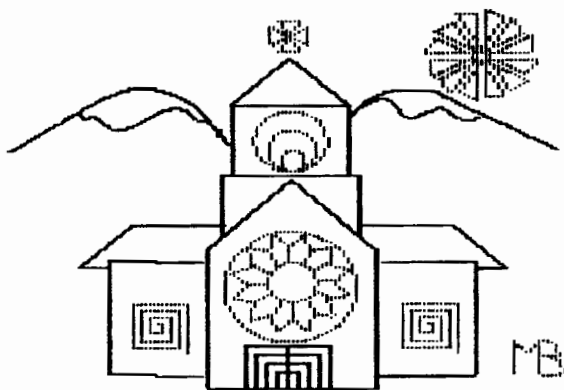


## Logo LinX

### Luminescent Explorations

by Judi Harris



*Programmed in Logo by: Marta Brann, Beaver College, Glenside, PA, February 1984.*

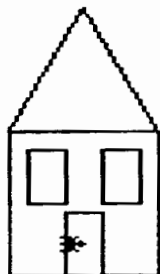
*Light, God's eldest daughter, is a principal beauty in a building.*

*Thomas Fuller, 1642*

As the winter holidays approach in many parts of the world, buildings, trees, windowsills, mantelpieces, sidewalks, and street curbs become luminiferous. This, of course, is not a naturally-occurring phenomenon. Neighbors align equidistant paper bag luminaries along streets and walks. Hanukkah menorahs are kindled with candles for eight nights. Gardeners trace the branches of their favorite trees with strings of lights. And, of course, Christmas celebrants often line their roofs, windows, and doors with multicolored electric bulbs. Inherent in these luminous decorations are motivating mathematical lessons on perimeter and area.

#### Logo Lighthouses

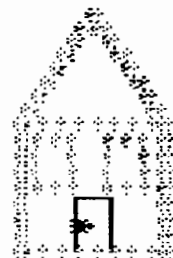
I'd be willing to wager that by this time in the school year, many of your students have drawn, filed, and forgotten houses similar to this one.



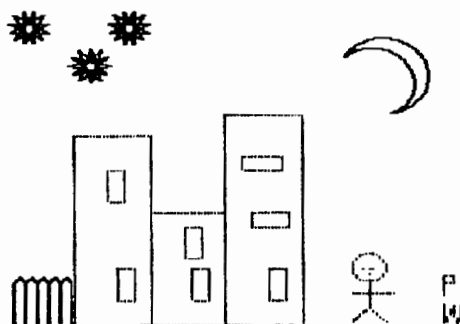
Why not challenge them to resurrect these creations, and decorate them with holiday lights? Once the pictures have been loaded from the diskette, the LogoWriter Turtle Move keys can be used to position the turtle for holiday decorating. Then a simple shape can be created to represent a luminous bulb, which, when stamped at measured intervals, will adorn your students' Logo houses for the holidays.

#### Igniting Instruction

Stated as such, Logo holiday lighting is an interesting beginning-level programming challenge. Tool procedures, such as the ones below (written in LogoWriter Version 2.0), can be used to help children also explore estimating perimeter and area size. Let's suppose that a student wanted to place lights around the outer perimeter of this apartment building.



*Programmed in Logo by: Pat Wagner, Beaver College, Glenside, PA, February 1984.*



An ESTIMATE tool procedure could be evoked, asking the student to make an estimate of the total number of steps that the turtle will have to travel to place Logo lights along the perimeter of the building. First, though, all global variable values should be reset with the RESET tool:

```
TO RESET
MAKE "PERIMETER 0
MAKE "AREA 0
MAKE "ESTIMATE 9999
END
```

Then the ESTIMATE tool would ask for the student's idea of the size of the building's perimeter.

```
TO ESTIMATE
CC
TYPE [How many turtle steps of lights do you
      want to use?]
NEXT.LINE
MAKE "LIGHT.ESTIMATE FIRST READLISTCC
END
```

#### Lightfooted Turtle's Feet of Lights

The student could then use the LIT.FD tool (in place of FORWARD) to place lights on the building. LIT.FD and its turtle-step input can be used by themselves, or from within a REPEAT statement, just like the FD command.

```
TO LIT.FD :DISTANCE
REPEAT :DISTANCE/10 [LIGHT.STEP]
END
```

Example: LIT.FD 50

One of LIT.FD's subprocedures, LIGHT.STEP, moves the turtle forward 10 steps and stamps a light. As it places the lights, it adds 10 turtle steps for each to the growing perimeter of the shape that is forming. It also checks to see if the number of turtle steps already travelled has exceeded the student's estimate.

```
TO LIGHT.STEP
IF :LIGHT.ESTIMATE < :PERIMETER [CC TYPE
[OOPS! You ran out of lights!] NEXT.LINE
STOPALL]
PLACE.LIGHT
HT
SETC 0
FORWARD 10
MAKE "PERIMETER :PERIMETER + 10
PLACE.LIGHT
END
```

```
TO NEXT.LINE
TYPE CHAR 13
END
```

```
TO PLACE.LIGHT
ST
PD
SETSH 13
SETC (1 + RANDOM 5)
STAMP
END
```

How many turtle steps did *you* estimate were needed to traverse the perimeter of this building? The windows?

### Enlightened Areas

Areas of polygons can be explored in terms of grids of holiday lights, placed, for example, on the front wall of this mountainside home.



*Programmed in Logo by: Rebecca Sickert, Beaver College, Glenside, PA, February 1984.*

The AREA tool might be helpful in this endeavor. It uses LIT.FD to traverse the wall's horizontals, repeating its trip according to the height of the area to be illuminated.

```
TO AREA :HORIZONTAL :VERTICAL
SETH 90
REPEAT :VERTICAL/10 [PD LIT.FD :HORIZONTAL
PU BACK :HORIZONTAL SETY YCOR + 10]
MAKE "AREA :HORIZONTAL * :VERTICAL
END
```

Since the AREA procedure keeps track of the total area that has been decorated with it, the student can ask for that information at any time by typing TYPE :AREA. To use this tool for practice in estimating area, simply type RESET, then ESTIMATE before invoking AREA.

### Holiday Heartlights

The legend of Hanukkah depicts light as a symbol of faith, hope, and survival. In the time of Judah Maccabee, the people's temple was destroyed. The Eternal Light, which must burn on the altar of the temple without ever being extinguished, was left with enough oil for only one day of flame. Yet, it burned for eight days while messengers travelled to get more oil. It was said to be a miracle.

The story of Christmas uses light to express promise and salvation. It includes a tale of a most brilliant star, which showed the way to the manger where a baby was born. He was said to be the true light of the world, a promise of salvation, a miracle incarnate.

May 1991 be a miraculous year of light for all of God's children, on Lightship Earth and beyond.

Judi Harris works in the Department of Teacher Education at the University of Nebraska, Omaha as an assistant professor of educational technology.

BITNET: JHarris@UNOMA1  
Internet: JHarris@Zeus.unomaha.edu  
CompuServe: 75116,1207