ANSWERS TO EVEN-NUMBERED CONCEPTUAL QUESTIONS

2. The pressure inside the balloon is greater than the ambient atmospheric pressure because the pressure inside must not only resist the external pressure, but also the force exerted by the elastic material of the balloon.

4. The lower temperature will make the power line decrease in length. This increases the tension in the line to the point that it is near breaking.

6. At high temperature and pressure, the steam inside exerts large forces on the pot and cover. Strong latches hold them together, but they would explode apart if you tried to open the hot cooker.

8. The measurements are too short. At 22°C the tape would read the width of the object accurately, but an increase in temperature causes the divisions ruled on the tape to be farther apart than they should be. This "too long" ruler will, then, measure objects to be shorter than they really are.

10. The existence of an atmosphere on a planet is due to the gravitational force holding the gas of the atmosphere to the planet. On a small planet, the gravitational force is very small, and the escape speed is correspondingly small. If a small planet starts its existence with atmosphere, the molecules of the gas will have a distribution of speeds, according to kinetic theory. Some of these molecules will have speeds higher than the escape speed of the planet and will leave the atmosphere. As the remaining atmosphere is warmed by radiation from the Sun, more molecules will attain speeds high enough to escape. As a result, the atmosphere bleeds off into space.

12. Doubling the volume while reducing the pressure by half results in no change in the quantity PV that appears in the ideal gas law equation. Consequently, the temperature and hence the internal energy remain the same.