

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 thermometer hanging outdoors in a shadow is likely to measure the actual temperature of the air.
 - B) If two identical-looking physical systems are in the same microscopic state they must be in the same macroscopic state.
 - C) The temperature in a stone building usually varies less than in a wooden building because the heat capacity per unit volume of stone is lower.
 - D) A properly functioning thermometer measures the temperature of its own.
- 2) What of the following is a WRONG statement? 2) _____
- 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 low 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 absence of convection the insulating value of a double-glazed window should increase proportionally to the spacing.
- 3) Which of the following is a WRONG statement? 3) _____
- 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 reason why Earth does not have the same temperature as the Sun, although it is exposed to solar radiation, is that Earth is also in thermal contact with the universe.
 - C) Several days after a snowstorm, the roof on Jones' house is uniformly covered with snow, whereas on Smith's house next door the snow has completely melted off. A likely reason for this is that Jones' house has better roof insulation than does Smith's.
 - D) An electronic fever thermometer works faster than a glass-and-mercury thermometer due to higher heat capacity of the measuring element of the electronic thermometer.
- 4) Which of the following is a WRONG statement? 4) _____
- A) In a thermos bottle the space between its two glass walls is evacuated to reduce the heat transfer due to both the thermal conductivity and convection.
 - B) For a good solar collector it is advantageous to have a good emissivity of the surface for the visible light.
 - C) In a thermos bottle the glass walls are aluminum coated to reduce the emissivity factor that appears in the Stefan-Boltzmann law
 - 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.

- 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 mol 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 running 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 composite rectangular solid has material 1 on the bottom and material 2 on the top. The temperature of the bottom is 346.0°C and the temperature of the top is 298.0°C . Material 1 has a thermal resistance of $.15\text{ K/W}$, and material 2 has a thermal resistance of $.40\text{ K/W}$. Find the heat-flow rate. Assume the thickness is small compared with the surface area, so heat loss at the edges can be neglected. 7) _____
- A) 1100 W B) -2,900 W C) -190 W D) -87 W
- 8) There are 5 mol of an ideal gas at an initial temperature of 240 K and pressure of 120 kPa. The pressure is increased to 360 kPa and the gas volume drops to half its initial value. What is the new temperature? 8) _____
- A) 60 K B) 360 K C) 1440 K D) 80 K

Answer Key

Testname: TEST2B

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