

54. We use $P_{\text{cond}} = kA(T_H - T_C)/L$. The temperature T_H at a depth of 35.0 km is

$$T_H = \frac{P_{\text{cond}}L}{kA} + T_C = \frac{(54.0 \times 10^{-3} \text{ W/m}^2)(35.0 \times 10^3 \text{ m})}{2.50 \text{ W/m}\cdot\text{K}} + 10.0^\circ\text{C} = 766^\circ\text{C} .$$