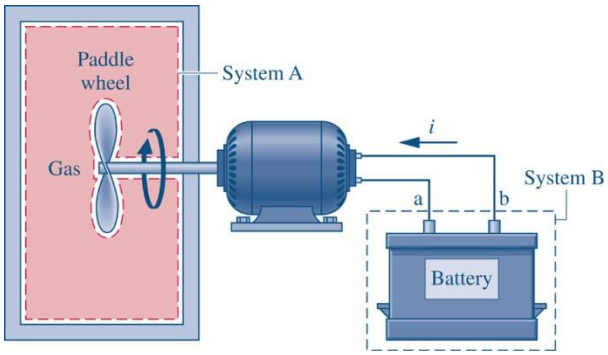
_____ 1. Two systems (A and B) are shown in the sketch below. Which of these systems are *closed* systems?



A. System A is the only closed system shown
B. System B is the only closed system shown
C. Both systems A and B are closed systems
D. Neither system A or B is a closed system

_____ 2. A closed, simple compressible system undergoes a process where the heat input to the system is 20 Btu, the kinetic energy increases by 10 Btu, the potential energy decreases by 12 Btu, and the internal energy of the system decreases by 4 Btu. Utilizing the normal sign convention for heat and work, the work done during this process is most nearly,

A. –6 Btu
B. 2 Btu
C. 14 Btu
D. 18 Btu
E. 26 Btu

_____ 3. Which of the following statements is *true* concerning a heat pump?

A. A heat pump is a refrigeration cycle operating in reverse
B. A heat pump is a device that moves heat from a high temperature to a low temperature
C. A heat pump is only theoretical; it cannot function because it is a perpetual motion machine
D. A heat pump often has a thermal efficiency (coefficient of performance) in excess of 100%
E. A heat pump is a device that delivers power by virtue of a heat input

_____ 4. A process that is reversible and adiabatic must also be,

A. isobaric
B. isochoric
C. isenthalpic
D. isothermal
E. isentropic

_____ 5. An ideal gas with constant heat capacity is undergoing a polytropic process where $n = 1.4$. The initial state of the gas is 400 kPa, 500 K. The final pressure of the gas is 200 kPa. The final temperature of the gas is most nearly,

A. 250.0 K
B. 378.9 K
C. 410.2 K
D. 609.5 K
E. 1000.0 K

_____ 6. An air conditioning system is used to keep a home cool during hot summer days. Consider a day where the outside temperature is 95°F and it is desired to keep the house at 72°F. The house is gaining heat at a rate of 48,000 Btu/hr. The *minimum* amount of power required to run the air conditioner is most nearly,

A. 1,990 Btu/hr
B. 2,076 Btu/hr
C. 3,199 Btu/hr
D. 11,621 Btu/hr
E. 15,333 Btu/hr

_____ 7. The enthalpy of an ideal gas is a function of…

A. temperature and pressure
B. temperature and specific volume
C. pressure and specific volume
D. pressure only
E. temperature only

_____ 8. A vapor compression refrigeration cycle, operating as a refrigerator, has a coefficient of performance of 2.0. If the same cycle operates as a heat pump, the coefficient of performance of the heat pump would be most nearly,

A. 1.0
B. 1.5
C. 2.0
D. 2.5
E. 3.0