# Temperature Profile Transient 3

A sphere with radius R initially has the same homogeneous temperature T_1 as the surrounding air. At time t_0 it is suddenly heated up in a very large basin with a constant basin temperature T_2. At a finite time $t_1 > t_0$, the temperature in the sphere has already increased, and the sphere is lifted out, and is again exposed to air of temperature T_1. Choose the diagram with the correct solution for the temporal evolution of the sphere's temperature.
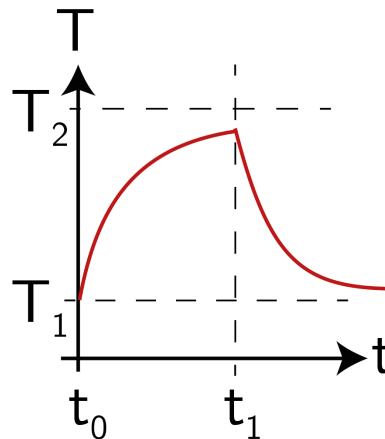
The sphere is being heated due to convection. Initially, the rate of heat transfer is the largest due to the relatively big difference between the temperature of the sphere and the ambient temperature. For this reason, the slope will be the steepest at the beginning.

As the sphere heats up, the temperature difference decreases and so does the slope, until the sphere will eventually reach its equilibrium temperature T_2. But in this case, it does not reach this temperature as it is being cooled down again at t_1.

Similarly, as for heating, the slope is the steepest at the beginning of the cooling process due to the relatively big temperature difference. Eventually, the sphere will reach the temperature of the ambient.