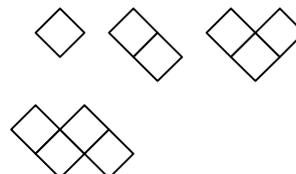


## ALGEBRA I ACTIVITY 3: GENERATING RECURSIVE SEQUENCES TO EXPLORE LINEARITY

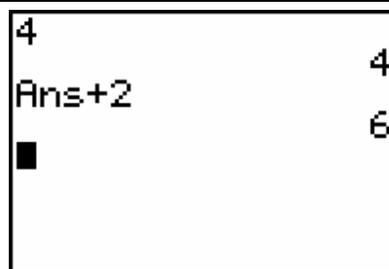
### ACTIVITY OVERVIEW:

In this activity we will

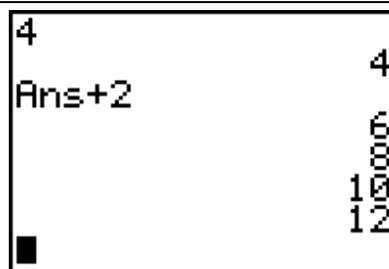
- Define a perimeter pattern recursively
- Generate a recursive sequence using the calculator using two methods
- Use recursion to answer questions



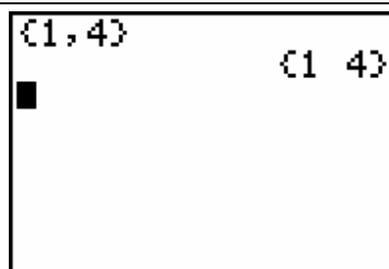
On the home screen, type the perimeter of the first figure in the illustration above (4) and press **ENTER**. Then press **+ 2 ENTER**. This will show how the perimeter grows when the next square is added.



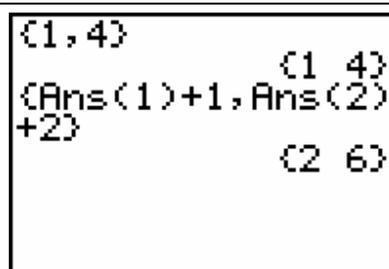
Press **ENTER**, **ENTER**, **ENTER** to show the perimeter for the next three figures. Unfortunately, this method will not be very useful if you are asked how many squares will have a perimeter of 34 units.



Clear the home screen. Press **2nd ( ) 1 , 4 2nd ( )**. Then press **ENTER**. This defines your first term as 1 square, perimeter of 4 units.



Now you need to show that as the number of squares increase by one, the perimeter increases by 2. Press **2nd ( ) 2nd (-) ( ) 1 ) + 1 , 2nd (-) ( ) 2 ) + 2 2nd ( )**. Press **ENTER**. The result {2 6} indicates that the figure with 2 squares has a perimeter of 6 units.



Press **ENTER**, **ENTER**, **ENTER** to show the number of squares and perimeter for the next three figures. How many squares will have a perimeter of 34 units?

(1 4)
(Ans(1)+1, Ans(2)+2)
(2 6)
(3 8)
(4 10)
(5 12)

To return to the beginning, press **2nd****ENTER** repeatedly until the entry {1,4} appears. Press **ENTER** to set this as the start again. Then press **2nd****ENTER** until the entry {Ans(1)+1, Ans(2)+2} appears. Press **ENTER**.

(4 10)
(5 12)
{1,4}
(Ans(1)+1, Ans(2)+2)
(2 6)

Press **ENTER** to answer questions like “What will the perimeter be when there are 20 squares? How many squares will give a perimeter of 50?”

(18 38)
(19 40)
(20 42)
(21 44)
(22 46)
(23 48)
(24 50)

Since having a *constant rate of change* is a characteristic of linearity, this sequence can be produced with a linear function. Use your knowledge of linear equations to create a function rule that you think will produce a table to match the sequence (where x is number of squares and y is perimeter).

Press **Y=** and enter your equation.

Plot1 Plot2 Plot3
Y1=2X+2
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=

Press **2nd****GRAPH** to observe the table. Determine if your equation is correct by checking the table against the sequence on the home screen.

X	Y1	
0	2	
1	4	
2	6	
3	8	
4	10	
5	12	
6	14	

X=0