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 **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

0. Rosa with mass m_1 and speed v_1 bumped into a resting Chiko with mass m_2. The collision is central.
   (a) *(0,5 points)* Calculate the speeds of Rosa and Chiko at the moment when the distance between them is minimal.
   (b) *(0,5 points)* Calculate the maximum elastic energy.
1. *(1,5 points)* Solve part 1 of the main problem with $k = 1$, $k = 0{,}5$ and $k = 0$.
2. *(1,5 points)* Solve part 2 of the main problem with $k = 1$, $k = 0{,}5$ and $k = 0$.
3. *(1,5 points)* Solve part 3 of the main problem with $k = 1$, $k = 0{,}5$ and $k = 0$.
4. *(0,5 points)* Prove that in part 4 of the main problem for $k = 1$ more energy can be transferred than without subsidiary kikoriki.
5. *(1 point)* Solve part 5 of the main problem for the masses $2m$, m, $2m$ and $k = 0{,}25$.
6. *(2 points)* Solve part 6 of the main problem for $k = 1$ and $k = 0$.
7. *(1 point)* Solve part 7 of the main problem with $k = 0{,}5$.