Atmosphere

- What is the Atmosphere?
  - What is it made of?
  - Does it help or hurt us?

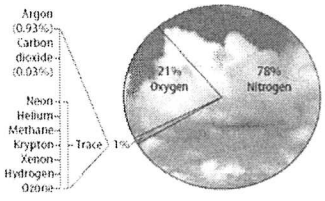
https://www.youtube.com/watch?v=I6jIMkPwahQ

Atmosphere

- A mixture of gases that surrounds Earth
  - Often referred to as "air".
  - Made up of several different gases and contains solids and liquids
  - Made up of 5 layers
  - Protects living things from the sun's rays
  - Keeps Earth warm enough for life to exist

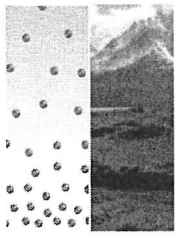
Atmosphere

- ***Atmospheric Gases***: 78% nitrogen, 21% oxygen and 1% other gases
- ***Particles:*** dust, volcanic ash, sea salt, smoke, skin, bacteria, pollen
- ***Water:*** mostly water vapor, but some is water droplets and snow or ice crystals.



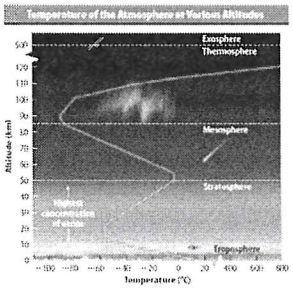
Air Pressure

- Atmosphere is held around Earth by gravity.
- This is because the gravity pulls down on particles/molecules, causing air pressure→ measure of the force with which particles in the air push on an area of a surface.
- There are less and less molecules as you go higher into the atmosphere.
- The higher you go up in the atmosphere, the lower the pressure. As air pressure decreases it becomes harder for organisms to breathe.



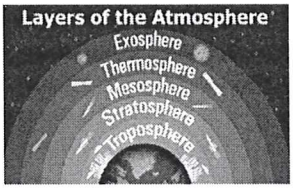
Air Pressure

- Temperature in the Atmospheric layers:
  - The five layers have been divided mainly based on their differences in temperature.
  - As altitude increases, air temperature changes.
    - Some parts are warmer due to a high percentage of gases that absorb solar energy
    - Other parts contain less of these gases and are cooler.
    - Layers of Atmosphere 5 E's activity



Atmosphere

- Five Layers (in order from the earth to space):
  1. Troposphere
  2. Stratosphere
  3. Mesosphere
  4. Thermosphere
  5. Exosphere



https://www.brainpop.com/science/earthsystem/earthsatmosphere/

Atmosphere

- **Troposphere**:
  - Where we are!
  - Rain, snow, and clouds occur in this layer.
  - Lowest layer extends up about 10-12 Kilometers.
  - Provides oxygen that most organisms need
  - 90% of the atmosphere's total mass
  - Closer to Earth's surface = greater gravity = denser air
  - Temperature is greater due to the sun warming the land and water which then warms the air above.

Atmosphere

- **Stratosphere:**
  - Layer above the troposphere
  - Extends from 12 Kilometers out to 50 Kilometers
  - Few clouds because this layer contains little water vapor
  - Airplanes will fly here
  - Area located between 15 km and 40 km contains higher levels of gas (ozone) and is called the Ozone Layer→ protects Earth by absorbing large amounts of harmful UV light from the sun.
  - We will learn more about the ozone in another section ☺

Atmosphere

- **Mesosphere**:
  - Layer above the stratosphere. It extends from 50Km to 85Km.
  - Temperature decreases as altitude increases
    - Lower areas warmed by stratosphere but top is coldest part of the atmosphere
  - Meteors burn up in this layer. You also know them as "Shooting stars"!
  - Layer is difficult to study because it is higher than aircraft can fly and lower than satellites can orbit.

Atmosphere

- **Thermosphere:**
  - Named for its high temperatures.
  - The thickest atmospheric layer; it extends from 80 km to 500 km above Earths surface.

Atmosphere

- Small side note!!..
  - Within the mesosphere and the thermosphere layers there is a layer of electronically charged particles called the Ionosphere. This ionosphere allows radio signal to travel across the country . The northern lights (aurora borealis) are also in this layer.

Atmosphere

- **Exosphere:**
  - The outermost layer of our atmosphere.
  - Beyond this layer there is just space. Space shuttles and satellites end up here.
  - Very few molecules located in this layer.

https://www.youtube.com/watch?v=2JC3wmtlqks

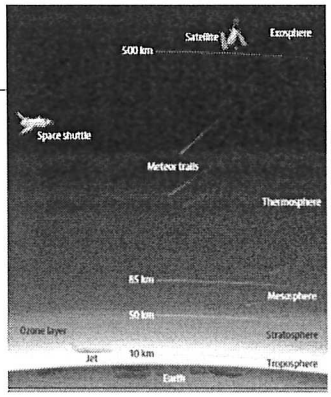
Warm-up

- On your white board…
  - Identify the 5 layers of our atmosphere in order from the Earth.
  - Tell me something special about each layer.

  https://www.youtube.com/watch?v=dQPyNY2WIdw

Atmosphere

- The big picture:



Warm-up: Atmosphere

- While hiking in the mountains, you notice that it is harder to breathe as you climb higher. Explain why this happens.

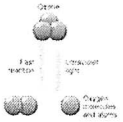
- State some effects of a thinning ozone layer.

Why is the Atmosphere Important?

- https://youtu.be/w-9pDALvMF4 :6:23-8:00ish
- Provides Gases Organisms Need
  - Contains oxygen and carbon dioxide living things need to survive
- Keeps Earth Warm
  - **Greenhouse Effect**→ certain gases in the atmosphere, such as water vapor and carbon dioxide, absorb and reradiate thermal energy
  - Acts like a warm blanket that insulates Earth, preventing the sun's energy from being lost.
- Absorbs Harmful Radiation
  - The Ozone Layer!!!
  - Within the Stratosphere layer
  - Made of Oxygen
    - Oxygen we breathe is made of two oxygen atoms bonded together: O_2
    - An Ozone molecule is made up of THREE oxygen atoms bonded together and protects us from extremely harmful ultraviolet radiation which can cause skin cancer.

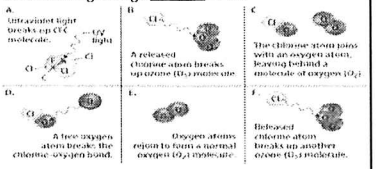
Humans Affecting the Atmosphere

- Pollution
  - Vehicle exhaust, ground-level ozone, smog, acid precipitation, burning fossil fuels (increasing greenhouse effect = global warming)
- The Ozone Layer
  - When an ozone molecule (O3) absorbs UV light it breaks down into an oxygen (O2) molecule and an oxygen (O) atom.
    - Normally the oxygen atom combines with other oxygen atoms or molecules and produces ozone again.
    - Process of breaking down and building back up ozone occurs at a constant rate and protects us from the sun.



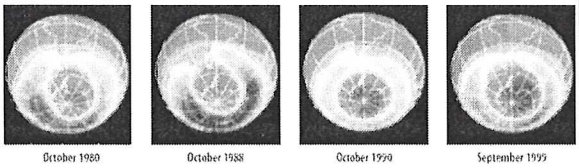
Humans Affecting the Atmosphere

- Harmful pollutants can also break down ozone molecules.
- (CFCs)**Chlorofluorocarbons:** compounds used in some refrigerators, air conditioners, and aerosol sprays, and many foam packaging.
  - Causes the ozone molecule (O3) to break down much faster. Depleting the Ozone!!! Causing a large "Hole" in our protective Ozone.



Atmosphere

- Ozone hole over time.. ☹



Short clip about ozone layer:
http://video.nationalgeographic.com/video/news/environment-news/antarctica-ozone-vin/
https://youtu.be/Sv7OHfpIRfU