

Atmospheric Processes

Atmosphere: Pressure, Density, and Temperature

Pressure

- **Air pressure** is the force of air weighing down over a unit of area, and it is felt in all directions.
- The higher the distance above sea level, or **altitude**, the lower the pressure and density

Study Tip

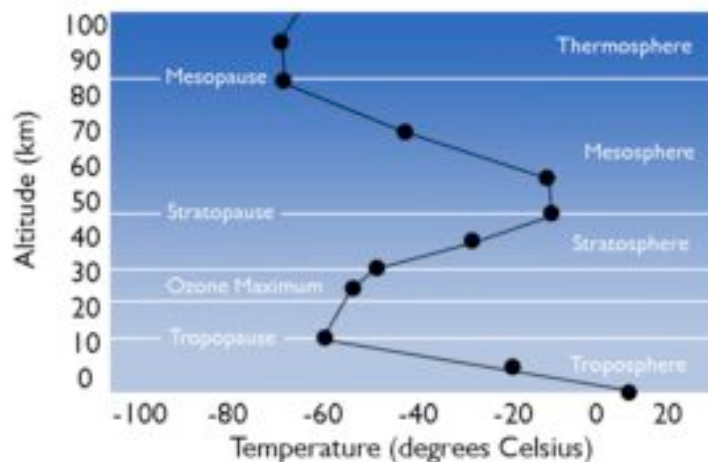
Remember that altitude dictates the changes for pressure, density, and temperature.

Density

- Air density is the number of air molecules in a given volume. It's lower at higher altitudes because there is less gravitational pull of gas molecules towards Earth's center at higher altitudes.

Temperature

- A change in temperature with distance is called a **temperature gradient**. The atmosphere's different layers are characterized by their different temperature gradients.
- Unlike pressure and density, changes in air temperature vary between layers of the atmosphere
- The temperature gradient in each layer is based on the heat source of the layer



Notice the differing altitudes and temperature changes for each layer in the atmosphere.

Why Warm Air Rises

- Cooler gas molecules don't take up as much space; therefore air density and pressure are higher because there are more molecules in less space. Warmer gas molecules take up more space because they move faster; therefore air density and pressure are lower because there are fewer molecules in the same amount of space. This is why warm air rises because it is more buoyant than cool air.

Concept Check

- What is air pressure? Air density? A temperature gradient?
- Why does warm air rise?
- Where in the atmosphere is air pressure and density generally lower? Higher?