

40. The work done by the motor in $t = 10.0 \text{ min}$ is $|W| = Pt = (200 \text{ W})(10.0 \text{ min})(60 \text{ s/min}) = 1.20 \times 10^5 \text{ J}$.
The heat extracted is then

$$|Q_L| = K|W| = \frac{T_L|W|}{T_H - T_L} = \frac{(270 \text{ K})(1.20 \times 10^5 \text{ J})}{300 \text{ K} - 270 \text{ K}} = 1.08 \times 10^6 \text{ J} .$$