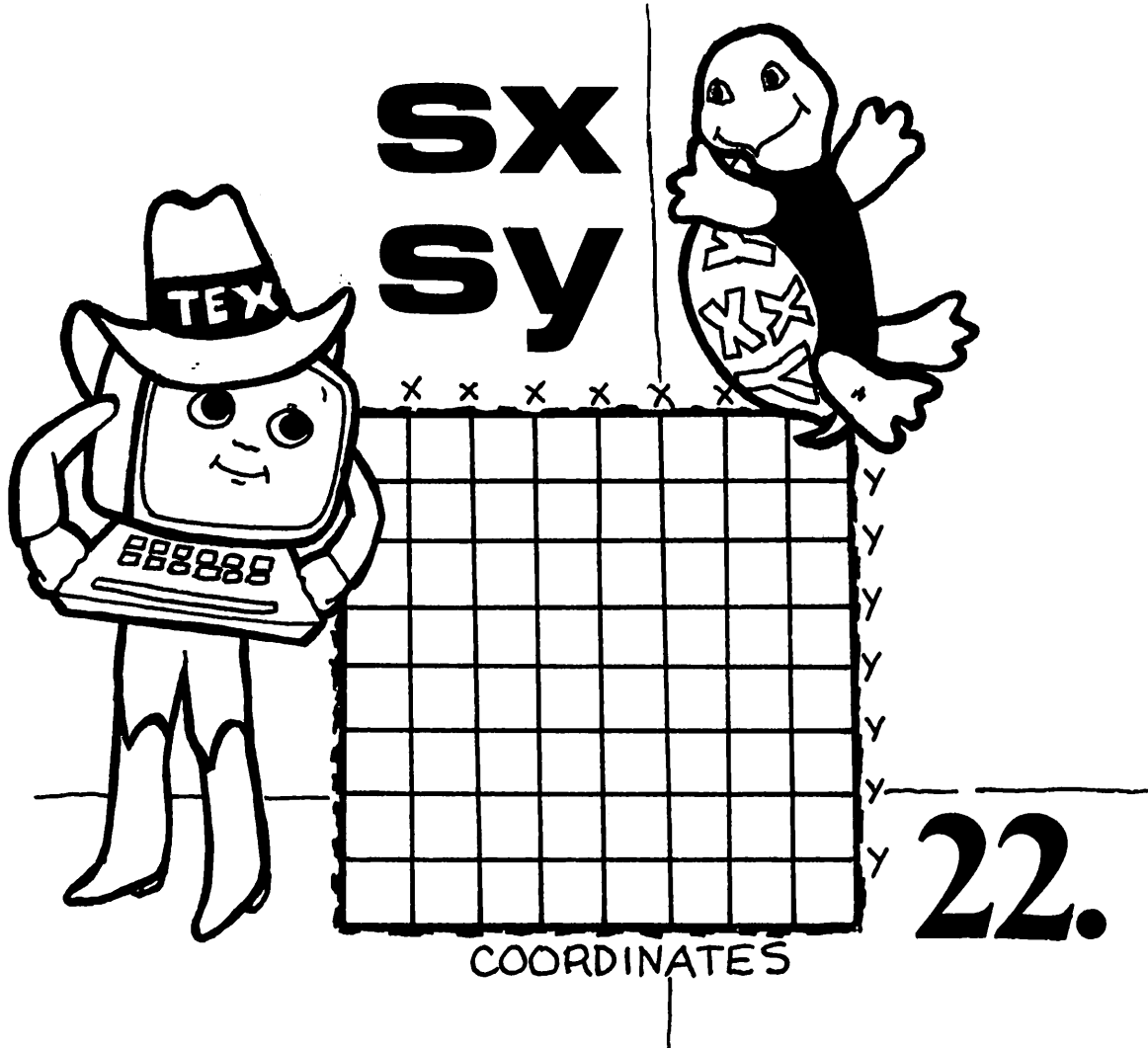
↓ LOCATION OF X COORDINATE
`?DOT 80 5` ← LOCATION OF Y COORDINATE
`?FD 10`
`?RT 90`
`?FD 180`

The "x" in x COORDINATE is a
horizontal position. ↔

The "y" in y COORDINATE is a
vertical position. ↑↓

If you type `PRINT XCOR` ,
you will find the position
of the x coordinate .

What do you think `PRINT YCOR`
does?



Do you want to move the turtle before you begin to draw on the screen?

Use `sx` and `sy` to set the location of the turtle.

Suppose you want to draw a very large circle.

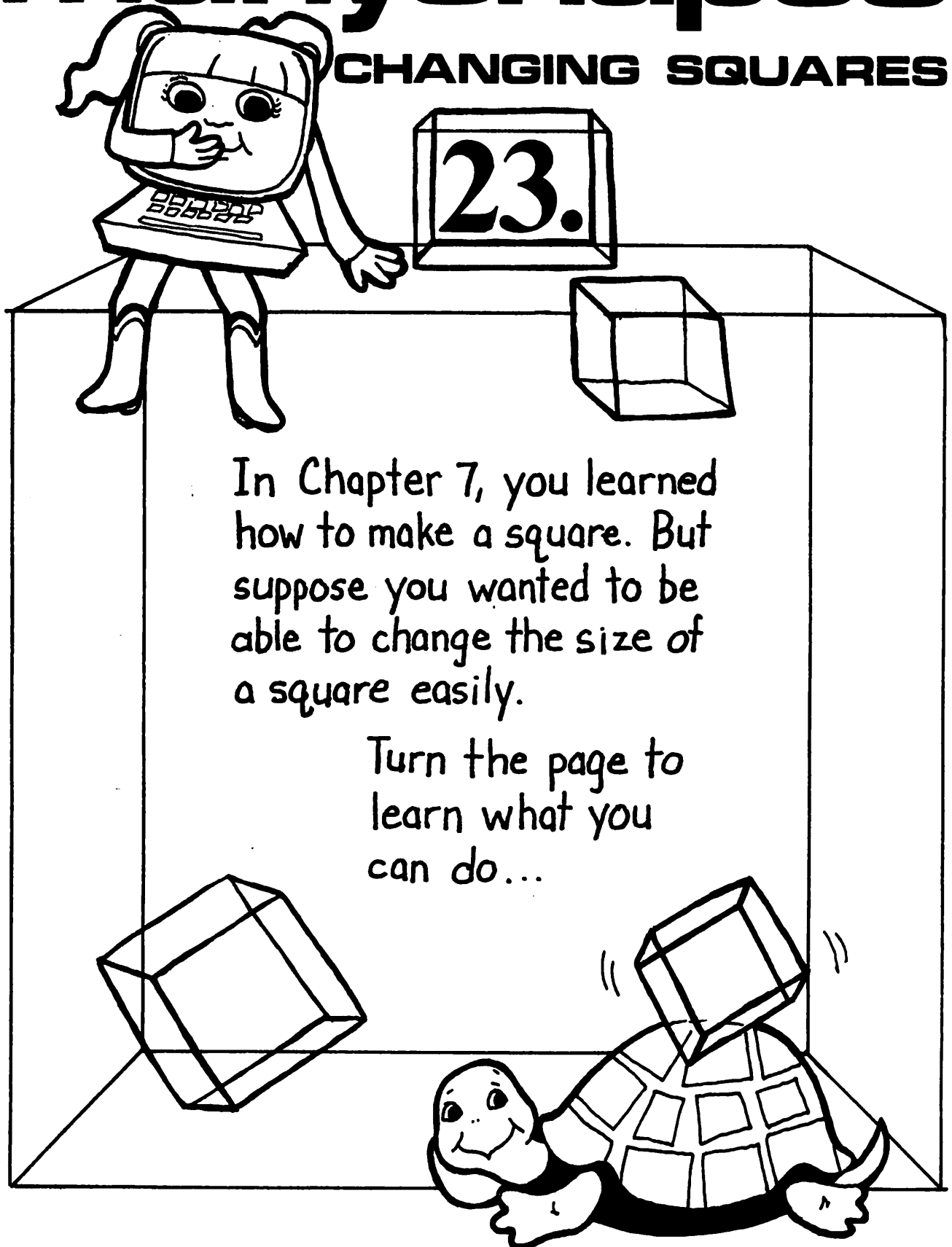
Try `?CIRCLER 12`

Now try `SXY - 66 30 CIRCLER 12`

That's a lot better for drawing, isn't it?

manyspaces

CHANGING SQUARES



Try this:

```
?TO SQUARE :SIDE  
>REPEAT 4 [FD :SIDE RT 90]  
>END
```

THIS REQUIRES AN INPUT
NUMBER FOR THE SIZE OF
THE SIDE.

THERE MUST ALWAYS BE A
SPACE BEFORE THE COLON(:).
THE COLON SIGNALS THAT
AN INPUT WORD WILL FOLLOW.

Now use this procedure and try this:

```
?SQUARE 40  
?SQUARE 10  
?SQUARE 20  
?SQUARE 30
```

WHEN YOU INPUT A NUMBER,
YOU DO NOT NEED THE COLON.

There are endless variations using
inputs. You can create many shapes.

Try this:

```
?TO MANYSHAPES :SIDE :ANGLE  
>FD :SIDE  
>RT :ANGLE  
>MANYSHAPES (:SIDE + 3) :ANGLE  
>END
```

Experiment with different
inputs such as:

```
?MANYSHAPES 6 97
```

Try other numbers.

Here are some examples of
MANYSHAPES that children have
invented:

TITLE	INPUTS FOR MANYSHAPES	
Bomb.Hit	1	150
Rose	5	94
Doily	1	170
Maze	3	45
Better.Stairs	53	243
Endless.Tunnel	8	90



fun with SPRITES

T1 LOGO has some creatures for you to play with. They are called SPRITES.

There are 32 SPRITES in all, numbered from 0 to 31.


Each SPRITE can carry a different shape. You can design the shapes yourself, if you want to.


There are 5 shapes in the computer's memory. They are numbered from 1 to 5.

1 is an airplane 

2 is a truck 

3 is a rocket 

4 is a ball 

5 is a box 

Now try this:

```
?TELL SPRITE 1
?CARRY 2
?HOME
?SC 4
```

What object did you get? What color is it?
Did you see a blue truck?

To make the truck disappear, type `SC 0`

Now try making a
red airplane with:

```
?TELL SPRITE 2
?CARRY 1
?SXY 50 50
?SC 6
```

TI LOGO II
only

Want to see it double in size? Type `BIG.`
To see it go back to half size, type `SMALL.`



Let's move our 2 SPRITES.
The truck should move across
the screen, so let's set the heading at 90.

```
?TELL SPRITE 1  
?SH 90  
?SS 25
```

SS means SET SPEED

That will get the truck moving.
Now let's get the plane moving.

```
?TELL SPRITE 2  
?SH 45 ← WE WANT THE PLANE TO GO UP  
?SS 75 ← PLANES GO FASTER THAN TRUCKS
```

What happens when the plane hits the truck?

If you want to get everything moving at the same speed, try

```
?TELL :ALL  
?SS 50
```

Tired of all that writing down the side of the screen? Type `cs`

Freeze & Thaw



You can stop the SPRITES any time
you wish.

Just type `FREEZE`

Want to get them going again?

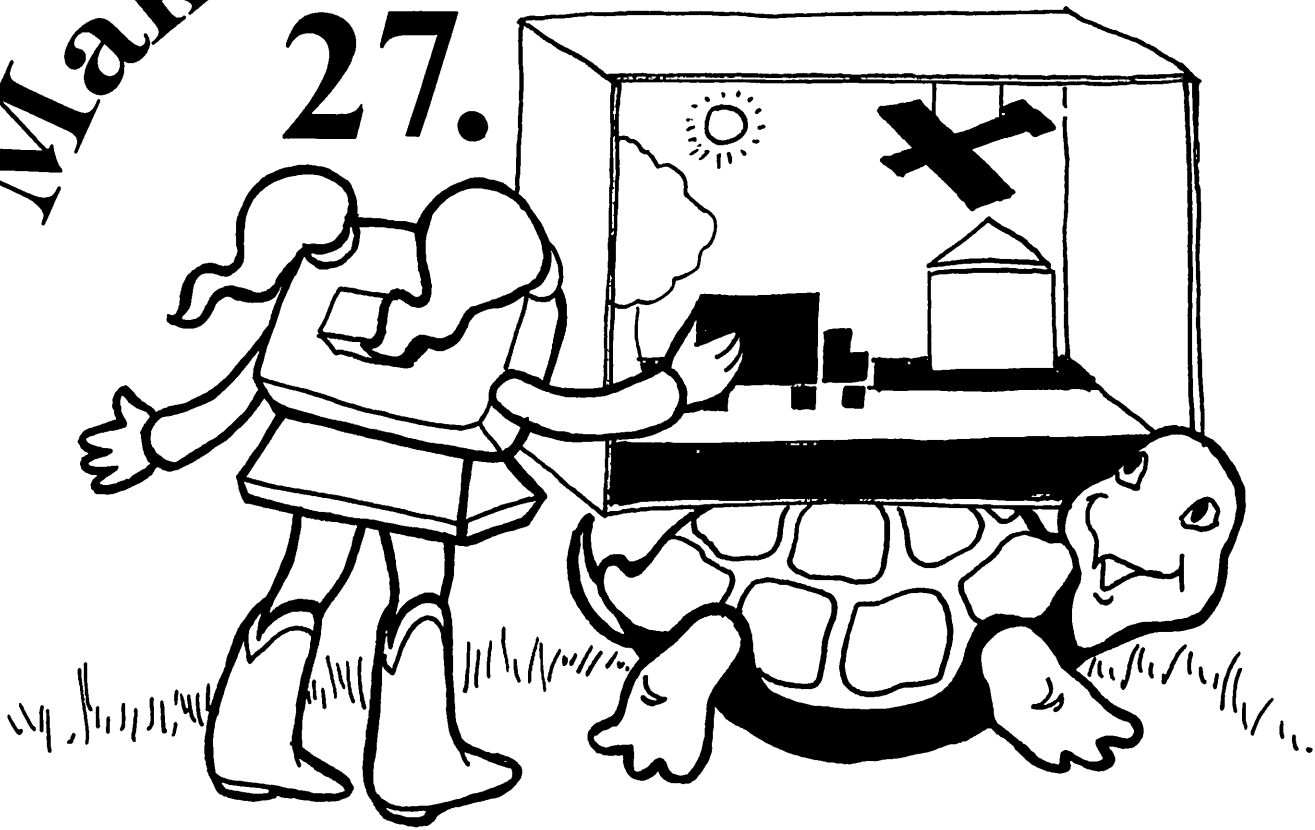
Type `THAW`

Want to make all the SPRITES go away?

Try
`?TO CLEARSPRITES`
`>TELL :ALL`
`>SC 0`
`>END`

Make Scenes

27.



Now that you know how to position objects on the screen, you can begin to combine `SPRITES` to create interesting scenes.

Try to make the `SPRITE` rocket land on a planet.

make Shapes

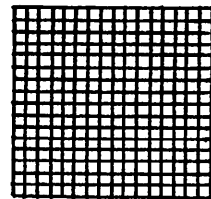


One day you may feel like making
your own SPRITES.

Try this: ?TELL SPRITE (A NUMBER 0 THROUGH 31)
?MAKESHAPE (A NUMBER MORE THAN 6)

Do you see a grid with a blinking
square? You move the square by
typing

E (UP)
S (LEFT)
D (RIGHT)
X (DOWN)



If you want to plot the square, just hold down **FCTN** and E, S, D or X. When you are finished, hold down **FCTN** and press 9.

Then type: CARRY (NUMBER YOU DID ON PREVIOUS PAGE)
SETCOLOR (SC) (COLOR NUMBER 0 THROUGH 15)
SETHEADING (SH) (HEADING NUMBER 0 THROUGH 360)
SETSPEED (SS) (SPEED NUMBER -127 THROUGH 127)

Try this:

```
?TELL SPRITE 3
?MS 14
FCTN E
FCTN E
FCTN E
FCTN E
FCTN E
FCTN D
FCTN D
FCTN D
FCTN E
FCTN E
FCTN E
FCTN E
FCTN E
FCTN E
FCTN 9
?CARRY 14
?SC 13
?CB 15
?HOME
?SH 45
?SS 76
```

You can have SPRITES do different things by using the command EACH .

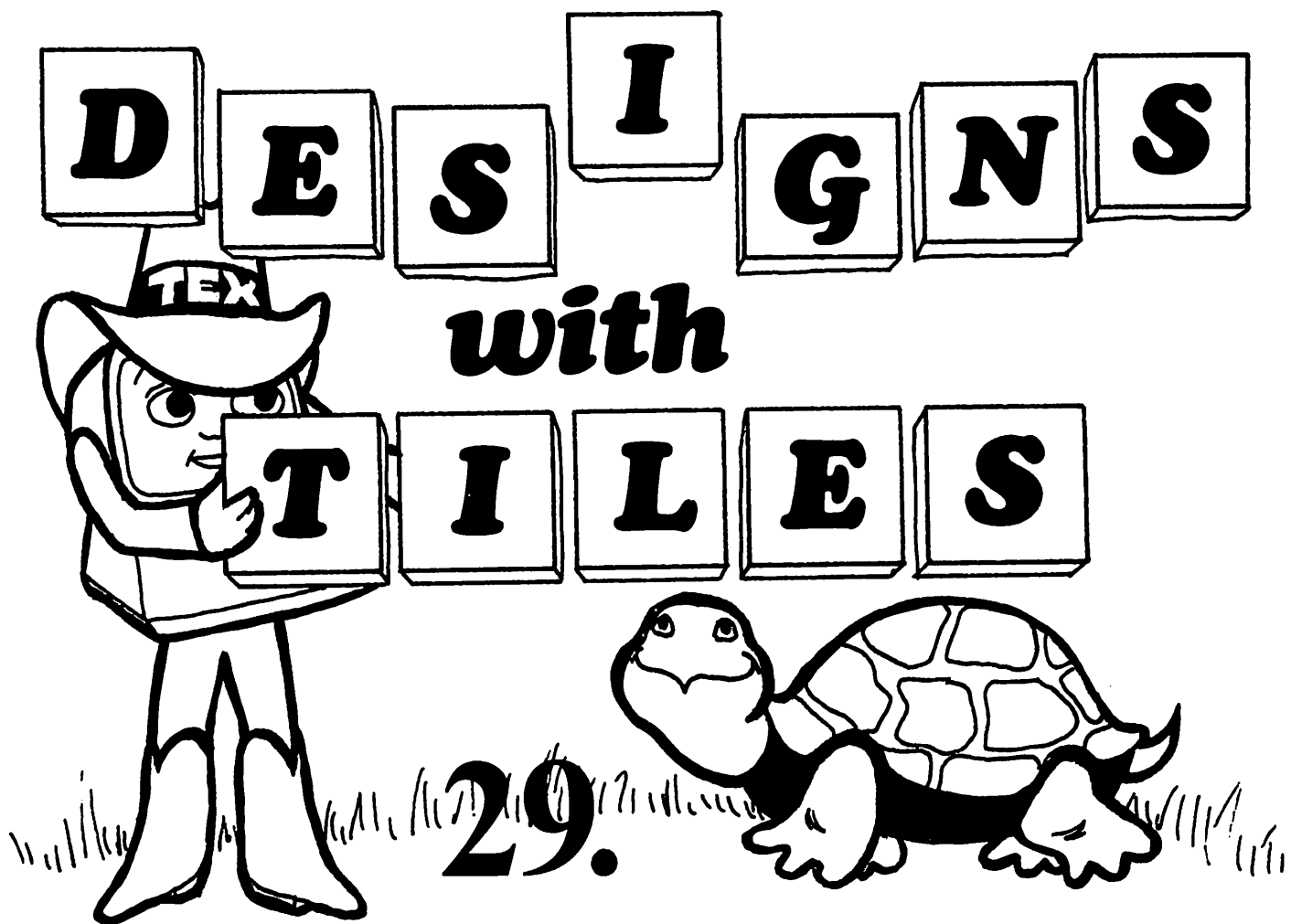
Try this:

```
?TELL :ALL
?CARRY :BALL
?EACH [SC YOURNUMBER]
?HOME
?EACH [SH YOURNUMBER]
?SS 76
```

To make an arrow

```
?TELL SPRITE 4
?MS 15
D, D, D, D, D, D, D
FCTN D
FCTN X
FCTN X
FCTN S
FCTN X
FCTN X
FCTN S
FCTN D, D, D, D
X
FCTN S, S, S, S, S, S
X
FCTN D, D, D, D, D, D, D, D
FCTN 9
?CARRY 15
?SC 13
?CB 15
?HOME
?SH 0
?SS 76
```

Make your own shapes.

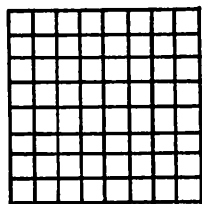


Would you like to make designs with letters?

Try this: MAKECHAR 45

What happened?

Did you see a grid that looks like this:



All of the characters that you can see on the screen belong to a group of objects called tiles. There are 128 tiles.

You can change the shape of any tile by using the command `MAKECHAR` & the code number for the character you want to see.

How do you find out the code number? Suppose you want to know the code for "A".

Try this:

```
PRINT CHARNUM "A"
```

Suppose you want to know what character has the code number 78.

Try this: `PRINTCHAR 78`

Now you can put a tile anywhere on the screen by typing:

`PUTTILE 65 20 10`

(PRINT TILE 65 AT POSITION 20,10)

Use the arrow keys ←, →, ↓, ↑ to draw on the grid.

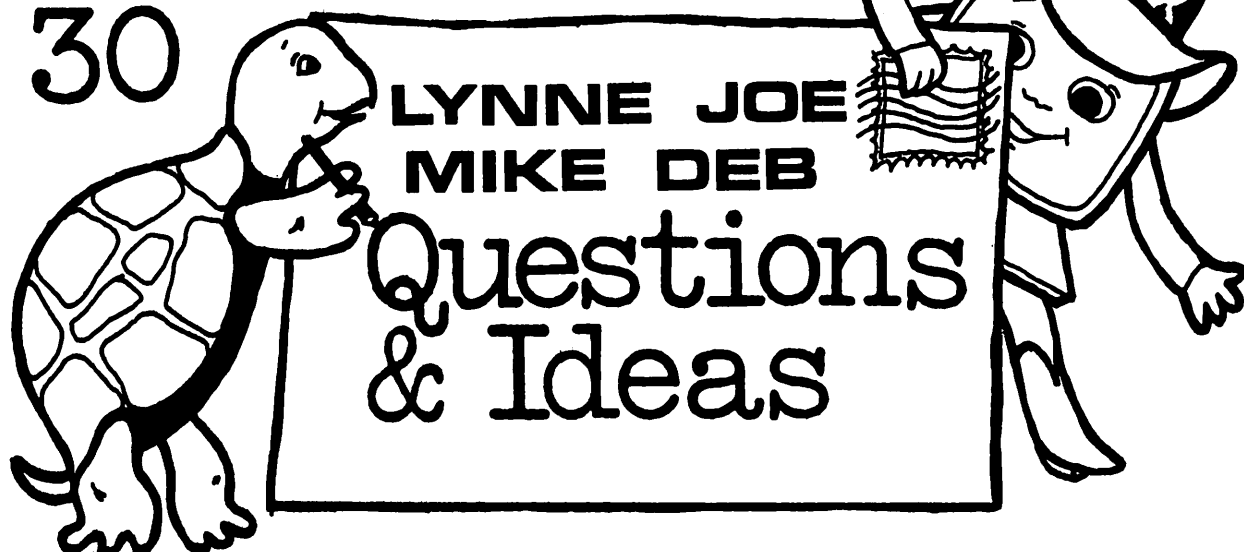
For real fun, try coloring the tiles:

`?PUTTILE 65 20 10`
`?TELL TILE 65`
`?SETCOLOR :RED`

Experiment with different tiles.

<u>SHORT-CUTS</u>		
MAKECHAR	=	MC
PRINTCHAR	=	PC
PUTTILE	=	PT

30



If you have questions about LOGO or want to share ideas with other LOGO-ites, the National LOGO Exchange is a friendly source. The address is:

THE NATIONAL LOGO EXCHANGE
Tom Lough, Editor
Box 5341
Charlottesville, VA 22905

Another address you might find useful is:

Logo Computer Systems, Inc.
368 Congress Street
Boston, MA 02210

IF YOU HAVE ANY FURTHER QUESTIONS, WRITE TO ONE OF THE AUTHORS AT THE FOLLOWING ADDRESSES:

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Lynne Mass
Abington Friends School
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Jenkintown, PA 19046

GLOSSARY

Brackets - two half squares ([and]). You get these on the screen by pushing SHIFT + N or M.

CARRY - a command that comes after SPRITE in the sequence of making a SPRITE appear.

CLEARSCREEN (CS) - a command that erases everything you have drawn on the screen.

Command - information you enter that tells the computer what to do. For example, CB, SC, TO...

Cursor - the white blinking square that moves on the screen. It shows where the next character will be printed and moves one space ahead of whatever you are writing.

Disk - stores information magnetically.

Disk Drive - "reads" the disk and converts its information to electrical impulses to be used by the computer.

DOT - a command that places a dot on the screen at the X coordinate and Y coordinate.

EACH - A command that allows you to use a list of commands with more than one SPRITE.

EDIT (ED) - a command that puts you into the LOGO editor.

END - a command that tells the computer your procedure is finished.

ENTER - pushing this key enables you to go to the next line. It also processes whatever has been typed into the computer.

ERASE (ER) - a command that erases a program from the memory.

FREEZE - a command that stops a moving SPRITE.

HIDETURTLE (HT) - a command that makes the turtle disappear.

HOME - a command that puts the turtle in the center of the screen pointing straight up (0°).

Input - requires the user to type in a number after a word command when the word is followed by a space and a colon. For example, in a procedure such as SQUARE :SIDE, the :SIDE indicates the need for a number to tell the computer how long to make the side.

MAKECHAR (MC) - a command that draws a character on a grid.

MAKESHAPE (MS) - a command that allows you to create your own **SPRITE**.

NOTURTLE - a command that makes the screen all text.

PA - prints out everything in the workspace.

PENDOWN (PD) - a command that enables the turtle to move while drawing. The opposite of penup.

PENERASE (PE) - a command that erases lines on the screen drawn by the turtle.

PENREVERSE (PR) - a command that reverses the color of anything the Pen crosses.

PENUP (PU) - a command that enables the turtle to move without drawing. The opposite of pendown.

PO procedurename - takes a procedure as input, and prints out procedure.

PP - prints procedures.

PRINT - a command that must be entered before writing a statement. For example, **PRINT HELLO** allows the computer to display **HELLO** on the screen after pushing **RETURN**.

PRINTCHAR (PC) - a command that gives a character shape to a number.

PRINT HEADING - a command that prints on the screen the degree (to the right of vertical) that the turtle is heading.

Printout - a command that prints a procedure on the screen or the printer.

Procedure - instructions to computer telling it what to do and how to do it. A procedure can be recalled from disk or memory whenever it is needed.

PUTTILE - a command that places a tile on a grid.

RECALL - a command that allows you to load previously saved procedures from a cassette or disk.

REPEAT - a command that tells the computer to repeat your commands. You must tell the computer how many times to repeat the command.

SAVE - a command that allows you to save your procedures on the disk.

SETBACKGROUND (CB) - a command that lets you change the color of the background of the screen.

SETHEADING (SH) - a command that sets the turtle's angle in degrees (from 0 to 360).

SHOWTURTLE (ST) - a command that places the turtle in the middle of the screen. It puts you in the graphics (drawing) mode.

SPRITE - a shape that you can create or that is stored in the computer's memory.

TELL SPRITE - a command that puts you in the SPRITE mode.

TELL TILE - a command that puts you in the TILE mode.

TELL TURTLE - a command that puts you in the TURTLE mode.

THAW - a command that reverses the effect of FREEZE.

WAIT - a command that allows a procedure to pause.

X Coordinate - a horizontal position on the screen as measured from a central line.

Y Coordinate - a vertical position on the screen as measured from a central line.

ERROR MESSAGES

TELL ME MORE

- input missing.

OUT OF SPACE

- you used up all available memory.

OUT OF INK

- all available tiles used up for drawing. To draw more, clear the screen.

TELL ME HOW TO (do something)

- either you have typed in a procedure that does not exist, or you have used a command that Mr. Turtle does not recognize.

(something) DOES NOT LIKE (something) AS INPUT

- the procedure you have entered does not go with the data you have entered.

TELL ME WHAT TO DO WITH (something)

- you have generated some data and have not given instructions of what to do with it.

Erasable Pen!



Turn The Turtle!



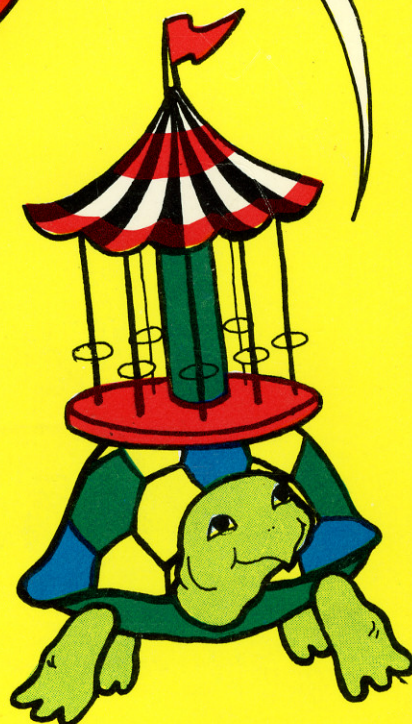
84.09.22
COLES
\$ 495⁰⁰

fun!
simple!
quick!

Math
Magic!



Mr. Turtle's
Merry-Go-
Round



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ISBN: 0-89824-074-3