ICTS-RRI Math Circle, Saturday 10th June 2023
Geometry and Galois Theory

Parthanil and Sam
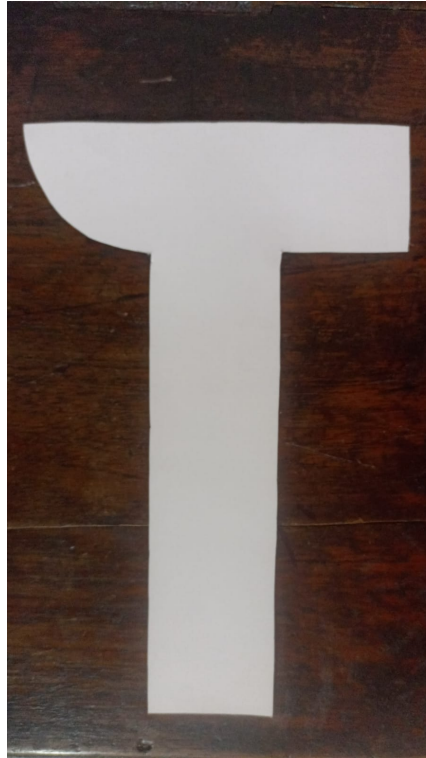

Figure 1: The 'hammer' shape

The next theme in the math circle is Geometry and Galois theory. This theme is based on a talk given by Parthanil at the Promys workshop. We will explore the theme over the next few sessions.

The problem of trisecting a given angle is an old one in geometry. We will explore this problem by using a 'hammer'. Before you come to the math circle on Saturday, make a 'hammer'. To do this, look at the figure and copy it onto a sheet of A4 paper. (You can choose the scale to suit the size of the paper.)

The shape can be described as a 'T'. First, draw a 'T' shape, an 'I' with two squares attached. Then, leave the right square as it is and cut the left square so the square is replaced by a quadrant of a circle. This is the paper hammer.

Now, this shape has to be transferred onto a stiff plane material that can be used to draw lines. One suggestion is to use transparency sheets (if you can find them). These are easy to cut using scissors and thick enough to use as a ruler. Ask your parents to help. They may have old transparency sheets (used in overhead projectors) lying around or know where to find them. If you can come up with a better material for making the 'hammer', please do so and bring it to class.

10:00 am First Activity: Your first challenge is to use the 'hammer' to trisect any given angle. This is an entry into a subject that is two thousand years old and still going strong.

Tea break: 11:15

11:30 am: Parthanil will lead a discussion about what the hammer teaches us about the famous 'straight edge and compass' of Euclidean geometry. This means asking which points on the plane can be constructed just using a ruler and compass.