Physics 212 Homework 4 Dr. Kotowich

Directions: Please complete all problems and show all details of your work. No work equals no credit.

1. a) If 1 mol of a gas in a container occupies a volume of 10 L at a pressure of 1 atm, what is the temperature of the gas in Kelvins?

b) The container is fitted with a piston so that the volume can change. When the gas is heated at constant pressure it expands to a volume of 20 L. What is the temperature in Kelvins?

c) The volume is fixed at 20 L and the gas is heated at constant volume until its temperature is 350 K. What is the pressure of the gas?

1. A room is 6 m by 5 m by 3m.
2. If the air pressure in the room is 1 atm and the temperature is 300 K, find the number of moles of air in the room.
3. If the temperature rises by 5 K and the pressure remains constant, how many moles of air leaves the room.
4. A car has 60 L steel gas tank filled to the top with gasoline when the temperature is 10 C. The coefficient of volume expansion of gasoline is B = 0.900 X 10-3 K-1. Taking the expansion of the steel tank into account how much gasoline spills out of the tank when the car is parked in the Sun and its temperature rises to 25 C?

(The linear coefficient of expansion for steel is 11 X 10-6 K-1 )

1. A 1 km steel railroad rail is fastened securely at both ends when the temperature is 20 C. As the temperature increases, the rail begins to buckle. When the temperature is 25 C how high is the buckle assuming it is triangular in shape?

(The linear coefficient of expansion for steel is 11 X 10-6 K-1 )