Constructing Besicovitch Sets

For this project, students will delve into the history of the Kakeya needle problem and, in doing so, investigate and construct Besicovitch sets.

In 1917, S. Kakeya posed the question of the smallest area for a convex planar set allowing a `needle' to continuously rotate 180 degrees. Pál demonstrated in 1921 that an equilateral triangle with unit height satisfies this condition. Building upon this, A. Besicovitch explored what happens when we relax the convexity assumption. It was later discovered that planar sets of `zero area', now known as Besicovitch sets, can be constructed so that a unit line segment can be continuously rotated by 180 degrees.

This project focuses on constructing such sets and delves into the history of the Kakeya conjecture.