Name_____ Date_____ Period_____

Unit 10

Thermodynamics Practice Test

Form P

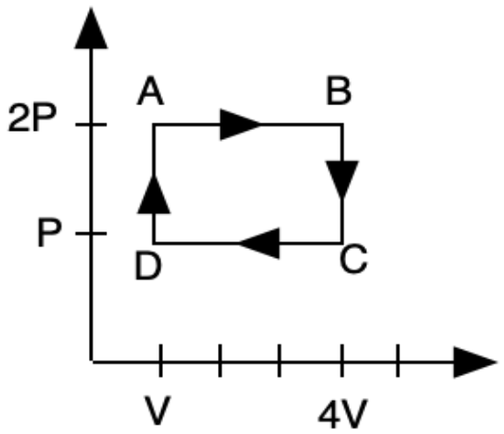
Some useful constants

$k_B = 1.38 \times 10^{-23}$ J/K R = 8.32 J/(mole K) $c_w = 4.19$ J/g °C 1 mL = 1 cm^3

Density of water = 1.00 g/mL $c_{Aluminum} = 0.900$ J/g °C

Part I: Choose the best answer

For questions 1-4, use the graph below



1. The process A-B shown on the p-V graph above is an
   a. adiabatic expansion. b. isothermal expansion.
   c. isometric expansion d. isobaric expansion

2. The process D-A shown on the p-V graph above is
   a. adiabatic b. isothermal c. isochoric d. isobaric

3. During the process C-D shown on the p-V graph above, the temperature of the gas
   a. increases b. is constant c. decreases d. Need more info

4. A gas is taken through the cycle illustrated above. During one cycle, how much work is done by an engine operating on this cycle?
   a. pV b. 2pV c. 3pV d. 4pV

5. What does a thermometer measure?
   a. heat b. temperature c. a & b d. entropy

6. Two ways that energy is transferred from one system to another are:
   a. heat b. temperature c. work d. entropy

Part II: Free Response

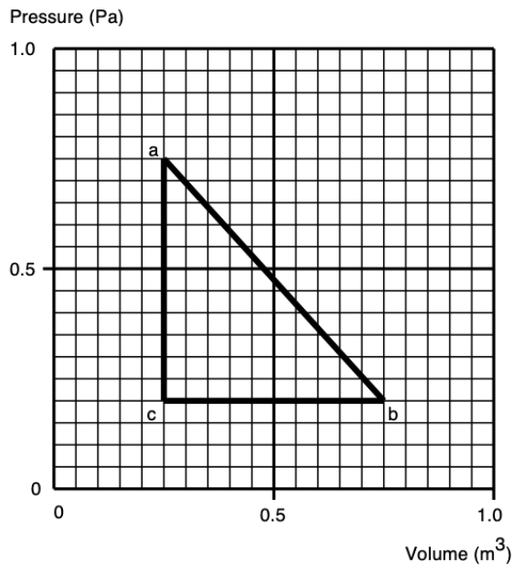
1. A container of ideal gas at STP is compressed adiabatically. If 200 J of work is done, what is the change in internal energy of the gas?

2. A 25.17 g metal ingot at a temperature of 97.6°C is placed in an aluminum calorimeter with 137.50 g of water at 8.3°C. The metal, the calorimeter, and the water reach an equilibrium temperature of 14.6°C. The calorimeter has a mass of 22.50 g.
    a. Calculate the heat gained by the water.

    b. Calculate the heat gained by the calorimeter.

    c. What is the heat capacity of the stone?

3. One mole of an ideal monatomic gas is taken through the cycle *abc* shown on the diagram below:



The temperature of the gas at *a* is 300 K. Determine each of the following:

    a. During which processes was work done *by* the gas? How much work was done?

    b. During which processes was work done *on* the gas? How much work was done?

    c. The net work done by the gas on its surroundings for the entire cycle.

    d. The heat $Q_{c \to a}$ absorbed by the gas during process *ca* if its mass is 4.00 g and its specific heat capacity is 5.20 J/g °C.

    e. The change in the internal energy of the gas during process $c \to a$.