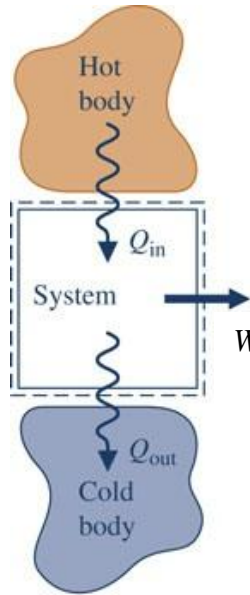


Problem 2.81

The net work of a power cycle operating as in Fig. 2.17a is 10,000 kJ, and the thermal efficiency is 0.4. Determine the heat transfers  $Q_{\text{in}}$  and  $Q_{\text{out}}$ , each in kJ.

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$$\eta = \frac{W_{\text{cycle}}}{Q_{\text{in}}} \rightarrow Q_{\text{in}} = \frac{W_{\text{cycle}}}{\eta}$$

$$Q_{\text{in}} = (10,000 \text{ kJ}) / (0.4) = 25,000 \text{ kJ} \quad \leftarrow$$

$$W_{\text{cycle}} = 10,000 \text{ kJ}$$

$$W_{\text{cycle}} = Q_{\text{cycle}} = Q_{\text{in}} - Q_{\text{out}}$$

$$\eta = 0.4$$

Thus

$$Q_{\text{out}} = Q_{\text{in}} - W_{\text{cycle}} = 25,000 - 10,000 = 15,000 \text{ kJ} \quad \leftarrow$$