

Title: **The Least Expensive Highway**

Topics: Maxima and Minima

Calculator: yes

Source: unknown (Technically Intensive Calculus for Advanced Placement?)

You are an employee of the **Pennridge Construction Company**. You have just been assigned to plan paths and estimate costs for a potential road building project. Analyze what you are given and plan three possible options for the road. One of these options must be the least expensive option. You are then to write a detailed report of your options.

Your report should be typed and include a summary of the task, an analysis of the possible options, and then your suggestion for the proper route and cost. Support your estimates graphically and mathematically. Once completed, your boss should follow your reasoning without difficulty from beginning to the end and understand why you chose the path you did.

The project is worth 50 points with points assigned to your summary (5), a discussion of your options (15), the accuracy of your choice of the road with the least expensive cost and the angle measure given (15), the calculus support of your estimate (the derivative must be given but then may be solved on the calculator) (10), and the quality of the report – typed, interesting, no spelling/grammar mistakes, etc. (5).

### The Least Expensive Highway

A city would like to build a new section of highway to link an existing bridge with another highway exchange, lying 8 miles east and 8 miles south of the bridge. Unfortunately, there is a 5-mile stretch of marshland that must be crossed. Given that the highway costs 10 million dollars per mile to build over marshland and 7 million dollars per mile to build on dry land, decide where you would recommend the road should go.

