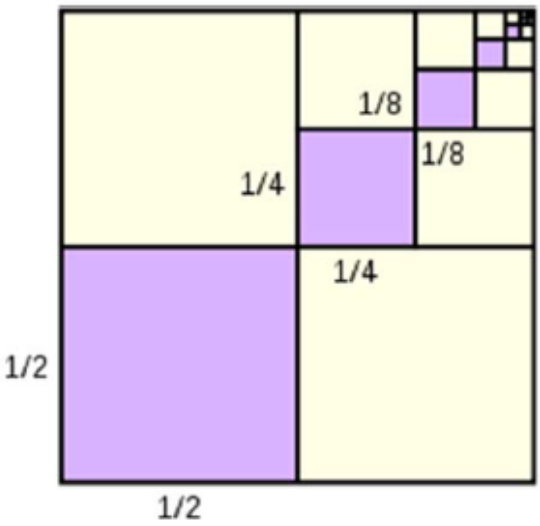
Directions: For this exploration you will be scored on the attached rubric. You will choose one of the following two tasks (labeled Level D and Level E) to solve. Complete work is expected on all parts of the task. This means you need to show your work, explain your thinking, verify your answers for reasonableness and record your findings in a way that allows you to recreate your thinking. Zero credit will be given for unsupported answers. You will lose points for unorganized, messy or incomplete work. All work must be done on a separate sheet of paper; do not try to squeeze your work and answers in the small spaces on this page. The rubric page attached will serve as the cover page to your exploration. In addition to completing the task you will write a paragraph using complete sentences explaining what about the task you choose appealed to you most. Please include the following in your response: did you choose the task that was easier for you or the task that challenged you most, how much time did it take you, did you try multiple strategies before coming up with a solution, etc.

Level D

Shrinking Squares

Consider the shaded squares. Write a sequence showing the perimeter of each square in the sequence.



1. What is the perimeter of each shaded square?

2. What is the area of each shaded square?

3. Discuss the different patterns you can find in the diagram.

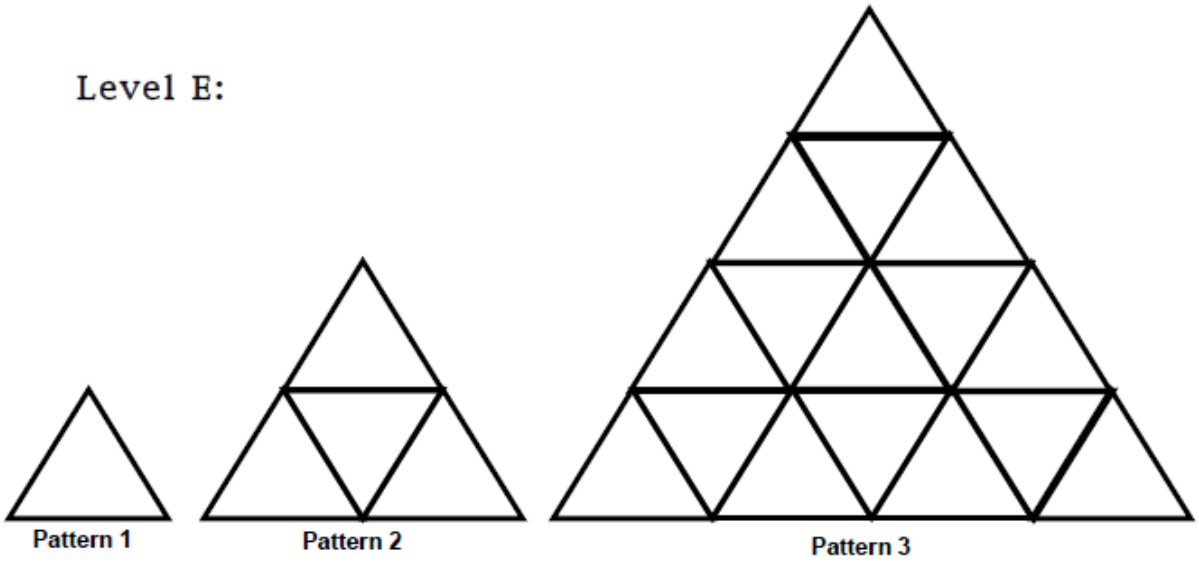
4. Suppose there are twelve terms in the sequence. What is the perimeter of the 12th square? Show how you figured it out.

5. How can you find the area of the 20th shaded square without having to find all of the ones before it?

6. At what rate do the different patterns change from term to term? How do you know?

7. How can you determine any terms in any of the patterns? Explain.

Level E:



Craig constructs the designs above from equal line segments. The design in Pattern 1 is made up of three line segments. Pattern 2 is made up of nine line segments. Pattern 3 is made up of thirty line segments, and so on.

How many line segments are needed to make Pattern 8?

How many line segments are needed to make Pattern 16?

Determine a function for finding the number of line segments needed to make the pattern for any number **n**. Justify why your function works.

You have 6,294,528 equal line segments. Can you construct a design that belongs in this sequence using just those line segments? If so, what pattern number would that be? If not, how many more line segments might you need to construct a design that fits the sequence?