

The PPL Cheat Sheet

P30 Meteorology

The facts that actually get tested in the EASA PPL(A) theory exams, stripped to the bone: definitions, key numbers, formulas, mnemonics and the classic traps for each subject. Built for the night before, the commute, and the last scroll before you walk into the exam hall.

P30 Meteorology

33 memory items

One of 9 subjects; the full set is free at skystudyatpl.com/ppi-cheat-sheet

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Meteorology

Atmosphere, pressure and altimetry, wind, cloud and fog, precipitation, air masses and fronts, hazards, observations and forecasts.

◆ ISA AND KEY MET VALUES

Sea level ISA

1013.25 hPa · 15 C

Lapse rate

about 2 C per 1000 ft

Tropopause

36,090 ft · minus 56.5 C

Pressure

Near sea level about 30 ft per hPa · sea-level density 1.225 kg per cubic metre

Fog needs

Radiation fog: clear sky, light wind (about 2 to 8 kt), moist air, cooling overnight

Advection fog: moist air moving over a colder surface (needs no cooling of its own)

High to low, look out below. Flying into lower pressure or colder-than-ISA air makes the altimeter over-read, so your true height is lower than indicated.

◆ MUST-KNOW DEFINITIONS AND CONCEPTS

- The **ISA (International Standard Atmosphere)** is a reference: 1013.25 hPa and 15 C at sea level, falling about 2 C per 1000 ft to the tropopause.
- **Relative humidity** is how close the air is to saturation; it reaches 100% at the **dew point**, when condensation (cloud, fog, dew) forms.
- **Stability** describes whether a displaced parcel returns (stable, layer cloud, smooth) or keeps rising (unstable, heap cloud, showers, turbulence).
- A **temperature inversion** is warmer air above colder air; it is very stable, traps haze and moisture, and caps convection.
- **Coriolis** deflects moving air to the **right** in the northern hemisphere; with the pressure-gradient force it gives the geostrophic wind flowing along the isobars.
- A **warm front** has a shallow slope, wide layered cloud and steady rain ahead; a **cold front** is steep with convective cloud, showers and a narrow violent band.
- An **occlusion** forms when the faster cold front catches the warm front and lifts the warm air off the surface.
- **Advection fog** forms when moist air moves over a colder surface; **radiation fog** forms overnight under clear skies and light wind.
- A **thunderstorm** needs unstable air, high humidity and a trigger to lift it; its worst stage is the **mature** stage, with updraughts and downdraughts together.
- A **METAR** is an actual weather report for an aerodrome; a **TAF** is a forecast for a period; a **SIGMET** warns of en-route hazards.

◆ KEY NUMBERS, LIMITS AND VALUES

- ISA sea level: **1013.25 hPa**, **15 C**, density **1.225 kg per cubic metre**; lapse rate about **2 C per 1000 ft** (1.98) to the tropopause.
- Tropopause in ISA: **36,090 ft** (about 11 km) at **minus 56.5 C**; above it the temperature is roughly constant.
- Pressure falls about **1 hPa per 30 ft** near sea level (the ratio changes with altitude).
- Dry air cools at about **3 C per 1000 ft** when lifted (DALR); saturated air cools at about **1.5 C per 1000 ft** (SALR).
- Cloud base estimate: **spread (temperature minus dew point) divided by 2.5, times 1000 ft** gives the approximate convective cloud base.
- Cloud base height: **low** to about 6500 ft, **medium** about 6500 to 20,000 ft, **high** above about 20,000 ft (ice crystal cirrus).
- Radiation fog needs a clear sky, moist air and a light wind of about **2 to 8 kt**; calm air makes dew, strong wind makes low stratus.
- Thunderstorm avoidance: stay at least **10 nm** from a cell; each cell lasts about **20 to 30 minutes**.
- Freezing (airframe icing) risk is greatest in cloud and precipitation between **0 C and about minus 15 C**, worst near 0 to minus 10 C.

◆ FORMULAS AND RELATIONSHIPS

- **Cloud base (ft) is approximately (temperature minus dew point) divided by 2.5, times 1000** for convective cloud.
- **Approximate freezing level: surface temperature divided by 2, times 1000 ft** above the surface (ISA-based rule of thumb).

◆ MNEMONICS AND MEMORY ITEMS

- **Buys Ballot** (northern hemisphere): stand back to the wind and low pressure is on your **left**.
- Wind **backs** with height as you descend into the friction layer and **veers** with height as you climb out of it (northern hemisphere).
- Cold front cloud is **heap** (cumulus, showers); warm front cloud is **layer** (stratus, steady rain).
- **Stable = Smooth and Stratus; Unstable = Upsurging cumulus** with showers and turbulence.
- Halo round the sun or moon (cirrostratus) often means a **warm front and rain within about a day**.

◆ COMMON EXAM TRAPS

- **High to low (pressure or temperature), look out below**: the altimeter over-reads, so your true height is lower than shown.
- Wind is named by where it comes **from**; a wind arrow on a chart points the way the air is **going**.
- Radiation fog needs a **light** wind; calm gives dew and a strong wind gives stratus, not fog.
- A cold front is **steeper and more violent** than a warm front but passes quickly; do not treat the two the same.
- Carburettor icing can form in **positive** temperatures with high humidity; it is not just a sub-zero hazard.
- The mature thunderstorm stage, not the towering build-up, has the **worst** turbulence, hail and windshear.
- QNH set from a distant station can be badly wrong in mountainous or fast-changing pressure; use a local setting when you can.

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