February 9, 2020

6th Atmosphere Quiz Review

*Composition of Earth's atmosphere*

* Nitrogen: 78%
* Oxygen: 21%
* Argon, water vapor, carbon dioxide

*Layers of the atmosphere*

The atmosphere is divided into layers based on temperature differences

**Troposphere** – closest layer to Earth’s surface

* Weather events occur here
* Contains around 80% of the air in our atmosphere

**Stratosphere** – layer above the troposphere

* Most long distance air travel occurs here to avoid bad weather and turbulence
* Contains the ozone layer
	+ **Ozone layer**: area where most of the ozone (O3) in our atmosphere resides
		- The ozone layer protects us by absorbing most of the sun's harmful UV radiation

**Mesosphere** – layer above the stratosphere

* Where most meteors that enter our atmosphere burn up

**Thermosphere** – layer above the mesosphere

* Large distances between single molecules
* One molecule would need to travel about one kilometer to hit another molecule
* Can reach 2700 degrees Fahrenheit

**Exosphere** – farthest layer from Earth

* Thinnest layer (fewest air molecules)
* Blends into outer space

*Heating and cooling of Earth*

* Heat and energy (radiation) from the sun enter Earth’s atmosphere
	+ Around 30% of this radiation is reflected back into space
* Solar radiation heats Earth’s surface
* Earth absorbs heat from the sun and radiates it back through the atmosphere into space

*Greenhouse effect + climate change*

* **Definition: gases in the atmosphere trap heat rising from Earth's surface and increase the temperature of the atmosphere**
* The greenhouse effect helps to heat Earth and keep us alive
* BUT, the greenhouse effect contributes to climate change **when excessive (too much) amounts of gases that trap heat are released into the atmosphere**
	+ Examples of “greenhouse gases” include: carbon dioxide, methane, and water vapor

*Effects of climate change*

* Increases in sea, land, and air temperatures
* Decreases in glaciers, snow cover, and sea ice (like ice in the North Pole and Antarctica)
* Sea level rise

*Charles's Law*

* **As temperature increases, volume increases**
	+ As temperature decreases, volume decreases
	+ In the experiment we did using the flask and the balloon, we saw that when we put the flask into hot water, the balloon began to expand
	+ The air in the flask was heated and caused the balloon to expand, showing how an increase in temperature causes an increase in volume

*Temperature and density*

* **As temperature increases, density decreases**
	+ **Hot air rises and cool air sinks** because warm air is less dense than cool air



*Convection currents*

* Hot air on Earth’s surface rises into the atmosphere
	+ (Hot air is less dense than cool air)
* This air then cools and sinks back down to Earth's surface
* As the air heats up again, it begins to rise back into the atmosphere → this creates a cycle of air that is heating, rising, cooling, sinking, heating, and rising again
* This is a “convection current system”

*Coriolis Effect*

* The Earth’s rotation causes one large convection current system to split into six smaller convection current systems



*Atmospheric pressure*

* The weight of air molecules presses down on Earth's surface, producing pressure
* Gravity causes the air molecules to press down on Earth
* *Without air molecules or gravity, there can be no atmospheric pressure*
* **Barometers** measure pressure
* **P = F/A**
	+ **P** = atmospheric pressure
	+ **F** = the force of the air molecules
	+ **A** = area

*Convection currents and atmospheric pressure*

* **As temperature increases, pressure decreases**
* **Warm air rising** into the atmosphere creates a **low pressure** zone beneath it
	+ The air molecules are not pressing down on Earth anymore
	+ Warm air molecules act against gravity due to increased kinetic energy
* **Cool air sinking** down onto Earth's surface creates a **high pressure** zone beneath it
	+ The air molecules are pressing down with greater force on Earth
* In the pictures above, you can see that the low pressure zones (where the **L**'s are) are where the hot air is rising, and the high pressure zones (where the **H**'s are) are where the cold air is sinking
* Convection systems create high and low pressure zones