

Problems of the 1st International Physics Olympiad¹ (Warsaw, 1967)

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Abstract

The article contains the competition problems given at the 1st International Physics Olympiad (Warsaw, 1967) and their solutions. Additionally it contains comments of historical character.

Introduction

One of the most important points when preparing the students to the International Physics Olympiads is solving and analysis of the competition problems given in the past. Unfortunately, it is very difficult to find appropriate materials. The proceedings of the subsequent Olympiads are published starting from the XV IPhO in Sigtuna (Sweden, 1984). It is true that some of very old problems were published (not always in English) in different books or articles, but they are practically unavailable. Moreover, sometimes they are more or less substantially changed.

The original English versions of the problems of the 1st IPhO have not been conserved. The permanent Secretariat of the IPhOs was created in 1983. Until this year the Olympic materials were collected by different persons in their private archives. These archives as a rule were of amateur character and practically no one of them was complete. This article is based on the books by R. Kunfalvi [1], Tadeusz Pniewski [2] and Waldemar Gorzkowski [3]. Tadeusz Pniewski was one of the members of the Organizing Committee of the Polish Physics Olympiad when the 1st IPhO took place, while R. Kunfalvi was one of the members of the International Board at the 1st IPhO. For that it seems that credibility of these materials is very high. The differences between versions presented by R. Kunfalvi and T. Pniewski are rather very small (although the book by Pniewski is richer, especially with respect to the solution to the experimental problem).

As regards the competition problems given in Sigtuna (1984) or later, they are available, in principle, in appropriate proceedings. "In principle" as the proceedings usually were published in a small number of copies, not enough to satisfy present needs of people interested in our competition. It is true that every year the organizers provide the permanent Secretariat with a number of copies of the proceedings for free dissemination. But the needs are continually growing up and we have disseminated practically all what we had.

The competition problems were commonly available (at least for some time) just only from the XXVI IPhO in Canberra (Australia) as from that time the organizers started putting the problems on their home pages. The Olympic home page www.jyu.fi/iphos contains the problems starting from the XXVIII IPhO in Sudbury (Canada). Unfortunately, the problems given in Canberra (XXVI IPhO) and in Oslo (XXVII IPhO) are not present there.

The net result is such that finding the competition problems of the Olympiads organized prior to Sudbury is very difficult. It seems that the best way of improving the situation is publishing the competition problems of the older Olympiads in our journal. The

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question arises, however, who should do it. According to the Statutes the problems are created by the local organizing committees. It is true that the texts are improved and accepted by the International Board, but always the organizers bear the main responsibility for the topics of the problems, their structure and quality. On the other hand, the glory resulting of high level problems goes to them. For the above it is absolutely clear to me that they should have an absolute priority with respect to any form of publication. So, the best way would be to publish the problems of the older Olympiads by representatives of the organizers from different countries.

Poland organized the IPhOs for three times: I IPhO (1967), VII IPhO (1974) and XX IPhO (1989). So, I have decided to give a good example and present the competition problems of these Olympiads in three subsequent articles. At the same time I ask our Colleagues and Friends from other countries for doing the same with respect to the Olympiads organized in their countries prior to the XXVIII IPhO (Sudbury).

I IPhO (Warsaw 1967)

The problems were created by the Organizing Committee. At present we are not able to recover the names of the authors of the problems.

Theoretical problems

Problem 1

A small ball with mass $M = 0.2$ kg rests on a vertical column with height $h = 5$ m. A bullet with mass $m = 0.01$ kg, moving with velocity $v_0 = 500$ m/s, passes horizontally through the center of the ball (Fig. 1). The ball reaches the ground at a distance $s = 20$ m. Where does the bullet reach the ground? What part of the kinetic energy of the bullet was converted into heat when the bullet passed through the ball? Neglect resistance of the air. Assume that $g = 10$ m/s².

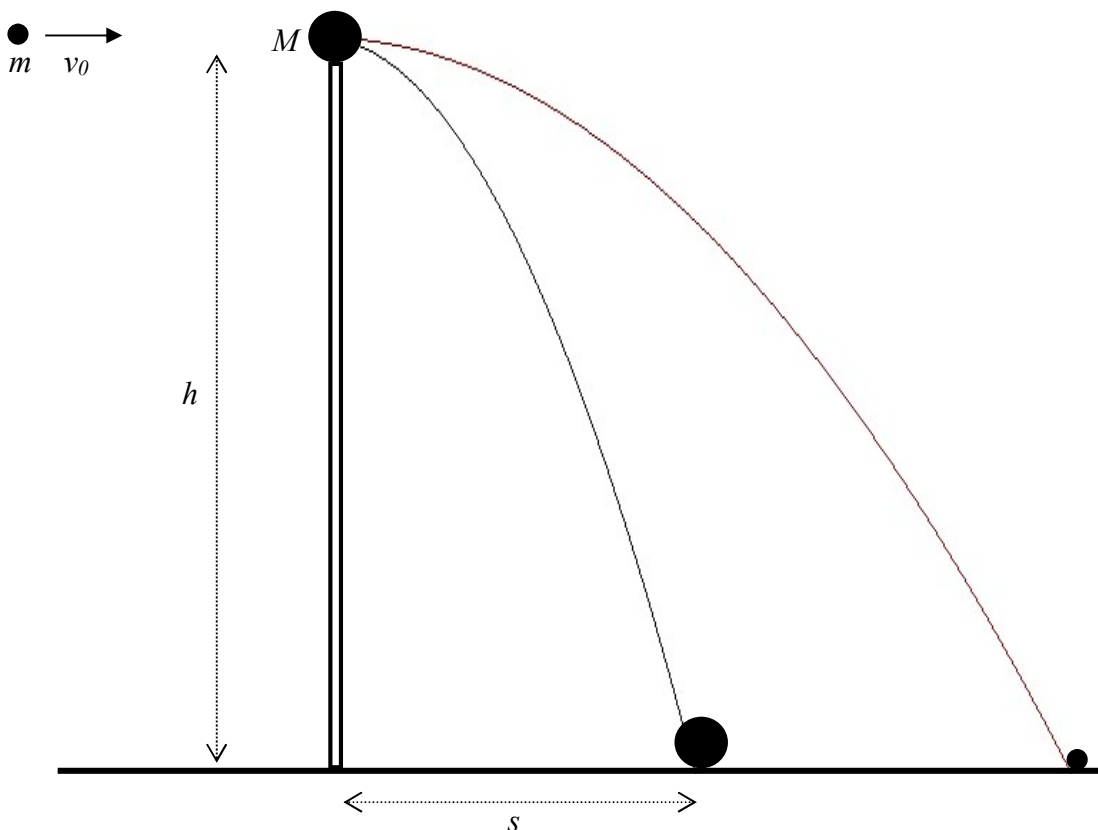


Fig. 1