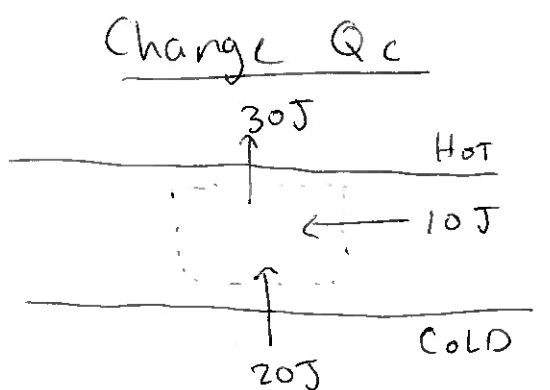
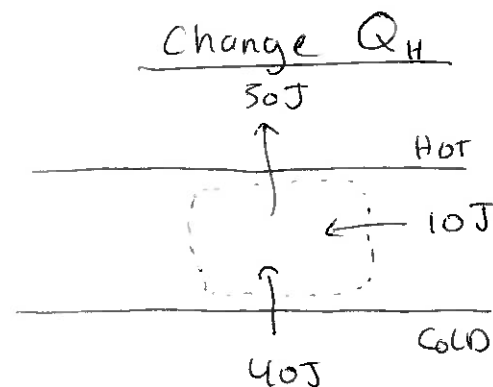


Reading 2/14 Solutions

- ① (a) The diagram violates the first law (energy cons.)
(b) There are two ways to fix it: one by changing Q_c and the other by changing Q_H



$$K = \frac{Q_c}{W_{in}} = \frac{20\text{J}}{10\text{J}} = 2$$



$$K = \frac{Q_c}{W_{in}} = \frac{40\text{J}}{10\text{J}} = 4$$

② (a) $\text{COP} = \frac{Q_c}{W_{in}} = \frac{Q_c}{Q_H - Q_c} \stackrel{\text{ideal}}{=} \frac{T_c}{T_h - T_c} = \frac{298\text{K}}{10\text{K}} = \boxed{29.8}$

(b) $Q_c = (\text{COP}) W_{in} = 29.8 (1.0\text{ kJ}) = \boxed{30\text{ kJ}}$

(c) Cons. of energy $\Rightarrow Q_H = W_{in} + Q_c = 1.0\text{ kJ} + 30\text{ kJ} = \boxed{31\text{ kJ}}$