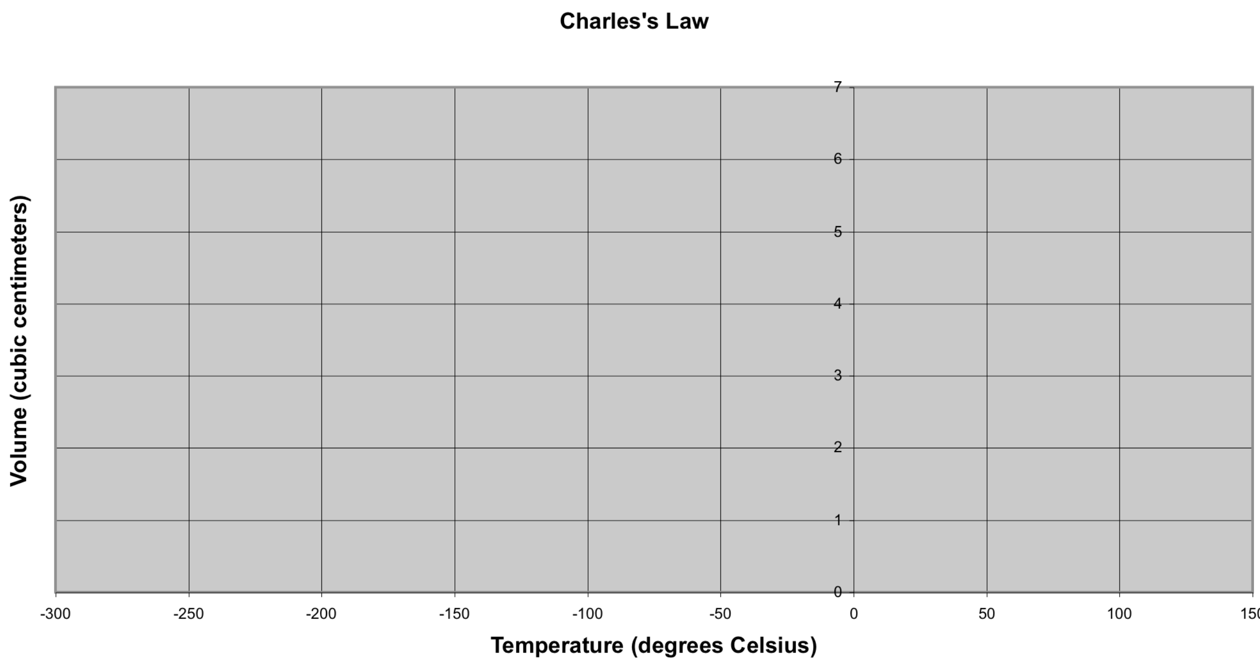
Lab: Charles's Law—Datasheet **Name**______________

The following activity was performed in a classroom lab:

- The plunger of a syringe, like the one used in the Boyle's Law Lab, was pulled out so that 5.0 cm^3 of air was confined.
- The syringe was then tightly capped so that the number of molecules of air confined could not change.
- Around the classroom, water baths at various temperatures were set up.
- The capped syringe containing 5.0 cm^3 of air was clamped into place in one of the water baths so that the capped bottom of the syringe pressed against the bottom of the beaker containing the water bath.
- A thermometer was placed in the water bath beside the capped syringe.
- Five minutes were allowed to pass so that the air in the syringe would equal the temperature of the water bath.
- The temperature of the water bath, and consequently the air inside the syringe, was recorded as well as the volume of trapped air.
- The process was repeated using the various water baths set up around the laboratory.
- Complete the chart below using the provided data.
- Graphing:
  - ➢ Make a graph of temperature <u>in degrees Celsius</u> vs. volume on the graph paper provided.
  - ➢ Using a dotted line, extend the best-fit line to determine what temperature is required to theoretically reduce the volume of air to 0 cm^3.

Temperature (°C)	Volume (cm^3)	Temperature (K)	V/T (cm^3/°C)	V/T (cm^3/K)
0.0°C	4.6			
20.0°C	5.0			
40.0°C	5.3			
80.0°C	6.0			
100.0°C	6.3			



Conclusions:

1. When a best-fit line is extended BEYOND plotted points, this is called EXTRAPOLATION. According to your graph, at what temperature would the volume of your gas equal 0 cm^3?

2. As the temperature of a gas increases, its volume (increases, decreases). This means that the volume of a gas is (inversely, directly) proportional to its temperature when the ______________ is held constant.

3. The law describing the relationship between volume and temperature of a gas is called ________________ law (look at the title of the lab). Mathematically, it can be stated V/T = k. Look at the last two columns of your data table. Which temperature scale must be used for this law?_____________

4. Look at your graph. At 20°C the volume of your gas would be _____cm^3. At 40°C the volume would be ______cm^3. The temperature has doubled. Has the volume doubled?_________ Explain this apparent contradiction to the law: