Exam Quiz 2, Phys 2Ca, Fall 2007

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) What of the following is a WRONG statement 1) _____

A) A properly functioning thermometer measures the temperature of its own.

B) In a thermos bottle the glass walls are aluminum coated to reduce the emissivity factor that appears in the Stefan–Boltzamann law

C) A thermometer hanging outdors in a direct sunlight cannot be expected to be in thermodynamic equilibrium with the surrounding air.

D) For a good solar collector it is advantageous to have a surface efficiently absorbing radiation in the range associated with a temperature of 100 °C.

2) What of the following is a WRONG statement 2) _____

A) A constant–volume gas thermometer is more similar to a barometer than to a pressure gauge.

B) If two indentical–looking physical systems are in the same microscopic state they do not have to in the same macroscopic state.

C) For a good solar collector it is advantageous to have a good emissivity of the surface for the visible light.

D) Large bodies of water exert a temperature moderating effect on their surroundings because of their high heat capacity.

3) What of the following is a WRONG statement? 3) _____

A) Thermal conductivities of glass and fiberglass are dramatically different because of low thermal conductivity of air.

B) Double–glazed windows provide good thermal insulation because of law thermal conductivity of air.

C) Filling cavities in walls with styrofoam beads provides better thermal insulation because of lower thermal conductivity of styrofoam compared with air.

D) In the absense of convection the insulating value of a double–glazed window should increase proportionally to the spacing.

4) Which of the following is a WRONG statement? 4) _____

A) The equation for the heat flow rate $H=-kA\frac{\Delta T}{\Delta x}$ is not directly applicable if there is convection going on.

B) The main reason why the temperature of Earth is much lowe than the temperature of the Sun, although it is exposed to solar radiation, is that Earth is absorbing only a small fraction of the sunlight reaching its surface.

C) Increasing the spacing between the glasses in a double–glazed window beyond a certain limit can reduce the insulation value of the window, because it enhances the convection of air between the glasses.

D) A temperature difference in 1 K is the same as 1 °C.

5) What of the following is a WRONG statement 5) _____

A) The constants a and b in the Van der Waals equation are different for different gases.

B) The ideal gas law implies that at zero temperature and zero pressure, a gas must have zero volume.

C) Van der Waals force is attractive.

D) The constant b in the Van der Waals equation can be understood as the volume of 1 mole of the gas at zero Kelvin.

6) Which of the following is a WRONG statement? 6) _____

A) The average velocity of the molecules of a gas does not depend on its temperature.

B) If you start runnig with a sealed can of air, it would have no effect on the pressure of the air in the can.

C) If gas A has a molecular weight 4 times higher than gas B, the thermal speed of molecules of gas A becomes equal to the thermal speed of molecules of gas B, when the temperature of gas A is 2 times higher than the temperature of gas B.

D) A planet with a higher gravitational acceleration is more likely to have a higher fraction of gases with lower molecular weights in its atmosphere.

7) A house is insulated so its total heat loss is 380 W/°C. The owner throws a party with 45 people (including the owner), who output 100 W of heat each. There are no other heat sources in the house and the temperature in it is 24 °C. What is the temperature outside? 7) _____

A) 20 °C B) 36 °C C) 12 °C D) 19 °C

8) Some properties of glass are listed here. 8) _____

Density 2300 kg/m^3

Specific heat 840 J/kg • °C

Coefficient of linear thermal expansion 8.5×10^{-6} (°C)$^{-1}$

Thermal conductivity 0.80 J/s • m • °C

A glass window pane is 1.5 m high, 1.8 m wide and 6 mm thick. The temperature at the inner surface of the glass is 22°C and at the outer surface 4°C. How much heat is lost each hour through the window?

A) 1.9×10^6 J B) 1.8×10^5 J C) 3.3×10^6 J D) 2.3×10^7 J

Answer Key
Testname: TEST2A

1) B, D
2) B
3) C
4) B
5) B
6) C
7) C
8) D