

Guidelines and Criteria

Overview

The International Physics Tournament is an annual competition between high-school teams. The tournament aims to **encourage basic understanding of scientific principles in general and of physics in particular and to develop original thinking** in implementing these principles.

The competition is open to pupils in 11th and 12th grade who are studying Physics at a high level in high school. The participants will work in teams of up to five students. Each team will be required to have a local teacher / mentor who will represent them and coordinate with the tournament's Physics counsellor, a Physicist from the Weizmann Institute, who will accompany the teams throughout the safe-building process. The teams need to plan, build and operate the locking mechanism of the safe that will work on the basis of Physics principles. The participants will be required to try to break into other teams' safes. Every team will include no more than five students **and no less than three students**.

The tournament judges meet the teams on the competition day and examine safe quality, complexity and team members' level of understanding.

The tournament fosters creative thinking while exploring the principles of physics. It combines a challenging and continuous learning experience over several months of preparation. At a time when the rates of students choosing to study physics is declining, we attach great importance to promoting the Physics Tournament.

Designing and Building the Safe – Guidelines

1. The physical concept

- The safe opening mechanism may be based on the use of a physical concept from the school's learning material, as indicated in the **list of topics**. Topics not included in the list require the tournament's Physics counsellor's approval at the beginning of the process.
- The concept for building the safe will be submitted through an electronic form only. Forms submitted by hand or manually drawn will not be reviewed, and a notice will not be sent.
- Cracking the safe will be based on the solution to a physics riddle. The mechanism will be based on an understanding of physics rather than on complex calculations or motor skills. The safe builders must ensure that it cannot be opened by any other means than solving the riddle. However, any form of opening the safe without the use of force will be considered legal.

- Each safe box may include up to two physics riddles. All the elements needed by the safe-cracking team to solve the riddles – such as tools they can use, significant components in the safe's structure, electrical circuitry – should be visible or detailed.
- Components which are not needed to solve the riddle and which may mislead (or distract) safe-crackers are prohibited.

2. Reversibility

To allow an unlimited number of safe-cracking attempts, the possibility that the breakers will perform an irreversible operation which will prevent any further breaking must be avoided.

Note: Safe-crackers are allowed to make mistakes in the process; the safes must be able to withstand such errors and be ready for further cracking attempts.

3. Robustness and reliability

The safe must be sturdy and reliable to withstand a large number of hacking attempts and open only upon completing the steps in their planned order.

4. Safety

Safety is a top priority, and the safe itself must not cause any health risk to the user. Any application of high voltage, gas, chemicals, fire, or any other risk factor will require the prior approval of the mentor team.

5. Simple maintenance

Safe maintenance and its return to the locked state after it was cracked must be simple and possible in less than three minutes. A quick opening option, without the need to solve the riddle, should be included for maintenance purposes. It must be ensured that the hacking teams do not have access to the quick opening.

6. Materials required

Box sizes: 60cm x 30cm x 40cm ~ 24" x 12" x 16", consisting of a wooden box with a transparent door that closes with an off-the-shelf electro-mechanical locking device.

The International Tournament Score Determination

1. **Online judging - Scores by senior judges: 50%** of the final score

2. **Virtual break-ins attempts: 25%** of the final score

Score for burglars - The two teams that meet must reach an agreement on the score for the burglars (the break-in), according to a rubric that will include components of solution steps / alternative solution / suggestions for improvement, each section will have a score. The score will be supported by a short written feedback submitted by both teams. Accumulation of maximum 10 points according to the rubric (subjected to modification prior to the tournament).

3. **Safe crackers' feedback: 25%** of the final score – according to a rubric.

4. **The Public's most Favorite safe**– Short video competition, opened to the general public on Davidson's YouTube channel (without scores). The criteria: each team will email a one minute video explaining and demonstrating the safe's story and method of operation. The video should present the safe only, without showing the team members' faces.

Important Notes

- **Submitting the concept for the safe** will be done in electronic form only. Hand-written forms or manual drawings will not be checked and no corresponding notice will be sent.
- Teams must meet all the milestones according to the schedule which will be published on the program's website (will follow). **Continuing to participate in the tournament requires meeting all the goals.** In addition, contact must be continuously maintained with the tournament's Physics counsellor.
- The safe descriptions of each team will be published on the website.

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