ADVANCED PHYSICS CLUB

NOVEMBER 24, 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 a few problems on Newton's laws. The remaining problems are reassigned, with few new ones added.

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

Reassigned Homework

1. Two bodies of masses m_1 and m_2 are connected by a thread which withstands tension up to T. Bodies are acted upon by forces $F_1 = \alpha t$ and $F_2 = 2\alpha t$, where α is a constant coefficient and t is time. Find the time when the thread will be torn.
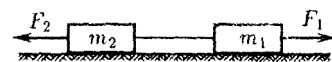
2. A system consists of N identical balls, connected by identical springs in a line and hanged vertically with a thread. Then the thread is cut. Find the accelerations of all the balls immediately after that.

New homework

1. A light magnet with a hook on a vertical steel wall stays at rest when a mass hanged on the hook is less than m_0. Friction coefficient between the wall and the magnet is μ. What is the magnetic force? What will acceleration of the magnet be if a mass $m > m_0$ is hung from the hook?
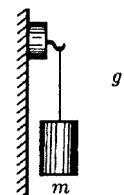
2. The air drag force acting on rain droplets depends on the speed of the droplet, its' radius and density of the air. Using dimensional analysis reconstruct the expression for the drag force up to a dimensionless constant factor. Assuming this factor to be 1 estimate the speed that a droplet of radius 1 mm will have near the ground after falling from a great height. Density of air is 1.3 kg/m^3.

3. An airplane makes a turn in the air. It moves horizontally along a circle of radius R with a constant speed v. Find the angle its' wings make with the horizon.
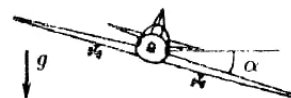
For the next meeting

IMPORTANT: The next club's meeting is at 3:30pm, via Zoom, on Sunday, **December 8**.