5. String and Pendulum (10 points) — *Päivo Simson, Jaan Kalda.*

Tools: stand with a clamp; a thread bar that can be fixed horizontally to the stand; one piece of red string and two pieces of orange thread; two wooden blocks for fixing orange threads between the stand's clamp; two steel nuts; tape measure, protractor, permanent marker, one staple of $m = 0.0889\,\mathrm{g}$.

i) *(5 points)* The formula for the oscillation period of a mathematical pendulum is $T = 2\pi\sqrt{l/g}$, where l is the length of the pendulum and g is the acceleration due to gravity, valid only for small oscillations. It is known that, in reality, the period T also depends on the angular amplitude α, which is the maximum deviation angle of the pendulum from the equilibrium position. For small angles $\alpha < \pi/2$, a good approximation is given by the formula $T = 2\pi\sqrt{l/g}\,(1 + A\alpha^2)$, where α is measured in radians and A is a dimensionless constant. Find the value of the constant A experimentally.

ii) *(5 points)* Find the mass of one meter's worth of red string.