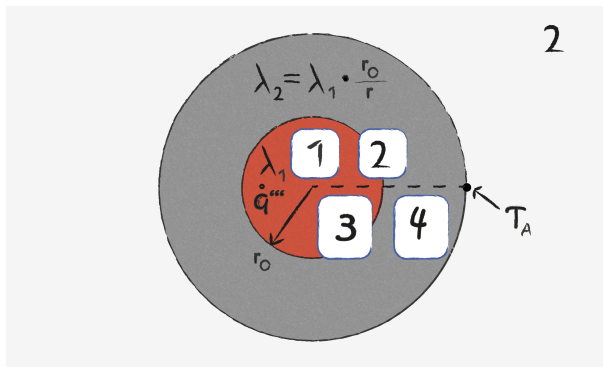


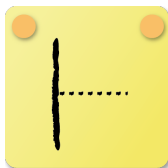


Heat Conduction: Task 2



The image describes a cylindrical body of infinite expansion. The inner compartment has a heat source. The conductivity of the outer material reduces with the radius in the same manner as the area increases.

1



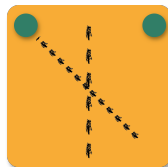
Due to symmetry reasons, the temperature gradient in the center of the pipe is zero.

2



To meet the condition in the center, the temperature gradient is zero (left side). Due to the constantly increasing heatflux (heat source), the temperature gradient increases constantly with the radius.

3



In the outer material, the temperature gradient is linear (see (4)). This temperature gradient is equal to the gradient at $r = r_0$ and thus there is a constant gradient at the interface.

4



The temperature decreases linearly because the thermal conductivity decreases by $1/r$ while the area increases with r . Both effects cancel out each other.