Patterns with Rectangular Numbers from Multiple Perspectives

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Rectangular numbers can be modeled in a rectangular array of rows and columns as shown below.

1. Ask students to discuss the connection between the rectangles and the sums of consecutive even numbers. Discuss what the "open dots" and the "solid dots" each represent.

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					2+4
					2+4

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2+4					•••••	4 .
3.4.4						6
2+4+0	2					12
2+4+6	5+8					

2. Press [STAT] [1:Edit] to enter the term index in L1 and the value of the term in L2.

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	L2(5)-					

3. Press 2nd [STATPLOT] and turn Plot 1 on. Use the default settings.

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DEGREE

123456789

PARAMETRIC POLAR

THIN DOT-THIN

GRAPH-TABLE

ON

NORMAL FLOAT AUTO REAL RADIAN MP	I
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On Off	
Туре: 🚾 🗠 🏊 🗠 🗠 🗠	
Xlist:L1	
Ylist:L2	
Mark : 🗖 + 🔹 🕖	
Color: BLUE	

4. Press [MODE], highlight GRAPH-TABLE, and press ENTER.

> Press WINDOW and enter these settings.

Press GRAPH .

5. Press [TRACE]. This will put you on the left pane, which is the graph screen. Press the \bigcirc and \bigcirc keys. Notice the right pane is gray.

Press 2nd [TABLE]. You are on the right pane, which is the dynamic list editor. Press \Box and \Box . Notice the right pane is black.



Y=12

NORMAL FLOAT AUTO REAL RADIAN MP

WINDOW

Xmin=-2

Xmax=12

Ymax=120

Yscl=10

Xscl=1 Ymin=0





After pressing 2nd TABLE you are in the right pane (list editor). Notice the right pane is **black**.

х=з

6. While in the right pane, press \Box to reach the last empty row. Press \Box N row is created with placeholder (0,0).

Type the index of the next term in L1. Press $\fbox{\term}$.

Warning: Plotting interactively works better if you have only **one plot active** or plots which have no dependencies. For example, if another stat plot was turned on that had L1 paired with a list other than L2, an error of Dimension Mismatch would occur when more elements to L1 are added or deleted.

Press D and enter the value of the fifth term in L2.







Repeat for the sixth term, entering its index in L1 and value in L2.

L1(6)=

When on the right pane, if you highlight a row and press the DEL key, both pairs will be deleted so that no mismatch occurs. This kindness is not preserved if you perform this action in the List editor. In the List Editor, if you delete an element in L1, its match in L2 is not deleted.

7. Enter the list editor by pressing <u>STAT</u> [1:Edit]. On the top row of the list editor, press 2nd [INS], then 2nd [L3] <u>ENTER</u>. In G-T mode, while the Graph Screen is live, if you press [DEL] the entire *pair* is removed to prevent a mismatch.

If L1 is the *width* of the array and L2 is the *total number* in the array, let L3 be the *length* of the array. RMAL FLOAT AUTO REAL RADIAN MP FLOAT AUTO REAL RADIAN M EDIT CALC TESTS 2 2 6 12 20 30 2345 6 12 20 30 0 6 12 20 30 0 2:SortA(43459 3:SortD(4:ClrList 5:SetUpEditor L3=L2∕L1∎ Name= Name=L3 O Make L3 = L2/L1. 000 ۲ 0 ۵ Ô O AL FLOAT AUTO REAL RADIAN MP П 0000 0 L3 . ο • 00000 0 6 12 20 30 00000 L1

8. Press 2nd [FORMAT], highlight GridLine, and press [ENTER].

9. Press 2nd [TABLE] to get on the right pane of the G-T screen. For the ninth term, enter the index in L1 and value in L2.

Press Y= to generalize for any value of *x*. 9.

Press GRAPH . Repeat as desired.

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NORMAL FLOAT AUTO REAL RADIAN MP

GridOff GridDot GridLine

RectGC PolarGC

Axes: BLACK

CoordOn CoordOff

GridColor: MEDGRAY







- 10. Press **STAT** [5:SetUpEditor] **ENTER** to return the list editor back to the default setting.
 - NORMAL FLOAT AUTO REAL RADIAN MP NORMAL FLOAT AUTO REAL RADIAN MP NORMAL FLOAT AUTO REAL RADIAN La L4 EDIT CALC TESTS SetUpEditor 1:Edit... Done 12 20 30 90 110 2:SortA(3 4 5 9 10 3:SortD(4:ClrList 5:SetUpEditor L1(1)=1