CC8/Algebra
Recursive Sequences

Name_____
Date_____ Period___

Recursive Toothpick Patterns

Part 1:

Consider this pattern of triangles.

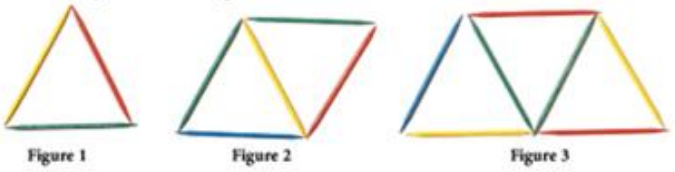

Figure 1 Figure 2 Figure 3

	number of toothpicks	perimeter
Fig. 1		
Fig. 2		
Fig. 3		
Fig. 4		
Fig. 5		
Fig. 6		

1.) Fill in the table for the number of toothpicks
It takes to make each figure, 1, 2, and 3.

2.) Fill in the table for the number of toothpicks that
Make the perimeter for each figure, 1, 2, and 3.

3.) Write a **recursive formula** to generate the sequence for the number of toothpicks needed to make each figure.

4.) Use your formula to complete the table

5.) Write a **recursive formula** to generate the sequence for the number of toothpicks that make the perimeter for each figure.

6.) Write an **explicit formula** to find the number of toothpicks needed to make the nth figure.

7.) Use your formula to find the number of toothpicks needed to make the 10^{th} and 25^{th} figures

8.) Write an **explicit formula** to find the number of toothpicks that make the perimeter of the nth figure.

9.) Use your formula to find the number of toothpicks needed for the perimeters of the 10^{th} and 25^{th} figures.

Part 2:

The following table is for a design that is a row of squares, instead of triangles created by toothpicks.

	number of toothpicks	perimeter	area
Fig. 1	4	4	1
Fig. 2	7	6	2
Fig. 3	10	8	3
Fig. 4			
Fig. 5			
Fig. 6			

10.) Write a **recursive formula** for each of the following:

a.) number of toothpicks in a square figure

b.) perimeter

c.) area

11.) Write an **explicit formula** to find the n^{th} value in each sequence for the following:

a.) number of toothpicks in a square figure b.) perimeter c.) area

12.) Use your explicit formula to find the 10^{th} and 25^{th} value for:

a.) number of toothpicks in a square figure 10^{th}: _____ 25^{th}: _____

b.) perimeter 10^{th}: _____ 25^{th}: _____

Part 3:

1.) Find the missing values in each sequence and the write both a recursive formula to generate the sequence and an explicit formula to find any term in the sequence.

a. 7, 12, 17, ____, 27, ____, ____, 42, ____, 52 Recursive formula _____

Explicit formula _____

b. 5, 1, -3, ____, -11, -15, ____, ____, -27, ____ Recursive formula _____

Explicit formula _____

c. -7, ____, -29, ____, -51, -62, ____, -84, ____ Recursive formula _____

Explicit formula _____