Unit 6: Coordinates

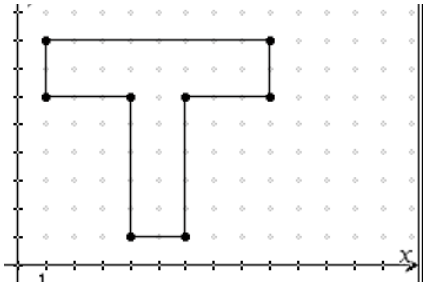
Skill Builder 3: Make the Shape

In this lesson, you will write a program to make a pre-designed two-dimensional shape. You will program with lists and use a loop to plot the points on paper.

Objectives:

- Define lists and use coordinate pairs stored in lists
- Design a 2-dimensional shape on paper and in the calculator (Stat Plot)
- Make the Rover draw the shape on paper (or simply follow the path)

This project requires the use of two lists that represent the x- and y-coordinates of the vertices of a shape of your own design. In this lesson, we will use the design of the block letter T shown to the right. Our goal is to get the Rover to make this design using the marker or just follow the path if no marker is available.



1. First, set up two lists containing the coordinate pairs. The lists to the right come from the block letter T shown above. The x-coordinates are in the list **L_1**, and the y-coordinates are in the list **L_2**. If desired, design a different pattern.

   Optional: Set up a Stat Plot to display your data in a graph screen to confirm that your data is correct.

L1	L2
4	1
6	1
6	9
9	9
9	11
1	11
1	9
4	9
4	1
------	------

2. Now, we can write a program so that the Rover will draw the shape. Start in the usual manner and, optionally, set the M/UNIT value to a smaller value so that the drawing is not too large. Select **prgm > Hub > Rover (RV)… > RV Setup… > Send("SET RV.GRID.M/UNIT**.

   Remember that 0.01 makes the unit 1 cm. If you want the unit to be 1 inch, use 0.0254. Add the closing quotation mark and closing parenthesis.

```
NORMAL FLOAT AUTO REAL DEGREE MP
EDIT MENU: [alpha] [f5]
PROGRAM:ROVER63
:ClrHome
:Disp "ROVER UNIT6 SB3"
:Send("CONNECT RV")
:Send("SET RV.GRID.M/UNIT
.0254")
:Pause "PRESS ENTER TO STA
RT"
:
:
```

3. We use a **For(** loop to process each element of the two lists. Remember that **For(** requires three arguments, the loop control variable, **I**, a starting value, **1**, and an ending value, **dim(L_1)**. Additionally, **End** is needed at the bottom of the loop body.

   Note: **dim(L_1)** is the number of elements in the list L_1.

```
NORMAL FLOAT AUTO REAL DEGREE MP
EDIT MENU: [alpha] [f5]
PROGRAM:ROVER63
:For(I,1,dim(L1))
:
:
:
:
:End
:
:Pause
:ClrHome
```

4. The loop *body* (the code inside the **For(** loop) consists of just one statement that tells the Rover to go to each point in the lists in order.

5. After entering the code, quit and run the program, and see if your shape is drawn correctly.

```
NORMAL FLOAT AUTO REAL DEGREE MP
EDIT MENU: [alpha] [f5]
PROGRAM:ROVER63
:For(I,1,dim(L1))
:
:
:
:Send("RV TO XY eval(L1(I)
) eval(L2(I))")
:
:End
:
```