

Name: \_\_\_\_\_ Unit 3: Weather, Climate & The Atmosphere

NOTES: 3.01

**FOCUS:** Layers of the Atmosphere

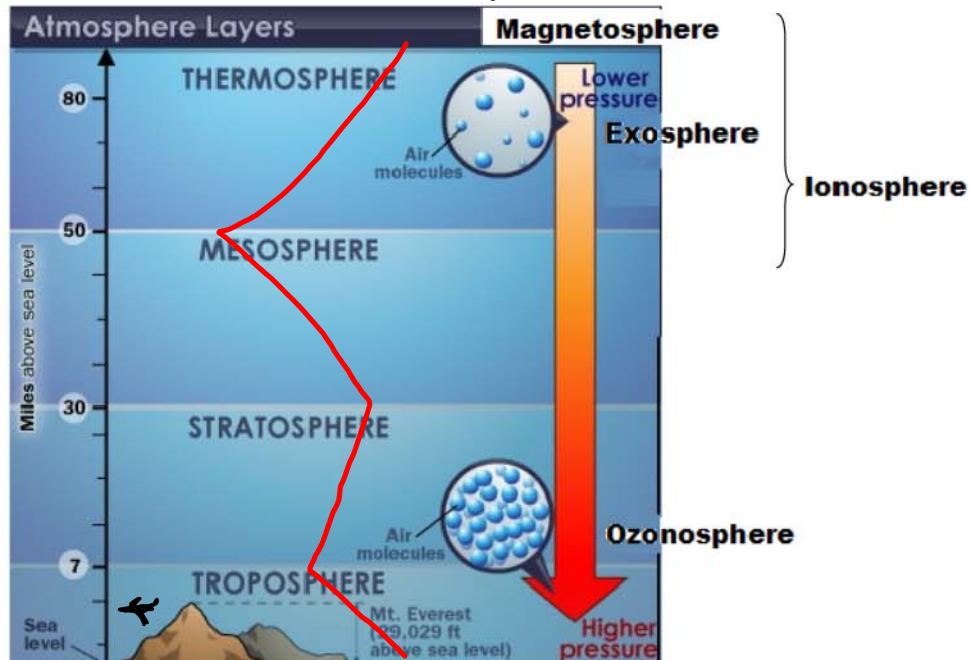
**ESSENTIAL QUESTION:** Can you name the layers of the atmosphere? How do the layers of the atmosphere change as you move further from Earth’s surface?

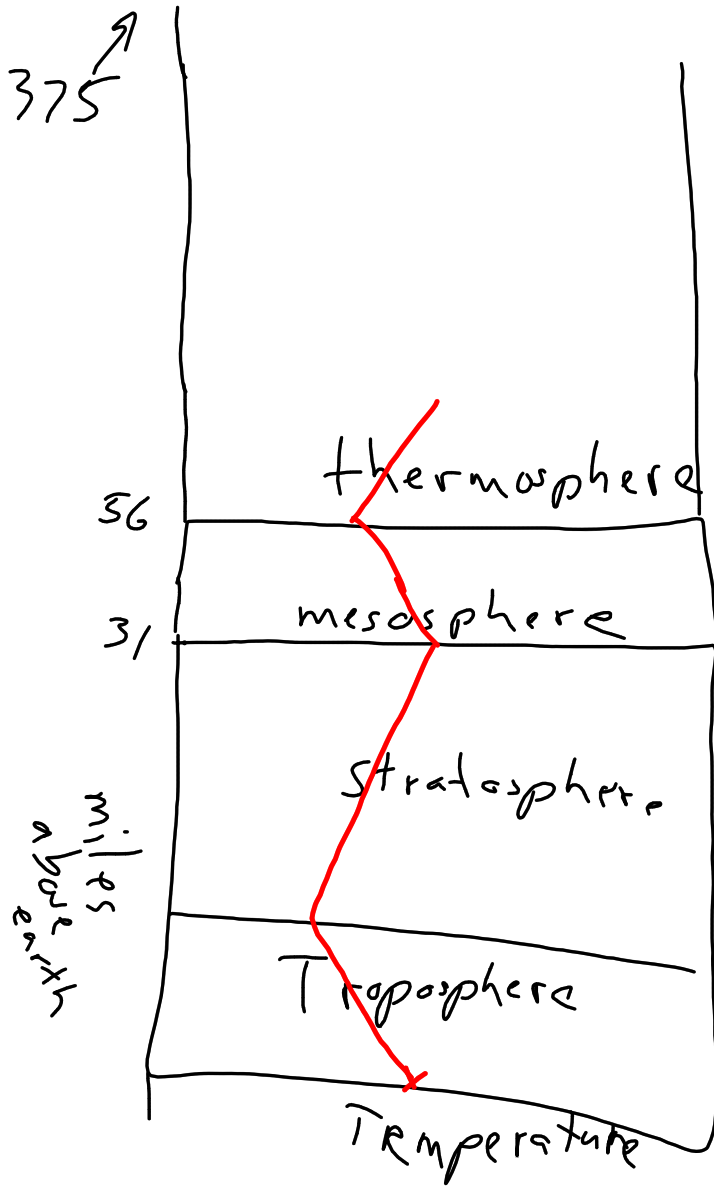
What is the atmosphere?

- The atmosphere is... The envelope of gases that surrounds the Earth
- Earth’s atmosphere is made up of:
  - 78% Nitrogen
  - 21% Oxygen
  - 1% Other gases (including carbon dioxide, argon, neon, helium, hydrogen, ozone, water vapor, and methane)

Layers of the Atmosphere

- The characteristics of the atmosphere change as distance increases from Earth’s surface toward outer space.
  - This creates 4 distinct major layers and 4 minor layers.



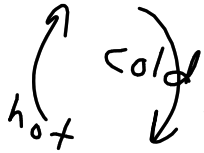
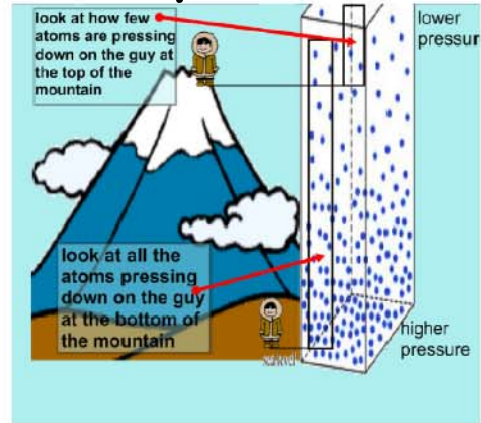


The Major Layers

→ Troposphere: First 6 - 20 km (4 -12 miles) above Earth's surface

52,800 ft  
30,000 ft - airplanes

- The layer we live in.
- Thickest at the Equator and thinnest at the poles.
- Closer to Earth (lower elevation) = higher pressure, greater density air, warmer temperatures
- Higher in the sky (higher elevation) = lower pressure, lower density air (AKA - "thin air"), colder temperatures

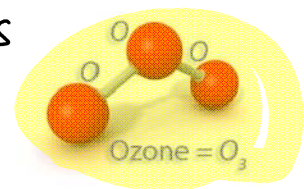


○ The layer in which almost all weather occurs.

→ Convection Currents drive the processes of cloud formation, weather, and the water cycle.

• Stratosphere: From the top of the troposphere to 50 km (31 miles) above Earth.

- Ozone (O<sub>3</sub>) forms in this layer as UV rays strike oxygen molecules.
- Ozone molecules collect to form the Ozone layer
- Ozone formation produces heat, causing temperature to increase with elevation in the stratosphere.



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○ Flat-topped

rain

Cumulonimbus clouds form at

the boundary of the Troposphere and Stratosphere since the flip-flopped

temperatures in the stratosphere prevent convection (cyclical air movement).

• Mesosphere: 50km to 90km (31 – 56 miles) above Earth

○ As elevation increases, air continues to get thinner.

○ As elevation increases (further from the ozone layer), temperatures get colder.

○ Protects us by burning up meteorites heading toward Earth.



• Thermosphere: 90km to 600km (56 – 375 miles) above Earth

○ Also known as the upper atmosphere.

○ The extremely thin air quickly absorbs UV and X-ray radiation, causing a rapid increase in temperature.

○ Air molecules can be more than 1 Km apart.

○ Location of the International Space Station

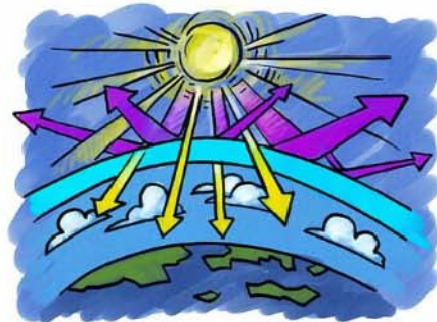


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**The Minor Layers**

- Ozonosphere (Ozone Layer)
  - The highest concentration of O<sub>3</sub> molecules is in this layer.
  - Blocks most of the harmful ultraviolet rays from the sun.



• Ionosphere:

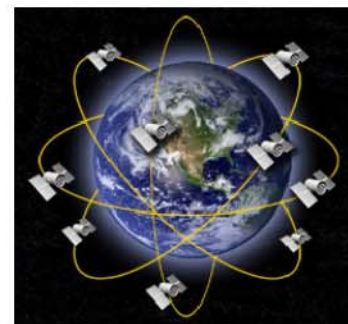


- The layer of the Thermosphere that is made up of ionized gas particles (particles that have lost or gained electrons).

- Important in transmitting shortwave radio signals signals.

• Exosphere:

- Outer layer of the thermosphere.
- Where atoms and molecules escape into space.
- Satellites (GPS, satellite radio, TV, ~~weather~~, military) orbit the earth.



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- Magnetosphere:
  - Outermost portion of the ionosphere
  - Reacts with solar radiation to produce the Northern Lights (Aurora Borealis). (Aurora Australis) ← Southern Light
  - The magnetic field around Earth produced by Earth's iron-nickel core.

