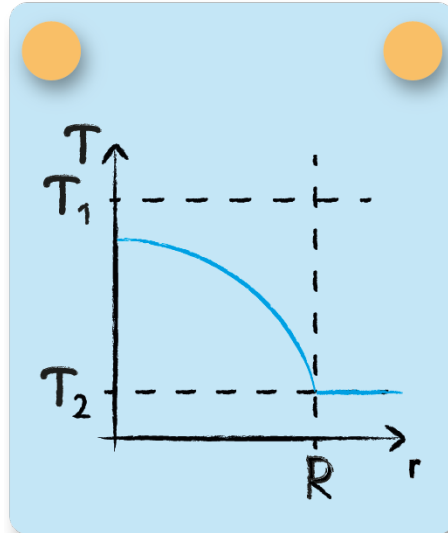


## Temperature Profile Transient 5

A sphere with radius  $R$  has a homogeneous initial temperature  $T_1$ . At the time  $t_0$  it is suddenly cooled down in a very large basin with a constant basin temperature  $T_2$ . At the finite time  $t_1 > t_0$  the temperature has already dropped everywhere in the sphere. Choose the appropriate radial temperature profiles at  $t = t_1$ .



As stated the temperature is already decreased everywhere. Because most heat will be lost from the surfaces, the temperature over there will be the lowest. Also, in the center, the gradient will be zero due to symmetry.

When moving from the center in a radial direction the temperature and its slope increase. The increase in slope is caused because most heat has been lost from the surface.

At the surface, the temperature is equal to the ambient temperature  $T_2$  due to the fact that  $\alpha \rightarrow \infty$  and thus the thermal resistance outside the sphere is negligible.