

97. (a) and (b) Regarding part (a), it is important to recognize that the problem is asking for the total work done during the two-step “path”:  $a \rightarrow b$  followed by  $b \rightarrow c$ . During the latter part of this “path” there is no volume change and consequently no work done. Thus, the answer to part (b) is also the answer to part (a). Since  $\Delta U$  for process  $c \rightarrow a$  is  $-160$  J, then  $U_c - U_a = 160$  J. Therefore, using the First Law of Thermodynamics, we have

$$\begin{aligned} 160 &= U_c - U_b + U_b - U_a \\ &= Q_{b \rightarrow c} - W_{b \rightarrow c} + Q_{a \rightarrow b} - W_{a \rightarrow b} \\ &= 40 - 0 + 200 - W_{a \rightarrow b} \end{aligned}$$

Therefore,  $W_{a \rightarrow b} = 80$  J.