Name: _____ Period: Key Date: _____

State of Matter and Gas Laws Study Guide

Vocabulary

These are new terms that you are likely to see on the test. Briefly define each in your own words.

1. Pressure – Amount of force exerted on an object.
2. Temperature – Intensity of heat present in an object
3. Volume – Amount of space a substance occupies
4. Density- The mass per unit volume within a substance.
5. Direct relationship – Variable affect each other in the same direction.
6. Inverse relationship – Variable have an opposite affect on each other

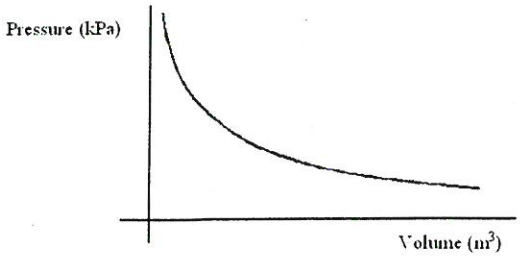
Critical Thinking

Be able to read, analyze, and give complete answers to questions like these.

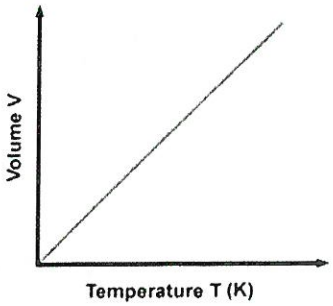
1. Explain, using this diagram, why the air inside of the balloon has more pressure than the air outside. The volume in the balloon is smaller, which increases the pressure within the balloon.

   a. Air tends to move from areas of high pressure to areas of low pressure.

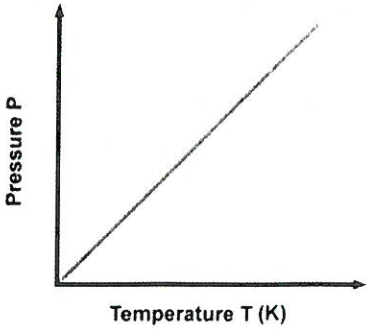
2. Identify the graph representing Boyle's law, Charles' law, and Gay-Lussac's Law.



Boyle's



Charle's



Gay-Lussac

Explain the relationship in the graph above	Explain the relationship in the graph above	Explain the relationship in the graph above
As P goes down, the volume increase. T is constent	As V goes up, so does the T. P is Constent	As P goes up, so does the T V is constent

3. Classify each of these relationships as direct or inverse.

Direct Pressure and temperature (Volume constant)

Direct Volume and temperature (Pressure constant)

Inverse Volume and pressure (T constant)

4. A metal aluminum can containing water is heated until the water boils. The can is then flipped upside-down into a container of ice water, causing it to crush. Why did it crush? Explain, using temperature, pressure, and volume.

As the temperature decrease from the ice water, the pressure decreases, causing it to crush in. Volume is constant.

5. A can containing a compressed liquid (e.g. hairspray) is thrown into a bonfire. Explain, using temperature, pressure, and volume, what will happen to it.

As the Temperature increases inside the hairspray, the pressure increase causing it to explode. Volume is constent.

6. You take an inflated balloon and sit on it, causing it to pop. Why did this happen? Which gas law does this demonstrate?

As the pressure increases from sitting on it, the volume decreases. The balloon cannot hold that much pressure, causing it to pop
* Boyle's Law.

7. Convert each of these temperatures to either Celsius or Kelvin. **Formula: <u>Kelvin = °Celsius + 273</u>**

Kelvin	**Celsius**
0K (Absolute zero)	-273°C
273 K	0°C (Standard Temperature)
298 K	25°C (Room Temperature)
369 K	96°C (Human body temperature)

1. Boyle's law describes the relationship between
   (a.) Volume and pressure
   b. Temperature and pressure
   c. Temperature and volume
   d. All of the above

2. Charles's law describes the relationship between
   a. Volume and pressure
   b. Temperature and pressure
   (c) Temperature and volume
   d. All of the above

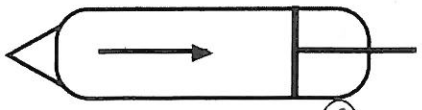
3. Boyle: If pressure ↓ …then volume goes up.

4. Charles: If temperature ↑ … then volume goes up

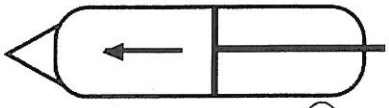
Below are 4 examples of Boyle's law using a syringe, air or a marshmallow. Provide the possible effects.

Boyle's Law

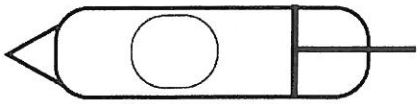
states that as the volume of a gas changes, so does its pressure.



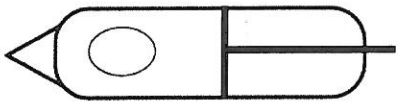
If the volume of a gas (↑), then the pressure (↓).



If the volume of a gas (↓), then the pressure (↑).



Air inside the syringe is under ↓ pressure, causing the marshmallow to ↑.

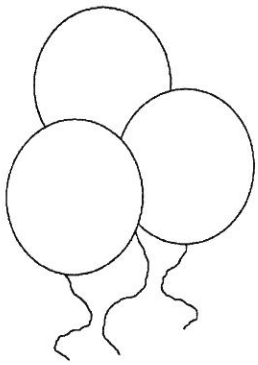


Air inside the syringe is under ↑ pressure, causing the marshmallow to ↓.

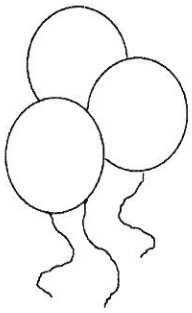
Below are 2 examples of Charles' law using balloons. Provide the possible effects.

Charles' Law

states that as the temperature of a gas changes, so does its volume.



If the temperature of a gas (↑), then the volume (↑).



If the temperature of a gas (↓), then the volume (↓).

Part 2

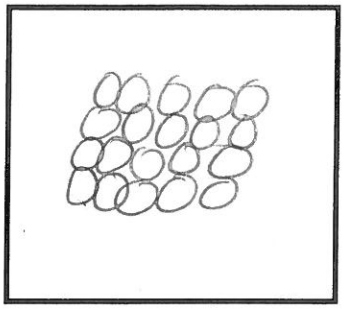
1. List the four states of matter:

solid, liquid, gas, plasma

2. If a substance changes form one phase to another, is it still the same substance? (YES) NO

3. Are the atoms in a solid allowed to move around much? YES (NO)

4. In the box to the right, draw what the atoms in a solid look like.



5. One characteristic of a liquid is that it fills up the container it goes into.

. Atoms in a liquid have higher energy than atoms in a solid, so the easiest way to change a solid to a liquid is to add heat. When changing from a solid to a liquid, there is a magic temperature for every substance called the specific heat.

7. Gases are really fast and the atoms and molecules are full of energy, bouncing around constantly.

8. One of the physical characteristics is that a gas can move around at random.

9. Use the chart to identify the state of matter described by the following. Many of these have more than one answer! (Use S, L, G or P in the spaces.)

S not easily compressible
S rigid – particles locked into place
L flows easily
G compressible
S conducts electricity
G lots of free space between particles
S does not flow easily
L assumes the shape of the part of the container which it occupies

P electrons and protons
G particles can move past one another
P lightning, fire, stars
S retains a fixed volume and shape
L assumes the shape and volume of its container
S little free space between particles
P most abundant phase

Directions: Complete the table below describing the various types of phase change.

Vocabulary Word	Change from _____to _____	Explain particle movement and kinetic energy during this phase change.
Freezing	L to S	Fast to slow movement High to low energy
Melting	S to L	Slow to fast movement Low to higher energy
Boiling	L to G	slower to fast movement Low to high energy
Condensation	G to L	Fast to slower movement High to low energy
Sublimation	S to G	Slow to very fast movement Very low to very high energy
Deposition	G to S	Very fast to very slow movement Very high to very low energy
Ionization	G to P	Fast to very fast movement High to very high energy