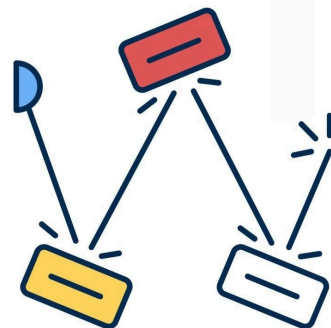
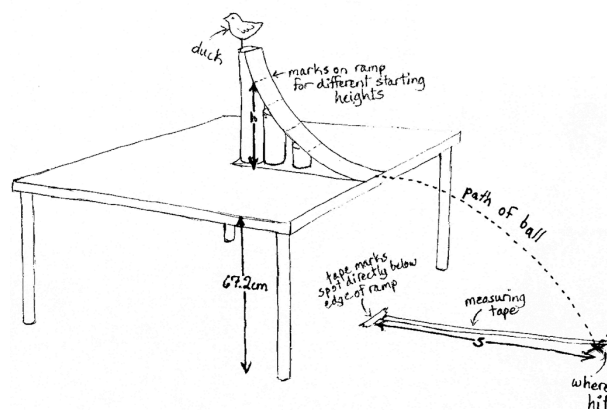


Thirty-Eighth Annual PHYSICS OLYMPICS



Wednesday, March 13, 2024

8:30 AM - 1:00 PM

Farmingdale State College

Lupton Hall

Sponsored by **Long Island Physics Teachers Association**

Hosted by Farmingdale State College

Registration for 2024 Physics Olympics

Registration:

- Register your 5-student team at www.lipta.org.
- A maximum of 5 students may attend. Spectators are not allowed.
- Each advisor and student participant must turn in a **signed** Photo Release form upon arrival to the event.

Confirmation:

- You will receive a confirmation email after you successfully register.
- Check www.lipta.org to make sure that you are on the official list of participants **before the event**.

Registration deadline: March 6, 2024. Only teams registered by this date may participate. There is a maximum of 18 teams, so register early!

Please enter the names of expected participants by March 6, 2024 at www.lipta.org.

Fee for the Physics Olympics:

Members	\$125*
Non-members	\$140* (includes one year membership)
	*includes 2 pizzas and soda

Send a check or PO to our address: **LIPTA**
419 Renee Drive
Bayport, NY 11705

Or pay online by credit card or Paypal at www.lipta.org
Need an invoice? Email us a request at treasurer@lipta.org

Physics Olympics schedule:

Date: **Wednesday**, March 13, 2024

Place: Farmingdale State College, Lupton Hall, 2350 Broadhollow Road Farmingdale, NY 11735

Registration: 8:30 a.m.

Event Start time: 9:00 a.m.

Awards: 12:45 p.m.

Text Justin King at 631-241-5404 or email king@lipta.org for more information.

The Rules

The events for the 2024 Physics Olympics are:

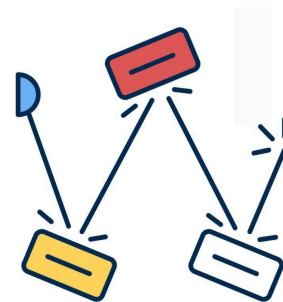
The Physics Bowl



Fermi Questions



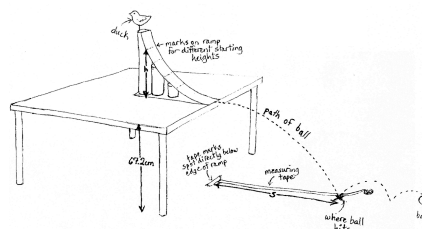
Let Us Reflect



Accelerate!



Precisely Predicting Projectiles



1. Each school may send a single team of no more than 5 students. Additional students and spectators cannot be accommodated. Violation of this rule will result in disqualification of the team.
2. All participants and advisors must turn in a signed photo release form, copy enclosed.
3. Each team must have a faculty advisor. Faculty advisors will judge the events. At least two judges will judge each event. Judges will not evaluate their own school's team.
4. Each event is timed. Teams that arrive late for an event will forfeit that event.
5. Teams should bring scientific or graphing calculators for the Physics Bowl, and are encouraged to wear team T-shirts. Equipment, including calculators, for other events are limited to what is provided by the judges at each event, as outlined in these rules.
6. Accessing the internet is prohibited during competition; students are not allowed to use phones during events.
7. For each event, the total number of points for 1st place will equal the number of teams present. For example, if there are 16 teams competing:

1st place = 16 points

2nd place = 15 points

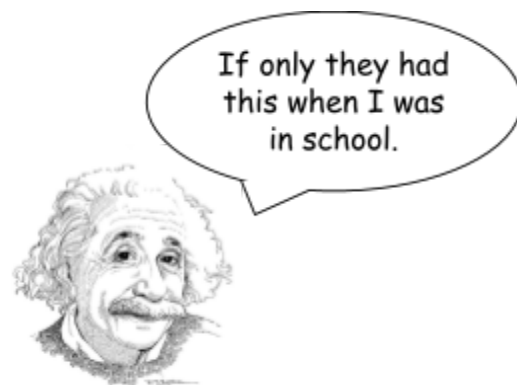
3rd place = 14 points

The last place team will score 1 point. Tying teams will split points equally for the places in question.

8. If two teams tie in overall points, their placement in the Physics Bowl will be the tiebreaker for overall standing.
9. Trophies will be awarded to the top three teams in each event and to the four teams that accumulate the most points overall.
10. A certificate will be awarded to the team with the best physics T-shirts, as determined by the judging panel of experts. The T-shirt award will *not* count towards the overall trophy.
11. All judges' decisions regarding events are final. The wording of each challenge in this year's event book has been carefully prepared to define each task as precisely as possible. It is expected that all participants will produce solutions which comply with the task as defined. Normal physical interpretations will be applied to all the terminology used in defining the tasks. Those solutions which, in the opinion of the judges, do not comply with the spirit or intent of the event will be disqualified. General questions regarding the events may be directed to the coordinators of the Physics Olympics. The coordinators will accept inquiries that may help them to prepare for unusually good solutions to the problem.
12. Students are required to remain with their team and in the designated areas at all times.
13. Any concerns regarding inappropriate behavior and/or conduct, including any form of harassment, must be brought to the attention of a LIPTA exec board member. Members will be present at the Physics Olympics or may be contacted at exec@lipta.org.
14. Text or email Justin King at 631-241-5404 or king@lipta.org if you have any questions.

The Schedule

1. Events begin at 9:00 a.m.
2. If you are driving your own vehicle, contact Justin King to obtain a parking pass. Park in Student Lot #9, across the Great Lawn from Lupton Hall. Look for LIPTA signage.
3. Teams may pick up their materials between 8:30 and 9:00 a.m.
4. Team registration includes lunch (2 pizzas + soda).
5. Morning refreshments and lunch will be provided to faculty and students.
6. Trophies will be awarded at 12:45 p.m.



Acknowledgement of Student Safety Protocols and Photo Release Form

Photo Release

Please sign below to grant permission for photographs and video taken during the Physics Olympics event to be used by Long Island Physics Teachers Association (LIPTA) for publication on the LIPTA website and in the LIPTA newsletter.

Student Safety Protocols

For the safety and well-being of all students, team members are required to remain together in designated areas at all times. To ensure a safe environment, there will be a minimum of two LIPTA board members and/or teacher volunteers present in each room or gathering space at all times.

Any participant (student, teacher volunteer, or LIPTA board member) with safety concerns or knowledge of an inappropriate incident should immediately contact the Physics Olympics Coordinator, Justin King, or LIPTA President, Gillian Winters, so we can address the issue promptly and ensure the continued safety of all students.

Please sign below to acknowledge these protocols and agree to abide by them while attending the Physics Olympics.

School name: _____

Participant (print)

Signature

Date

Parent/guardian name
if participant is under 18 yrs

Signature

Date

★ 1 signed photo release form is required for each participating student and faculty advisor.

Duplicate for each participant (5 students and faculty advisor)

Additional forms can be obtained at www.lipta.org

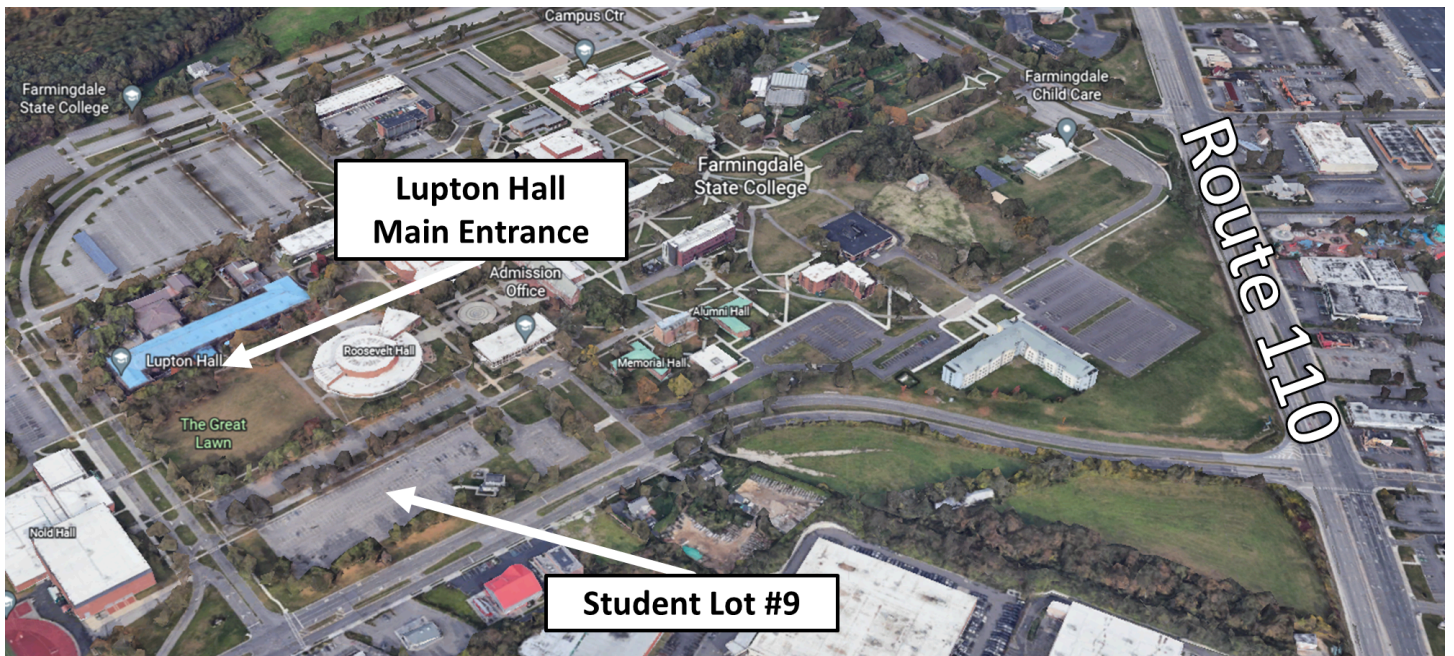
T-shirt Contest

Do you have a phlair for physics phashion? Show us your finest at the LI Physics Olympics. Our panel of experts will recognize, with a certificate, the team with the best physics T-shirts!



- Judging will be based solely on physics content; professional printing is not necessary.
- For a team to qualify for this contest, the team's t-shirts must all have the same design.

Farmingdale State College



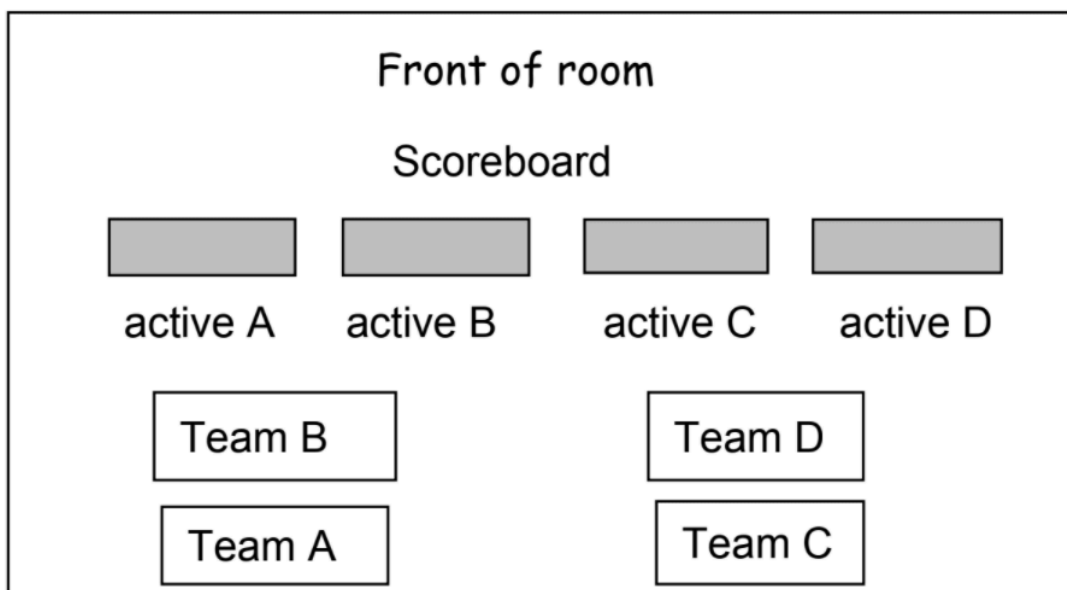
Physics Bowl

Objective:

To be the first team to score twenty points. First round winners will compete in the trophy round.

Rules:

1. All members of the team will participate. Three of the five members will be designated to rotate into the “active player” seat.
2. All questions will be multiple choice and based on the Regents Physics core mechanics syllabus. In the trophy round some questions will be at the honors level. Regents reference tables and paper will be provided. Scientific or graphing calculators may be brought and used.
3. One member of each team, the “active player”, will sit at the shaded location, facing away from teammates. (See diagram)
4. The first team’s “active player” to turn on the light will earn one point for the correct answer or lose two points for a wrong answer.
5. The teammates of the “active player” who answers correctly will have the right to try for a bonus point. To earn a bonus point, the remaining team members must answer the question correctly without help from the active player. Only one person may speak for the team. There is no penalty for an incorrect answer.
6. After each question, one of the three designated “active players” will rotate into the shaded location and will become the “active player” for the round.
7. The first team to reach twenty points will advance to the trophy round.



Fermi Questions



Objective:

To estimate quantities which are either difficult or impossible to measure directly.

Rules:

1. Each team will be provided with a list of Fermi questions.

An example of a Fermi question is:

How many drops of water are there in the Long Island Sound?

2. Answers are to be given to the nearest order of magnitude.

Example: Acceptable answer: 10^3

Unacceptable answer: 2×10^3

3. One point will be deducted for each answer which is not in acceptable form.
4. Questions must be answered in the allowed time.
5. Only one set of answers may be submitted by a team.
6. Calculators and other electronic devices are not permitted.
7. Reference materials are not permitted.
8. No work needs to be shown.
9. Each answer which agrees with the accepted answer will be awarded 10 points. One point will be subtracted for each order of magnitude different from the accepted value, to a minimum of 0 points.

Tiebreaker: The time to complete the event will serve as a tiebreaker.

Time limit: 15 minutes.

Accelerate!



Objective:

To have a person move at a nearly constant acceleration of 0.5 m/s^2 .

Rules:

1. The team will select a team member to be the “accelerator”. The accelerator is to move with a constant acceleration of 0.5 m/s^2 as they complete a 10-25 meter straight line course. The accelerator is not permitted to use any timing device.
2. Three team members will be given stopwatches and will be placed at specific positions along the course. One judge will be at the finish line also with a stopwatch. One team member will be the starter.
3. When given the go ahead, the accelerator will begin moving and all other members and the judge will begin their stopwatches. For the duration of the trial, there will be no communication between the accelerator and the other team members. Any communication will disqualify this trial from the event.
4. Each team member will stop their stopwatch at the moment the accelerator reaches their position. The judge will stop the stopwatch when the accelerator reaches the end of the course.
5. The time from each stopwatch will be recorded to the nearest hundredth of a second.
6. Each team is allowed up to 3 trials with any team member as the accelerator.
7. The team will select which trial is to be analyzed.
8. The absolute value of the difference between the expected and measured times will be added to determine the final score. Low score wins.

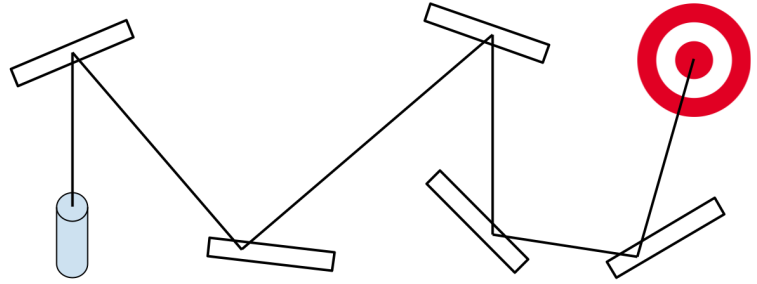
Tiebreaker: The absolute value of the time difference at the finish line will be the tiebreaker.

Time limits: 15 minutes.

Let Us Reflect

Objective:

To reflect laser light off of a maximum of five front-surface mirrors, such that the beam avoids one or more opaque obstacles and hits a predetermined target.



Rules:

1. The timer begins when the team receives the paper template, printed on 17 inch x 11 inch ledger paper, indicating the origin and direction of the laser, the size and location of the opaque obstacle(s), and the location of the target along the edge of the paper. Protractors, rulers and mirrors will be provided.
2. To indicate the location of each mirror, the team will draw an 8-centimeter-long line. The team may write additional information on the diagram to help them determine appropriate locations for the mirrors. To identify the lines that represent mirrors, students must label them “M1”, “M2”, and so on.
3. When the team is ready to place their mirrors, they will hand their template to the judges and their timer will be paused. When the judges are ready for the team to test their mirror arrangement, the team will be given their requested number of mirrors, the timer will be unpaused, and the team will be allowed to position their mirrors on the lines indicated on their template. The team will tell the judges when they are satisfied with the placement of their mirrors, at which point their time will be recorded.
4. The judges will place the laser as indicated on the template, and power it on. The distance along the perimeter of the paper from the center of the target to the center of the laser light will be measured by the judges to the nearest millimeter.
5. A team’s score will be determined as follows:

$$\text{Score} = (\text{Distance from target to laser}) \div (\text{number of mirrors struck by laser})$$

The lowest score wins.

Tiebreaker: The shortest time will serve as a tiebreaker.

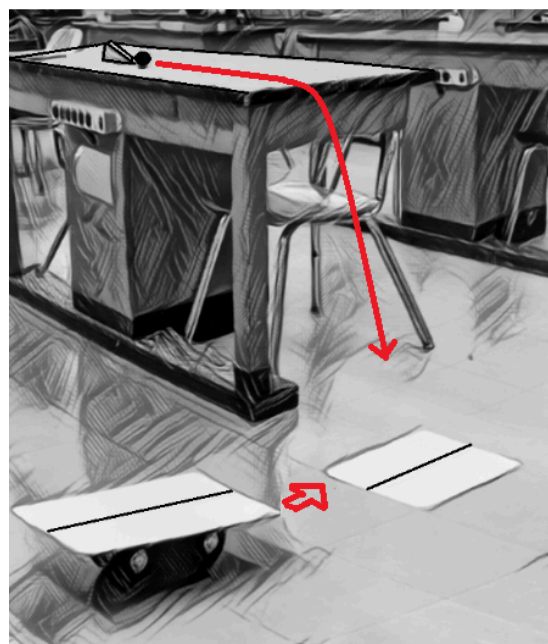
Time limit: 15 minutes.

Precisely Predicting Projectiles

Objective:

To predict where a steel ball that is rolled down a ramp, across a lab table, and off the edge will land, and to predict when to release the ball so that it lands on a target (released before the ball) moving perpendicularly to the projectile's horizontal velocity.

Each team will be given a steel ball, a wooden ramp, two 1-meter sticks, 2 stopwatches, a plumb bob, a target to be put on the floor, a second target attached to a battery operated car, and masking tape.



Rules:

1. The team may make measurements while they repeatedly turn on and release the battery operated car with the target attached to the top of it.
2. The team may make measurements while they repeatedly release the steel ball so that it rolls down the ramp and across the lab table. The steel ball may not roll off the edge of the lab table during this time period for any reason. If the ball accidentally rolls onto the floor during this time period, the team will be disqualified from the event.
3. The wooden ramp may be moved to another location on the lab table at any time. However, the steel ball must roll off the wooden ramp and onto the lab table before rolling off the edge. The wooden ramp may be taped to the lab table. No guide rails can be used to steer the ball as it rolls across the lab table.
4. The team may measure the vertical distance from the floor to the lab table top and may use the plumb bob to mark the location on the floor directly below the edge of the lab table where the steel ball will roll off.
5. The team must calculate the horizontal displacement of the steel ball while it is a projectile and then tape a target to the floor where they predict the steel ball will land.
6. The team will inform the judges when they are ready to test their prediction, and the team's timer will be stopped. The judges will place a sheet of carbon paper over the target on the floor and over the target on the car so that an ink mark will be made at the projectile's landing point.

7. No practice rolls off the lab table are allowed. However, if a team rolls the ball down the ramp and doesn't like "the look" of the ball's roll across the lab table or if they don't like the way the battery operated car is heading, they can stop the ball at the edge of the lab table before it becomes a projectile and try again. This last moment stopping of the ball can only be done twice, if done at all.
8. The judges will measure the perpendicular distance between the line on the target and the mark made by the landing ball. Teams whose projectiles land on the moving target will be ranked higher than teams whose projectiles hit the target on the floor. Teams will be ranked by distance in ascending order (i.e. shortest distance first).

Tiebreaker: The distance between the spot where the projectile lands and the center of the target.

Time limit: 15 minutes.