## Mathematical Christmas Tree













## **Mathematical Christmas Tree**



Take several rolls of Christmas paper and cut them into sixteen A5 sized pieces.

Fold the A5 sheet in half then open it out again.

Fold the top right hand corner down to the central line, so the the paper bisects the angle it creates



Fold the bottom right hand corner up so the fold follows the edge of the folded down sheet and the two edges match.

Tuck in the little right angled triangle that sticks out.



Fold over the 3 corners to make 4 equilateral triangles













## **Mathematical Christmas Tree**



Fold the triangles into the centre, then open out to form a tetrahedron (triangular based pyramid)

Tape the three open edges together. This is the stage 0 of our Fractal - Not a fractal, just the basic element with which we will build the fractal





Stage 1: Tape four stage 0 tetrahedra together and you have the first stage of your fractal. It is called a Sierpinski Tetrahedron.















## **Mathematical Christmas Tree**

Make more tetrahedra to make a stage 3, 4 or greater Sierpinski Tetrahedron



Make other patterns



Use other materials. This one is made out of modelling balloons



Questions to ask:

- 1. How many A5 sheets of paper will be needed to make a Stage 3 Sierpinski Tetrahedron? (4 x 16)
- 2. How many sheets are needed for a Stage 4? etc.
- 3. How many triangles are there on each face of the big tetrahedron? How many on all the faces?
- 4. What is the shape inside the Sierpinski Tetrahedron? (Octahedron shh)
- 5. How many stages would be required to make a Sierpinski Tetrahedron with 1 metre edge length using A5 sheets of paper?









