85. (a) Recalling that a Watt is a Joule-per-second, and that a change in Celsius temperature is equivalent (numerically) to a change in Kelvin temperature, we convert the value of k to SI units, using Eq. 19-12.

$$\left(2.9 \times 10^{-3}\,\frac{\text{cal}}{\text{cm}\cdot\text{C}^\circ\cdot\text{s}}\right)\left(\frac{4.186\,\text{J}}{1\text{ cal}}\right)\left(\frac{100\,\text{cm}}{1\text{ m}}\right) = 1.2\,\frac{\text{W}}{\text{m}\cdot\text{K}}\ .$$

(b) Now, a change in Celsius is equivalent to five-ninths of a Fahrenheit change, so

$$\left(2.9 \times 10^{-3}\,\frac{\text{cal}}{\text{cm}\cdot\text{C}^\circ\cdot\text{s}}\right)\left(\frac{0.003969\,\text{Btu}}{1\text{ cal}}\right)\left(\frac{5\,\text{C}^\circ}{9\,\text{F}^\circ}\right)\left(\frac{3600\,\text{s}}{1\text{ h}}\right)\left(\frac{30.48\,\text{cm}}{1\text{ ft}}\right) = 0.70\,\frac{\text{Btu}}{\text{ft}\cdot\text{F}^\circ\cdot\text{h}}\ .$$

(c) Using Eq. 19-33, we obtain

$$R = \frac{L}{k} = \frac{0.0064\,\text{m}}{1.2\,\text{W/m}\cdot\text{K}} = 0.0053\ \text{m}^2\cdot\text{K/W}\ .$$