

THE LOWER BOUNDS OF THE LENGTHS OF  
THICK KNOTS

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**Abstract**

In this paper, we derive a formula that provides lower bounds on the minimal arc length required to tie a unit thickness knot in terms of the minimal crossing number of the knot. We prove that for any nontrivial knot with unit thickness, the minimal arc length is at least 24. This answers a long standing open question in the negative: one cannot tie a knot using one foot-length of one-inch (diameter) rope. For knots with minimal crossing numbers up to 1850, our result yields larger lower bounds on the lengths of the knots than the known results.

**Key words and phrases:** Knots, Links, Crossing Number, Thickness of Knots, Arc Length of Knots.