Aerodynamics : is the study of object in motion through the air and the force that produce or change such motion.

Air properties affect the control and performance of an aircraft.

Air is a fluid composed mostly of nitrogen and oxygen.

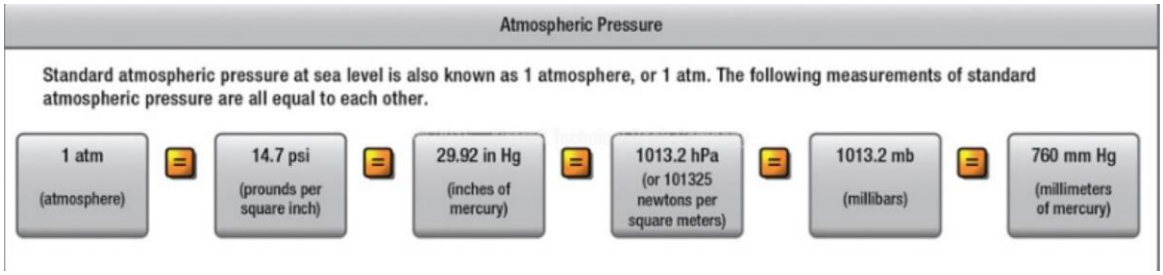
Atmospheric Pressure is the force exerted against the earth's surface by the air above that surface.

Atmospheric Pressure: the pressure within the atmosphere of Earth by the air above it.

The atmospheric pressure at sea level is 14.7psi

Atmospheric Pressure measured with barometer, tube with mercury measuring in inches of Hg and (mb).

1Hectopascal: is 100 pascals



Atmospheric pressure decreased with increasing altitude

As altitude increases: Atmospheric pressure drops, oxygen decreased, temperature drop, aircraft performance greatly affected.

Density: is mass per unit volume.

Air as a mixture of gases is compressible

Air density and volume occupied is proportional to the pressure:

Density varies in direct proportion with pressure

Density varies inversely with temperature

Aircraft flies faster in high altitude due to less resistance from less dense air

Humidity : is the amount of vaper in the air.

Amount of water vapor in air varies with temperature

The higher the air temperature, the more water vapor it absorbs.

Absolute Humidity, weight of water vapor in a unit volume of air.

Relative Humidity, the ratio in percent of moisture in air to the moisture it would hold if it were saturated at this temperature and pressure.

Density varies inversely with humidity.

Longer runway required for aircraft take-off in dump days than dry days

Water vapor weighs 5/8 of equal amount of dry air

Air with water vapor lighter than dry air

Temperature and Altitude

Temperature variations are of concern to aviators

Temperature changes as altitude is increased

Oblong nature of Troposphere: troposphere / stratosphere / mesosphere / thermosphere

Most civil aircraft fly in troposphere with temperature decreasing and altitude increasing.

Rate of temperature decrease in troposphere: $-2C$ or $-3.5F$ for every 1,000 f

Temperature increased in Stratosphere to near $0ooCC$ before decreasing.

During warm days, density drops, and aircraft takeoff performance decreased