LPR Cup

9.s01.e04

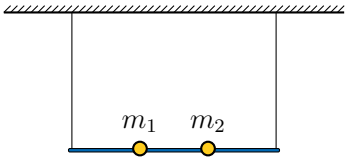
Hint 2

IMPORTANT! The next task is both a hint and an alternative to the main task. Three important points:

1. You can continue to send the solution to the main problem.
2. At any time before the final deadline, you can switch to *alternative task*. If you do this, write *a*t the very beginning of the solutionI'm moving on to an alternative task!. In this case, you get an additional coefficient of 0.7, which is multiplied by the old coefficient, and the solutions to the main problem are not checked from this point on. Be careful!
3. The task consists of several items. The penalty multiplier earned by **before** is applied to all points. In the future, each item is evaluated as a separate task. If you send a solution without any item, this item's solution is considered as Incorrect. For more information about scoring points for composite tasks, see the rules of the Cup.

Alternative Problem

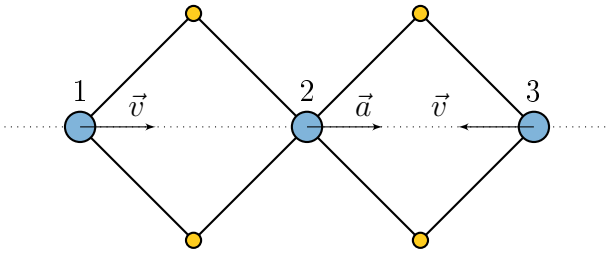
Part 1 *(2 points)* A horizontal weightless rod length $3L$ with weights m_1 and m_2 attached to it is held in the balance position by two vertical threads (see figure). The points with weights divide the rod into three parts of equal length. Determine the tension force of the left thread immediately after cutting the right one.



Part 2 *(2 points)* The inside energy of a system is the potential energy of interaction of its particles with each other plus the kinetic energy of movement of these particles relative to the center of mass of the system (inside motion). In which case is the total energy of the system equals to the inside energy? Prove that the increment of the inside energy of the system is equal to the work of external forces applied to the particles of this system when they move relative to the center of mass.

Part 3 A hinged structure similar to the previous task is located on a horizontal surface. The central washer moves with constant acceleration a, and the speeds of the other two washers at some point in time are equal to v and are directed as shown in the figure. Find the acceleration of washers 1 and 3 at this time. Consider two cases:

1. *(3 points)* The horizontal surface is smooth.
2. *(3 points)* Coefficient of friction between the surface and the washers μ.


1
2
3
$\vec{v}$
$\vec{a}$
$\vec{v}$