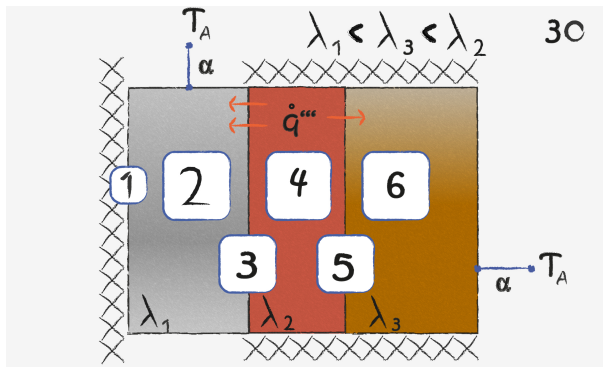


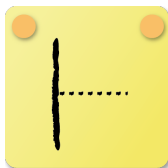


Heat Conduction: Task 30



The image describes a rectangular body with three different heat conductivities and homogeneous heat production in the middle part, where the heat flux to the left side is more than to the right side. The walls on the left side, top and bottom of area 2 and 3 are adiabatic.

1



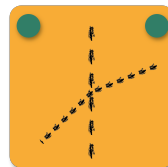
On an adiabatic wall there is no heat transport so the temperature gradient is zero.

2



Due to the heat loss through convection, the temperature gradient decreases from right to left and to meet the condition on the adiabatic wall (no heat transport), the temperature gradient must be zero on the wall.

3



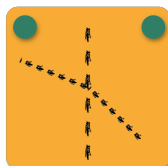
λ_1 is smaller than λ_2 which means the Temperature gradient in 1 is steeper than in 2.

4



Due to the heat production and heat flux in both directions, there must be a maximum in the area 2 and since the heat flux in the direction of area one is larger (as shown in the image), the temperature gradient to the left is steeper than to the right.

5



λ_3 is smaller than λ_2 which means the Temperature gradient in 3 is steeper than in 2.

6



According to Fourier's law. At constant area and heat conductivity the temperature gradient decreases linearly from left to right.