PHY 101 Quiz #10 **Name _____**

Score _____

Instructions:
1. Do all of your work on this sheet.
2. **Show all of your steps** in problems for full credit.
1. **Be clear and neat** in your work. Any illegible work, or scribbling in the margins, will not be graded.
2. Place your **answers in a box**.
3. If you need more space, you may use the back of the page and write **On back** in the problem space.

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1. **Multiple Guess (4 pts)** Find the answer which best fits the question and **write it in the space provided**.

a. Doubling the intensity increases the intensity level
a) 3 dB b) 5 dB c) 10 dB d) 20 dB _____

b. As an ambulance drives away from an observer, the siren frequency will
a) stay the same. b) increase. c) decrease. _____

c. The thermodynamic statement of conservation of energy of a system is the
a) zeroth law; b) first law; c) second law; d) third law. _____

d. A process in which the volume remains constant is called
a) isothermal; b) isobaric; c) adiabatic;
d) quasistatic; e) isochoric. _____

2. **Quickies (3 pts)**

a. What is the speed of sound in air at room temperature?

b. Write Celsius temperature T_C in terms of Fahrenheit temperature T_F; i.e., T_C = _____

c. Convert 350.0 calories to Joules.

Bonus: Two speakers emit sounds (in phase) of the same amplitude and frequency. An observer is 2.50 m from one and 2.85 m from the other. If the sound intensity is a minimum at this point, then what is the lowest possible frequency emitted? Assume that the speed of sound is 350 m/s.

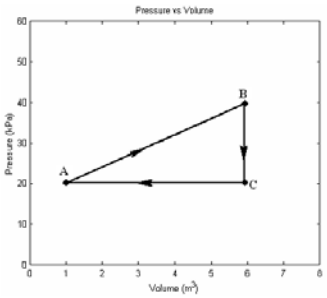
Constants

Water: L_f = 80 cal/g L_v = 540 cal/g

3. **Problems (13 pts)**

a. The NewRiver Gorge Bridge in West Virginia is a steel arch bridge 518.0 m in length. How much does its length change from 20.0 °C to 35.0 °C? [$\alpha = 11\times10^{-6}$ $(^oC)^{-1}$.]

b. The PV diagram (kPa vs m^3) is shown below for a particular gas.



i. . How much work is done as the system goes from state A to B to C and back to A?

ii. If 200 kJ of heat is added to the system during this cycle, then what is the change in internal energy?

c. How much heat energy in kilocalories is required to boil away 0.50 kg of water that is initially at 100°C?

d. Find the intensity of a sound that has a sound level of 35 dB?

e. An organ pipe with one end open has a length of 0.75 m. Assuming the speed of sound to be 343 m/s, what is the frequency of the fifth harmonic?

f. How much ice at 0 °C must be added to 1.0 kg of water at 100 °C so as to end up with all liquid at 20°C?