

# Optimization Problems and School Mathematics

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It is well-known that mathematics studied in school is widely considered non-applicable and remote from the real life. This throws a shade on the image of mathematics in society and repels many high-ability students from selecting mathematics as a field of professional realization. Optimization problems, especially those related to practice, have a lot of unexhausted potential for changing this negative attitude to mathematics. Nevertheless, such problems are rarely considered in class or extracurricular activities. There are several different reasons for avoiding such problems at school age. We mention only two of them here. The first is the process of turning a practical problem into a mathematical one (i.e. making a mathematical model of the problem). Mathematical modelling is a challenge of its own and students have to learn how to use it successfully. The situation is additionally complicated by the fact that practical problems are often complex enough and require for their modeling higher level of mathematics than the one studied in school (for instance differential equations, optimal control, advanced algebra). The second reason is that even when the school mathematics provides enough tools for making an adequate mathematical model, the model itself can require a higher level of mathematics for its solution (calculus, optimization, numerical methods). The goal of the talk is to present several such situations that allow to be modeled by school mathematics as optimization problems which are not tractable, at least easily, in the frames of what is studied currently in school. These problems are, however, completely amenable for solving, with satisfying degree of preciseness, by means of the widely available dynamic mathematics software (DMS) systems. Moreover, some of the problems allow to be explored directly by the in-built capabilities of the DMS, without developing a mathematical model first. Using DMS for solving such optimization problems can broaden significantly the applicability of school mathematics and increase its appeal. The ability of students to solve such problems (by means of DMS) was tested via two types of online competitions conducted in Bulgaria.