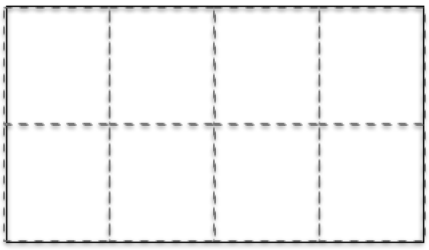
MAKE A GIANT SIERPINSKI TRIANGLE

There are lots of giant fractal activities that you could do with your class, but if you're looking for a low-prep giant fractals lesson then we've got you covered! Make a Level 4 Sierpinski triangle as a class.

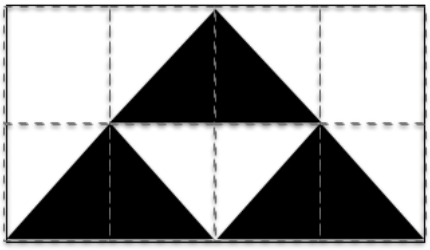
Teacher instructions:

These instructions assume you have 27 students. See below for ideas if you have more students.

- Give each student a piece of printer paper.
- Clear a big wall or floor space. If using one piece of A4 paper per student, you will need a space that is at least 168 cm tall by 237.6 cm wide.
- Each student needs to divide their paper into eighths (as below).



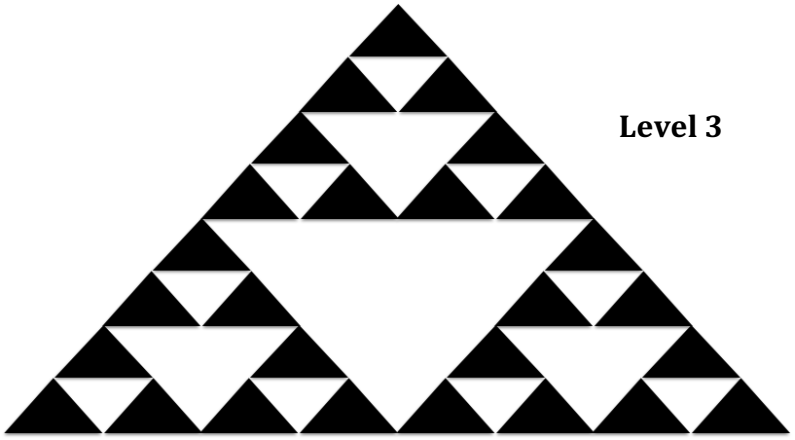
Each student then draws a Level 1 Sierpinski triangle (as below), using the lines to guide them. They can repeat this process within each triangle for as long as they have time, and colour the resulting triangles however they like.



Level 1

- Each student cuts out their big triangle.

- Students then put their Level 1 triangles together in groups of three to make Level 2 triangles. Three Level 2 triangles can then be put together to make a Level 3 triangle, and so on. If 27 students all make a Level 1 triangle each, then as a class a Level 4 triangle can be made. See our Level 3 diagram below.



- If you have 3 classes, could they all do this and put their work together to make a Level 5 Sierpinski triangle? How big can your school make their Sierpinksi triangle? We'd love it if you send us photos of what you make!

More students?

If you have more than 27 students in the class: cut all the printer paper into four pieces, each half the width and half the height of the original. Students then draw one Level 0 triangle on each of these smaller bits of paper. You'll need the class to make, between them, 81 of these smaller triangles to be able to build a Level 4 Sierpinski triangle with them. For example, a class of 31 students could make 3 triangles each (this would only make 12 triangles too many).

What space/size paper do I need?

The dimensions of the space needed double every time you go up a level. You can work out the space needed by finding the dimensions of your paper, and doubling for every new level. (Equally, you could work backwards from the space available to find the size of paper to start with, or how many levels you can make).

For example, if your Level 1 Sierpinski triangles are A4 size (landscape) then you can use the table below to find how much space you'll need for each level.

	No. of Level 1s needed to make it	Height of space	Width of space
Level 1	1	21cm	29.7cm
Level 2	3	42cm	59.4 cm
Level 3	9	84cm	118.8 cm
Level 4	27	168 cm	237.6 cm

If you wish your triangles to be equilateral triangles then you'll need to use pieces of paper with dimensions in the ratio 1: $\frac{\sqrt{3}}{2}$. Working this out is fun – a nice challenge for a student who knows Pythagoras' theorem.

Possible extension questions

Students could be asked if they can find (using only the dimensions of their piece of paper):

- The perimeter of their Level 1 Sierpinski triangle (they'll need Pythagoras' theorem)
- The shaded area of their Level 1 Sierpinski triangle
- The perimeter and shaded areas for higher level Sierpinski triangles