



## ADVANCED PHYSICS CLUB

OCTOBER 6, 2019

### TODAY'S MEETING

Today after discussing last homework we solved the following problems on kinematics.

1. When entering a rough part of the road, every car reduces its' velocity from  $v_1$  to  $v_2$ . What the initial minimal distance between the cars should be to avoid collisions? The length of each car is  $l$ .
2. A particle enters an angle  $\alpha$  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?

### HOMEWORK

1. 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?
2. From the same point with the time interval  $\Delta t$  two balls are thrown upwards with the same velocity  $v$ . What is the time from throwing the second ball until they collide? Free fall acceleration  $g$  is given.

### ADDITIONAL PROBLEMS

1. A ball is launched on an inclined plane with the velocity  $v$  at an angle  $45^\circ$  with the horizontal edge of the plane. Inclined plane makes an angle of  $45^\circ$  with the horizontal plane. What distance will the ball travel until it rolls off the inclined plane? Free fall acceleration  $g$  is given.
- \*2. 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?

### FOR THE NEXT MEETING

The next club's meeting is at 2:40pm, room P-122, on Sunday, **October 20**. There will be **NO** meeting on October 13. We will continue to work on kinematics.

### 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=ay2019](https://schoolnova.org/nova/classinfo?class_id=adv_phy_club&sem_id=ay2019)

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

For the next meeting you might find the following links useful.

Description of motion: <http://hyperphysics.phy-astr.gsu.edu/hbase/mot.html>

Velocity and acceleration: <http://hyperphysics.phy-astr.gsu.edu/hbase/mot.html#motcon>

Trajectories: <http://230nsc1.phy-astr.gsu.edu/hbase/traj.html>