

The PPL Cheat Sheet

P70 Flight Performance and Planning

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.

P70 Flight Performance and Planning

30 memory items

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

You are reading the static PDF. The interactive web version of this cheat sheet at skystudyatpl.com/ppi-cheat-sheet adds a light and dark theme, a quiz mode that covers every key value so you can test your recall, instant search across every memory item, and hover or tap explanations for every aviation abbreviation. Like the rest of SkyStudy, it is free to use in the browser while the beta is open.

Study aid only. This is an independently authored revision summary, not exam material and not affiliated with EASA or any CAA. Figures marked **VERIFY** and all regulatory limits change over time and vary by aircraft type, so always confirm against the current EASA regulations, AMC/GM and your aircraft POH or flight manual. No pass is guaranteed. Copyright SkyStudy, skystudyatpl.com. Free to share unmodified.

Flight Performance and Planning

Mass and balance, centre of gravity, performance factors, take-off and landing data, fuel planning, the navigation plan and the ICAO flight plan.

◆ MASS BUILD-UP AND THE CG RULE

Basic empty mass

aircraft + unusable fuel + oils

+ crew, payload

= dry operating / zero fuel mass

+ usable fuel

= take-off mass (below MTOM)

Moment = mass x arm

CG = total moment divided by total mass (the mass-weighted average arm)

Longer take-off and landing when

heavier · higher · hotter · tailwind · upslope · soft or contaminated surface

Density altitude rises with height, temperature and humidity, and cuts performance.

Never average the arms. CG is total moment over total mass; fuel burn walks the CG along the loading line as fuel (ahead of or behind the CG) is used.

◆ MUST-KNOW DEFINITIONS AND CONCEPTS

- **Basic empty mass** is the aircraft with unusable fuel and full operating fluids; add crew and payload for the **dry operating** and **zero fuel** masses, then usable fuel for take-off mass.
- The **centre of gravity (CG)** is the point through which weight acts; it must stay within the forward and aft limits for the whole flight.
- A **moment** is mass times arm (the horizontal distance from the datum); the CG is the total moment divided by the total mass.
- The **forward CG limit** is set by control authority (elevator power to flare and recover); the **aft limit** is set by stability.
- **Density altitude** is pressure altitude corrected for temperature; high, hot and humid conditions raise it and degrade take-off, climb and landing.
- **TODR/LDR** are the required take-off and landing distances from the flight manual for the conditions; apply the required safety factors.
- A **navigation plan** (or log) lists tracks, headings, distances, times and fuel for each leg; the **ICAO flight plan** is the form filed with ATS.
- **Contingency fuel** covers unforeseen factors; **final reserve** is the untouchable minimum you plan to land with.

◆ KEY NUMBERS, LIMITS AND VALUES

- Performance is worse when **heavier, higher, hotter**, with a **tailwind**, on an **upslope**, or on a **soft or contaminated** surface.
- Wind rule of thumb for planning: allow only about **50% of a reported headwind** and at least **150% of a reported tailwind**.
- A rough density-altitude effect: performance falls roughly **1% per 1000 ft** of density altitude for a light piston aircraft **VERIFY**.
- Take-off and landing distances grow rapidly with mass; a small overload gives a **larger-than-proportional** distance increase.
- Standard passenger and baggage masses may be used where the flight manual and rules allow; otherwise use **actual** weighed masses.
- The **ICAO flight plan** Item 15 carries cruising speed, level and route; **Item 19** is supplementary (endurance, persons on board, emergency equipment).
- AVGAS weighs about **0.72 kg per litre**; multiply litres by the density to convert a fuel volume to a mass for loading.

◆ FORMULAS AND RELATIONSHIPS

- **Moment = mass x arm**. Sum the moments and masses, then **CG = total moment divided by total mass**.
- **CG shift when a load is moved = (mass moved x distance moved) divided by total mass** (the CG moves the same way as the load).
- **Fuel mass = volume x density** (about 0.72 kg per litre for AVGAS).

◆ MNEMONICS AND MEMORY ITEMS

- Performance killers: **Heavy, High, Hot, Humid** and a **tailwind** all lengthen the run.
- **Empty, then payload, then fuel:** basic empty mass to zero fuel mass to take-off mass, each below its limit.
- **Moment = mass x arm; CG = total moment over total mass.** Never average the arms.
- Forward CG = **firm and stable, heavy on the controls**; aft CG = **light and unstable, hard to recover**.
- Item 15 route, **Item 19 the survival details** (endurance, souls on board, equipment).

◆ COMMON EXAM TRAPS

- **Do not average the arms** to find the CG; use total moment over total mass, or a nose-heavy answer will look balanced.
- As fuel burns the CG **moves**; a load legal at take-off can go out of limits later, so check take-off, landing and zero-fuel points.
- **Density altitude, not indicated altitude**, drives performance; a cool sea-level airfield on a hot day can perform like a mountain strip.
- Apply only **half a headwind** and **1.5 times a tailwind** when planning distances; using the full reported wind is optimistic.
- A small overload gives a **disproportionately longer** take-off and a higher stall speed; weight is never a rounding error.
- Standard masses are only allowed where the rules permit; when in doubt use **actual weighed** masses.
- Convert fuel **volume to mass** before adding it to the load sheet; litres are not kilograms.

FREE WHILE SKYSTUDY IS IN BETA

Keep studying free, while the beta is open

This cheat sheet is built and maintained by **SkyStudy**. SkyStudy is currently in **beta**, and during the beta every study tool below is free to use in the browser at skystudyatpl.com. This will not always be the case: when the beta ends, parts of SkyStudy will move to a paid subscription. If you want the full toolset free, now is the time to try it.

PPL Question Bank

2,830 independently authored PPL(A) revision questions across all 9 subjects, with worked explanations and spaced repetition.

Free PPL Quiz

See where your theory stands across all nine subjects, no account needed.

ICAO English Test

Check where you stand with a realistic ICAO English self-assessment.

Pilot Aptitude Training

Timed cognitive exercises across memory, spatial, numerical and multitasking domains, built for airline selection preparation.

Pilot CV Maker

Build a clean, airline-ready pilot CV in your browser, free.

And much more

Aviation weather tools, a free demo question bank, study guides and the rest of the free tool family.



On paper? Scan to open SkyStudy and every free tool on this page: skystudyatpl.com

Found this useful? Share the cheat sheet unmodified with your study group or forum of choice. And if you are reading this on paper or PDF: the web version at skystudyatpl.com/ppl-cheat-sheet adds light and dark themes, quiz mode and tap-to-expand abbreviations.

Copyright SkyStudy. Independently authored PPL revision aid. Not affiliated with EASA or any CAA. Free to share unmodified. SkyStudy is in beta; free access to the full toolset is a beta offer and will not always be available.

skystudyatpl.com