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 moment before the final deadline you can start to solve the Alternative problem. If you do so, at the beginning of the solution write: *I am doing the Alternative problem!* In this case a penalty coefficient for the Alternative problem is

$$0{,}7 \cdot \sum_i \frac{k_i \cdot p_i}{10},$$

   where p_i is a point for the problem item, and k_i is a penalty coefficient for the corresponding problem's item at the moment of moving to the Alternative problem. In other words, maximal points for the alternative problem equals to the maximal points you can gain at the moment of moving to the alternative one multiplied by 0,7. Also, we remind you that a penalty coefficient can't be less than 0,1. Solutions of the main problems from that moment will not be checked. 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.

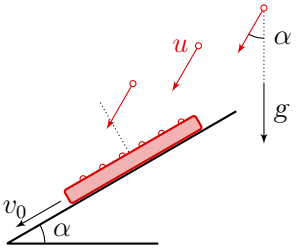
Alternative Problem

During may holidays, taking advantage of the announced weekend and the abnormal weather, Cheburashka and his evil twin brother, Cheburashka Voodoo, went out for a sled ride. In all further problems, consider that the mass of precipitation falling on the sled per unit of time is equal to γ, and the velocity of precipitation near the ground is equal to u.

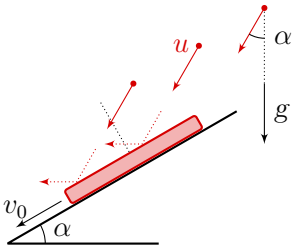
1. (*2,5 points*) Cheburashka pulls the sled of mass m at constant speed v along a rough road with friction coefficient μ_0, applying force F. It starts to rain. Drops of water falling on the sled acquire its speed, after which they immediately flow down from it. What force F_1 does Cheburashka need to apply to continue moving at the speed v? Water falls on the sleigh vertically.
2. (*2,5 points*) The rain gave way to hail. Assuming the hail is absolutely smooth and elastic, find the force F_2 that Cheburashka needs to apply to the sled in order to continue moving at the speed v. The hail falls exclusively vertically.

3. (*2,5 points*) Having reached the slide, the brothers decided to test the sled and roll it down without a passenger. Consider that the slide is an inclined plane that makes an angle α with the horizon. The coefficient of friction of the sled against the hill is $\mu = \operatorname{tg}\alpha$. The hail had not yet stopped by that time, but it started to go at an angle α to the vertical (see figure). Cheburashka launched the sled at an initial speed $v_0 = \mu u$. Assuming the hail is still absolutely smooth and elastic, find the dependence of the speed of the sled on time $v(t)$. The same hailstone does not fall on the sled twice.

4. (*2,5 points*) The second time Cheburashka Voodoo invited his brother to go sledding. By this time, the hail turned into rain again, but the direction of the fall of precipitation did not change. The initial speed of the sled is $v_0 = \mu u$. Find the dependence of the speed of the sled on time $v(t)$, as well as the time T required for the sled to cover the distance s. *Note.* The mass of Cheburashka is not zero. Cheburashka's wool gets wet in the rain.



in the rain



in the hail