ADVANCED PHYSICS CLUB

OCTOBER 20, 2024

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=ay2024`

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

Today's meeting

Today we solved most of the problems on motion with acceleration. One remaining problem is reassigned, we will discuss it next time.

The next homework is on projectile motion. For a concise review of the key concepts see:
`http://hyperphysics.phy-astr.gsu.edu/hbase/traj.html#tra2`

Please solve the problems at home! It is most effective when during the club meeting we discuss the solutions that you already have.

If you feel like you need clarification about the formulation of any problem, you are always welcome to email apc@schoolnova.org

Reassigned Homework

***1.** You are standing on a platform next to a train which is scheduled to depart at 12:00:00. It's exactly 12:00:00 by your watch and the second to last carriage already starts moving past you, and it goes 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?

New homework

1. In order to model how objects move on the moon, where the free fall acceleration is only 1.5m/s^2, a student prepares an inclined plane and studies how particles move on the inclined plane. At what angle would the inclined plane precisely model motion of particles on the moon?

2. A ball is thrown from the ground with a given velocity v at an angle α to the horizon. What is α such that the distance traveled by the ball horizontally is maximal (before hitting the ground)? What is this distance?

3. What should be the initial velocity of a cannon missile in order to hit a rocket, moving vertically with a constant acceleration a? The rocket starts accelerating at the same moment as the cannon fires. The cannon and the rocket launching point are both at the ground level, the distance between them is L. The cannon fires at an angle $45°$ to the horizon.

***4.** A ball is released from rest and hits an inclined plane after falling a distance H. Find the distances between points at which the ball hits the inclined plane after the initial collision. Assume that all collisions are perfectly elastic. The plane is inclined at an angle α.

For the next meeting

IMPORTANT: The next club's meeting is at 3:30pm, via Zoom, on Sunday, **October 27**.