



ADVANCED PHYSICS CLUB

SEPTEMBER 28, 2025

USEFUL RESOURCES

The updates, homework assignments, and useful links for APC can be found on SchoolNova's web page:

https://schoolnova.org/classinfo?class_id=2252&sem_id=74

The practical information about the club and contacts can be found on the same web page.

TODAY'S MEETING

Today we solved the first set of problems, on kinematics of uniform motion.

The second homework has problems on kinematics of acceleration. Please solve the problems at home! During the club meeting we will only have time to discuss the solutions that you already have. You can also think in advance which problem(s) you may want to present at the meeting.

HOMEWORK

1. Solve problems 1 and 2 of the 2021 F=ma exam that you can find by following the link:
https://www.aapt.org/Common2022/upload/2021_Fma_exam.pdf
2. Imagine that you are watching a movie in reverse, so that people are walking backwards, spilled water goes back directly into the glass, etc. If you watch a scene with an accelerating car, how does velocity of the car compare to the velocity of the same car in the normal movie? How about the acceleration of the car?
To get an idea, you may check out the following Youtube channel:
<https://www.youtube.com/@moviesinreverse531/featured>
3. Two bodies start moving towards each other along a straight line with initial velocities v_1 and v_2 . They have accelerations a_1 and a_2 respectively and acceleration is in the opposite direction to velocity for both of them. What is the maximal initial distance between them l_{max} such that they will meet each other?
4. A bus moving on a straight road at initial speed 15 m/s is approaching a stop. It spends 20 seconds on traveling the last 350 meters before stopping. Prove that acceleration of the bus has changed direction during these 20 seconds.
5. A charged particle is emitted and moves distance L away from its' source with constant velocity. After that, it reaches a region with electric field providing the particle with constant deceleration a ; eventually the particle stops. What is the initial velocity of the particle such that the time of its motion from emission to stopping is minimal?
6. Two balls are launched vertically upwards from the same point with the same initial velocity v , with a relative delay Δt . How much times passes after the second ball launch until the balls collide?
7. You are standing on a platform next to a train scheduled to depart at 12:00:00. It is precisely 12:00:00 by your watch and the second to last carriage already starts passing you, going past you completely in 10 s. Then the last carriage goes past you in 8 s. The train has departed on time and it is moving with a constant acceleration. How much does your watch fall behind?

FOR THE NEXT MEETING

IMPORTANT: The next club's meeting is at 3pm, via Zoom, on Sunday, **October 5**.