

61. We use $P_{\text{cond}} = kA\Delta T/L \propto A/L$. Comparing cases (a) and (b) in Figure 19-40, we have

$$P_{\text{cond } b} = \left(\frac{A_b L_a}{A_a L_b} \right) P_{\text{cond } a} = 4P_{\text{cond } a} \quad .$$

Consequently, it would take $2.0 \text{ min}/4 = 0.5 \text{ min}$ for the same amount of heat to be conducted through the rods welded as shown in Fig. 19-42(b).