# The IYPT Ideas in Daily Teaching and Learning

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**Abstract.** Yearly the International Committee of the International Young Physicists' Tournament releases seventeen physics problems for teenagers and their teachers to enjoy. I will present a detailed description of the structure of so-called "physics fights" during the International Young Physics Tournament (IYPT), along with examples of tasks and suggestions for using IYPT ideas in the classroom. I will also share my experiences coaching YPT teams in several schools with students of varying interests and skills.

## Introduction

The International Young Physicists' Tournament (IYPT) is an annual competition that challenges high school students to engage in open-ended scientific inquiry and problem-solving. It fosters a passion for physics and develops critical thinking, teamwork, and presentation skills. In this prestigious international competition, teams of high school students investigate and present solutions to challenging physics problems. It promotes a hands-on, inquiry-based approach to learning physics, encouraging students to think creatively and work collaboratively.

*Figure 1 During Physics Fight, IYPT Viena 2010*

Complex skills are essential to becoming competent in physics, and hence, multiple activities teachers can engage students with are a shield from boredom in the classroom. However, the complexity of physics requires continuing effort, and hence, less motivated students are prone to failure. There are numerous ways of maintaining enthusiasm for science, and the IYPT-based ideas are one of my favourites.

Every year, the International Committee releases seventeen open-ended physics problems for teenagers and their physics teachers to enjoy. During the workshop, we will examine some of the IYPT problems in detail and discuss the benefits of various stages of preparation for the competition for both students and teachers.

## The preparation for IYPT as an efficient teaching tool.

Consider the motion of a rubber band that is non-uniformly stretched when shot. Investigate why it spins and how it affects the distance it flies. Drop the water container with the ping pong ball in it. Optimize the relevant parameters for the height at which the ball is launched after the impact with the ground. Hear the howling sound of the large, thin, and flexible plate. Produce solar cells with blackberry juice. Measure the amount of water that can be pumped with the rotating straw. Explain why a piece of tracing paper curls into a scroll when

*Figure 2 Magnetic train. Preparations for YPT 2016.*

placed on the water surface. [1] These was the first step into the 37th International Young Physicists' Tournament in September 2023. And as competing on a national or international level is a fine goal, these first steps are accessible to every physics learner.

For some of our students, participating in these first steps is beneficial enough. Others may be inspired to pursue the matter, even taking part in so-called "Physics Fights" during national or international competitions.

*Figure 3 YPT Polish semi-finals winners. Wrocław, 2023.*

The 17 inquiry problems released yearly is a resource physics teachers are fortunate to have. The process of posing relevant questions, formulating a hypotheses, defining dependent, independent, and controlled variables, planning experiments, analyzing data, and drawing conclusions, namely – hands-on learning of how the scientific method works – is more fulfilling when attractive not only for students but also for the teacher. And the IYPT tasks are that. They are new; they do not have only "correct" solutions. Relevant sources are not that easy to find. And what matters most in the finals is creativity and an innovative approach.

## Teachers hands and minds on

Workshop participants will be provided with the necessary equipment and invited to approach up to five IYPT tasks. After some time to play, participants will be asked to share their findings, hypotheses, ideas, and reflections on the tasks. Then, the stages of physics fights will be presented.

## How to compete in (I)YPT

To summarise, pieces of students' work on the same five tasks will be presented along with examples of methods of working with students in a few different schools. I had the pleasure of coaching the YPT teams.

*Figure 4 YPT in school, Wrocław, October 2023*

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*Figure 5 Polish YFT 2024 silver and bronze teams 2024*

## References

[1] https://www.iypt.org/problems/problems-iypt-2024/ [19.03.2024]
[2] https://www.iypt.org/basic-facts/#what_is_iypt [19.03.2024]