



(الف)

$$PV = nRT \Rightarrow 2 \times 21 \times 100 = 1.25 \times 8 \times T \Rightarrow T = 42 \text{ K}$$

$$PV = nRT \Rightarrow 2 \times 6 \times 100 = 1.25 \times 8 \times T \Rightarrow T = 120 \text{ K}$$

(ب)

$$Q_{ab} = \frac{3}{2} (30 - 12) \times 100 = 2700 \text{ J}$$

$$Q_{bc} = \frac{3}{2} (42 - 30) \times 100 - \left(-\frac{(2 \times 5) \times 15 \times 100}{2} \right) = 7050 \text{ J}$$

$$Q_{ca} = \frac{C_p}{R} P \Delta V = -7500 \text{ J}$$

$$\Rightarrow \frac{+Q}{-Q} = \frac{9750}{7500} = \frac{39}{30}$$