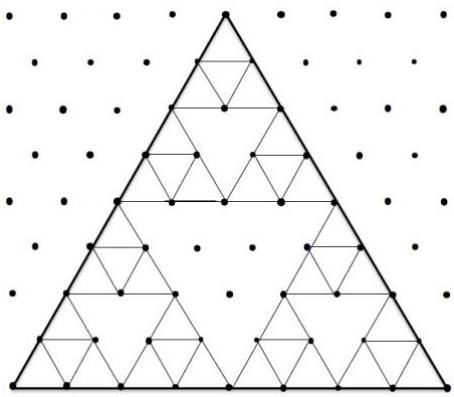
WORKSHEET FOR THE WORKSHOP. Print the worksheet and you will be able to use it to do the activities during the workshop when the ideas will be explained.



1. SIERPINSKI TRIANGLE

Colour the small triangles that are this way up.

Leave the triangles like this uncoloured.

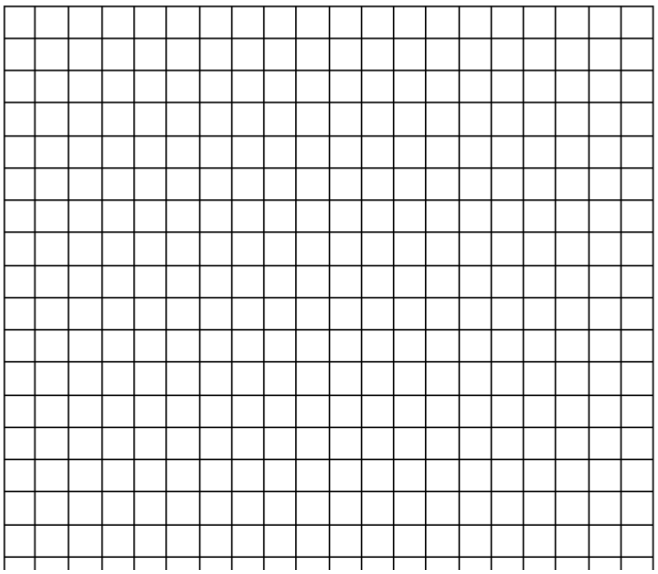
2. **SIERPINSKI TRIANGLE AND SCALING** Answer the questions below by filling in the table.

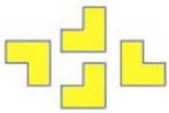
- How many triangles are shaded at each stage of the Sierpinski Gasket?
- At each stage compare the smallest shaded triangle to the whole gasket. Compare the lengths of the edges and compare the areas.
- What fraction of the area of the gasket is shaded at each stage?
- What scale factors give the similarity (enlargement) at each stage.
- What fraction is unshaded?

Stage	Number of shaded triangles	Edge length of shaded triangles. Linear scale factor	Fraction of area of one shaded triangle. Area scale factor	Total fraction of area shaded	Fraction unshaded
Stage 0					
Stage 1					
Stage 2					
Stage 3					
Stage 4					
Stage 5					

https://aiminghigh.aimssec.ac.za/30-minute-fractals-lesson/

3. REPTILE FRACTAL





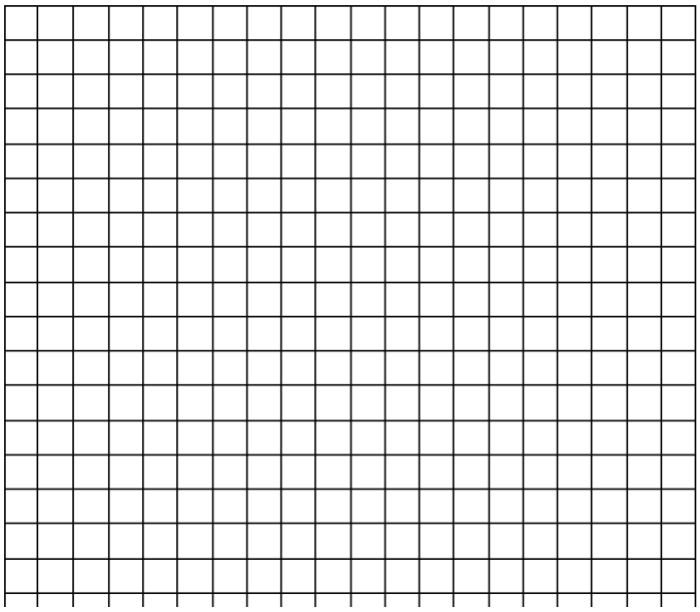
Make an enlargement of this shape by putting the 4 pieces together edge to edge. Draw it on the grid

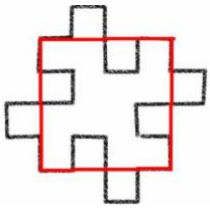
Repeat this again and again to form enlargements by factors 4, 16, 64, ….

Imagine repeating this enlargement process again and again infinitely often…

https://aiminghigh.aimssec.ac.za/trisquares/

4. SQUAREFLAKE TESSELLATION





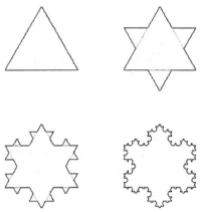
Colour in a tessellation pattern made up of copies of the stage 1 squareflake pattern.

The red square shows the Stage 0 pattern. It's not necessary to include this but it might help to mark the corners of the Stage 0 square on the grid as a guide.

https://aiminghigh.aimssec.ac.za/squareflake-fractal/

5. VON KOCH CURVE

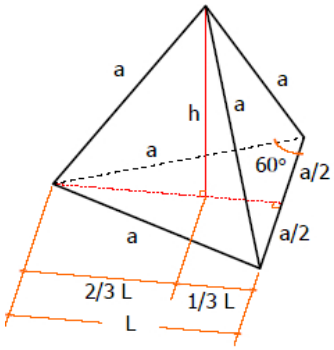
Von Koch snowflake	A Length of edge	B Number of edges	C Perimeter
1	1	3	3
2	1/3	12	4
3			
4			
5			
n			



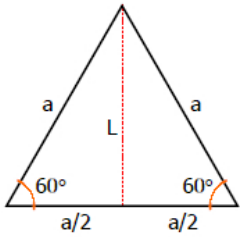
https://aiminghigh.aimssec.ac.za/make-a-von-koch-poster/

6. SIERPINSKI TETRAHEDRON

Investigate the construction and fill some results in the table



Regular Tetrahedron

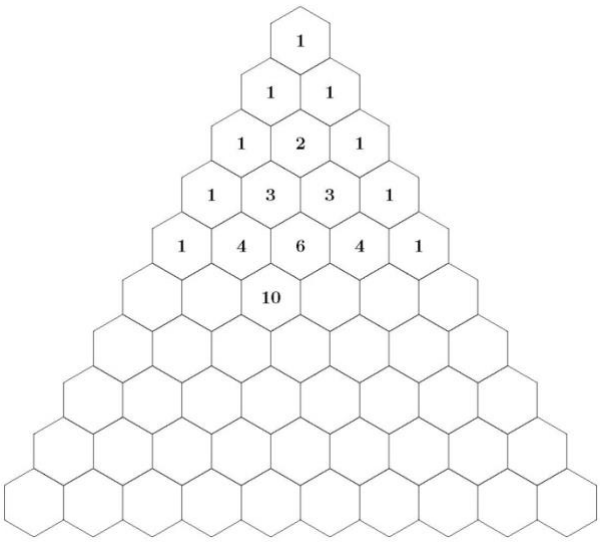


One Face of Regular Tetrahedron

Stage	0	1	2	3	4	5	6
Number of tetrahedra	1	4	16				4^6=4096
Number of 25 cm balloons	6	24					24576
							Target for new record
Edge length metres	0.25	0.50					16
Altitude of faces. L=a√3/2 metres							13.856
Vertical height H = a√(2/3) metres by Pyth Th.							13.064
Vertical height in feet							42.460

https://aiminghigh.aimssec.ac.za/sierpinski-number-and-shape-patterns/

7. **SPOT THE PATTERN**
   https://aiminghigh.aimssec.ac.za/pascals-triangle-and-fractal-patterns/



Continue filling in the numbers in this pattern.

Shade the cells containing odd numbers

Expand these powers of (1+x)
$(1+x)^0$, $(1+x)^1$, $(1+x)^2$, $(1+x)^3$, $(1+x)^4$,$(1+x)^5$.
What do you notice?

$$(\mathbf{1}+\boldsymbol{x})^{\mathbf{0}} =$$
$$(\mathbf{1}+\boldsymbol{x})^{\mathbf{1}} = \mathbf{1}+\boldsymbol{x}$$
$$(\mathbf{1}+\boldsymbol{x})^{\mathbf{2}} = \mathbf{1}+\mathbf{2}\boldsymbol{x}+\boldsymbol{x}^{\mathbf{2}}$$
$$(\mathbf{1}+\boldsymbol{x})^{\mathbf{3}} = (\mathbf{1}+\boldsymbol{x})(\mathbf{1}+\boldsymbol{x})^{\mathbf{2}} = ?$$
$$(\mathbf{1}+\boldsymbol{x})^{\mathbf{4}} = ?$$