

LEVEL 3 – AVIATION SUBJECTS COMBINED ASSESSMENT STUDY GUIDE

PO 331 - DESCRIBE PRINCIPLES OF FLIGHT

Aircraft stability is defined as the tendency of an aircraft in flight to remain in straight, level, upright flight and to return to this attitude, if displaced, without corrective action by the pilot. To get more specific:

- Dynamic stability is the initial tendency of aircraft to return to its original attitude.
- Static stability is the initial tendency of an aircraft to return to its original attitude, if displaced.
- Directional stability is around the vertical axis.
- Longitudinal stability is influenced by the centre of gravity of an aircraft.

PO 336 – IDENTIFY METEOROLOGICAL CONDITIONS

We know that 78% of the atmosphere is composed of nitrogen, that the stratosphere is the layer of the atmosphere that includes the ozone layer, and that the layer of the atmosphere closest to the Earth's surface is the troposphere but in North America there are some assumptions we make about the atmosphere. These include:

- That the air is a perfectly dry gas
- The mean sea level pressure is 29.97" Hg (that's mercury)
- The mean sea level temperature is 15 degrees Celsius
- The temperature decreases with altitude at a rate of 1.98 degrees C per 1000 feet.

When there is horizontal movement of air within the atmosphere, wind is created.

Because air moves from place to place (has mobility) air masses that form over one region can impact weather in another region.

Mobility and expansion are both properties of the atmosphere. Expansion, however, is when air is forced to rise (for various reasons) which causes decreased air pressure. When there is decreased pressure, air expands and cools. The cooling might be enough for condensation to occur and clouds to form, creating precipitation.

(Note that the dew point is the temperature to which this unsaturated air must be cooled in order for it to become saturated!)

Convection is a lifting agent – or one of the reasons that air might be forced to rise. It occurs when air is heated through contact with the earth's surface. As the sun heats the surface of the earth the air in contact with the surface warms up, rises, and expands.

If the mass of rising air is still warmer than the new air around it, then the air mass will continue to rise. This causes unstable air which impacts flight by creating good visibility (unless there is precipitation), cumulus clouds, showery precipitation, gusty winds, and moderate to severe turbulence.

Low pressure areas, where pressure is low relative to the surrounding air but with the lowest pressure in the centre, also have an impact on the weather. They normally move in an easterly direction at a rate of

800km/day in the summer and 1100 km per day in the winter. They are connected with thunderstorms and tornadoes but don't stay in one place for very long.