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

1. In the presented below optical scheme somewhere on the right from the red dash-line Hider occupied a place. The position of Seeker is marked with an eye. Define the regions, in which Hider might be put so that Seeker sees

   (a) *(1,5 points)* 0 images,

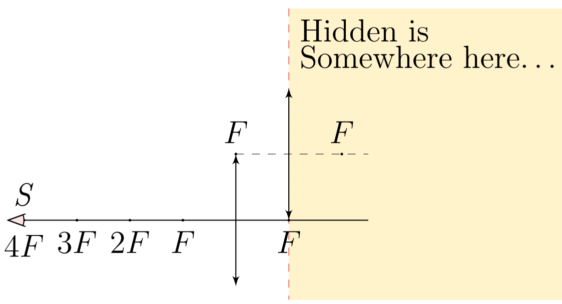
   (b) *(1,5 points)* 1 image,

   (c) *(1,5 points)* 2 images,

   (d) *(1,5 points)* 3 images,

   (e) *(1,5 points)* 4 images

   of Hider. Distance from the center to the edge of each lens F.



Note. An image is a region on the lens (probably, a point) by looking at which Seeker sees Hider and which is separated with a split from other such regions.

2. *(2,5 points)* The refractive index of the atmosphere on an unknown planet takes a form as follows: $n = n_0 - kR$, where R is a distance from a centre of planet to the studied point, n_0 and k are known constants. Define the distance from a centre of planet at which a ray in such an atmosphere might go in a circular loop way.