**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_**

**Physical Science Chapter 3 Guided Notes**

**States of Matter**

*Kinetic Molecular Theory*

* All matter is made up of \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ that act like particles
* Particles of matter are \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in \_\_\_\_\_\_\_\_\_\_\_\_\_
* The kinetic energy (\_\_\_\_\_\_\_\_\_\_\_\_\_) of these particles \_\_\_\_\_\_\_\_\_\_\_\_\_\_ as temperature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Four States of Matter*

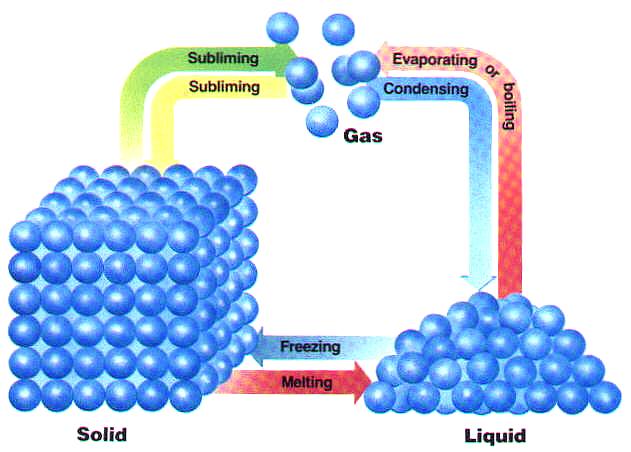
* \_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_ kinetic energy- particles \_\_\_\_\_\_\_\_\_\_\_ but \_\_\_\_\_\_\_\_ move around
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:repeating geometric pattern
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: no pattern (e.g. glass or wax)
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_ kinetic energy than solids, particles can move around but are still \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_ kinetic energy-particles can \_\_\_\_\_\_\_\_\_\_ and move \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ container
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kinetic energy-particles \_\_\_\_\_\_\_\_\_\_\_ with enough \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to break into charged particles (+ and –)
  + \_\_\_\_\_\_\_\_-like, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Conduct \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Ex: stars, fluorescent light bulbs, TV tubs

*Thermal Expansion*

* Most matter \_\_\_\_\_\_\_\_\_\_\_\_ when \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_ when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Total \_\_\_\_\_\_\_\_\_\_\_\_ energy = total \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy
* \_\_\_\_\_\_\_\_\_\_\_ temperature causes \_\_\_\_\_\_\_\_\_\_\_\_\_\_ kinetic energy
  + Particles collide with more \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Thermal energy also depends on \_\_\_\_\_\_\_\_\_\_ of particles in substance

*Phase Changes*

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(boiling): \_\_\_\_\_\_\_\_\_\_\_to \_\_\_\_\_\_\_\_\_ at the boiling point
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: \_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ the boiling point
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: \_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: \_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_



*Conservation of Mass and Energy*

* When water boils, the number of molecules \_\_\_\_\_\_\_\_\_\_\_\_\_\_ even as the liquid loses volume. The mass of the \_\_\_\_\_\_\_\_\_\_ is the same of the mass of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Mass \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, it can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Fluids*

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_= states of matter than have the ability to \_\_\_\_\_\_\_\_ (ones \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are fluids

*Fluids and Pressure*

* Fluids exert pressure \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in \_\_\_\_\_\_\_\_\_ directions
* Pressure is the amount of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ per unit \_\_\_\_\_\_\_\_\_\_\_\_\_
  + Pressure= Force ÷ Area
  + SI Unit= Pascal

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

* Force of a fluid that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on an \_\_\_\_\_\_\_\_\_\_\_\_\_
* Makes the object seem \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Why most of your toys didn’t sink in the bathtub
* Buoyancy: the ability of a fluid to exert an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on an object \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in it

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Principle*

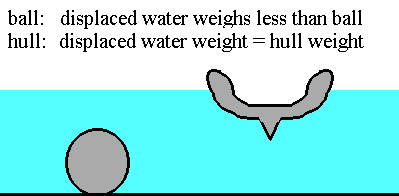
* There are 2 ways object can float:

1. If the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ force of an object is \_\_\_\_\_\_\_\_\_ to the \_\_\_\_\_\_\_\_ of the fluid displaced by the object
2. If the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the object is \_\_\_\_\_\_\_\_\_ than the density of the liquid

* Density of water is \_\_\_\_\_\_\_\_\_\_\_\_\_\_; Will gasoline (density=0.7 g/mL) float or sink in water? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Archimedes found that the buoyant force \_\_\_\_\_\_\_\_\_ the weight of the fluid displaced by an object
* In other words, the weight of the \_\_\_\_\_\_\_\_\_\_ has been \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Why do Ships float?*

* If the weight of the \_\_\_\_\_\_\_\_\_\_displaced is \_\_\_\_\_\_\_\_ than the weight of the \_\_\_\_\_\_\_\_\_\_, the object will \_\_\_\_\_\_\_\_\_\_\_\_
* Otherwise, the object will \_\_\_\_\_\_\_\_\_
* Archimedes’ Principle explains why steel ships float. Steel is more dense than water, so why do ships float?



Example: An object weighs 20N. It displaces a volume that weighs 15N. What is the buoyant force on the object? Will it float or will it sink?

Buoyant force=weight of water displaced

Buoyant force=\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Object will \_\_\_\_\_\_\_\_\_\_\_\_ because its weight is \_\_\_\_\_\_\_\_\_\_\_\_\_\_than the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ acting on it

*Pascal’s Principle*

* The \_\_\_\_\_\_\_\_\_\_\_\_\_ applied to a fluid is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the fluid
* Example: when you squeeze one end of the toothpaste, toothpaste emerges from the other end.
* \_\_\_\_\_\_\_\_\_\_\_\_\_: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a fluid to \_\_\_\_\_\_\_\_\_\_
  + Water vs. syrup
* What happens to viscosity if you increase temperature?
* Water has a \_\_\_\_\_\_\_ viscosity, it can flow \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Syrup has \_\_\_\_\_\_\_\_ viscosity; it flows \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ affects the viscosity of a fluid:
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ items flow faster
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_items flow slower

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ principle*

* As the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(speed) of a fluid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the pressure exerted by the fluid \_\_\_\_\_\_\_\_\_\_\_\_\_
* Example: airplanes, birds, Frisbees

*Gases*

* Properties of Gases
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Gas particles move \_\_\_\_\_\_\_\_\_\_\_ in \_\_\_\_\_\_\_\_\_ directions
  + Gas molecules are in \_\_\_\_\_\_\_\_\_\_\_\_\_ motion and frequently \_\_\_\_\_\_\_\_\_ with one another and their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Gases have a very \_\_\_\_\_\_\_\_\_\_\_\_\_ because particles are so \_\_\_\_\_ apart
  + Gases are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Gases \_\_\_\_\_\_\_\_\_\_\_out and easily \_\_\_\_\_\_\_\_\_ with one another
  + Gases are mostly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Gases exert \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on their containers
* Gases will try to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_when ever possible

*Gas Laws*

* For temperature values with gas laws, we have to use \_\_\_\_\_\_\_\_ instead of degrees Celsius

0°C=\_\_\_\_\_\_\_\_\_\_\_\_\_K

* Example: Find the temperature in units of Kelvin if it is at 25°C

*\_\_\_\_\_\_\_\_\_\_\_\_\_Law*

* Relates \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* For a fixed amount of gas at constant \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, volume \_\_\_\_\_\_\_\_\_\_ as pressure \_\_\_\_\_\_\_\_\_\_\_\_\_
* As volume \_\_\_\_\_\_\_\_\_\_\_, pressure \_\_\_\_\_\_\_\_\_\_\_
* Inversely related



*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Law*

* Relates \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* For a fixed amount of gas at constant \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, volume \_\_\_\_\_\_\_\_\_\_\_\_ as temperature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* As volume \_\_\_\_\_\_\_\_\_\_\_, temperature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Directly related



*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Law*

* Relates \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* For a fixed amount of gas at constant \_\_\_\_\_\_\_\_\_\_\_\_\_\_, pressure \_\_\_\_\_\_\_\_\_\_\_\_ as temperature \_\_\_\_\_\_\_\_\_\_\_\_
* As temperature \_\_\_\_\_\_\_\_\_\_\_\_, pressure \_\_\_\_\_\_\_\_\_\_\_\_\_



* Example #1: A gas occupies 100 mL at 150 kPa. Find its volume at 200 kPa
  + Given:

V1=

P1=

V2=

P2=

* + Work:
* Example #2: A gas occupies 475 cm3 at 36°C. Find its volume at 94°C. Remember to change to Kelvin
  + Given:

V1=

T1=

V2=

T2=

* + Work:
* Example #3: A gas pressure is 765 torr at 23°C. At what temperature willt he pressure be 560 torr?
  + Given:

P1=

T1=

P2=

T2=

* + Work: