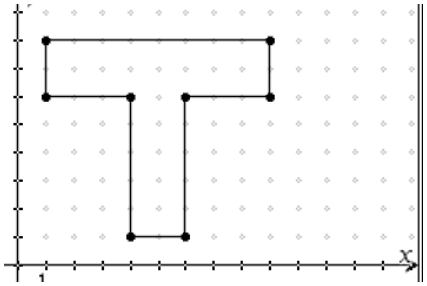
Unit 6: Coordinates **Skill Builder 3: Make the Shape**

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 points on paper.

Objectives:

- Define lists and use coordinate pairs stored in lists
- Design a 2-dimensional shape on paper and in the handheld
- Have 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 ***xs*** and the y-coordinates are in the list ***ys***. Feel free to design a different pattern.

   Optional: Set up a plot to display your data to confirm that your data is correct.

	A xs	B ys
=		
1	4	1
2	6	1
3	6	9
4	9	9
5	9	11
6	1	11
7	1	9
8	4	9
9	4	1
10		

Teacher Tip: The program can also enter the coordinates into the lists. Use statements such as the ones shown below at the beginning of the program.

{1,2,3,4,5}→xs

{6,7,8,9,10}→ys

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 **menu > Hub > Rover (RV) > RV Setup > 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.

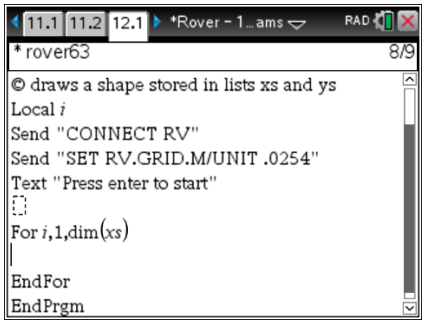
   Send "SET RV.GRID.M/UNIT .0254"

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(xs)**. **EndFor** is needed at the bottom of the loop body.

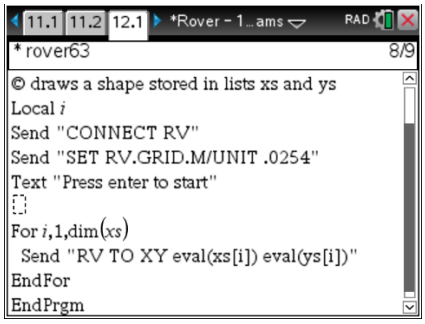
   For *i*, 1, dim(*xs*)

   EndFor

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



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.

   Send "RV TO XY eval(xs[i]) eval(ys[i])"

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