

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=ay2020](https://schoolnova.org/nova/classinfo?class_id=adv_phy_club&sem_id=ay2020)

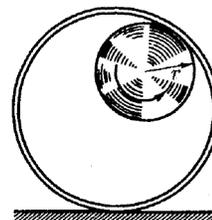
The practical information about the club and contacts can be found on the same web page.

TODAY'S MEETING

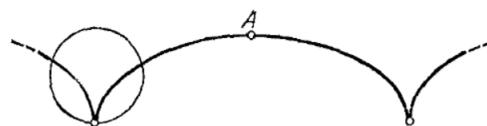
Today we discuss kinematics of rotational motion. We didn't discuss it last year, so all problems should be new for everybody. Therefore the homework is not split into parts this time.

HOMEWORK

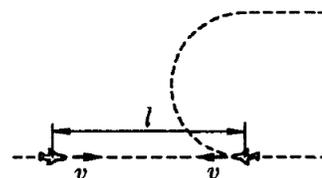
1. A small object moves on a circle of radius  $r$  with speed linearly growing in time:  $v = kt$ . Find how full acceleration of the object depends on time.
2. A wheel of radius  $r$  rolls without slipping on the internal surface of motionless a cylinder of radius  $2r$ . Find the trajectory of a particular point on the rim of the wheel.



3. Find the radius of curvature of a cycloid in the highest point of its arc. One of definitions of cycloid is that it is the trajectory of a given point on the rim of a wheel which is rolling without slipping on a horizontal surface.

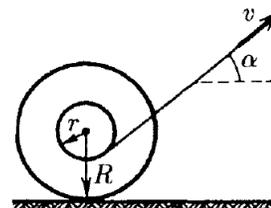


4. Two planes are flying towards each other along a straight line with the same speed  $v$ . The largest distance at which they see each other is  $l$ . Immediately after they see each other, one of the planes makes a "U-turn" keeping its speed constant and then continues to move parallel to the other plane. For what acceleration of the turning plane they will lose sight of each other by the end of the turn?



5. A spherical reservoir of radius  $R$  stands on the ground. A rock is thrown from the ground level with initial speed  $v$  in such a way that it just touches the topmost point of the reservoir. What is the smallest possible  $v$ ?

- \*6. A thread coiled around a bobbin is pulled with velocity  $v$  at an angle  $\alpha$  (see picture). The bobbin rolls without slipping on a horizontal surface. Find velocity of the axis of the bobbin and its angular velocity. For which  $\alpha$  does the bobbin move right? Left? The thread is very long, so  $\alpha$  does not change during the motion.



FOR THE NEXT MEETING

**IMPORTANT:** The next club's meeting is at 3:00pm, via Zoom, on Sunday, **November 22**.