

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=ay2021

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

TODAY'S MEETING

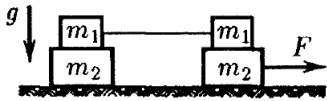
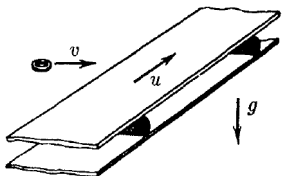
Today we had an unusual meeting where the participants shared and discussed the Youtube physics demos of their choice. If you would like to review it, please take a look in our Discord.

This assignment focuses on preparation for F=ma exam and has a focus on friction force.

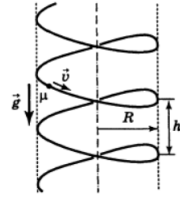
F=MA PREPARATION

1. Solve F = ma exam 2016 and time yourself. You can download exam problems here:
<https://aapt.org/physicsteam/2016/upload/exam1-2016-3-1-2.pdf>
 Please, time yourself and try to do all problems within 75 minutes as explained on the first page of the exam set.
2. Give us feedback on F = ma 2016. We are interested in the following:
 - Which problems were the most difficult for you?
 - Which problems took the most time to solve?
 - Which problems were on physics topics that you do not know well.
 You can send us feedback either by email: apc@schoolnova.org or using Discord.
3. Be prepared to tell us during the meeting if you plan to write F=ma with SchoolNova or with your own school. The F=ma exam for 2022 will be offered on February 9, 2022 (exam A) and February 15, 2022 (exam B). The registration information for F = ma 2022 can be found here:
<https://www.aapt.org/physicsteam/2022/registration.cfm>

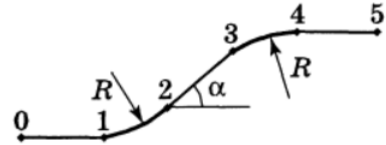
HOMEWORK ON FRICTION

1. A body of mass m on a horizontal plane is acted upon with a force F directed at an angle α above the horizon. Friction coefficient is μ . Find acceleration of the body if it is not lifted above the plane.
2. A system of blocks lies on a horizontal frictionless table, as shown on the figure. The bottom right block is being pulled to the right with force F . Friction coefficient between blocks m_1 and m_2 is μ . Find acceleration of every block in the system.
 
3. A horizontal conveyor belt is moving with speed u . A puck flies on the belt with initial velocity v perpendicular to the belt. Find the maximal width of the belt at which the puck will still reach the opposite side of the belt if friction coefficient between the puck and the belt is μ .
 

4. A long wire is shaped as a coil of radius R and pitch h . The axis of the coil is vertical. There is a bead sliding down along the coil. Friction coefficient between the bead and the coil is μ . Find the steady speed of the bead.



- *5. A truck is going uphill with constant speed v . The profile of the road is shown on the figure: there are straight parts (horizontal 0-1 and 4-5; at angle α to the horizon 2-3) and arcs of circles with radius R (1-2, 3-4). There is a loose load in the trailer. For which minimal critical friction coefficient μ_{cr} between the load and the trailer floor the load will stay still throughout the motion? If the friction coefficient is a little bit below μ_{cr} , at which point on the road the load will start sliding in the trailer? The size of the truck is small compared R .



- *6. A coin lies on a very long inclined plane with angle α . Friction coefficient is $\mu = \tan \alpha$. The coin is hit and it starts to move with horizontal velocity v along the plane. Find velocity of the coin after a very long time.

FOR THE NEXT MEETING

IMPORTANT: The next club's meeting is at 3:00pm, via Zoom, on Sunday, **January 9**.