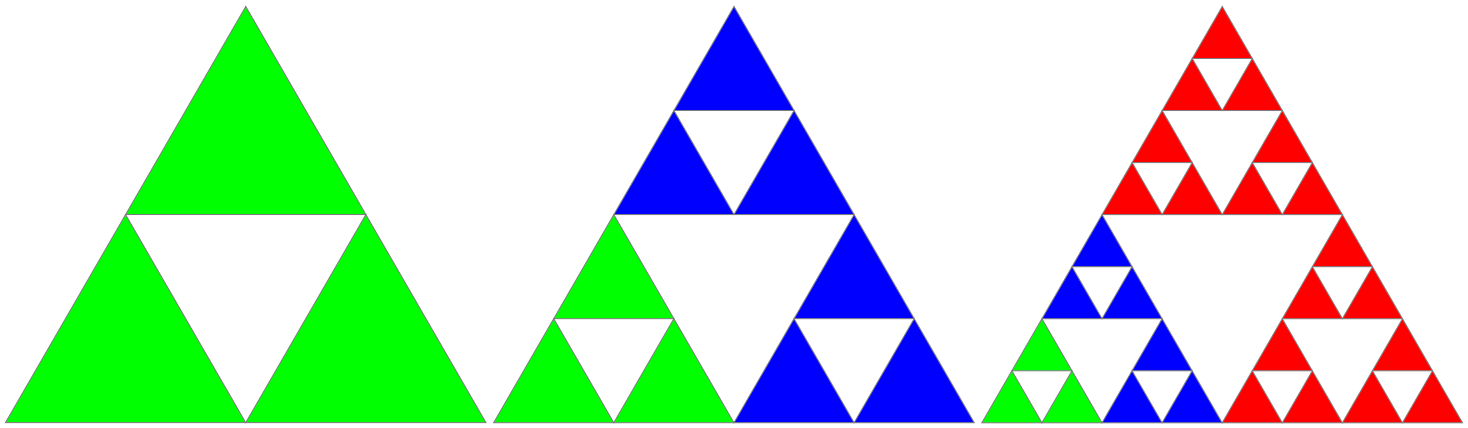
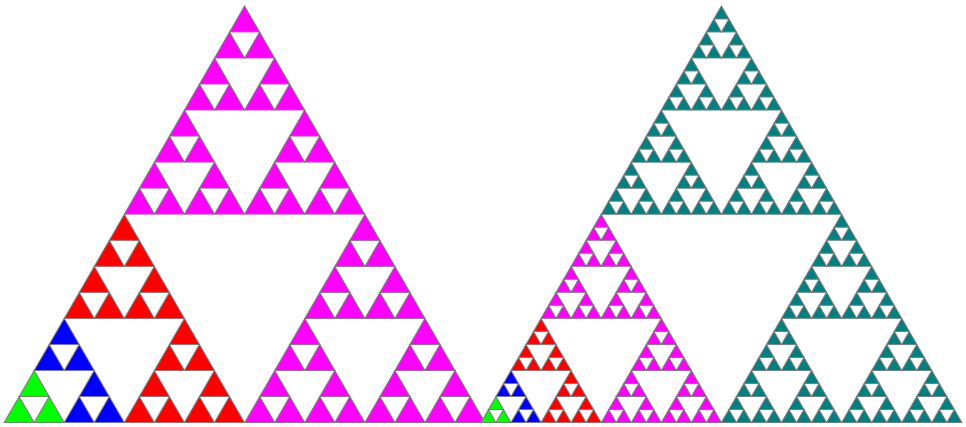
Sierpinski Triangle

Another nice two-dimensional fractal can be made by splitting an equilateral triangle into four smaller ones, removing the middle one and repeating forever until you get a **Sierpinski Triangle,** sometimes also called a Sierpinski Sieve.



First stage | Second stage | Third stage



Fourth stage | Fifth stage...

Questions

1. How many triangles make up the second stage Sierpinski triangle?
2. How many more triangles are in the third stage than in the second stage?
3. Is there an easy way to calculate how many triangles there are in each stage?
4. What fraction of the area of the whole triangle are the smaller triangles which make up the first stage Sierpinski triangle? What about the second stage?

- Bonus: What fraction of the area of the triangle has been removed at Stage 3?

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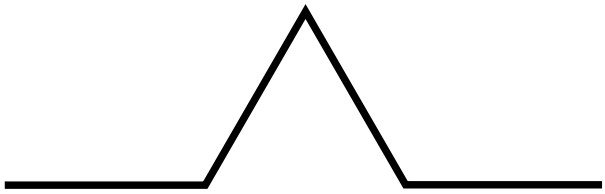
Koch Curve

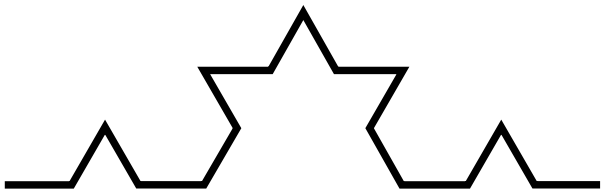
Instead of removing the middle third of a line, as for the Cantor Set, if you instead replace it with two sides of an equilateral triangle, and repeat for each section forever, you get the Koch Curve.

Each time you repeat, you increase the length of the line - so if you repeat forever, the line has infinite length!

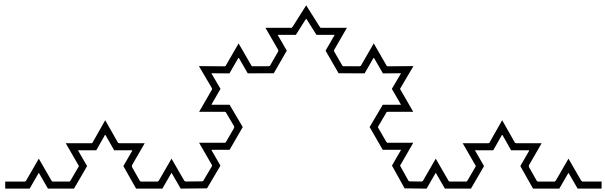
First stage



Second stage

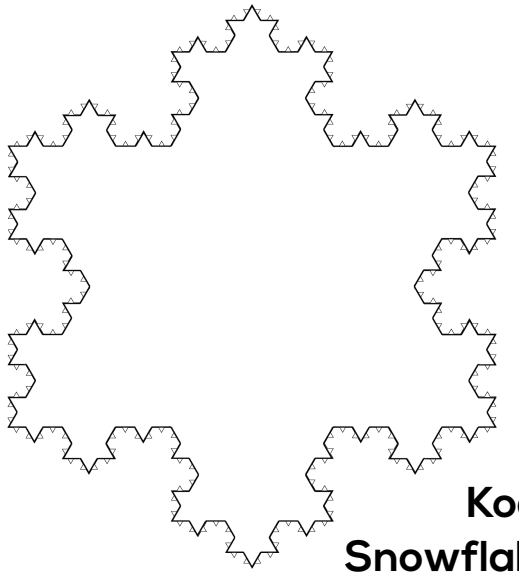


Third stage



Fourth stage

If instead of starting with a line, you started with an equilateral triangle, you get a Koch Snowflake.



Koch Snowflake

Questions

1. If the original first stage line was 12cm long, how long would the second stage line be? What about the third?

Is there an easy way to calculate how the length increases at each stage?

2. How many triangles are added to the curve when you go from the 2nd stage to the 3rd stage? How many are added when you go from the 3rd to the 4th?

Can you write down a way to calculate this number for any stage?

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