

**Given:**  $\text{kJ} := 1000\text{J}$

The food compartment of a refrigerator is maintained at  $4^{\circ}\text{C}$  by removing heat from it at a rate of  $360 \text{ kJ/min}$ .

**Required:**

If the required power input to the refrigerator is  $2 \text{ kW}$ , determine the coefficient of performance of the refrigerator and the rate of heat rejection to the room that houses the refrigerator.

**Solution:**

The heat supplied to the refrigerator cycle (that which is removed from the cooled space) is defined as

$$Q'_L := 360 \frac{\text{kJ}}{\text{min}}$$

The work supplied to the refrigerator is defined as

$$W'_{\text{net,in}} := 2\text{kW}$$

The COP of the refrigerator is then given by

$$\text{COP}_R := \frac{Q'_L}{W'_{\text{net,in}}} = 3$$

The heat rejected by the refrigerator cycle is then found by

$$Q'_H := Q'_L + W'_{\text{net,in}} = 480 \cdot \frac{\text{kJ}}{\text{min}}$$