

58. (a) We estimate the surface area of the average human body to be about 2 m^2 and the skin temperature to be about 300 K (somewhat less than the internal temperature of 310 K). Then from Eq. 19-37

$$P_r = \sigma \varepsilon A T^4 \approx (5.67 \times 10^{-8} \text{ W/m}^2 \cdot \text{K}^4) (0.9) (2.0 \text{ m}^2) (300 \text{ K})^4 = 8 \times 10^2 \text{ W} .$$

- (b) The energy lost is given by

$$\Delta E = P_r \Delta t = (8 \times 10^2 \text{ W})(30 \text{ s}) = 2 \times 10^4 \text{ J} .$$