**WEATHER & CLIMATE**

Ch. 1 Sect. 1 – “The Atmosphere”

**Characteristics of the Atmosphere (Intro.)**

* Earth – surrounded by a mixture of gases.  
  + Contains oxygen we need
  + Protects us from Sun
  + Atmosphere is always changing
  + Everything WE do, affects the make-up of the atmosphere

**The Composition of the Atmosphere**

* 78% Nitrogen
* 21% Oxygen **[**made by phytoplankton and other plants**]**
* 1% Other Gases **[**Argon, CO2, tiny particles, & water **\*]**
* Water is in atmosphere in different states:  
  + LIQUID – droplets
  + SOLID – snow & ice crystals
  + **\*** GAS – invisible gas called “water vapor” **(most H2O in atmosphere)**

**Atmospheric Pressure and Temperature**

* We carry a load equivalent to a column of air 700 km high every day
* Even though air is light, a square inch at sea level is under 15 POUNDS of air  
  + (similar to carrying large bowling ball in tip of finger)

**As Altitude Increases, Air Pressure Decreases**

* Gravity pulls the atmosphere (air molecules) toward Earth
* Air pressure = measure of force that air molecules push on a surface
* When you’re on Earth, more molecules are above you so air pressure is stronger than if you’re in space. (e.g. people on bottom of human pyramid have more pressure)  
  + As altitude ….. air pressure   
      
    *(altitude & air pressure are inversely related)*

**Atmospheric Composition Affects Air Temperature**

* Some parts of atmosphere have more gases that absorb solar energy = warmer temp.
* Some parts of atmosphere have less gases that absorb solar energy = cooler temp.

**Layers of the Atmosphere**

* Because of temperature differences, there are 4 separate layers of atmosphere  
  + Sphere = ball
  + Tropo = turning / change
  + Strato = layer
  + Meso = middle
  + Thermo = heat

**The Troposphere: The Layer in Which We Live**

* Layer next to Earth’s surface
* Densest – contains almost 90% of atmosphere’s TOTAL MASS
* Almost all CO2, water vapor, clouds, air pollution, weather, & life are here  
  + Temperature varies *(altitude & temperature are inversely related)*
* Gases in this layer mix continuously

**The Stratosphere: Home of the Ozone Layer**

* Gases are layered and don’t mix like they do in the troposphere
* Air is thin and has little moisture
* OZONE LAYER in stratosphere (near top) = protects us from sun’s harmful UV radiation   
  + Because ozone is at top of layer & absorbs UV radiation …   
     *temperature as altitude*

**The Mesosphere: The Middle Layer**

* Coldest layer
* Altitude and temperature are inversely related (like in troposphere)

**The Thermosphere: The Edge of the Atmosphere**

* Top atmospheric layer
* Temperature as altitude (like in stratosphere)  
  + **Temperature** = measure of average energy of particles in motion
  + **Heat** = TRANSFER of thermal energy between objects of different temps.

Even though there are extreme temperatures (1,000oC +) in the thermosphere because the particles there are moving very fast, you cannot ***feel*** heat because there are so few particles (low density) to collide with or touch each other. ***(See definitions above)***

**The Ionosphere: Home of the Auroras**

* Gas particles in upper mesosphere and lower thermosphere absorb harmful solar energy and become electrically charged = ***IONS****.*
* The ions in the thermosphere *(layer is called “IONOSPHERE”)* radiate energy as shimmering lights = ***AURORAS*** (known as northern or southern lights)
* Ionosphere also reflects AM radio waves causing them to bounce off this layer and go back to Earth.

