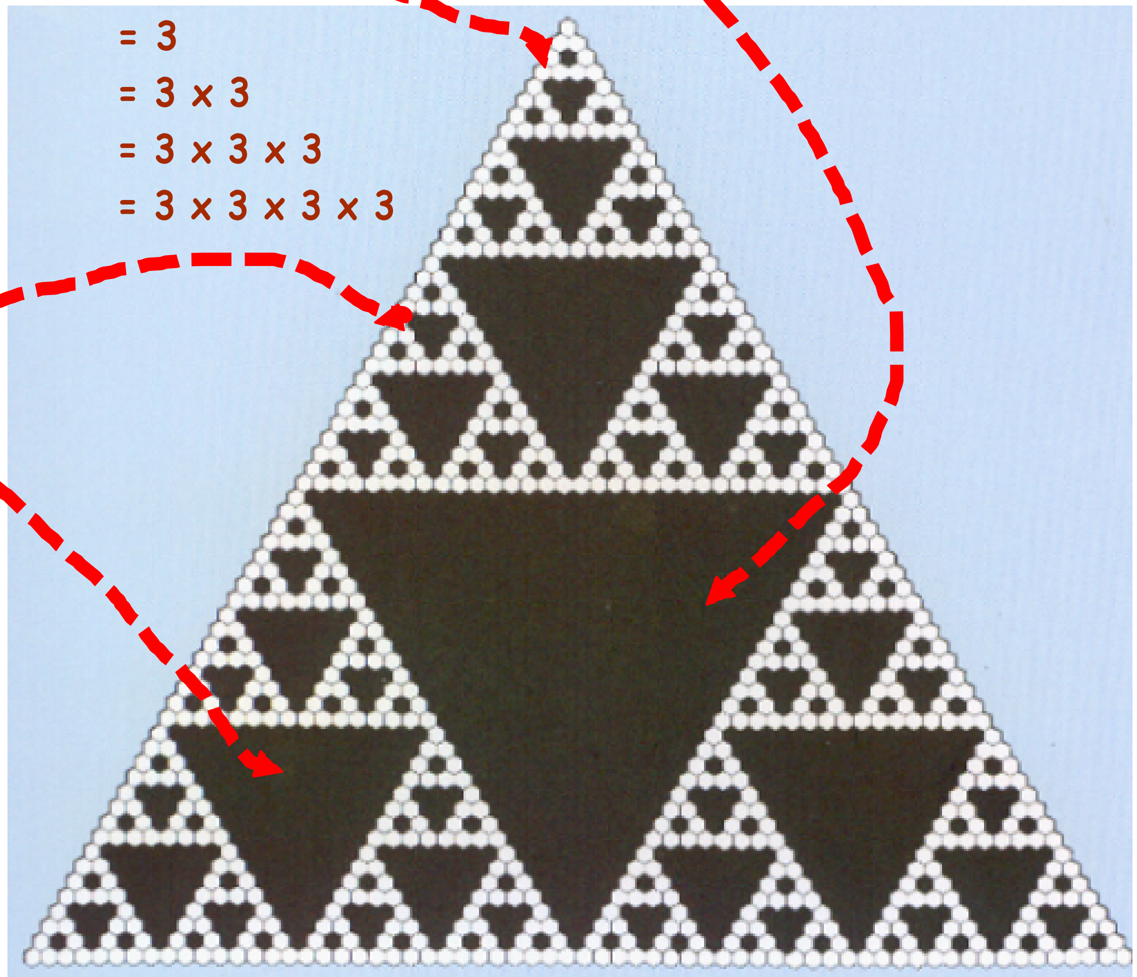
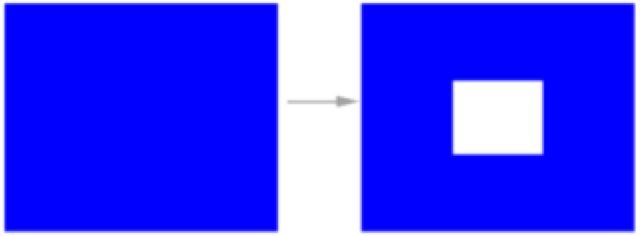
Sierpinski's Triangle is a self-similar fractal that has a pattern of number of triangles as follows:

| | | | |
|---|---|---|---|
| • super-sized | 1 | $= 3^0$ | $= 1$ |
| • extra-large | 3 | $= 3^1$ | $= 3$ |
| • large | 9 | $= 3^2$ | $= 3 \times 3$ |
| • medium | 27 | $= 3^3$ | $= 3 \times 3 \times 3$ |
| • small | 81 | $= 3^4$ | $= 3 \times 3 \times 3 \times 3$ |

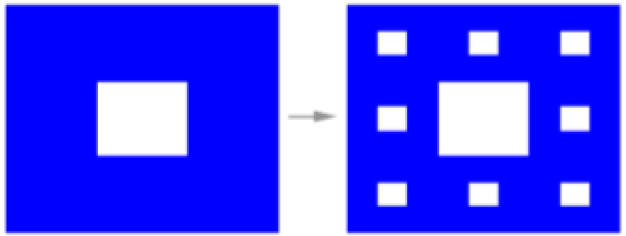


## Sierpinski Carpet

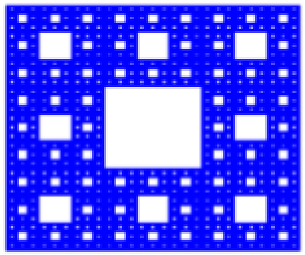
Sierpinski Carpet is an example of a **fractal cluster**, which can be formed by cutting out parts of a 2-dimensional figure. The Sierpinski Carpet starts with a square, which is divided into 9 smaller squares, and cuts out the center square:



After that the same is done with each of the 8 squares left:



If you continue the process infinitely, you will get the Sierpinski Carpet:



FRACTAL DIMENSION

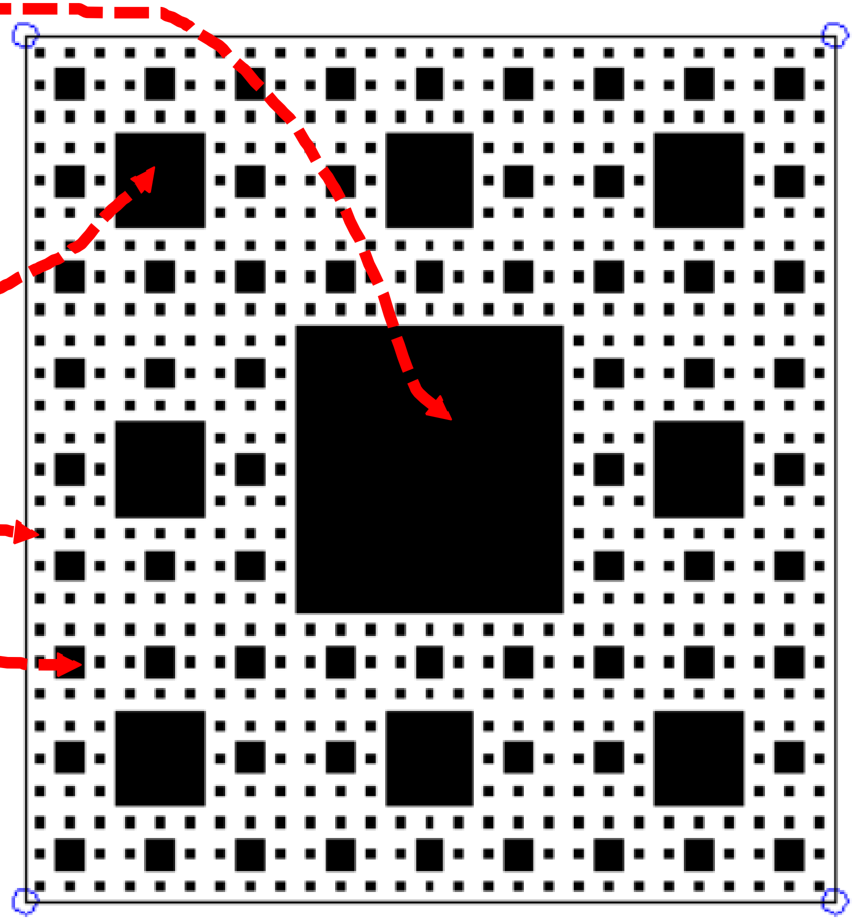
In the fractal, there are 8 identical figures, each of which has to be magnified 3 times to get the entire figure. Using the **similarity method**, we can find the **fractal dimension** to be log 8 / log 3, which is approximately 1.89.

AREA

After every **iteration**, we leave 8/9 of the area of the figure. To find the area of the figure after some number of iterations, we have to raise 8/9 to the power of that number. Although it doesn't seem so, after an infinite number of iterations, the area will become 0.

Sierpinski's Carpet is a self-similar fractal that has a pattern of number of squares as follows:

| | | | |
|---|---|---|---|
| • super-sized | 1 | $= 8^0$ | $= 1$ |
| • extra-large | 8 | $= 8^1$ | $= 8$ |
| • large | 64 | $= 8^2$ | $= 8 \times 8$ |
| • medium | 512 | $= 8^3$ | $= 8 \times 8 \times 8$ |



*if you want to see a Sierpinski's Carpet with one more iteration, see the next two pages where I created such a fractal from a simple 27 x 27 grid; we would have had the following number of squares (notice that the squares are not colored in):

| | | | |
|---|---|---|---|
| • small | 4,096 | $= 8^4$ | $= 8 \times 8 \times 8 \times 8$ |