

USEFUL RESOURCES

The updates, homework assignments, and useful links for APC can be found on SchoolNova's web page:  
[http://schoolnova.org/nova/classinfo?class\\_id=adv\\_phy\\_club&sem\\_id=ay2022](http://schoolnova.org/nova/classinfo?class_id=adv_phy_club&sem_id=ay2022)

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

TODAY'S MEETING

Today we solved problems on momentum conservation. One remaining problem is reassigned; the next topic is energy conservation.

F=MA PREPARATION

Solve  $F = ma$  exam 2019 and time yourself. You can download exam problems here:

[https://www.aapt.org/physicsteam/2020/upload/2019\\_Fma\\_A.pdf](https://www.aapt.org/physicsteam/2020/upload/2019_Fma_A.pdf)

If you don't have time for the entire exam, at least look through the problems to choose the ones most interesting/unclear to you. We will discuss them problems at the beginning of the next meeting.

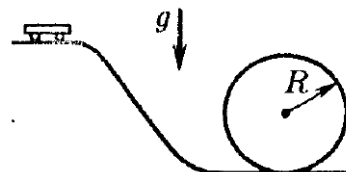
REASSIGNED HOMEWORK

1. A snake preparing to jump is lifting its body at a constant vertical speed  $v$ . Mass of the snake is  $m$ , it is uniformly distributed along the length of the snake  $l$ . Find the force the snake is pushing against the floor with.

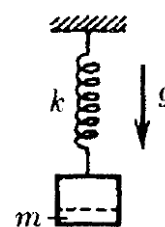
NEW HOMEWORK

1. Two identical bodies are given the same initial velocity at the same angle to the horizon. One of the bodies moves freely while the other one moves without friction in a straight tube. Which of the bodies will reach greater height?

2. A cart goes down the smooth rails which are curved in a vertical loop of radius  $R$ . The cart starts moving from rest at height  $h$  above the lowest point and stays on the rails the whole way. What is the minimal  $h$  such that it is possible?



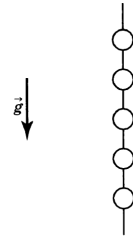
3. A block is hanging in equilibrium on a vertical spring with spring constant  $k$ . A part of this block of mass  $m$  is detached from it. Up to what height will the rest of the block go?



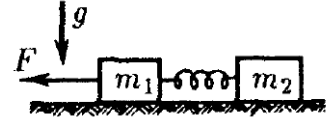
4. In a system of three balls two of them are initially at rest. The moving ball has mass  $m_1$  and collides with the intermediate ball which then collides with the last ball of mass  $m_2$ . For which mass of the intermediate ball will the speed of  $m_2$  after the collision be maximal for a given initial speed of  $m_1$ ? All collisions are perfectly elastic and central.



5. Five identical beads are initially held at rest on a vertical wire. They could slide along the wire without friction, collisions between the beads are perfectly elastic. The beads are simultaneously released with random (in value and direction) initial velocities. What is the maximal possible number of collisions between the beads during their subsequent motion?



- \*6. Two bodies of masses  $m_1$  and  $m_2$  are connected with an undeformed spring and lie on a horizontal plane. Find what minimal constant force should be applied to the left body so that the other body eventually starts moving. Friction coefficient is  $\mu$ .



FOR THE NEXT MEETING

**IMPORTANT:** The next club's meeting is at 3:30pm, via Zoom, on Sunday, **January 22**.