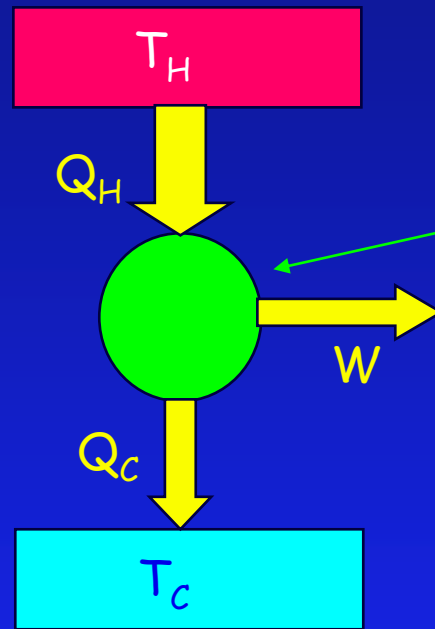
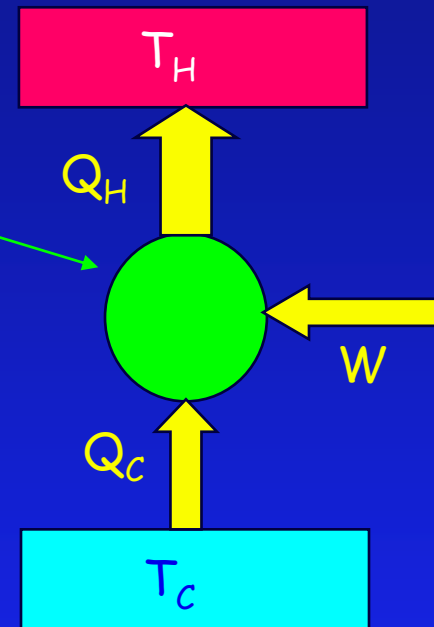


Engines and Refrigerators

"HEAT ENGINE"



REFRIGERATOR



- system taken in closed cycle $\Rightarrow \Delta U_{\text{system}} = 0$
- therefore, net heat absorbed = work done by system (W)

$$Q_H - Q_C = W \text{ (engine)}$$

$$Q_C - Q_H = -W \text{ (refrigerator)}$$

energy into green blob = energy leaving green blob