Revisiting Mike's Problem with GeoGebra

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Abstract: *This article revisits "Mike's Problem," a task originally posed in the Ohio Journal of School Mathematics back in the Spring of 2001. Using GeoGebra, a freely available dynamic geometry software, the author proposes an updated solution.*

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1 Introduction

We've all had math problems to which we've said, "I'll get back to that some day." This is one of mine. I wrote an article that was published in the Spring, 2001, issue of the *OJSM*, entitled, "Mike's Problem." It was left open-ended partially because I wanted to encourage others to explore it, and partially - to be quite honest - because I hadn't completely solved it myself. Not receiving a solution from any $Journal$ readers in 15 years - and now being retired - I decided to get back to a solution.

2 Mike's Problem Revisited

The problem in a nutshell is as follows.

> Mike, a fellow teacher - but not a mathematician - wanted to cut circular table tops from $4' \times 8'$ sheets of plywood. Given the constraint that he could make one straight cut joining any two sides, or any side and a corner, he was to join those two pieces and cut out a circular table of the largest possible diameter.

In the earlier article, I proposed a series of approaches to the problem, each successively better. My best result was a table top with radius = $33.94''$.

3 A New Approach with GeoGebra

To reach my solution this time, I used a tool I didn't have then - namely, GeoGebra. I set up the problem in GeoGebra, tinkered around with it until I found what appeared to be the best possible configuration building on the best from the article - using geometry to come up with the numbers. In a sense, it's still an open-ended problem: *how do I know that this is the best possible configuration?* I rely on that trusted technique, known to every high school student: proof by lack of counterexample. My new best result is a table top with radius = 34.196. I anxiously await hearing from anyone with a better solution, or with a more formal proof that this is, indeed, the largest possible table top. Figure 1 illustrates a model of the problem within GeoGebra. I'm hopeful that you can take my sketch - freely available on the web at `https://www.geogebra.org/m/XKt33S6F` - to improve upon my results.

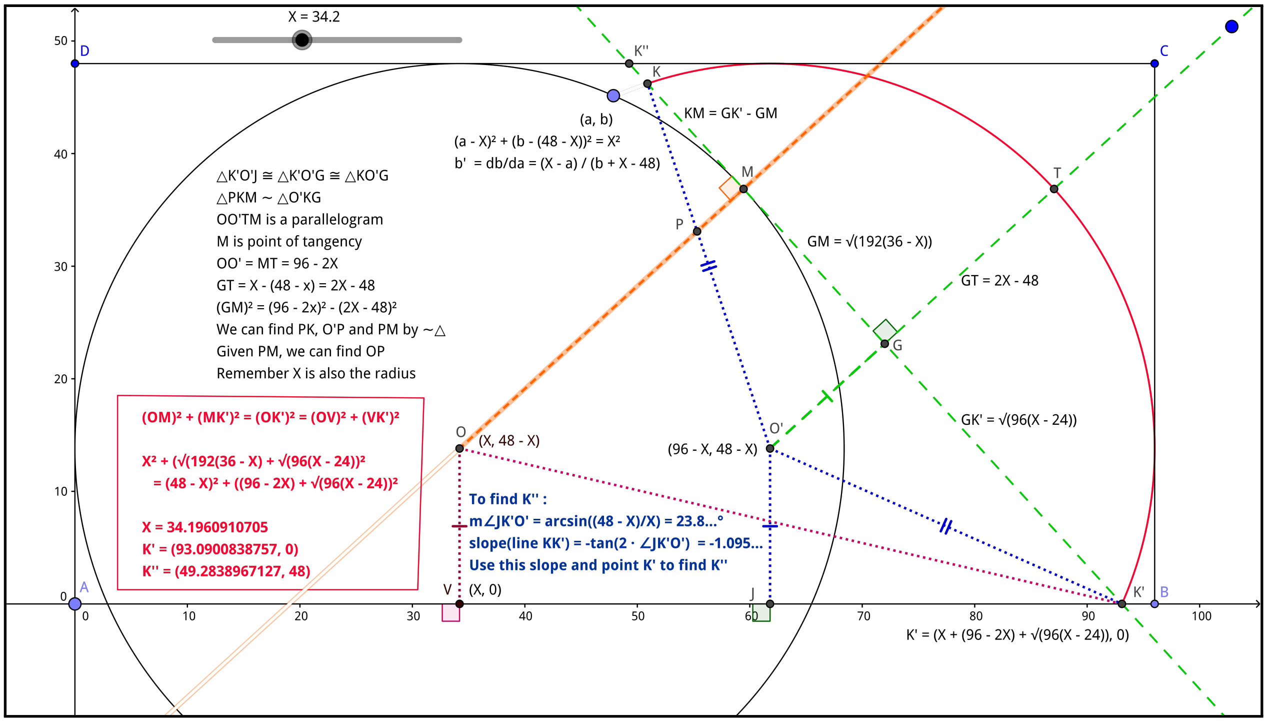
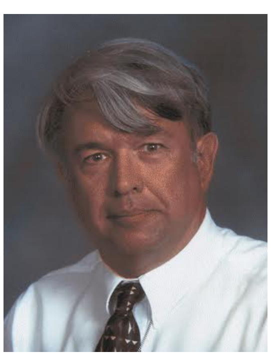


Fig. 1: *GeoGebra model of Mike's Problem.*

3.1 Constructing the Model

In constructing the Geogebra model, along the way I created a number of lines and measurements that turned out to be dead ends. I left them on the model as bread-crumb trails for future explorers. At some point, the connection needed for the solution just jumped out at me - thank goodness I didn't erase any of those trails along the way. Fifteen years ago, I tossed out a message in a bottle, hoping for a reply. I'll try it again.



Mr. Bob Kinner, `keysandwind@gmail.com`, is recently retired from Fenwick High School, Franklin, OH, where he enjoyed introducing his AP and honors math students to the joys of mathematics - and to sticking with problems until they are solved. In retirement, he is finally getting back to problems he left unsolved when he was too busy teaching.