76. For convenience, the "int" subscript for the internal energy will be omitted in this solution. Recalling Eq. 19-28, we note that

$$\sum_{\text{cycle}} E = 0$$
$$\Delta E_{A\to B} + \Delta E_{B\to C} + \Delta E_{C\to D} + \Delta E_{D\to E} + \Delta E_{E\to A} = 0 \ .$$

Since a gas is involved (assumed to be ideal), then the internal energy does not change when the temperature does not change, so

$$\Delta E_{A\to B} = \Delta E_{D\to E} = 0 \ .$$

Now, with $\Delta E_{E\to A} = 8.0$ J given in the problem statement, we have

$$\Delta E_{B\to C} + \Delta E_{C\to D} + 8.0 = 0 \ .$$

In an adiabatic process, $\Delta E = -W$, which leads to

$$-5.0 + \Delta E_{C\to D} + 8.0 = 0 \ ,$$

and we obtain $\Delta E_{C\to D} = -3.0$ J.