

PROBLEM 2.54

KNOWN: Data are provided for Q , W , E_1 , E_2 , and ΔE for several processes of a closed system.

FIND: Determine values for the missing table data.

Process	Q	W	E_1	E_2	ΔE
a	+40	+25	+15	+30	+15
b	+20	+5	+7	+22	+15
c	-4	+10	+6	-8	-14
d	-10	-30	-10	+10	+20
e	+3	-3	+8	+14	+6

Process a: $\Delta E = Q - W \Rightarrow 15 = 40 - W \Rightarrow W = +25$
 $\Delta E = E_2 - E_1 \Rightarrow E_2 = \Delta E + E_1 = 30$

Process b: $\Delta E = E_2 - E_1 = 22 - 7 = 15$
 $\Delta E = Q - W \Rightarrow 15 = Q - 5 \Rightarrow Q = 20$

Process c: $\Delta E = Q - W = (-4) - (10) = -14$
 $\Delta E = E_2 - E_1 \Rightarrow E_1 = E_2 - \Delta E = (-8) - (-14) = 6$

Process d: $\Delta E = Q - W \Rightarrow W = Q - \Delta E = (-10) - (20) = -30$
 $\Delta E = E_2 - E_1 \Rightarrow E_2 = \Delta E + E_1 = 20 + (-10) = 10$

Process e: $\Delta E = Q - W = 3 - (-3) = 6$
 $\Delta E = E_2 - E_1 \Rightarrow E_2 = \Delta E + E_1 = 6 + 8 = 14$