Meteorology – Nov. 09/2017

The Atmosphere – pg. 123-124

The Atmosphere is composed of → 78% Nitrogen, 21% Oxygen, 1% (other gases)

- Properties of the atmosphere: Mobility, **Expansion**, Compression
- Expansion is very important because as the air rises, it expands, and cools which create meteorological conditions like clouds, fog, etc.

Water vapour → The gaseous phase of water. It is the most important component of the air since it can change into water droplets or ice crystals under conditions of temperature and pressure. Can only be found in the lower layers of the atmosphere

Divisions of the atmosphere

Division	Height	P – D – T (Troposphere)	Top Layer	Weather
Troposphere	The ground – 54, 000 feet	Pressure – decreases Density – decreases Temperature - decreases	Tropopause	Most of the "weather occurs here due to the presence of water vapour
Stratosphere				
Mesosphere				
Thermosphere				
Exosphere				

ICAO Standard atmosphere → Because pressure, temperature, and density change is not constant, we must create a standard for aeronautical purposes. Pilots flying North America follow these conditions:

1. The air is a perfectly dry gas
2. A mean sea level pressure of 29.92 inches of mercury ("Hg) or 1013.25 hPa
3. A mean sea level temperature of 15**°**C
4. The rate of decrease of temperature with altitude is 1.98 **°**C per 1000 feet

Surface Winds – pg. 131-133

Sea Breeze→ Pressure moves from the sea (higher pressure) to the land (lower pressure)
Land Breeze→ Pressure moves form the land (higher pressure) to the sea (lower pressure)

Katabatic Wind (or mountain breeze)→ At night, the sides of the hill cool down and the air becomes denser, thus forcing the air to go down the mountain.
Anabatic Wind (or valley breeze)→ In the day, the sides of the hill heat up and the air becomes less dense, thus forcing the air to go up the mountain.

Wind Speed and Direction – pg. 133-135

Gust→ A brief rapid increase of wind speed and direction. It is caused by the unequal heating between the air and ground as well as mechanical turbulence.
Squall→A sudden increase in wind strength. It lasts much longer than a gust. May be caused by a fast moving cold front or thunderstorm.
Eddies→ Swirling vortices of air that are caused by the friction between the moving air mass and surface features (buildings, trees). In unstable air and strong winds, the eddies become very strong. In stable air, they dissipate quickly.

Veering→ With an <u>increase</u> of height, the wind veers <u>clockwise</u> and increases in velocity.
Backing→ With a <u>decrease</u> in height, the wind backs <u>counter-clockwise</u> and decreases in velocity.

clockwise and counter-clockwise refers to degrees of north, south, east, and west
Ex.

Wind Shear→A violent change in wind speed or direction that produces a "tearing" effect. Some speed changes have been measured to up to 80 knots. Severe wind shear hinders airplane performance as the change in the wind may be faster than the plane is able to accelerate or decelerate.

Jet Stream – pg. 134

Jet Stream→ In the higher levels of the atmosphere (around 20,000 – 40,000 feet or more), there are narrow bands of exceedingly high speed winds.

Clear Air Turbulence (CAT)→ It is like a jet stream, however it has more bumpy and turbulent conditions and does not have any visual cues like clouds. It is almost impossible to forecast. It is caused when one body of air that moves at a particular speed meets another body of air at a particular speed. Usually occurs near the troposphere, specifically near the tropopause.

Meteorology Worksheet

Please study the following terms and definitions as you will have a quiz (optional, but for bonus marks) on it next week (November 16th, 2017). It is suggested to read the FTGU to deepen your understanding of the concepts found below.

Topic: Types of Clouds

	Type of Cloud	**General Characteristics**
High Cloud	Cirrus (CI)	• Thin delicate wisps
High Cloud	Cirrocumulus (CC)	• Thin cotton ball like
High Cloud	Cirrostratus (CS)	• Thin high sheets, may indicate an approaching warm front. Produces **the halo effect**.
Medium Cloud	Altocumulus (AC)	• Layer of rounded masses of clouds
Medium Cloud	Altostratus (AS)	• Think grey clouds that often cover the entire sky
Medium Cloud	Altocumulus Castellanus (AC)	• Altocumulus with turrets
Low Cloud	Stratus (ST)	• A uniform layer, like fog, but not resting on the ground
Low Cloud	Stratocumulus (SC)	• Thin layer of rounded masses of cloud
Low Cloud	Nimbostratus (NS)	• Low layer of uniform dark grey cloud
Low Cloud	Stratus Fractus (SF)	• Pieces of stratus
Vertical Development	Cumulus	• Thick, round and lumpy, resembles cotton balls.
Vertical Development	Towering Cumulus	• Towering cumulus – heavy icing clouds, rough air underneath
Vertical Development	Cumulonimbus	• Cumulonimbus – heavy masses of cumulus, violent vertical current, all aircrafts should avoid these clouds
Vertical Development	Cumulus Fractus	• Broken cumulus

Families	Height of Bases
Low Clouds (Strato)	Surface – 6500 ft
Middle Clouds (Alto)	6500 ft – 23000 ft
High Clouds (Cirro)	16500 ft – 45000ft
Clouds of Vertical Development	1500 ft and above