Hint 2

As an alternative problem, we offer you several classic problems that can lead to the right way of solving the main problem. In case they still do not help, you can send a solution of alternative problem.

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. A thermally insulated vessel with a volume of V is divided into two parts by partition. In one part there is an ideal gas at a temperature of T_1, a pressure of p_1, which occupies a volume of αV, in the other part there is an ideal gas at a temperature of T_2 and a pressure of p_2.

1. *(2 pts)* Find the temperature T and the pressure p that will set after removing the partition.
2. *(1 pts)* Find how the gas density depends on α after the partition has been removed.

Part 2. In a vessel with a volume of αV there is air with a relative humidity of φ_1, and in another vessel with a volume of $(1-\alpha)V$ there is air at the same temperature, but with a relative humidity of φ_2. The vessels are connected by a thin tube with a tap.

1. *(1 pts)* Find what relative humidity will set after opening the tap.

Part 3. In an sealed container under a fixed piston there is moist air at a temperature of 75° C with a humidity of 25%. The air in the vessel begins to cool.

1. *(2 pts)* At what temperature T the inner walls of the vessel fog up?
2. *(1 pts)* What should be the initial humidity in the vessel for condensation to occur at such a process at 5° C?
3. *(1 pts)* How the answer will change, if the piston is released and the cooling process is isobaric?

Information about the dependence of saturated vapor pressure on temperature can be taken from the first hint.

Part 4. *(2 pts)* At what maximum relative humidity in the room does a bottle of milk taken out of the refrigerator not fog up? The temperature in the refrigerator is 5° C and in the room is 25° C. Information about the dependence of saturated vapor pressure on temperature can be taken from the first hint.