



# LPR Cup

10.s01.e01

hint 2



## Hint 2

Tasks that are rated at zero points are not checked, so if you decide to make a CHOICE (see the rules of the Cup), you do not need to send a solution to these problems. They are *leading*. Many of them can be found in open sources, which we recommend using.

### Problem 1

(0 points) You do not need to send a solution to this problem!

Determine the resistance of an infinite grid with the resistance of each side of the cell  $R$ , measured between nodes  $A$  and  $B$  for each of the circuits shown in the pictures.

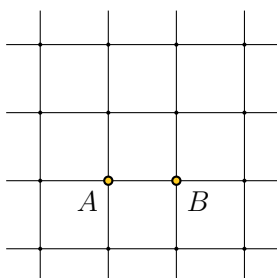


Рисунок 1

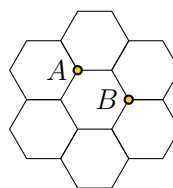


Рисунок 2

Answer: 1)  $R/2$ ; 2)  $R$ .

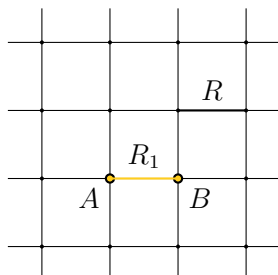
**IMPORTANT!** The next task is both a hint and an alternative to the main task. Three important points:

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 *at* the very beginning of the solution I'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 coefficient 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 of three parts, such a solution is considered Incorrect. For more information about scoring points for composite tasks, see the rules of the Cup.

## Alternative problem

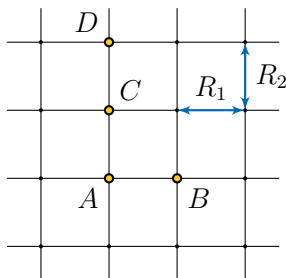
**Part 1** (2 points) You can send a solution to this problem as an alternative.

In an infinite symmetric square grid with the resistance of each edge  $R$ , one edge between the points  $A$  and  $B$  was replaced with the resistance  $R_1$ , as shown in the figure. Find the resistance of the grid between the points  $A$  and  $B$ .



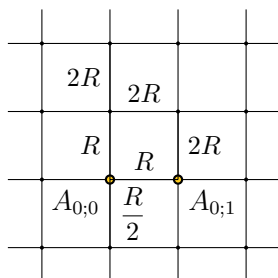
**Part 2** (4 points) You can send a solution to this problem as an alternative.

In an infinite symmetric square grid, the resistance of any horizontal edge is  $R_1$ , and of any vertical edge is  $R_2$ , as shown in the figure. Find the grid resistance between points  $A$  and  $B$ , if it is known that the grid resistance between points  $C$  and  $D$  equals  $R_0$ .



**Part 3** (4 points) You can send a solution to this problem as an alternative.

In an infinite symmetric square grid, the edge resistance is doubled when shifted up or to the right, as shown in the figure. Find the grid resistance between the nodes  $A_{0;0}$  and  $A_{0;1}$ .



Send your solutions until 01.05.2020 22:00 (Moscow time)