

USEFUL RESOURCES

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

https://schoolnova.org/nova/classinfo?class_id=adv_phy_club&sem_id=ay2020

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

TODAY'S MEETING

At this meeting we discussed linear motion with acceleration and a little bit more.

HOMEWORK PART 1

1. When entering a rough part of the road, every car reduces its' velocity from v_1 to v_2 . What the minimal distance between the cars should be to avoid collisions? The length of each car is l .
2. A particle enters an angle α traveling parallel to a side of the angle at the distance H from that side. After several elastic collisions with sides, the particle departs. What was the minimal distance between the particle and the vertex of the angle during the motion? Can you say how many collisions with sides were there altogether?
3. After leaving its' source, a particle moves with a constant velocity. After having traveled distance L it decelerates with a constant acceleration a until it finally stops. For which initial velocity the overall time of its motion is minimal?
4. A body starts moving from some point A and first moves with a constant acceleration for time t_0 , and then with a constant deceleration with the same absolute value. After what time since the beginning of the motion it will return to the point A?
5. From the same point with the time interval Δt two balls are thrown upwards with the same velocity v . What is the same from throwing the second ball until they collide? Free fall acceleration g is given.
- *6. Train departure is scheduled at 12:00. It's exactly 12:00 on your watch, but the second to the last carriage already starts moving past you, and it goes past you completely in 10 s. The last carriage goes past you in 8 s. The train has departed on time and is moving with a constant acceleration. For how much does your watch fall behind?

HOMEWORK PART 2

- *7. An ant is running away from an anthill with speed inversely proportional to the distance from the center of the anthill. At the moment when the ant is at point A 1 m away from the center of the anthill, its speed is 2 cm/s. In what time will the ant reach point B which is located 2 m away from the center of the anthill?
- *8. Water level in a conical tank rises with constant speed v_0 . Water arrives through a tube with cross-section s . How does speed of water in the tube depend on time? Aperture of the cone is 2α , initially there was no water in the tank.
- *9. If acceleration changes at a constant rate, the measure of this change is called jolt: $j = \frac{\Delta a}{\Delta t}$ (acceleration changes by Δa in time Δt). For jolt 1 m/s^3 what will speed be in 5 s? What will be the distance traveled in the same amount of time? Could you think of practical situations in which it is important to consider jolt?

FOR THE NEXT MEETING

IMPORTANT: The next club's meeting is at 3:00pm, via Zoom, on Sunday, **November 8.**