ADVANCED PHYSICS CLUB

DECEMBER 3, 2023

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=ay2023
The practical information about the club and contacts can be found on the same web page.

Today's meeting

Today we discussed some of the problems of the previous assignment. Two problems are reassigned.

Reassigned Homework

4 A horizontal conveyor belt is moving with speed u. A puck flies on the belt with initial velocity v perpendicular to the belt. Friction coefficient between the puck and the belt is μ. Find the maximal width of the belt such that the puck will still reach the opposite side of the belt.
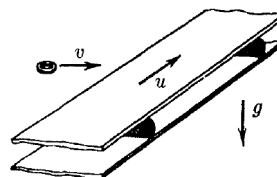
5 A coin lies on a very long inclined plane with angle α. Friction coefficient is $\mu = \tan\alpha$. The coin is hit and starts to move with horizontal velocity v along the plane. Find velocity of the coin after a very long time.

New Homework

We finish with Newton's laws with a few final problems.

1. A wedge with a block of mass m on it stands next to a vertical wall (as shown on the figure). The inclined surface of the wedge makes angle α with the horizon. Friction coefficient between the block and the wedge is μ; there is no friction between the wedge and the floor. Find the force with which the wedge is acting on the vertical wall.
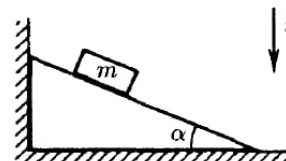
2. The air drag force acting on rain droplets depends on the speed of the droplet, its' radius and density of the air. Using dimensional analysis reconstruct the expression for the drag force up to a dimensionless constant factor. Assuming this factor to be 1 estimate the speed that a droplet of radius 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.
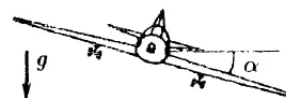
An unusual extra assignment

To have a fun conclusion of the club before the Christmas break please think if there are any Youtube videos demonstrating some cool physical effect or in general related to physics that you would like to share with everyone. We will watch them together and discuss. At the beginning of the class we will need to estimate the time we dedicate to this, so please be prepared to tell how long does your video (or videos) last.

IMPORTANT: The next club's meeting is at 3:30pm, via Zoom, on Sunday, **December 10**.