

# Level 3 Exam Review

WO2 Augé

## Foreward

- Most important topics and concepts are bolded. These are the most important points
- However, this is everything that is on the test. All of this information is important
- Our test is on **Thursday December 8<sup>th</sup> 2016, 3<sup>rd</sup> period**. If you will not be there for this test, please let Training Staff (WO2 Augé or Lt Bejenaru) know as soon as possible
- The test consists of a multiple choice section, followed by a short answer section

**Stability**

- **\*\*Stability:** The tendency of an aircraft to remain in straight, level, upright flight and to return to this attitude, if displaced, without corrective action by the pilot. **\*\***
- Longitudinal (Pitch): stability around the **lateral** axis – affected by **horizontal stabilizer and center of gravity**
- Lateral (Roll): stability around the **longitudinal** axis – affected by **dihedral, sweepback, and keel effect**
- Directional: stability around **normal (vertical) axis** – is affected by **size of fin**

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**Stability**

- **Static:** The **initial** tendency of an aircraft to return to its original attitude, if displaced.
- **Dynamic:** The **overall** tendency of an aircraft to return to its original attitude.
- **Positive:** returns without corrective action
- **Neutral:** remains in new attitude
- **Negative:** moves further away from original attitude

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**Aircraft Instruments**

- ASI (Air Speed Indicator): **Pitot AND Static** pressure source – difference in pressure between pitot and static sources.  
(faster speed = higher pressure in pitot tube)
- Altimeter: **static pressure only** – changes in air pressure  
(lower pressure=higher altitude)
- VSI (Vertical Speed Indicator): **static only** – rate of change in pressure  
(higher rate of change = faster climb)

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### Properties of the Atmosphere

- Layers from lowest to highest: **troposphere**, stratosphere, mesosphere, thermosphere
- Composition: **Nitrogen (78%)**, Oxygen(21%), Other(1%); water vapour is the most important from the standpoint of weather.
- **Most weather occurs in the troposphere.**
- The ozone layer is found in the stratosphere.

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### Properties of the Atmosphere

- **Mobility:** ability of the air to move from one place to another; explains why an air mass that forms over the arctic may affect places in the south.
- Capacity for expansion: as air is forced to rise air pressure decreases, and the air will expand and cool. This cooling may be enough for condensation, cloud formation, and precipitation.
- Capacity for compression: occurs when air cools and becomes denser. The air sinks, decreasing in volume and increasing in temperature.

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### ICAO Standard Atmosphere

- Based on summer and winter averages in North America (40 degrees north latitude).
- **Assumptions for a standard atmosphere (MEMORIZE THESE!!!!):**
  - The air is a perfectly dry gas
  - A mean sea level pressure of 29.92 inches of mercury
  - A mean sea level temperature of 15 degrees Celsius
  - Temperature decreases with altitude at a rate of 1.98 degrees Celsius per 1000 feet.

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### Clouds and air stability

- Cumulus: unstable air, like cotton, seen mostly during warmer seasons, may develop into storm clouds
- Stratus: stable air, flat, can be seen year round, associated with colder temperatures
- Stable air: poor low-level visibility (possible fog), steady precipitation and winds, smooth flying
- **Unstable air: good visibility, showery precipitation, gusty winds, moderate to severe turbulence**

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### Lifting Agents

- **Convection: as the sun heats the earth's surface, air in contact with the surface warms, rises, and expands.**
- Orthographic lift: sloping terrain forces air upward
- Frontal lift: warm air is forced upward by cold air
- Mechanical turbulence (eddies): air affected by friction with forests, buildings, large ditches, etc.
- Convergence: winds blow toward the center of a low pressure system and are forced upward at the center.

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### Pressure and Wind

- **Low pressure area:** areas of relatively lower pressure, with the lowest pressure in the center, associated with thunderstorms and tornadoes and do not stay in one place for very long, air moves counter clockwise.
- High pressure area: highest pressure in center, light and variable winds, move slowly, air moves clockwise.
- Isobar: lines joining areas of equal pressure on a weather map.

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### Pressure and Wind

- **Wind: the horizontal movement of air within the atmosphere.**
- Wind normally moves parallel to the isobars of a pressure system. Since isobars are not straight lines, the wind will vary at different locations along the pressure system.
- **Pressure gradient:** Rate of change of pressure. If isobars are close together, the rate of change is steep (high gradient) the wind will be stronger.

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### Humidity

- **Relative Humidity:** the ratio of the actual amount of water in the air compared to the amount of water it would hold if it were saturated.
- **Dew Point:** the temperature to which the air must be cooled in order to become saturated. Clouds or precipitation will form if the dew point is reached.

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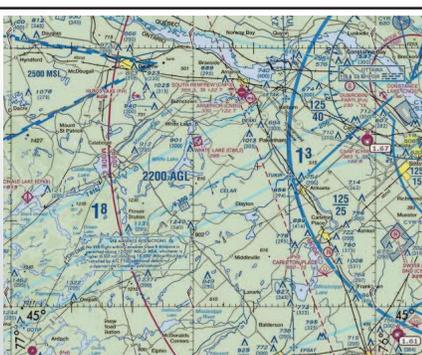
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### HOW TO USE COORDINATES

- Locate Degree Line Identifiers (bottom left)
- Each "box" is 30' of latitude by 30' of longitude
- Use small dashes on thin black lines to determine minutes.
- Remember, in Ottawa we are above the equator (**North latitude**) and to the left of Greenwich (**West longitude**)



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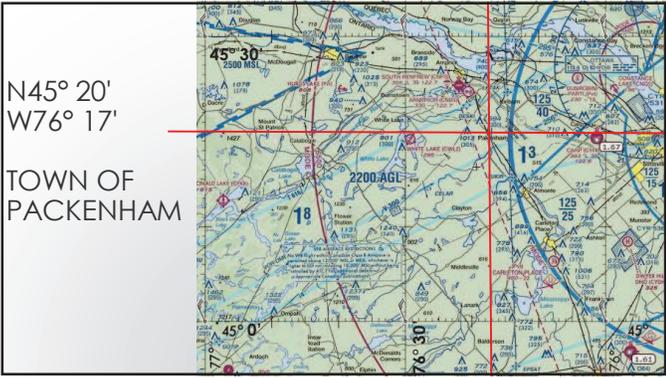
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