Boyle’s Law Worksheet Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Match the variables used to describe gases to the correct unit.

\_\_\_\_\_1. kPa a. pressure

\_\_\_\_\_2. oC b. temperature

\_\_\_\_\_3. mL c. volume

\_\_\_\_\_4. K

\_\_\_\_\_5. mm Hg

\_\_\_\_\_6. atmospheres (atm)

\_\_\_\_\_7. L

\_\_\_\_\_8. m3

1. Write out the equation for Boyle’s Law:
2. I have added 15 L of air to a balloon at sea level (1.0 atm). If I take the balloon with me to Denver, where the air pressure is 0.85 atm, what will the new volume of the balloon be?
3. If I have 5.6 liters of gas in a piston at a pressure of 1.5 atm and compress the gas until its volume is 4.8 L, what will the new pressure inside the piston be?
4. In a thermonuclear device, the pressure of 0.050 liters of gas within the bomb casing reaches 4.0 x 106 atm. When the bomb casing is destroyed by the explosion, the gas is released into the atmosphere where it reaches a pressure of 1.00 atm. What is the volume of the gas after the explosion?
5. Synthetic diamonds can be manufactured at pressures of 6.00 x 104 atm. If we took 2.00 liters of gas at 1.00 atm and compressed it to a pressure of 6.00 x 104 atm, what would the volume of that gas be?
6. The highest pressure ever produced in a laboratory setting was about 2.0 x 106 atm. If we have a 1.0 x 10-5 liter sample of a gas at that pressure, then released the pressure until it is equal to 0.275 atm, what would the new volume of that gas be?
7. Atmospheric pressure on the peak of Mt. Everest can be as low as 150 mmHg, which is why climbers carry 10.0 liter tanks with an internal gas pressure of 3.04 x 104 mmHg, what will be the volume of the gas when it is released from the tanks?
8. Part of the reason that conventional explosives cause so much damage is that their detonation produces a strong shock wave that can knock things down. While using explosives to knock down a building, the shock wave can be so strong that 12 liters of gas will reach a pressure of 3.8 x 104 mmHg. When the shock wave passes and the gas returns to a pressure of 760 mmHg, what will the volume of that gas be?
9. Submarines need to be extremely strong to withstand the extremely high pressure of water pushing down on them. An experimental research submarine with a volume of 15,000 liters has an internal pressure of 1.2 atm. If the pressure of the ocean breaks the submarine forming a bubble with a pressure of 250 atm pushing on it, how big will that bubble be?
10. Divers get “the bends” if they come up too fast because gas in their blood expands, forming bubbles in their blood. If a diver has 0.05 L of gas in his blood under a pressure of 250 atm, then rises instantaneously to a depth where his blood has a pressure of 50.0 atm, what will the volume of gas in his blood be? Do you think this will harm the diver?