

96. We note that there is no work done in process  $c \rightarrow b$ , since there is no change of volume. We also note that the *magnitude* of work done in process  $b \rightarrow c$  is given, but not its sign (which we identify as negative as a result of the discussion in §19-8). The total (or *net*) heat transfer is  $Q_{\text{net}} = (-40) + (-130) + (+400) = 230 \text{ J}$ . By the First Law of Thermodynamics (or, equivalently, conservation of energy), we have

$$\begin{aligned} Q_{\text{net}} &= W_{\text{net}} \\ 230 \text{ J} &= W_{a \rightarrow c} + W_{c \rightarrow b} + W_{b \rightarrow a} \\ &= W_{a \rightarrow c} + 0 + (-80 \text{ J}) \end{aligned}$$

Therefore,  $W_{a \rightarrow c} = 310 \text{ J}$ .