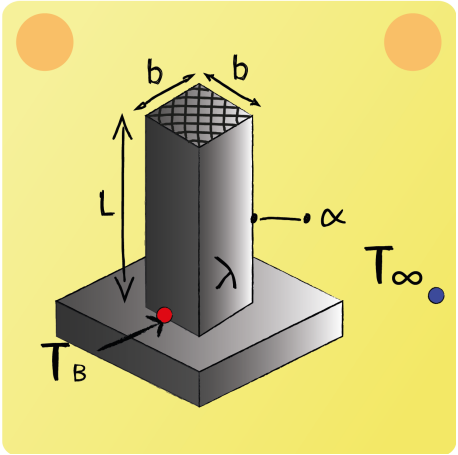
# Lecture 12 Question 1

**Give an expression of the fin efficiency for the fin with an adiabatic head.**




$$\eta_{\mathrm{R}} = \frac{\dot{Q}_{\mathrm{cond,base}}}{\dot{Q}_{\mathrm{max}}}$$

$$\dot{Q}_{\mathrm{cond,base}} = \lambda \cdot A_{\mathrm{c}} \cdot m \cdot \Theta_{\mathrm{B}} \cdot \tanh\left(m \cdot L\right)$$

$$\dot{Q}_{\mathrm{max}} = A_{\mathrm{s}} \cdot \alpha \cdot \Theta_{\mathrm{B}}$$

$$\Rightarrow \eta_{\mathrm{R}} = \frac{\lambda \cdot A_{\mathrm{c}} \cdot m \cdot \Theta_{\mathrm{B}} \cdot \tanh\left(m \cdot L\right)}{U \cdot L \cdot \alpha \cdot \Theta_{\mathrm{B}}}$$

$$= \frac{\tanh\left(m \cdot L\right)}{m \cdot L}$$