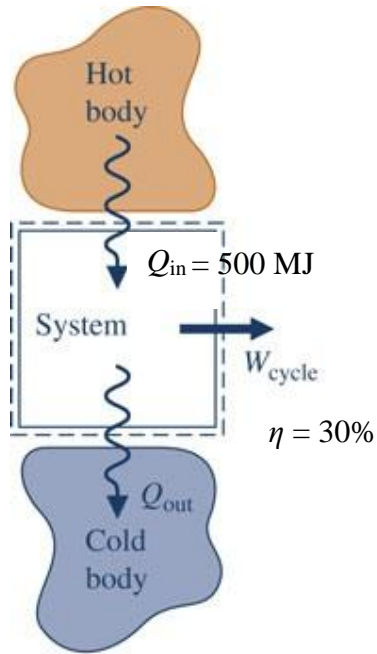


Problem 2.82

For a power cycle operating as shown in Fig. 2.17a, the energy transfer by heat into the cycle,  $Q_{\text{in}}$ , is 500 MJ. What is the net work developed, in MJ, if the cycle thermal efficiency is 30%? What is the value of  $Q_{\text{out}}$ , in MJ?

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

$$W_{\text{cycle}} = \eta Q_{\text{in}} = (0.3)(500 \text{ MJ}) = 150 \text{ MJ} \quad \longleftarrow$$

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

Thus

$$Q_{\text{out}} = Q_{\text{in}} - W_{\text{cycle}} = 500 \text{ MJ} - 150 \text{ MJ} = 350 \text{ MJ} \quad \longleftarrow$$