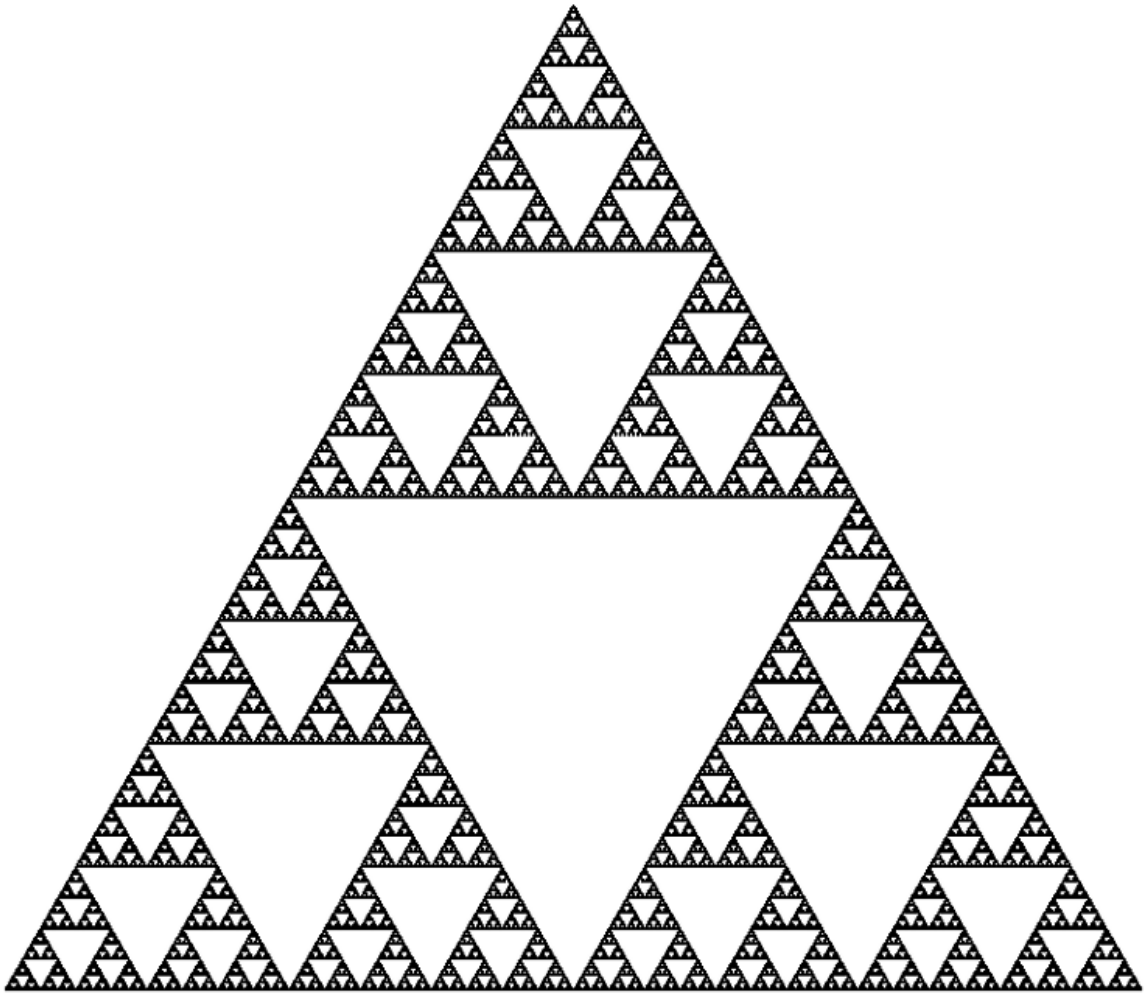
Plymstock School

Achieving Excellence through Curriculum and Culture

A Level Further Maths Summer Work



As a further mathematician, it is good to attempt some additional problems as well as the A Level maths summer work to ensure your mathematical brain muscles get a good workout before the course starts. All the knowledge you need for this you knew at GCSE; you just need to select the relevant knowledge to solve each problem. This is key for the geometry questions and for studying further maths.

Do not worry if you get stuck – we can look at any you can't work through in September.

Let's start with some algebra.

1. Rearrange the following to make a the subject of the equation:

(a) $\frac{1}{a} + \frac{1}{b} = \frac{1}{c}$

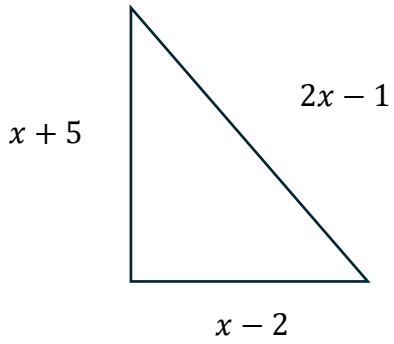
(b) $P = \frac{n^2+a}{n+a}$

2. Solve the equation $\frac{4}{x+1} + \frac{2}{x-2} = 3$

3. Express $\frac{5}{(x+2)(x-3)} - \frac{2}{x+5} - \frac{1}{x-3}$ as a single fraction in its simplest form.

4. The diagram shows a right-angled triangle. Find the value of x.

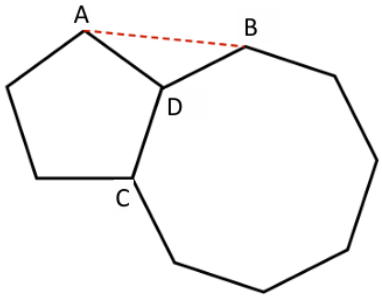
   Hence find the area of the triangle.



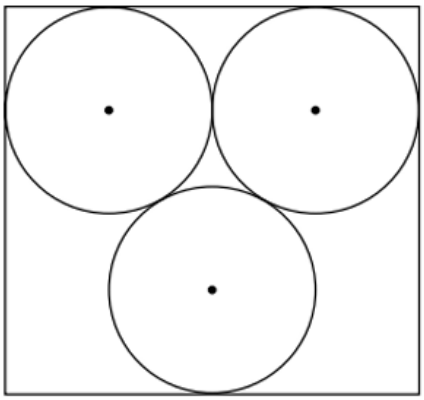
5. Given that $f(x) = x^2 + 4$ and $g(x) = x - 9$ for all values of x, solve the equation $fg(x) = gf(x)$

Geometry and problem solving

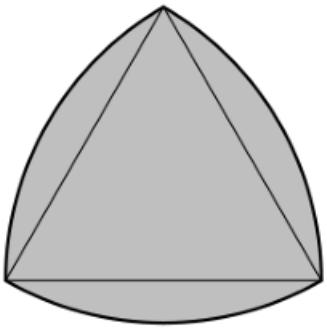
1. A is the vertex of a regular pentagon. B is the vertex of a regular octagon. C and D are vertices of both polygons. Given that the perimeter of the octagon is 120 cm, work out the length AB giving your answer to 2 decimal places.



2. The diagram below shows 3 identical circles, each of radius 2 cm, inside a rectangle. Each circle touches the other two circles and the sides of the rectangle. Work out the **exact** area of the rectangle, leaving your answers in terms of a surd.



3. The sides of an equilateral triangle with side length r are rounded off by drawing arcs of radius r centred around the vertices of the triangle. Find, in terms of r, the shape's **exact:**
   (a) Perimeter
   (b) Area



Now some research work for you.

One of the topics we will study is Complex Numbers.

Your task:

- We usually work in radians when working with complex numbers. What are radians and how do we use them?
- What is a complex number?
- How are they used?
- Find mathematical examples of them – find questions and solutions (don't just google, chat GPT and copy and paste. I may ask you to explain). Don't over complicate – simple examples of solving equations, argand diagrams, complex conjugate etc. will suffice.