

### THE CHAOS GAME

*The Chaos Game will only give you a good pattern if*  
 (a) you are accurate in where you place the dots, and  
 (b) you put a lot of dots in (at least 500).

*This game takes a long time to do properly.*

Take a large piece of paper (flip chart paper works well for this), and draw as large an equilateral triangle on it as you can.

Mark the vertices (points) with the numbers 1, 2 and 3.

Make a mark in a different colour somewhere inside the triangle.

This is your first **game point**.

**Step 1** Now take an ordinary die, and throw it.

**Step 2** If you throw a 1 or 4, then you use the vertex (point) marked with a 1,

If you throw a 2 or 5, then you use the vertex (point) marked with a 2,

If you throw a 3 or 6, then you use the vertex (point) marked with a 3. Measure the distance between your game point and the vertex 1 if you throw a 1 or 4, or the distance between your game point and the vertex marked with a 2 if you throw a 2 or 5, or the distance between your game point and the vertex marked with a 3 if you throw a 3 or 6.

**Step 3** Find the point which is halfway **exactly** between your game point and the corresponding vertex of the triangle - this point then becomes your new game point. Mark it accurately and not just to the nearest centimetre or half centimetre. Put a small piece of blu-tak on your point so you remember which one it is.

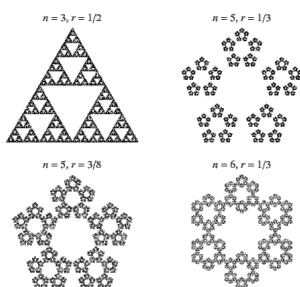
**Repeat steps 1 to 3 a lot of times (and that really does mean a lot, 500 or more – maybe everyone in the class could have a go every day for a few weeks). To get a good result it is important that your measuring and marking of points is as accurate as you can get it.**

You should find that a particular pattern of dots forms, which will look familiar. Can you identify which pattern you are making?

See this pattern on Geogebra and vary the distance ratio

<https://www.geogebra.org/m/KSS8YkW5>

#### Challenge for students who can write computer programs (code).



The Chaos Game can be programmed if you know how to put a loop into your program and you can incorporate a conditional command using a randomly selected digit 1, 2 or 3.

Try this for 5,000 or 10,000 points.

You might try your program with 5 or 6 points rather than 3.