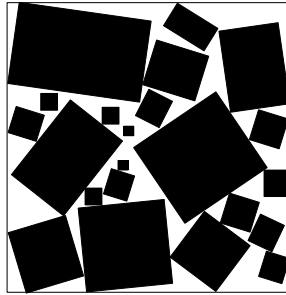
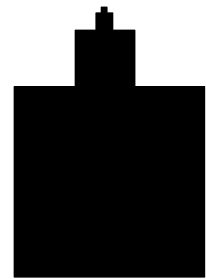


Square Snowflakes Investigation

Q1. Is it possible to fill 2-dimensional space with shapes that touch only at points? Explain why.



Q2. A square is 1 m by 1 m. The middle third of the top side is replaced by three lines, each the same length as the middle third, to make a square bulge on the original square. The same thing is then done to the new square. This process is repeated an infinite number of times to get a shape a bit like this.



Find the perimeter and area of the shape.

Q3. Now consider a 1 m by 1 m square. But this time, instead of adding a smaller square to one side, we do it to all sides. The result will be a 20-sided figure. Then we do the same to all 20 sides to get a 100-sided figure. Then we keep doing this for ever.

- Do a rough drawing of the resulting figure.
- What shape will the figure be?
- Will it have holes in it?
- What will its area be? Find out using geometry and Pythagoras and using an infinite series and compare the results.
- Is there any conflict between your answers to c and d?
- What will be the total length of the edges of the shape?
- What will be its outside perimeter?