10-1A) What temperature gives the same reading in both the °C and °F scales?
(a) 0° (b) 100° (c) -40° (d) 20° (e) None of these.

10-2A) A comfortable room temperature is 68°F. About what is this temperature in °C and K?
(a) 20°C & 293 K (b) 65°C & 338 K (c) 56°C &329 K (d) 180°C & 453 K (e) None of these.

10-3A).Which one of the following statements is TRUE?
(a) Temperatures that differ by 20° on the Fahrenheit scale must differ by 45° on the Celsius Scale.
(b) 40 K corresponds to - 40°C.
(c) Temperatures that differ by 10° on the Celsius scale must differ by 50° on the Fahrenheit scale.
(d) 0°F corresponds to - 32°C.
(e) All four of the above statements are wrong.

10-4A) A bar of Copper (Cu) is 1.000 m long at 20°C. If the coefficient of linear expansion of Cu is $= 17\text{x } 10^{-6}\ (^{o}\text{C})^{-1}$, by about how much should the bar expand if it is heated to 220°C?
(a) 0.34 mm (b) 3.4 mm (c) 34 mm (d) 0.034 mm (e) None of these is close.

10-5A) If the volume of a gas is doubled, and its temperature halved, what is the ratio p_f/p_i of the final pressure to the initial pressure?
(a) 1/4 (b) 1/2 (c) 1 (d) 2 (e) 4

10-6A) One way to cool a gas is to let it expand. If a gas under 50 atm of pressure at 25°C expands to 15 times its volume by the time it reaches a final pressure of 1 atm, about what is its new temperature?
(a) 83°C (b) 0°C (c) – 89°C (d) –184°C (e) 8°C

10-7A) If you put twice as many molecules into a container of fixed volume, and then double the temperature of the container, what is the ratio p_f/p_i of the final pressure to the pressure before the extra molecules were added and the temperature increased?
(a) ¼ (b) ½ (c) 1 (d) 2 (e) 4.

10-8A) If you double the temperature of a gas what is the ratio of the new average speed of the molecules in the gas to their average speed at the original temperature?
(a) 1/2 (b) 2 (c) $\sqrt{2}$ (d) 1/4 (e) $1/\sqrt{2}$

10-9A) Two moles of a gas at standard temperature (0°C = 273K) and pressure (1 atm), represents how many molecules of the gas?
(a) 6×10^{23} (b) 12×10^{23} (c) 3×10^{23} (d) 9×10^{23} (e) 1×10^{23}

10-10A) Which one of the following is NOT an assumption made for the kinetic theory of gases?
(a) The number of molecules is small.
(b) The molecules obey Newton's laws of motion.
(c) For a gas of a given type of molecule, all molecules are assumed to be identical.
(d) Collisions between molecules are elastic.
(e) The average separation between molecules is large compared to the size of the molecule itself.

10-11A) Which one of the following statements is WRONG?
(a) The average speed of gas molecules in thermal equilibrium is greater than zero, but their average velocity is zero.
(b) If containers of helium (He) and neon (Ne) gas—m(Ne) > m(He) —are at the same temperature, the neon gas will have the higher average speed.
(c) The temperature of a gas is a measure of the average kinetic energy of its molecules.
(d) If you double the temperature of an ideal gas, but hold the number of moles and the volume constant, then you double its pressure.
(e) Equal volumes of all gases at the same temperature and pressure contain the same number of molecules.

10-12A) Which one of the following statements is WRONG?
(a) If two equal size, otherwise sealed rooms are connected through an open doorway, and the temperature in room B is kept lower than the temperature in room A, then at equilibrium room B will contain more air molecules than room A.
(b) If you double the temperature of a gas, then you increase by a factor of four the average speed of its molecules.
(c) If a container of gas is at rest, then the average velocity of the molecules it contains must be zero, but the average speed of the molecules is not zero.
(d) If you double the average speed of the molecules of a gas, and simultaneously double the volume of the container holding the gas, without increasing the number of gas molecules, then the pressure in the gas also doubles.
(e) If you double the average speed of the molecules in a gas, holding everything else that you can constant, then you increase the pressure in the gas by a factor of four.

10-13A) If the molecules in a tank of hydrogen (H) gas have the same rms speed as the molecules in a tank of oxygen (O) —m(O) > m(H) —then we may be sure that:
(a) the pressures in the two gases are the same.
(b) the hydrogen is at a higher temperature.
(c) The hydrogen is at a higher pressure.
(d) the temperatures in the two gases are the same.
(e) the oxygen is at the higher temperature.

10-1B) The temperature 100°C corresponds to about what temperature in °F?
(a) 180 (b) 212 (c) 158 (d) 238 (e) None of these.

10-2B) A temperature of -10°F corresponds to about what temperatures in °C and K?
(a) -23°C & 296 K (b) -38°C & 235 K (c) -38°C &311 K (d) -23°C & 250 K (e) None of these.

10-3B).Which one of the following statements is FALSE?
(a) Temperatures that differ by 20° on the Fahrenheit scale must differ by about 11° on the Celsius Scale.
(b) -40 K corresponds to - 40°C.
(c) Temperatures that differ by 10° on the Celsius scale must differ by 18° on the Fahrenheit scale.
(d) 0°C corresponds to 32°F.
(e) 293 K corresponds to 68°F.

10-4B) Assume that on a day when the temperature is 20°C, the Statue of Liberty is 93.000 m tall. If the statue is made of Cu ($\alpha = 17 \times 10^{-6}$ (°C)$^{-1}$) about what would be its height when the temperature is 35°C?
a) 92.764 m (b) 93.024 m (c) 95.460 m (d) 108 m (e) None of these is close.

10-5B) If you halve the volume of a gas, and double its temperature, what is the ratio p_f/p_i of the final pressure to the initial pressure?
(a) 1/4 (b) 1/2 (c) 1 (d) 2 (e) 4

10-6B) One way to cool a gas is to let it expand. If a gas under 40 atm of pressure at 21°C expands to 20 times its original volume by the time it reaches 1 atm of pressure, what is its new temperature?
(a) -126 K (b) 11 K (c) 147 K (d) –100K (e) None of these is close.

10-7B) If you double the volume of a gas, halve its pressure, and double the number of moles, then the ratio of the final temperature to the initial temperature is:
(a) ¼ (b) ½ (c) 1 (d) 2 (e) 4.
.

10-8B) If you halve the temperature of a gas, holding its volume constant, what is the ratio of the new average speed of the molecules in the gas to their average speed at the original temperature?
(a) $\sqrt{2}$ (b) 2 (c) 1/2 (d) $1/\sqrt{2}$ (e) 1/4

10-9B) Two moles of a gas at standard temperature (0°C = 273K) and pressure (1 atm) corresponds to how many liters of the gas?
(a) 67.2 (b) 11.2 (c) 89.6 (d) 44.8 (e) 22.4

10-10B) Which one of the following is NOT an assumption made for the kinetic theory of gases?
(a) The number of molecules is large.
(b) The molecules obey Newton's laws of motion.
(c) For a gas of a given type of molecule, all molecules are assumed to be identical.
(d) Collisions between molecules, and of molecules with the walls, are elastic.
(e) The average separation between molecules is comparable to the size of a molecule.

10-11B) Which one of the following statements is WRONG?
(a) The average speed of gas molecules in thermal equilibrium is greater than zero, but their average velocity is zero.
(b) If containers of helium (He) and neon (Ne) gas—m(Ne) > m(He)—are at the same temperature, the helium gas will have the higher average speed.
(c) The temperature of a gas is a measure of the average kinetic energy of its molecules.
(d) If you double the temperature of an ideal gas, holding the number of moles and the volume constant, then you double its pressure.
(e) Equal volumes of different gases at the same temperature and pressure will generally contain different numbers of molecules.

10-12B) Which one of the following statements is WRONG?
(a) If two equal size, otherwise sealed rooms are connected through an open doorway, and the temperature in room B is kept higher than the temperature in room A, then at equilibrium room B will contain more air molecules than room A.
(b) If you quadruple the temperature of a gas, then you increase by a factor of two the average speed of its molecules.
(c) If a container of gas is at rest, then the average velocity of the molecules it contains must be zero, but the average speed of the molecules is not zero.
(d) If you double the average speed of the molecules of a gas, and simultaneously double the volume of the container holding the gas, without increasing the number of gas molecules, then the pressure in the gas also doubles.
(e) If you double the average speed of the molecules in a gas, holding everything else that you can constant, then you increase the pressure in the gas by a factor of four.

10-13B) If the molecules in a tank of hydrogen (H) gas have the same rms speed as the molecules in a tank of oxygen (O) —m(O) > m(H) —then we may be sure that:
(a) the pressures in the two gases are the same.
(b) the oxygen is at the higher temperature.
(c) The hydrogen is at a higher pressure.
(d) the temperatures in the two gases are the same.
(e) the hydrogen is at the higher temperature.

10-1A) c 2A) a 3A) e 4A) b 5A) a 6A) d 7A) e 8A) c 9A) b 10A) a 11A) b 12A) b 13A) e

10-1B) b 2B) d 3B) b 4B) b 5B) e 6B) c 7B) b 8B) d 9B) d 10B) e 11B) e 12B) a 13B) b