QUICK-FIRE EXAM/JOB REVIEW

questions/answers/explanations (fixed wing).

(KNOWLEDGE IN A NUTSHELL - OVER 1800 REVIEW Q & A's.)

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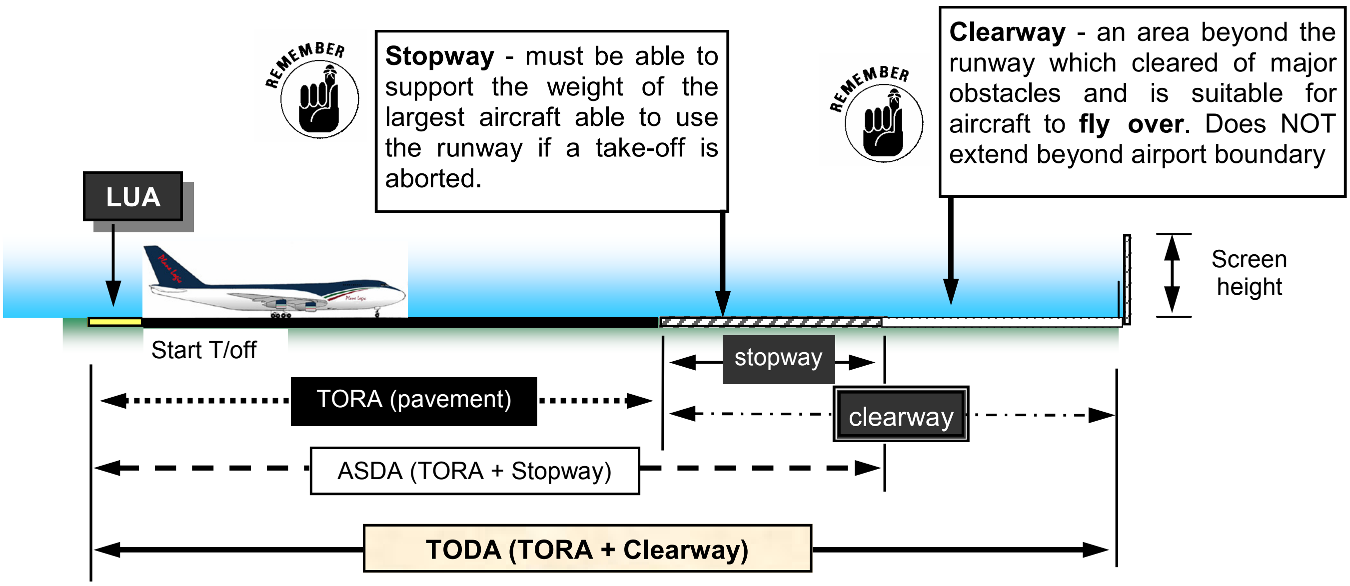
SECTION 3.
PERFORMANCE

PPL + CPL + ATPL

Best used in association with Rob Avery's ATPL Performance and Loading training text Av15, and exam book product codes, Av18, Av28 & Av37), and ATC "PPL/CPL Aircraft Operation, Performance and Planning" reference textbook.

RUNWAY TAKEOFF PERFORMANCE (PPL + CPL + ATPL)

Refer CAO 20.7 section.



Q1. ASDA is ?

- The Accelerate Stop Distance Available is the TORA plus stopway beyond it. (see above and TORA below). It is sometimes called Emergency Stop Distance Available (EMDA). It is for the use of aircraft after aborting a takeoff. The stopway need not be paved, but must be able to support the weight of the aircraft without causing damage to the aircraft. ASDR is the distance to accelerate to V1 speed, abort the take-off, and bring the aircraft to a full stop assuming one braking feature (normally reverse thrust) is not used.

Q2. What is TORA ?

- The Takeoff Run Available. It is the physical length of the pavement. An aircraft must be airborne by the end of the TORA.

Q3. What is TORR ?

- The takeoff run required to get airborne by the aircraft at it's takeoff weight and in the current atmospheric conditions, as found from the Performance Tables or charts (P charts).

Q4. What is meant by the term TODA ?

- TODA is the TORA plus clearway, which can incorporate a stopway within it. A clearway is that obstacle free area beyond the TORA that is usually grass or water, and cannot support the weight of a large aircraft. Basically it is a fly-over area, allowing you to climb safely to screen height (typically 35 feet).

Q35. Define stability ?

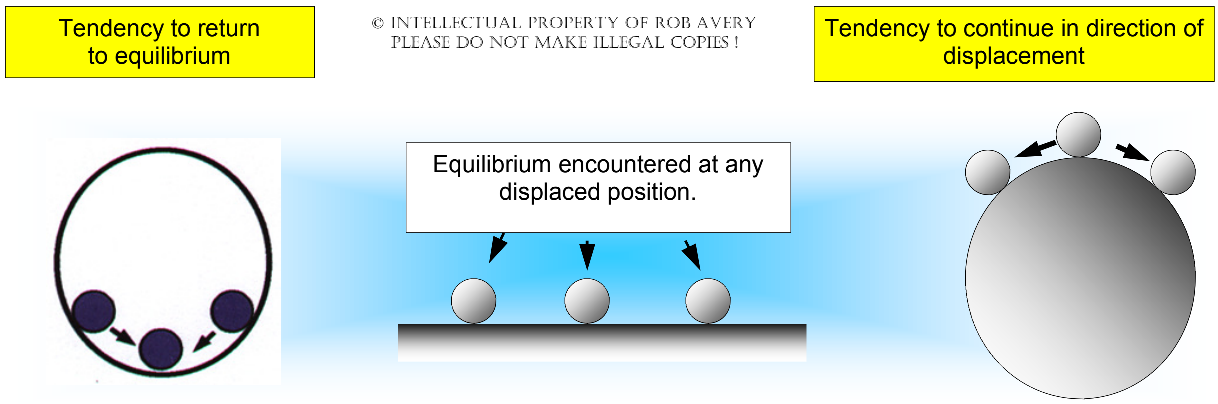
- The inherent quality of an aircraft to correct for conditions that may disturb its equilibrium, and to return to the original flightpath.
- An aircraft must be built with positive stability to reduce the workload of the pilot trying to control it.
- Pitching is movement about the lateral axis, and pitching stability is described as longitudinal stability.
- Rolling is movement about the longitudinal axis, and rolling stability is described as lateral stability.
- Yawing is movement about the normal (vertical) axis, and stability in yaw is described as directional stability.
- All three axes pass through the Centre of Gravity (CG).
- The more stability built into a design, the less maneuverable it will be.

Q36. What is static stability ?

- Refers to the initial tendency, or direction of movement, back to equilibrium. It refers to the aircraft's initial response when disturbed from a given AoA, slip, or bank. More to follow →→

Q37. What are the types of static stability ?

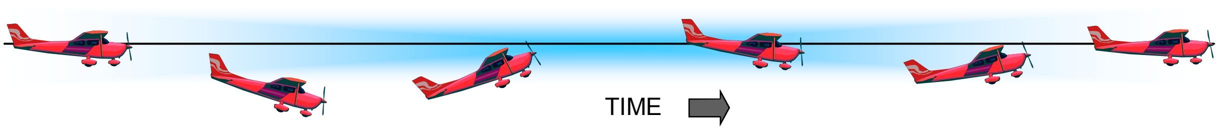
- A tendency to return to equilibrium is called "positive static stability".
- If the object tends to continue in the direction of the disturbance it shows "negative static stability".
- Neutral static stability—the initial tendency of the aircraft to remain in a new condition after its equilibrium has been disturbed. Refer figure below.



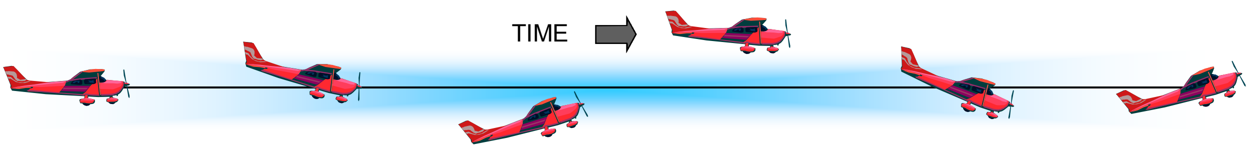
Positive static stability. Neutral static stability. Static instability.

Q38. What is Dynamic Stability ?

- Where static stability is simply concerned with a body returning to equilibrium, dynamic stability is defined as resulting motion with time. If an object is disturbed from equilibrium, the time history of the resulting motion is the indicator of the dynamic stability. If the amplitude (strength) of the motion decreases with time, then positive dynamic stability exists. On the contrary, if the amplitude increase with time, this demonstrates negative dynamic stability. Should the amplitude remain unchanged after the initial disturbance, this demonstrates neutral stability. Refer to figure below.

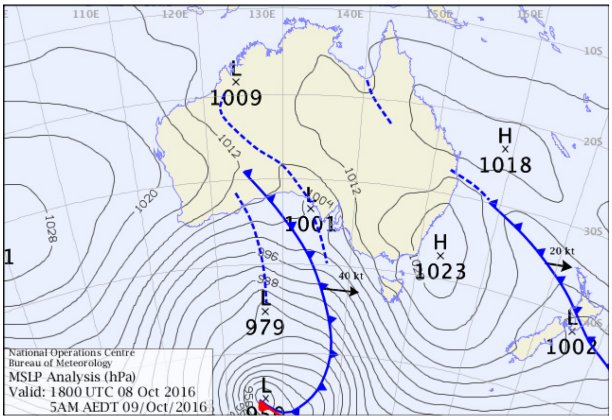


Positive static stability and positive dynamic stability - Positive damping exists here.



Positive static stability and neutral dynamic stability - No damping exists here.

SYNOPTIC METEOROLOGY (PPL + CPL + ATPL)



Q1. What would happen to the density/stability/cloud conditions if a cool air is mass moving over a warmer surface ?

- It will become less dense/unstable/form cumuliform clouds if sufficient moisture is present.

Q2. If relatively cooler tropical maritime air moves over a hot continent in summer, you would likely expect what affect on stability/what type of could to form ?

- Unstable conditions/cumuliform cloud. This is because the cool air from the ocean is warmed by conduction with the hot land surface, which reduces it's density, causing it to rise. The abundant moisture would create cumulus type clouds, and the latent heat release at the cloud base would increase the buoyancy of the air within the cloud. That air will cool at the SALR of 1.5ºC/1000 ft, keeping the air in the cloud warmer than the environment air. CB clouds are likely in this case.
- This is essentially the conditions that, if on a wide scale, brings on the monsoon (wet season).

Q3. In summer, air near the centre of a continent would tend to be ?

- Hot/dry/unstable.

Q4. If warm tropical maritime air flows over a relatively cooler landmass in winter, you would expect what in terms of cloud type/stability/air density change/precipitation ?

- Stratus type clouds/stability/air becoming more dense/possible rain.
- The air just above the cooler surface will cool by conduction, making it more dense and not want to rise. This is a stable condition, and so stratus type cloud and precipitation in the form of rain (not showers) is possible if dewpoint is reached.

Q5. Discuss the observations of a classic warm front before and after passing through a location in the southern hemisphere ?

- Lowering stratus type clouds/pressure dropping/temperature cool/light northerly winds/long period of rain. Then after the front passes, gradual clearance/steady pressure/warmer westerly winds.

Q6. Discuss the observations of a classic cold front before and after passing through a location in the southern hemisphere ?

- Low-base cumulus clouds/pressure dropping/temperature warm/fresh northerly winds/brief but intense showers. Then after the front passes, trailing Cu or cold-stream CB clouds/general clearance/rising pressure/cooler southerly winds.

Q7. Line squalls are most often associated with what type of system (s) ?

- A cold front, but can be associated with a trough of low pressure also.

Q8. Explain about the slope/speed of progression across the surface of a classic cold front, compared to a classic warm front ?

- Cold fronts are steeper than warm fronts, and it normally travels faster, typically overtaking a warm front and becoming an occluded front. This is called a 'cold front occlusion'. In the rare event that a warm front overtakes a cold front, it is called a 'warm front occlusion'.

Q9. Compared to a warm front, the extent of weather associated with a cold front/intensity ?

- Smaller/more intense.

SECTION 2.
NAVIGATION - GENERAL

Best used in association with ATC PPL/CPL training manual, and Rob Avery ATPL product Av2.

SAMPLE ONLY

AIRSPEED (PPL + CPL + ATPL).

Q1. When will the airspeed indicator read correctly

1. The aircraft is flying at sea level. Airspeed indicators are calibrated to ISA/sea level.
2. The outside air temperature (OAT) is 15°C, and the barometric pressure is 1013.2 HPA (ISA).
3. There is no interference to the flow of air over the pitot or static vents by the aircraft structure. That is to say, no "Pressure Error" (sometimes called "Position Error").
4. There are no errors in the instrument mechanism.
5. The aircraft is flying below approximately 10000 ft/and less than 200 KIAS. Above this, compressibility effect will cause the IAS gauge to over-read.

(If any of the conditions listed above are not met, then the airspeed indicator readings will contain errors).

Q2. What is the effect of hot/cold days ?

- Flying at low levels in the tropics sees the airspeed indicator under-read because warm, humid air is less dense, and has a lesser effect on the pitot aneroid capsule. The reverse in polar regions.

Q3.How does TAS vary compared to IAS in climbs and descents ?

- Climbing at a fixed IAS sees TAS increase. The reverse on descent.

Q4. How does TAS value compare to IAS at FL400.

- TAS is twice IAS value.

Q5. What is position error (pressure error) ?

- An error induced by false pressure sensing by the pitot and static vents, caused by air flow pressure patterns. Refer aircraft flight manual (AFM) for position error correction (PEC) values.

Q6. What causes instrument error ?

- This is **caused by small imperfections in manufacturing and maintenance.**

Q7. How does ram effect cause errors in an IAS gauge?

- Ram effect comes into play above about 200 KIAS/10000 ft pressure altitude. The air is compressed as it enters the pitot and this over-pressurises the aneroid capsule, which in turn causes the ASI to over-read. Called compressibility error, it is most noticeable at high speed/high altitude.

Q8. What is CAS (also called rectified airspeed—RAS)?

- It is IAS corrected for instrument and pressure errors.

Q9. What is EAS ?

- It is CAS (RAS) corrected for compressibility effects. Refer AFM "F" factor table. EAS is always equal to, or less than CAS.

Q10. Why does the Machmeter not contain compressibility errors ?

- The Machmeter is free of compressibility errors because it incorporates an altimeter capsule that effectively takes out the compressibility. Compressibility is often referred to as "F" factor.

Q11. What are the errors of a Machmeter ?

- Pressure error, and instrument error (not compressibility error).