Physics Quiz — Chapter 11: Efficiency, Energy, Refrigerator

Name:_____ Date:_____

Note: Please show your complete work, write organized and clearly, draw a diagram, and explain your reasoning for the full credit.

Problem: (20 points)

During a 1 minute, a refrigerator removes an amount of thermal energy of $Q_C = 3.0\,\text{MJ}$ from the interior while using electrical work of $W = 1.5\,\text{MJ}$.

(a) **(5 points)** Write the **coefficient of performance (COP)** for a refrigerator in terms of what you get and what you pay for.

(b) **(5 points)** Calculate the numerical value of the refrigerator's **COP**.

(c) **(5 points)** Using conservation of energy, determine the amount of thermal energy Q_H released into the room during this time interval. Draw a diagram.

(d) **(5 points)** Explain briefly (one or two sentences) why the COP of a refrigerator can be greater than 1 without violating conservation of energy.