

## Combined Gas Law Worksheet

- 1) If I initially have 4.0 L of a gas at a pressure of 1.1 atm, what will the volume be if I increase the pressure to 3.4 atm?
  
  
  
  
  
  
  
  
  
  
- 2) A toy balloon has an internal pressure of 1.05 atm and a volume of 5.0 L. If the temperature where the balloon is released is 20<sup>0</sup> C, what will happen to the volume when the balloon rises to an altitude where the pressure is 0.65 atm and the temperature is -15<sup>0</sup> C?
  
  
  
  
  
  
  
  
  
  
- 3) A small research submarine with a volume of 1.2 x 10<sup>5</sup> L has an internal pressure of 1.0 atm and an internal temperature of 15<sup>0</sup> C. If the submarine descends to a depth where the pressure is 150 atm and the temperature is 3<sup>0</sup> C, what will the volume of the gas inside be if the hull of the submarine breaks?
  
  
  
  
  
  
  
  
  
  
- 4) People who are angry sometimes say that they feel as if they'll explode. If a calm person with a lung capacity of 3.5 liters and a body temperature of 36<sup>0</sup> C gets angry, what will the volume of the person's lungs be if their temperature rises to 39<sup>0</sup> C. Based on this, do you think it's likely they will explode?

## **Combined Gas Law Worksheet - Solutions**

- 1) If I initially have 4.0 L of a gas at a pressure of 1.1 atm, what will the volume be if I increase the pressure to 3.4 atm?

$$(1.1 \text{ atm})(4.0 \text{ L}) = (3.4 \text{ atm})(x \text{ L})$$
$$x = 1.29 \text{ L}$$

- 2) A toy balloon has an internal pressure of 1.05 atm and a volume of 5.0 L. If the temperature where the balloon is released is 20<sup>0</sup> C, what will happen to the volume when the balloon rises to an altitude where the pressure is 0.65 atm and the temperature is -15<sup>0</sup> C?

$$(1.05 \text{ atm})(5.0 \text{ L})/(293 \text{ K}) = (0.65 \text{ atm})(x \text{ L})/(258 \text{ K})$$
$$x = 7.11 \text{ L}$$

- 3) A small research submarine with a volume of 1.2 x 10<sup>5</sup> L has an internal pressure of 1.0 atm and an internal temperature of 15<sup>0</sup> C. If the submarine descends to a depth where the pressure is 150 atm and the temperature is 3<sup>0</sup> C, what will the volume of the gas inside be if the hull of the submarine breaks?

$$(1.0 \text{ atm})(1.2 \times 10^5 \text{ L})/(288 \text{ K}) = (150 \text{ atm})(x \text{ L})/(276 \text{ K})$$
$$x = 767 \text{ L}$$

- 4) People who are angry sometimes say that they feel as if they'll explode. If a calm person with a lung capacity of 3.5 liters and a body temperature of 36<sup>0</sup> C gets angry, what will the volume of the person's lungs be if their temperature rises to 39<sup>0</sup> C. Based on this, do you think it's likely they will explode?

$$(3.5 \text{ L})/(309 \text{ K}) = (x \text{ L})/(312 \text{ K})$$
$$x = 3.53 \text{ L}$$

**It seems unlikely that this very small increase in lung volume would cause somebody to explode, though you never know.**