Name: _____

Koch Curve and Coastlines

1. Write one sentence that describes what a fractal is. *Include some of the following: repeated or neverending pattern; something simple that, when repeated over + over gets complicated; pattern that gets bigger or smaller*

2. What are four types of fractal patterns that you learned about?

a) *spiral*

b) *branching*

c) *geometric*

d) *algebraic*

3. What is a perimeter? *The distance around a shape*

4. Using the worksheet on the following page, divide each line segment into thirds and replace the middle segment with the V shape like shown in the one example.

Once you've done this for each line, in the table on the following page, report the number of line segments in total, the length of each segment and total length of lines.

5. Repeat this process two more times, making the lines smaller and smaller, continuing to fill in the table.

6. What trends do you see? Write a mathematical expression for the trends for number of segments, length of each segment and total length of lines.

 # segments: ×4   length = ÷3   total length = ÷1.3

7. Name three other things in nature that are formed by the same processes as in the Koch Curve.

Snowflakes, mountains, coastlines
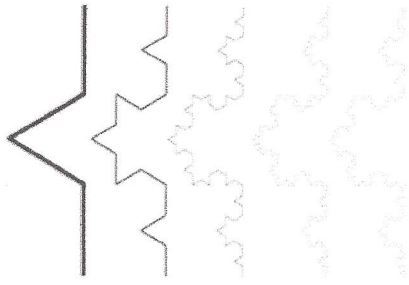
Name: _____

Koch Curve and Coastlines

8. Using the following page, cut out the ruler, measure the perimeter of the outlined shape with the 2.5 cm length of ruler. Fill in the table for the number of counted units and calculate the perimeter.

9. Measure the perimeter of the shape with the 5 cm length of ruler and the 10 cm length, reporting the counted units and perimeter in the table.

10. Graph the perimeter for each of the ruler sizes. You have to determine the scale of the Y axis.

11. What pattern do you observe that relates the scale of the ruler to the resulting perimeter measurement?

less accurate

The Koch Curve Fractal

The first version of the shape, Iteration 1, has been drawn for you, and consists of 4 segments, each 27 units long, for a total length of 108

Using a pencil, divide each segment into 3 equal parts, then replace the middle third of the segment with an upsidedown "v". This is Iteration 2.

Count how many segments you have now, and figure out how long each of these segments is. Multiply the number of segments by the length of each to find the total length of the Koch Curve.

Repeat this process to make Iterations 3 and 4, each time erasing the middle segment and re-placing it with a smaller copy of the "v". Fill in the values in the table for Iteration 3 and 4.

Iteration	Number of segments	Length of each segment	Total Length
1	4	27	108
2	16	9	144
3	64	3	192
4	256	1	256

×4   ÷3

consider looking at the trend

and using your math skills instead of counting

÷6 ×3

—— Length = 27 dots ——
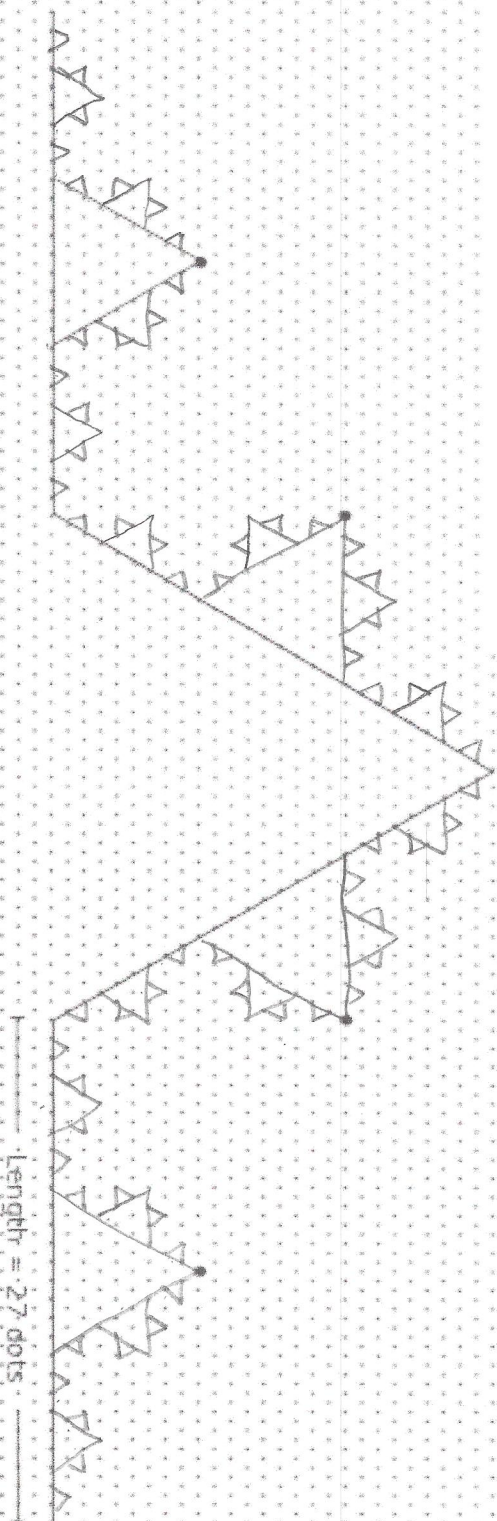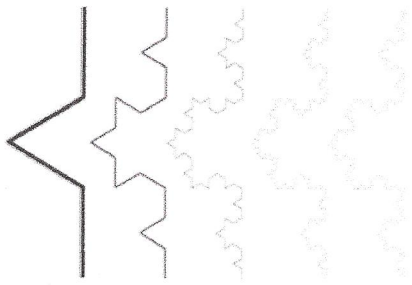
Name: _____

Koch Curve and Coastlines
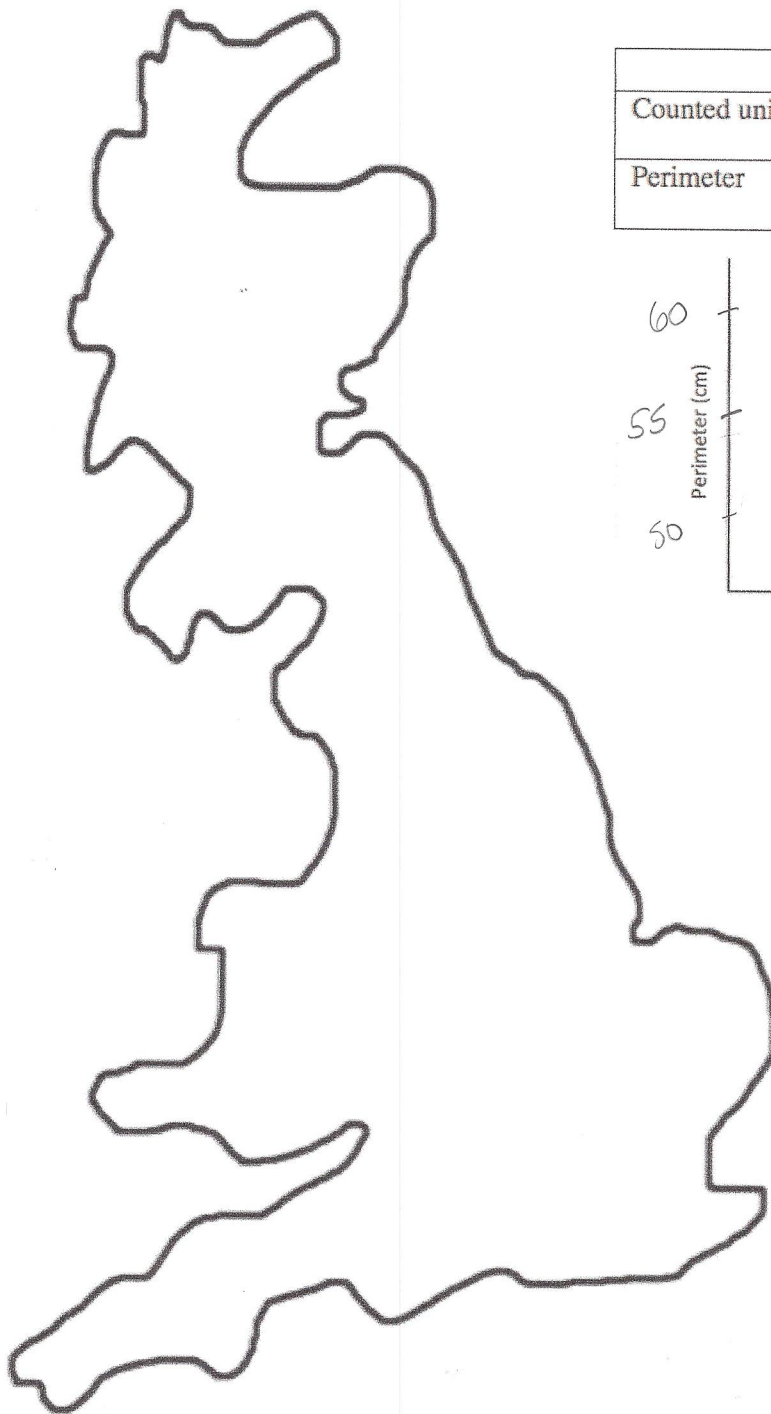
	2.5 cm	5 cm	10 cm
Counted units	23	11	5
Perimeter	57.5	55	50

2.5 cm

10 cm

5 cm

4