EASA ATPL(A) · THEORY REVISION

The ATPL Cheat Sheet
033 Flight Planning and Monitoring

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

033 Flight Planning and Monitoring | **49** memory items

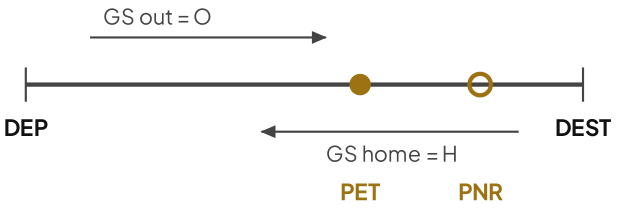
One of 14 subjects; the full set is free at skystudyatpl.com/atpl-cheat-sheet

You are reading the static PDF. The interactive web version of this cheat sheet at **skystudyatpl.com/atpl-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.

033 Flight Planning and Monitoring

Fuel policy, PET and PNR, ICAO flight plan, cruise techniques, altimetry.

PET AND PNR, AND THE FUEL BUILD-UP

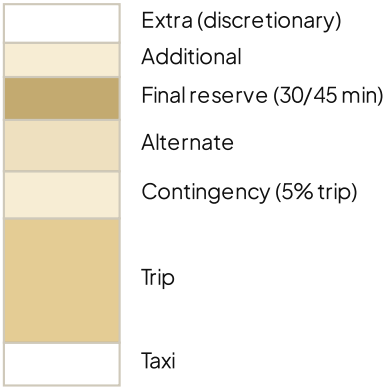


PET distance = D x H / (O + H)

PNR time = E x H / (O + H)

PET: equal-time point (geometry). PNR: last point a safe return fits the endurance E.

Block (ramp) fuel



PET depends on geometry only; a headwind out moves it toward the destination. **PNR** depends on endurance; any wind reduces its range. Fuel order upward: Taxi, Trip, Contingency, Alternate, Final reserve, Additional, Extra.

MUST-KNOW DEFINITIONS AND CONCEPTS

- **Trip fuel**: brake release at departure to touchdown at destination (takeoff, climb, cruise, descent, approach, landing).
- **Taxi fuel**: fuel used before takeoff, including APU and expected delay.
- **Contingency fuel**: covers deviations from plan; normally the higher of a percentage of trip fuel or a time-based allowance VERIFY.
- **Alternate fuel**: from the missed approach at destination to landing at the destination alternate, including one approach and landing.
- **Final reserve**: a fixed holding time at 1500 ft above the alternate (or destination if none), at estimated landing mass.
- **Additional fuel**: for engine or pressurisation failure at the critical point, or flight to an isolated aerodrome with no usable alternate.
- **Extra/discretionary fuel**: carried at the commander's discretion above the required minimum.
- **Block (ramp) fuel**: taxi + trip + contingency + alternate + final reserve + additional + extra.
- **Isolated aerodrome**: no suitable alternate in range, needing additional fuel instead of alternate fuel.
- **Point of Equal Time (PET)** / Critical Point: the point from which time to continue equals time to return.
- **Point of No Return (PNR)**: the furthest point from which a safe return to departure is still possible with the endurance available.
- **Redispatch/reclearance**: dispatch to an intermediate point with a new plan filed for continuation once airborne, to reduce the required fuel load.
- **ICAO flight plan (FPL)**: the standardised ATC/ATFM form; distinct from the operational (company) flight plan used for fuel and performance.
- **Network Manager (Eurocontrol)**: manages European flow, issues ATFM slots (CTOT); the **RAD** publishes permitted and prohibited route segments.
- **Conditional Route (CDR)**: usable only under stated conditions (CDR1 always plannable, CDR2 per AUP/NOTAM, CDR3 tactical only).
- **LRC** gives about 99% of maximum range for a useful speed gain; **max range** gives the greatest still-air distance per fuel; **max endurance** gives minimum fuel flow.
- **Transition altitude/level/layer**: at or below the TA use altitude on QNH; above the TL use flight levels on 1013.25; do not level in the layer between.

KEY NUMBERS, LIMITS AND VALUES

- Contingency: the higher of **5% of trip fuel** or a time-based holding allowance VERIFY.
- Final reserve: **30 minutes** for turbine (jet/turboprop), **45 minutes** for piston, holding at 1500 ft in standard conditions VERIFY.
- Standard pressure setting (QNE) for flight levels: **1013.25 hPa** (29.92 inHg).
- **MINIMUM FUEL** call: committed to an aerodrome where any extra delay would land below final reserve; it is not a distress call.
- **MAYDAY FUEL** call: predicted usable fuel on landing at the nearest suitable aerodrome will be below final reserve; this is distress.
- FPL wake categories (Item 9): **L** Light, **M** Medium, **H** Heavy, **J** Super.
- FPL flight rules (Item 8): I (IFR), V (VFR), Y (IFR then VFR), Z (VFR then IFR).
- FPL type of flight (Item 8): S scheduled, N non-scheduled, G general aviation, M military, X other.
- Semicircular levels: odd for magnetic track roughly 000 to 179, even for 180 to 359 VERIFY .

FORMULAS AND RELATIONSHIPS

- `PET distance from departure = D x H / (O + H), where D = total distance, O = groundspeed out, H = groundspeed home.`
- `PNR time from departure = E x H / (O + H), where E = safe endurance as time, O = groundspeed out, H = groundspeed home.`
- `Time to PET = PET distance / O; PNR distance = PNR time x O.`
- `With no wind (O = H), PET is at the mid-point D/2 and PNR is at maximum range for the endurance.`
- `A headwind out / tailwind home moves PET toward the destination; any wind (versus still air) moves PNR closer to departure, reducing range.`
- `Specific air range (SAR) = distance per unit fuel; LRC and max-range speeds sit at or near the peak of the SAR curve.`

MNEMONICS AND MEMORY ITEMS

- Fuel build-up **Taxi, Trip, Contingency, Alternate, Final reserve, Additional, Extra**.
- **PET splits the trip in time; PNR is the last chance to turn back.**
- Keep the letters straight: **O** is Out, **H** is Home; swap them and the answer flips.
- **Minimum fuel is a heads-up; Mayday fuel is an emergency.**
- **LRC = a little less range, a lot more speed** (about 1% range traded).
- Going up: QNH to QNE at the transition altitude. Coming down: QNE to QNH at the transition level.

COMMON EXAM TRAPS

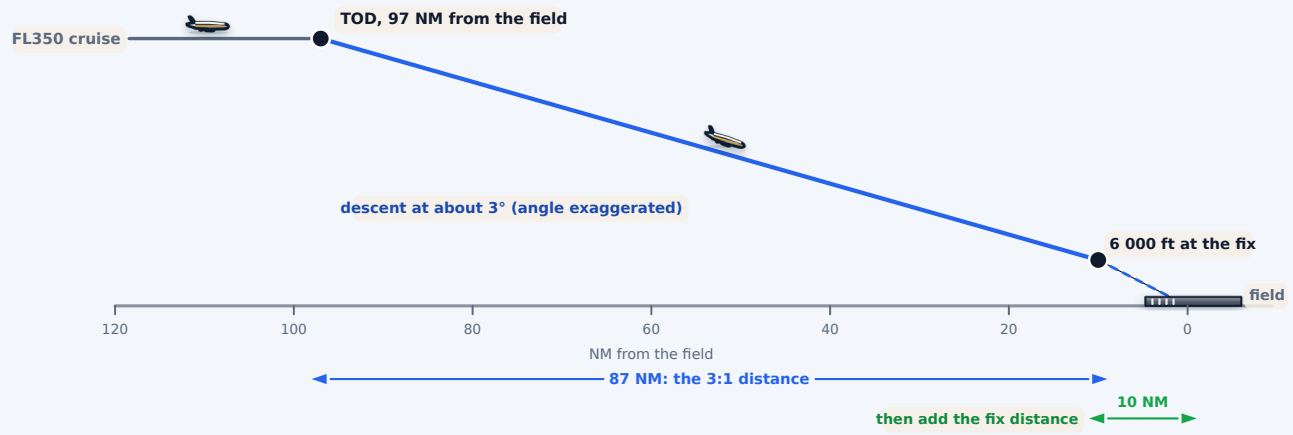
- PET is a **time-equality** point (independent of fuel); PNR is **endurance-limited**. Do not conflate them.
- Do not swap **O** and **H**; confirm which groundspeed is outbound and which is the return.
- PET is at the mid-point **only** in zero wind; wind shifts it toward the less favourable leg.
- Final reserve is the minimum fuel **on landing**, not a planning allowance to dip into en route.
- Do not mix the **30 min** (turbine) and **45 min** (piston) reserves; a turboprop uses the turbine figure VERIFY.
- Contingency is normally the **higher** of the two methods, not always 5%.
- Do not confuse **QNH** (altitude AMSL), **QFE** (height above aerodrome) and **QNE** (flight levels on 1013.25).
- FPL Item 10a is COM/NAV/approach equipment; Item 10b is surveillance equipment (transponder, ADS: Automatic Dependent Surveillance); do not merge them.
- Restricted route segments in the RAD will get the plan rejected or delayed by ATFM.
- Redispatch reduces the **required minimum**, it does not exempt the flight from carrying adequate fuel for the routing actually flown.
- Max endurance speed is lower than max range speed; a MAYDAY FUEL situation needs the MAYDAY call, not MINIMUM FUEL.

EXAM FIGURES FROM THE SKYSTUDY QUESTION BANK

Top of descent: the 3:1 rule

100 · KSA

FL350, reach 6 000 ft at a fix 10 NM from the field



FL350 down to 6 000 ft at the fix

altitude to lose = 35 000 − 6 000 = 29 000 ft

in thousands = 29

29 × 3 = 87 NM, then 87 + 10

× 3

3 NM per 1 000 ft

TOP OF DESCENT

97 NM

The three printed errors

- Multiplying the cruise level instead of the altitude to lose: FL320 down to FL100 needs 22 × 3 = 66 NM, but 32 × 3 prints 96 NM
- Dropping the fix distance leaves the raw 87 NM, which arrives at the fix still high and still descending
- Adding a buffer the question did not ask for: when the stem says the 3:1 rule only, the raw answer is the printed one

red: the bank's own distractor rationales

Three miles for every thousand feet, and the fix distance is added to that answer, never folded into it.

1 Three miles per thousand feet

The 3:1 rule gives three nautical miles of track for every thousand feet the aircraft has to lose. Twenty nine thousand feet therefore needs eighty seven nautical miles.

2 The altitude to lose, not the level

Subtract the target altitude from the cruise level first. From FL350 to six thousand feet the figure is twenty nine thousand feet, not the thirty five thousand feet of the cruise level itself.

3 Then add the fix distance

A constraint at a fix ten nautical miles from the field means the descent must finish there, so the top of descent lies eighty seven plus ten, ninety seven nautical miles from the field.

4 Awkward levels still work

FL283 down to three thousand feet is twenty five thousand three hundred feet, so 25.3 times three is 75.9 nautical miles, and the closest printed answer is seventy six.

5 The named errors

Multiplying the cruise level rather than the altitude to lose, and forgetting the fix distance, are both printed options. So is a buffer that the rule-only question never asked for.

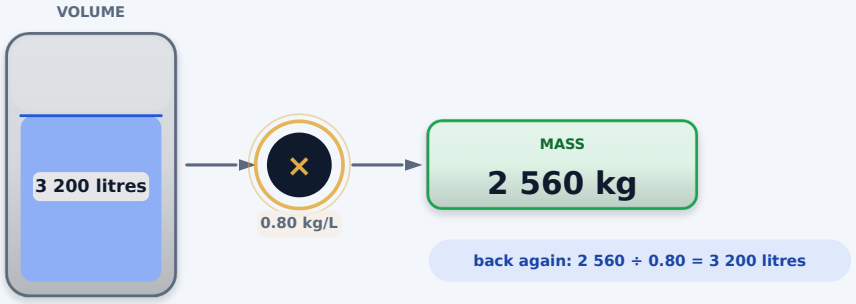
6 Comparing, not just computing

Asked whether a crossing restriction can be met, work the distance the descent needs and compare it with the track available. Twenty two thousand feet needs sixty six miles, so eighty miles will do.

The 3:1 rule multiplies the altitude to lose in thousands of feet by three, and any fix distance is added to that answer.

Fuel volume to mass: litres and kilograms

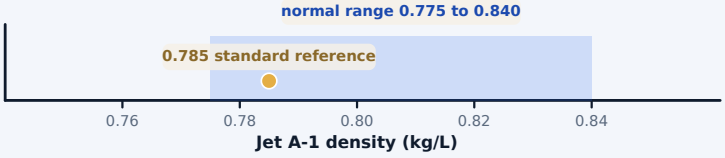
100 · KSA



The inversions

- Volume × density gives mass. Mass ÷ density gives volume. Swapping them is the error the bank names most
- Leaving litres unchanged as kilograms assumes a density of 1.00 kg/L, which is water
- Use the density printed in the question, never the standard value

red: the named errors



Cold fuel is denser, so a given mass fills fewer litres.

The units the bank quotes

1 US gallon	**3.785 litres**
1 Imperial gallon	**4.546 litres**
1 lb	**0.4536 kg**
Jet-A	**6.7 lb per US gallon**

1 Mass from volume

Mass in kilograms is the volume in litres multiplied by the density in kilograms per litre. Three thousand two hundred litres at 0.80 kg/L is 2 560 kg.

2 Volume from mass

Volume in litres is the mass in kilograms divided by the density. Two thousand one hundred kilograms at 0.84 kg/L occupies 2 500 litres.

3 Specific gravity is the density

The bank writes specific gravity and density interchangeably, so a specific gravity of 0.80 is a density of 0.80 kg/L and multiplies litres straight into kilograms.

4 A density of 1.00 is water

Leaving a litre figure unchanged treats fuel as water. Three thousand two hundred litres would become 3 200 kg instead of 2 560 kg, and no aviation fuel is that dense.

5 Use the density you are given

Jet A-1 runs about 0.775 to 0.840 kg/L because cold fuel is denser. 0.785 kg/L is the standard reference, but the figure printed in the question always wins.

6 Mind the gallon

A US gallon is 3.785 litres and an Imperial gallon is 4.546. Convert the gallons to litres first, then apply the density: 2 500 US gallons at 0.80 kg/L is 7 570 kg.

Multiply litres by density for kilograms and divide kilograms by density for litres: a litre figure must never walk into a mass box unchanged.

These two come from SkyStudy's KSA (100) mental-maths set; they are the exact methods 033 planning questions test. Two of the 369 code-drawn study figures inside the SkyStudy question bank. Try them with the free demo at **skystudyatpl.com/demo**.

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