

PRIVATE PILOT GROUND SCHOOL

MODULE 2-R — PHASE 2 CUMULATIVE REVIEW

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MNEMONICS

East is least, west is best — Going from true to magnetic, subtract easterly variation and add westerly variation

The sign rule for variation on the heading chain. Read the isogonic line nearest the route: an easterly variation is subtracted from the true heading to get the magnetic heading, a westerly one is added. Say it at the nav log, where the chain is worked, and again on the checkride when the examiner hands you a chart.

The five Cs — Climb, communicate, confess, comply, conserve

The lost procedure in the order it is flown. Climb for the view, the radio, and the radar. Communicate on a charted frequency or 121.5. Confess that you do not know where you are, which the AIM calls an urgency condition the moment it begins. Comply with the vectors. Conserve the fuel by leaning and slowing while the position is rebuilt. The airplane is flown first, before the first C.

FACTS TO REMEMBER

KNOW THESE COLD

- Task priority in any abnormal situation is aviate, navigate, communicate — in that order.

Source: AFH ch. 18; PHAK ch. 2

- Situational awareness is an accurate picture of what is happening now and what happens next; distraction and fixation are its two main killers.

Source: PHAK ch. 2

- Magnetic variation is the angle between true and magnetic north; deviation is the compass error from the airplane's own fields, corrected by the card below the compass.

Source: PHAK ch. 8

- Compass acceleration error (northern hemisphere, east/west headings): Accelerate-North, Decelerate-South — ANDS. (Mnemonic object.)

Source: PHAK ch. 8

- Compass turning error: turning from a northerly heading the compass lags (shows a turn the opposite way at first); from a southerly heading it leads — Undershoot North, Overshoot South (UNOS). (Mnemonic object.)

Source: PHAK ch. 8

- The magnetic compass is reliable only in straight, level, unaccelerated flight — every other moment it is lying by a known recipe.

Source: PHAK ch. 8

- Before every flight, the pilot in command must become familiar with all available information concerning that flight.

Source: 14 CFR 91.103

- For a flight away from the vicinity of an airport, preflight action must include weather reports and forecasts.

Source: 14 CFR 91.103(a)

- For a flight away from the vicinity of an airport, preflight action must include fuel requirements.

Source: 14 CFR 91.103(a)

- For a flight away from the vicinity of an airport, preflight action must include alternatives available if the planned flight cannot be completed.

Source: 14 CFR 91.103(a)

- For a flight away from the vicinity of an airport, preflight action must include any known traffic delays advised by ATC.

Source: 14 CFR 91.103(a)

- For every flight, preflight action must include the runway lengths at the airports of intended use.

Source: 14 CFR 91.103(b)

- For every flight, preflight action must include takeoff and landing distance data from the POH/AFM, or other reliable performance information if no AFM is required.

Source: 14 CFR 91.103(b)

- NOTAMs, including TFRs, are part of "all available information" and must be checked before every cross-country flight.

Source: 14 CFR 91.103; AIM 5-1-3

- The VFR sectional chart is the primary planning chart for a private-pilot cross-country; each covers a named region at 1:500,000 scale.

Source: PHAK ch. 16

- Sectional charts expire on a published 56-day cycle; planning on an out-of-date chart risks missing new towers, frequencies, and airspace.

Source: Aeronautical Chart User's Guide

- Route selection starts with the airspace the route crosses: Class B, C, and D add communication or clearance requirements, and special use airspace must be identified and checked.

Source: PHAK ch. 15–16

- The Chart Supplement is the source for airport details the chart cannot show: runway data, lighting, frequencies, fuel, services, and hours.

Source: Chart Supplement legend

- Route selection weighs emergency options — terrain, airports along the way, and glide range — against the shortest straight line.

Source: PHAK ch. 16

- Frequency and navaid selection is part of planning: the VORs, CTAF/tower, and ATC frequencies for each leg are picked before flight, not hunted for in the air.

Source: PHAK ch. 16

- An EFB may replace paper charts for VFR flight if the pilot verifies the chart and database currency before flight.

Source: AC 91-78

- EFB failure must be planned for: charge state, a backup device or paper chart, and heat/sunlight shutdown risk.

Source: AC 91-78

- Cruising altitude must clear terrain and obstacles along the whole route; the quadrangle MEF on a sectional

gives the elevation of the highest feature in that quadrangle.

Source: PHAK ch. 16

- The MEF is not a safe cruising altitude by itself — it carries no buffer; the pilot adds a clearance margin above it.

Source: PHAK ch. 16

- Higher cruising altitude increases glide distance and the number of landable options after an engine failure.

Source: PHAK ch. 16; POH glide data

- In level VFR cruise more than 3,000 ft above the surface, a magnetic course of 0–179° requires an odd-thousand MSL altitude plus 500 ft.

Source: 14 CFR 91.159

- In level VFR cruise more than 3,000 ft above the surface, a magnetic course of 180–359° requires an even-thousand MSL altitude plus 500 ft.

Source: 14 CFR 91.159

- Forecast winds aloft change groundspeed and fuel burn with altitude; altitude selection weighs wind advantage against terrain and climb cost.

Source: PHAK ch. 16

- Time en route for a leg equals leg distance divided by groundspeed.

Source: PHAK ch. 16

- Groundspeed is true airspeed corrected for wind: a headwind component lowers it, a tailwind component raises it.

Source: PHAK ch. 16

- Climb segments are planned from POH climb data: time, fuel, and distance to top of climb differ from cruise values and are budgeted separately.

Source: POH/AFM sect. 5

- A descent is planned backward from the destination: choose a descent rate and groundspeed, then compute the distance needed to lose the altitude.

Source: PHAK ch. 16

- Flight-plan times and ETAs are figured in UTC (Zulu); local time converts to UTC by the zone offset, watching the date change.

Source: AIM 4-2-12

- METARs, TAFs, and briefings all timestamp in UTC, so the nav log converts once and stays in one time system.

Source: AWH FAA-H-8083-28

- Leg fuel equals leg time multiplied by the POH fuel-burn rate for the chosen power setting.

Source: POH/AFM sect. 5

- Total fuel required is taxi/runup plus climb plus cruise legs plus descent plus the legal reserve — and the tanks' usable fuel must cover all of it.

Source: 14 CFR 91.151; POH

- Day VFR fuel minimum: enough to fly to the first point of intended landing plus 30 minutes at normal cruising speed.

Source: 14 CFR 91.151(a)

- Night VFR fuel minimum: enough to fly to the first point of intended landing plus 45 minutes at normal cruising speed.

Source: 14 CFR 91.151(a)

- The 91.151 reserve is a legal floor, not a plan; North Aero planning sets a larger personal fuel reserve, fixed before flight.

Source: 14 CFR 91.151; personal minimums doctrine

- Usable fuel, not total fuel, is the planning number: unusable fuel cannot reliably reach the engine in flight attitudes.

Source: POH/AFM sect. 2

- A VFR flight plan exists for search and rescue: it tells Flight Service where to look and when to start looking.

Source: AIM 5-1-4

- A VFR flight plan is not required for most VFR flights, but filing one is the cheapest safety net on a cross-country.

Source: AIM 5-1-4

- A VFR flight plan carries: aircraft ID and type, departure point and time, route, altitude, destination, ETE, fuel on board, souls on board, and contact information.

Source: AIM 5-1-4

- Filing does not activate a VFR flight plan: the pilot opens it after departure by radio, phone, or EFB link to Flight Service.

Source: AIM 5-1-4

- Closing a VFR flight plan is the pilot's job; tower controllers do not close it for you.

Source: AIM 5-1-14

- If a VFR flight plan is not closed within 30 minutes after ETA, search and rescue procedures begin.

Source: AIM 5-1-14

- An intercepted aircraft follows the interceptor's visual signals: rocking wings from the interceptor means "you have been intercepted — follow me."

Source: AIM 5-6

- If intercepted: maintain a steady course, attempt contact on 121.5 MHz, squawk 7700 if unable to communicate, and notify ATC.

Source: AIM 5-6

- The Pilot leg of PAVE on a cross-country adds duration exposure: fatigue, food and water, and currency for the length and conditions of the trip.

Source: PHAK ch. 2

- The Aircraft leg asks whether this airplane is equipped and legal for this route: avionics, lighting for the arrival time, inspections current, performance adequate.

Source: PHAK ch. 2

- The enVironment leg is evaluated leg by leg — weather, terrain, airspace, and obstacles along the whole route, not just at the endpoints.

Source: PHAK ch. 2

- A reason you "must" arrive is itself a risk factor; the mitigation is alternatives arranged before takeoff — an extra day, a backup ride, a planned alternate.

Source: PHAK ch. 2

- VFR flight following is workload-permitting: ATC can refuse or drop it, and radar and radio coverage have floors — it is a service, not a guarantee.

Source: AIM 4-1-15

- No ATC service relieves a VFR pilot of see-and-avoid, terrain avoidance, or airspace compliance.

Source: AIM 4-1-15; 14 CFR 91.113

- Night cross-country planning raises the altitude floor: terrain and obstacles you cannot see demand a larger clearance margin than day.

Source: AFH night ops ch.

- Night cross-country checkpoints must be lighted or self-announcing — airports, beacons, towns, major highways — never section lines or dry creeks.

Source: AFH night ops ch.

- Pilotage is navigation by visible landmarks compared against the chart.

Source: PHAK ch. 16

- Dead reckoning is navigation by computed heading, speed, and time from a known starting point.

Source: PHAK ch. 16

- On a VFR cross-country the two run together: dead reckoning predicts, pilotage confirms — neither alone is the plan.

Source: PHAK ch. 16

- The required foundation for solo cross-country is charts plus pilotage and dead reckoning with a magnetic compass; electronic navigation rides on top of it, never in place of it.

Source: 14 CFR 61.93(e)(1)

- Variation is the angle between true north and magnetic north at your location, shown by isogonic lines on the chart.

Source: PHAK ch. 16

- "East is least, west is best": going from true to magnetic, subtract easterly variation and add westerly.

Source: PHAK ch. 16 (Mnemonic)

- The heading chain runs: true course, plus or minus wind correction gives true heading; plus or minus variation gives magnetic heading; plus or minus deviation gives compass heading.

Source: PHAK ch. 16

- The wind correction angle points the nose into the wind just enough to keep the ground track on the course line.

Source: PHAK ch. 16

- Contour lines and shaded relief show terrain elevation on the sectional; tightly packed contours mean steep terrain.

Source: PHAK ch. 16; Chart User's Guide

- A good checkpoint is unique, visible from cruise altitude, and on or near the course line.

Source: PHAK ch. 16

- Line features crossing the course (rivers, highways, railroads) make natural timing gates; line features parallel to the course confirm track and bound drift.

Source: PHAK ch. 16

- Checkpoints are spaced so groundspeed checks come at a regular interval — frequent enough to catch a wind change, sparse enough not to swamp the pilot.

Source: PHAK ch. 16

- The first checkpoint belongs after the top of climb, so the first groundspeed check measures cruise performance, not climb.

Source: PHAK ch. 16

- True course is measured with a plotter against a meridian near the midpoint of the leg.

Source: PHAK ch. 16

- True airspeed is calibrated airspeed corrected for density altitude; it rises roughly 2% per 1,000 ft of altitude

for the same calibrated airspeed.

Source: PHAK ch. 11

- Planning TAS comes from the POH cruise table for the chosen altitude, power setting, and temperature.

Source: POH/AFM sect. 5

- Cruise power selection trades speed against fuel flow and range; the POH cruise-performance table is the menu.

Source: POH/AFM sect. 5

- The wind side of the flight computer solves wind correction angle and groundspeed from forecast wind, TAS, and true course.

Source: PHAK ch. 16

- Actual groundspeed equals the distance between two checkpoints divided by the time between them.

Source: PHAK ch. 16

- A groundspeed slower than planned recomputes destination fuel first and the schedule second.

Source: PHAK ch. 16

- Off-course corrections are made by visual re-intercept, then a revised heading that holds the track.

Source: PHAK ch. 16

- A VOR broadcasts 360 radials oriented to magnetic north; a radial always points FROM the station.

Source: PHAK ch. 16; AIM 1-1-3

- A VOR must be identified by its Morse (or voice) identifier before use; a missing identifier means the facility is unusable, often for maintenance.

Source: AIM 1-1-3

- With a course set in the OBS, the CDI shows displacement from that course, and the TO/FROM flag shows whether flying the course would take you to or from the station.

Source: PHAK ch. 16

- CDI sensing is correct only when the selected course roughly matches the direction of flight; flying the reciprocal of the selected course gives reverse sensing.

Source: PHAK ch. 16

- To fix position with one VOR: center the needle with a FROM indication — the course window then reads the radial you are on.

Source: PHAK ch. 16

- Radials from two VORs cross at exactly one place: a two-VOR cross-fix is a position without any visual landmark.

Source: PHAK ch. 16

- VOR reception is line-of-sight: range grows with altitude, and terrain can block it down low.

Source: AIM 1-1-3

- GPS position comes from satellite ranging; the receiver needs four satellites for a three-dimensional fix.

Source: AIM 1-1-17; PHAK ch. 16

- RAIM is the receiver's integrity self-check: it detects when a satellite signal cannot be trusted; without RAIM the position is unmonitored.

Source: AIM 1-1-17

- A RAIM-loss or integrity annunciation in flight means the GPS position is unverified: crosscheck it, or revert to pilotage, dead reckoning, or VOR.

Source: AIM 1-1-17

- No regulation requires a current GPS database for VFR, but stale airspace and frequency data is a trap: an

out-of-date database must be covered by chart crosscheck.

Source: AIM 1-1-17

– Handheld and tablet GPS are situational-awareness aids only: not certified, not primary navigation, and their failure modes (battery, signal, heat) travel with them.

Source: AC 91-78

– VFR flight following provides traffic advisories and safety alerts, workload permitting; request it from approach or center with position, altitude, and destination.

Source: AIM 4-1-15

– Traffic advisories come as clock positions relative to your ground track — "traffic, two o'clock, five miles" — so the search sector shifts with your wind correction.

Source: AIM 4-1-15

– "Radar service terminated, squawk VFR" ends the service: navigation, terrain, and traffic are all yours again, with no handoff coming.

Source: AIM 4-1-15

– Mode A sends the four-digit squawk; Mode C adds pressure altitude; Mode S adds selective interrogation and data link.

Source: AIM 4-1-20

– Squawk 1200 is VFR; 7500 is hijack, 7600 lost communications, 7700 emergency — and avoid spinning the knobs through them.

Source: AIM 4-1-20

– ADS-B Out broadcasts GPS-derived position and velocity about once a second; it is how modern ATC and equipped aircraft see you.

Source: AIM 4-5-7

– ADS-B In (optional) receives TIS-B traffic and FIS-B weather; TIS-B shows only transponder- or ADS-B-equipped targets with coverage — it never shows every aircraft.

Source: AIM 4-5-7

– If an operable transponder is installed, it runs with altitude reporting whenever airborne in controlled airspace.

Source: 14 CFR 91.215(c)

– Program the navigator before the runway: a mis-set GPS flight plan flown faithfully is the modern way to get lost.

Source: PHAK ch. 16

– In-flight navigation programming is a distraction budget item: aviate first, then navigate — head-down time is scheduled, not stolen.

Source: PHAK ch. 2

– Name the limitation of whatever you navigate by today — VOR line-of-sight, GPS integrity, EFB battery — before flight, not after it bites.

Source: PHAK ch. 16

– On any nav-signal loss (flag, integrity warning, frozen EFB): say it out loud, hold the last crosschecked heading, and rebuild from pilotage and dead reckoning.

Source: PHAK ch. 16

– The lost-procedure spine is the five Cs: climb, communicate, confess, comply, conserve.

Source: AFH (Mnemonic 5 Cs)

– Climbing when lost improves both the view and radio/navaid reception.

Source: AFH

- Position rebuilds from the last known fix: time flown times groundspeed bounds the circle you must be in; then match large features to the chart.

Source: PHAK ch. 16

- A VOR cross-fix or the GPS nearest page resolves position without any visual match at all.

Source: PHAK ch. 16

- Any ATC radar facility can locate you and vector you; 121.5 and squawk 7700 exist for exactly this — asking early is airmanship, not failure.

Source: AIM 6-2-1

- Logging actual times over checkpoints is the raw material for un-losing yourself later: a current nav log is the anti-lost device.

Source: PHAK ch. 16

- The escalation triggers are concrete: fuel below plan, darkness coming, or weather lowering — any one of them means ask for help now or declare.

Source: AIM 6-1-2

- A lost airplane still needs flying: set safe altitude and power first, keep eyes out — circling a landmark head-down over a chart is a collision setup.

Source: AFH

- Unplanned fuel or power consumption while navigating (headwind, rich mixture, deviations) is caught by the checkpoint fuel log, and the response is the fuel decision point, not hope.

Source: PHAK ch. 16

- Performance numbers come from POH section 5 charts and tables, entered with actual weight, wind, temperature, and altitude — never from memory.

Source: POH/AFM sect. 5

- When conditions fall between table rows, interpolate — and when in doubt, round every input in the conservative direction.

Source: PHAK ch. 11

- The chart's conditions and notes are part of the data (paved level dry runway, flap setting, leaning technique); different conditions void the number.

Source: POH/AFM sect. 5

- Book performance was flown by test pilots in a new airplane; a worn trainer flown by a private pilot will not match it, so margin is added, not hoped for.

Source: AFH; PHAK ch. 11

- Pressure altitude is the altimeter reading with 29.92 set; it is the entry point for most performance charts.

Source: PHAK ch. 11

- Density altitude is pressure altitude corrected for nonstandard temperature: the altitude the airplane thinks it is at.

Source: PHAK ch. 11

- Standard sea-level atmosphere is 15 °C (59 °F) and 29.92 inHg (1013.25 hPa) — the yardstick every performance chart measures against.

Source: PHAK ch. 11

- Hot, high, or humid each raise density altitude alone — all three are not needed; a merely hot day at a low-elevation field has killed airplanes.

Source: AWH FAA-H-8083-28; NWS (1% guide)

- High density altitude cuts performance three ways at once: less lift from the wing, less thrust from the

propeller, less power from the engine.

Source: PHAK ch. 11 (1% guide)

– A headwind component shortens takeoff and landing distance; a tailwind lengthens it far more per knot — the POH tailwind penalty always outweighs the headwind credit.

Source: POH/AFM sect. 5

– Only the wind components count: the crosswind chart splits reported wind into a headwind component and a crosswind component.

Source: PHAK ch. 11

– Published short- and soft-field performance assumes the POH technique exactly — speeds, flap setting, braking; sloppy speeds add distance no chart shows.

Source: POH/AFM; AFH

– Takeoff flaps per POH shorten ground roll but flatten climb; landing flaps steepen the approach and slow the touchdown.

Source: POH/AFM

– Grass, soft, wet, or contaminated runways add roll; where the POH gives correction factors they are used, and where it does not, margin covers the guess.

Source: POH/AFM notes

– Runway slope matters in both directions: uphill takeoff and downhill landing each lengthen the distance that is critical.

Source: PHAK ch. 11

– Ground effect reduces induced drag within about a wingspan of the surface: an overloaded or high-DA airplane can lift off in ground effect and still be unable to climb out of it.

Source: PHAK ch. 5/11 (1-5 principles)

– Forward CG: more stable and nose-heavy — higher stall speed, more flare force needed, lower cruise speed.

Source: PHAK ch. 10

– Aft CG: less stable, slightly faster cruise — and degraded stall and spin recovery.

Source: PHAK ch. 10

– CG behind the aft limit can make spin recovery impossible; it is the deadliest weight-and-balance error.

Source: PHAK ch. 10

– Stall speed rises with the square root of load factor: 60° of bank in level flight is 2 g, and stall speed grows about 41%.

Source: PHAK ch. 5 (1-5 principles)

– Stall speed rises with weight; every stall and performance table is keyed to a weight.

Source: POH/AFM sect. 5

– Weight times arm equals moment; CG equals total moment divided by total weight.

Source: PHAK ch. 10

– The datum is the manufacturer's reference line; every arm in the airplane measures from it.

Source: PHAK ch. 10

– Basic empty weight includes unusable fuel and (in modern GAMA-format POHs) full oil — confirm what your airplane's figure includes before using it.

Source: PHAK ch. 10; POH sect. 6

– The airplane's current weighing record and equipment list — not the POH sample problem — is the legal source of empty weight and moment.

Source: POH sect. 6; PHAK ch. 10

- Useful load is maximum weight minus basic empty weight: crew, passengers, baggage, and usable fuel all come out of it.

Source: PHAK ch. 10

- Avgas weighs 6 lb per US gallon; oil weighs 7.5 lb per gallon.

Source: PHAK ch. 10

- The loading envelope chart is the verdict: plot weight against CG or moment, and the point must sit inside the envelope.

Source: POH sect. 6

- Fuel burn moves both weight and CG in flight: a loading legal at takeoff can leave the envelope later — check takeoff and landing conditions both.

Source: PHAK ch. 10

- The weight-shift formula: weight moved times distance moved equals total weight times CG change.

Source: PHAK ch. 10

- Overweight operation costs everything at once: longer takeoff, shallower climb, higher stall speed, less structural margin — and it voids the performance charts.

Source: PHAK ch. 10/11

- Baggage-area placards are structural limits: the floor and tiedowns are certified only to the placarded weight.

Source: POH sect. 2

- Operating limitations bind wherever they appear: POH section 2, placards, and instrument markings all carry regulatory force.

Source: 14 CFR 91.9; POH sect. 2

- The airspeed limits: Vne never exceed (red line), Vno maximum structural cruise (top of green), Va maneuvering (not marked on the dial), Vfe maximum flaps extended (top of white).

Source: PHAK ch. 8; POH sect. 2

- Vy climbs give the most altitude per minute; Vx the most altitude per distance — obstacle-clearance planning uses Vx numbers.

Source: POH sect. 5; PHAK ch. 11

- Climb rate falls as you go up; service ceiling is the altitude where the best rate has decayed to 100 fpm.

Source: PHAK ch. 11

- The cruise-performance table links percent power, RPM, TAS, and fuel flow at each altitude and temperature — the same table feeds 2-1's fuel plan and 2-2's TAS.

Source: POH sect. 5

- Takeoff and landing "over a 50-ft obstacle" columns include the air segment; the ground-roll column alone understates the runway needed when anything stands off the end.

Source: POH sect. 5

- The performance-chart check is a per-flight event, not a per-airplane fact: a new field elevation, temperature, or load resets every number.

Source: PHAK ch. 11

- Runway and takeoff-path selection is a computed decision — aircraft performance and limitations, distance available, surface, and wind, weighed against pilot capability — made before taxi, not at the hold-short line.

Source: POH/AFM sect. 5; AFH (pin-needed)

- Density altitude follows the airplane around the pattern: a go-around at a high-density-altitude field may barely climb, so the go-around path and obstacle picture are part of the runway decision.

Source: PHAK ch. 11 (pin-needed)

- The regulatory driver for weather briefing is 91.103: weather reports AND forecasts are required preflight information for any flight away from the airport's vicinity.

Source: 14 CFR 91.103(a)

- The two official outlets are aviationweather.gov (Aviation Weather Center) for products and Flight Service (1800wxbrief.com / 1-800-WX-BRIEF) for briefings.

Source: AIM 7-1-5; AC 91-92

- A self-briefing from official sources is regulatorily compliant — a phone call to a briefer is one way to meet 91.103, not the only way.

Source: AIM 7-1-5a; AC 91-92

- Weather can be updated in flight — Flight Service by radio and FIS-B datalink — but nothing available in flight replaces the preflight briefing.

Source: AIM 7-1-5f; AC 00-63B

- A standard briefing is the complete picture, requested closest to departure time, for any flight.

Source: AIM 7-1-5

- An abbreviated briefing updates an earlier briefing or answers specific items — it rides on top of a standard one, never in place of it.

Source: AIM 7-1-5

- An outlook briefing applies when departure is six or more hours away, and it is for planning purposes only.

Source: AIM 7-1-5d

- An outlook briefing is never a launch briefing: get a standard briefing near departure time.

Source: AIM 7-1-5d (1% material)

- A briefer (or self-brief form) needs: aircraft ID and type, VFR, departure point and time, route, altitude, destination, and ETE.

Source: AC 91-92

- A briefing is weather plus aeronautical information: NOTAMs and TFRs ride in it, so a blue-sky day can still be a no-go on a runway closure or a TFR.

Source: AC 91-92

- "VFR flight not recommended" is advisory in nature; the go/no-go decision rests solely with the pilot — it is a strong data point, not an order.

Source: AIM 7-1-5b

- The self-brief runs in a fixed order: synopsis, then hazards, then current weather, then forecasts, then winds, then decide and document.

Source: AC 91-92 (Erick doctrine, depth std.)

- A METAR is a routine surface observation, typically hourly: it is history, not forecast.

Source: AWH FAA-H-8083-28

- A SPECI is an unscheduled special observation: its existence alone says something changed fast.

Source: AWH FAA-H-8083-28

- METAR wind reads dddffKT in degrees true and knots; G marks gusts, VRB variable, 00000KT calm.

Source: AWH FAA-H-8083-28

- METAR visibility is in statute miles, including fractions (1 1/2SM).

Source: AWH FAA-H-8083-28

- Weather codes carry an intensity prefix: minus is light, none is moderate, plus is heavy — and the letter pairs are learnable (RA rain, SN snow, BR mist, FG fog, HZ haze, TS thunderstorm).

Source: AWH FAA-H-8083-28

- Sky condition comes in eighths: FEW 1–2, SCT 3–4, BKN 5–7, OVC 8, with heights in hundreds of feet AGL.

Source: AWH FAA-H-8083-28

- A ceiling is the lowest broken or overcast layer (or vertical visibility); scattered is not a ceiling.

Source: AWH FAA-H-8083-28

- Temperature and dewpoint report in whole degrees Celsius; an M prefix means below zero.

Source: AWH FAA-H-8083-28

- A closing temperature–dewpoint spread across successive METARs is the fog warning: a small spread on a clear, calm evening reads "expect fog by morning."

Source: AWH FAA-H-8083-28 (mechanism -> 3-3)

- The altimeter group (A2992 = 29.92 inHg) is set before flight, and the altimeter should then read field elevation.

Source: AWH FAA-H-8083-28

- The briefing covers stations along the whole route, not just the endpoints: en route METARs are where the surprise lives.

Source: AC 91-92

- A TAF is an aerodrome forecast for the area within 5 SM of the airport — it says nothing about the en route segment.

Source: AWH FAA-H-8083-28

- TAFs issue four times daily on the 6-hour cycle, valid 24 hours (30 at some airports).

Source: aviationweather.gov TAF docs

- TAF groups read day-plus-hour Zulu: the header carries issuance time and a ddhh/ddhh validity window.

Source: AWH FAA-H-8083-28

- FM means a rapid change to a new prevailing condition at that time.

Source: AWH FAA-H-8083-28

- BECMG means a gradual change spread across the stated window.

Source: AWH FAA-H-8083-28

- TEMPO means temporary fluctuations, each lasting less than an hour and covering less than half the period.

Source: AWH FAA-H-8083-28

- PROB30 marks a 30-percent chance of the bracketed conditions in that window — low odds, real enough to plan around.

Source: AWH FAA-H-8083-28

- The flight-category quick look: VFR is ceiling above 3,000 and visibility above 5; MVFR 1,000–3,000 and/or 3–5; IFR 500 to below 1,000 and/or 1 to below 3; LIFR below 500 and/or below 1.

Source: AIM 7-1-7

- MVFR is a decision zone, not a green light: legal VFR can still sit below personal minimums.

Source: AIM 7-1-7; personal minimums doctrine

- The briefing's adverse-conditions section is the no-go trigger list: known or forecast icing or turbulence aloft, or convection, in a non-deiced trainer reads "no" — before any product decoding.

Source: AC 91-92; AWH FAA-H-8083-28

- Winds aloft from the briefing feed the nav log, and a strong disagreement between winds aloft and surface wind warns of shear and turbulence in the climb and descent.

Source: AWH FAA-H-8083-28 (decode -> 3-4)

- Personal weather minimums are written numbers — ceiling, visibility, wind and crosswind — set before flight, sitting above the legal minimums.

Source: AC 91-92 §8.2; NA Personal Minimums Sheet

- The personal-minimums comparison is mechanical: forecast versus the written number; the number does not renegotiate on the ramp.

Source: NA Personal Minimums Sheet (internal)

- Weather worse than briefed and trending below personal minimums IS the circumstance that makes diversion prudent — recognizing it is 2-4's job; flying the diversion is 1-16's.

Source: AC 91-92

- Every product has an age: a METAR is minutes to an hour old, and a forecast's confidence decays through its period — check issue times, not just contents.

Source: AWH FAA-H-8083-28

- The go/no-go is stated as a conclusion falling out of the framework — brief, compare, decide, document — never as a feeling about the sky.

Source: AC 91-92 (Erick doctrine, depth std.)

- Class B draws as solid blue rings; each shelf is labeled ceiling-over-floor in hundreds of feet MSL (100/40 = 10,000 over 4,000).

Source: PHAK ch. 15; Chart User's Guide

- Class C dimensions: typically a 5-NM-radius surface core and a 10-NM shelf from about 1,200 to 4,000 ft above the airport.

Source: PHAK ch. 15

- The boxed Class D ceiling figure reads in hundreds of feet MSL; the airspace typically runs up to 2,500 ft above the field.

Source: PHAK ch. 15

- Class E to the surface draws as a dashed magenta circle around the airport.

Source: PHAK ch. 15

- Inside magenta vignette (shading), Class E begins at 700 ft AGL; outside it, Class E generally begins at 1,200 ft AGL.

Source: PHAK ch. 15

- Below the Class E floor is Class G — a thin layer at most airports, thicker in the mountain West.

Source: PHAK ch. 15

- Class A begins at 18,000 ft MSL everywhere: IFR clearance and instrument rating territory, with no VFR operations.

Source: PHAK ch. 15

- Airport symbol color is the tower key: blue airports have (or share) an operating control tower, magenta airports do not.

Source: Chart User's Guide

- Class G carries no ATC communication requirement; self-announcing on CTAF is procedure and good sense, not a legal entry gate.

Source: 14 CFR 91.126; AIM 4-1-9

- Class E en route has no communication requirement for VFR aircraft.

Source: 14 CFR 91.127

- Class D entry requires two-way radio communications established BEFORE entering, and maintained inside.

Source: 14 CFR 91.129(c)

- Class C entry takes the same established-communications test as D, plus an altitude-reporting transponder and ADS-B Out.

Source: 14 CFR 91.130(c); 91.215; 91.225

- Class B entry requires an explicit ATC clearance into the Class B — hearing your callsign is not enough.

Source: 14 CFR 91.131(a)

- Class B requires at least a private pilot certificate, or a student pilot with the specific ground and flight training and a logbook endorsement under 61.95, dated within the preceding 90 days and naming that Class B.

Source: 14 CFR 91.131(b); 61.95

- An altitude-reporting (Mode C) transponder and ADS-B Out are required in Class A, B, and C, and at and above 10,000 ft MSL except at and below 2,500 ft AGL.

Source: 14 CFR 91.215(b); 91.225

- The Mode C veil: within 30 NM of a listed Class B primary airport, surface to 10,000 ft MSL, transponder-with-altitude and ADS-B Out are required even under or outside the shelves.

Source: 14 CFR 91.215(b)(2); 91.225(d)(2)

- The speed cap below 10,000 ft MSL is 250 KIAS.

Source: 14 CFR 91.117(a)

- At or below 2,500 ft AGL within 4 NM of a Class C or D primary airport, the cap is 200 KIAS (does not apply inside Class B).

Source: 14 CFR 91.117(b)

- Under a Class B shelf or in a VFR corridor through Class B, the cap is 200 KIAS.

Source: 14 CFR 91.117(c)

- The everyday minimums ("3-152s"): Class C, D, and E below 10,000 ft MSL take 3 SM visibility and 500 below, 1,000 above, 2,000 ft horizontal from clouds.

Source: 14 CFR 91.155(a)

- Class B takes 3 SM and CLEAR of clouds — the exception that works because everyone inside holds an ATC clearance.

Source: 14 CFR 91.155(a)

- Class G in the daytime, at or below 1,200 ft AGL: 1 SM and clear of clouds.

Source: 14 CFR 91.155(a)

- Class G at night takes 3 SM and 500/1,000/2,000 — darkness strips away the Class G discount.

Source: 14 CFR 91.155(a)

- When the ceiling is under 1,000 ft, VFR flight beneath it is prohibited within the lateral boundaries of controlled airspace designated to the surface for an airport.

Source: 14 CFR 91.155(c)

- To take off, land, or enter the pattern inside a B/C/D/E surface area under VFR, ground visibility must be at least 3 SM (flight visibility 3 SM if ground visibility is not reported).

Source: 14 CFR 91.155(d)

- The preflight use of 91.155: destination METAR/TAF ceiling and visibility against the surface-area rule — 1,000 and 3 is the pair that decides whether the field is legally enterable VFR.

Source: 14 CFR 91.155(c)-(d)

- Cloud clearance buffers exist for see-and-avoid: an IFR aircraft can appear out of that cloud, and 500/1,000/2,000 is your reaction time.

Source: PHAK ch. 15

- Special use airspace prints on the sectional with hatched borders and an R-, P-, A-, or MOA label; the chart-edge panel gives its altitudes, times, and controlling agency — identify and check, with the operating rules in 3-5.

Source: Chart User's Guide; PHAK ch. 15

- TFRs never print on the sectional: they live in NOTAMs and current EFB overlays, which is why the NOTAM check is an airspace check.

Source: 14 CFR 91.103; AIM 3-5

- Shelf floors and ceilings on the chart are MSL numbers: convert against local terrain before ducking under a shelf that is lower above the ground than it looks.

Source: PHAK ch. 15

- The Class E floor is a minimums boundary too: below the vignette you hold G minimums (1 SM clear, day); climbing through 700 or 1,200 AGL the 3-152s attach.

Source: 14 CFR 91.155; PHAK ch. 15

- Airspace risk is a position problem: the ring only bites if you don't know you're in it — boundaries are fixed to landmarks and GPS overlays before flight.

Source: PHAK ch. 15

- Cones serve center vision, color, and detail, and need light; rods serve peripheral and dim-light vision, detect motion, and see no color.

Source: PHAK ch. 17; AIM 8-1-6

- The night blind spot: rods are absent at the center of vision, so a light stared at directly at night can disappear.

Source: PHAK ch. 17

- Night scanning is off-center: look about 5–10° to the side of what you want to see.

Source: PHAK ch. 17; AIM 8-1-6

- Full dark adaptation takes about 30 minutes — and seconds of bright white light can erase it.

Source: PHAK ch. 17

- Preserving adaptation is procedure: cockpit lights dim, flashlight filtered, eyes shielded from strobes, landing lights, and lightning.

Source: PHAK ch. 17

- Red light preserves night vision but washes out red and magenta chart print; dim white is the chart-reading compromise.

Source: PHAK ch. 17

- A lighted civil land airport beacon flashes white and green.

Source: AIM 2-1-10

- A military airport beacon shows two quick white flashes between the green.

Source: AIM 2-1-10

- Runway edge lights are white; from the approach the threshold shows green and the far end shows red.

Source: AIM 2-1-4/2-1-5

- Taxiway edge lights are blue; taxiway centerline lights, where installed, are green.

Source: AIM 2-1-9

- Two-bar VASI: red over white is on the glide path; white over white high; red over red low ("red over red, you're dead").

Source: AIM 2-1-2

- Four-light PAPI: two white and two red is on path; more white is high, more red is low.

Source: AIM 2-1-2

- Pilot-controlled lighting keys on the CTAF: 7 clicks for high intensity, 5 medium, 3 low — and the lights time out (typically 15 minutes), so key again on final.

Source: AIM 2-1-8

- Obstructions light with steady or flashing red at night and white strobes by day or night — and a lit tower's guy wires are unlit and reach far to the sides of it.

Source: AIM 2-2-3

- Aircraft position lights: red on the left wingtip, green on the right, white on the tail.

Source: 14 CFR 91.205(c); AIM 4-3-23

- Position lights must be lighted from sunset to sunrise — and an aircraft parked or moved in a night operations area must be lighted, illuminated, or in a marked area.

Source: 14 CFR 91.209(a)

- Anticollision lights run for all operations, day and night, unless the PIC determines that turning them off is in the interest of safety (strobes in cloud or on a crowded ramp).

Source: 14 CFR 91.209(b)

- Night VFR equipment is the day list plus: approved position lights, an approved anticollision light system, a landing light if operated for hire, an adequate electrical source, and spare fuses.

Source: 14 CFR 91.205(c)

- Logging night time runs on the civil-twilight clock: night is the time between the end of evening civil twilight and the beginning of morning civil twilight.

Source: 14 CFR 1.1

- Night passenger currency runs on its own clock: 1 hour after sunset to 1 hour before sunrise.

Source: 14 CFR 61.57(b)

- To carry others at night, the PIC needs three takeoffs and three landings to a FULL STOP, in the currency window, within the preceding 90 days, as sole manipulator, in the same category, class, and type if a type rating is required.

Source: 14 CFR 61.57(b)

- Day currency landings may be touch-and-go; night landings must be full-stop — and night full-stops count toward day currency, never the reverse.

Source: 14 CFR 61.57(a)-(b)

- Personal night equipment starts with two flashlights — white for the preflight, red or dim for the cockpit — plus spare batteries.

Source: AFH night ops ch.

- The night cockpit is organized before dark: charts and EFB night mode set, frequencies staged, flashlight within reach — fumbling for gear is the signature night distraction.

Source: AFH night ops ch.

- Night pilotage runs on lighted features — beacons, towns, highways; unlighted landmarks are simply gone.

Source: AFH night ops ch.

- Distances and heights deceive at night: obstacle and terrain clearance comes from the chart and altimeter, not from the view.

Source: AFH night ops ch.

- On dark-terrain legs the instruments corroborate what the window cannot: attitude and altimeter crosscheck guards the lost horizon (1-8's skills, applied at night).

Source: AFH night ops ch.

- Finding the airport at night is beacon-first, runway-lights-second; the beacon is visible far beyond the runway environment.

Source: AIM 2-1-10

- Night weather risk is a visibility-of-weather problem: clouds you cannot see, so the METAR/TAF picture and the disappearing-lights check replace your eyes, and night personal minimums run higher than day.

Source: AFH night ops ch.; NA Personal Minimums Sheet

- Night taxi is slower and lower-trust: blue edges and green centerline, the airport diagram out, progressive taxi available for the asking.

Source: AFH night ops ch.

- Night ground light discipline for the taxi/landing light: on whenever the airplane is moving, courtesy-off when facing another aircraft head-on.

Source: AIM 4-3-23

- Strobes stay off during taxi and come on when entering the runway.

Source: AIM 4-3-23

- Night runway incursion defense: hold-short lines are harder to see, so position is verified against lighting, signage, and the diagram — unsure means stop and ask.

Source: AIM 2-3-5

- Seeing another aircraft's red and green together means it is coming toward you.

Source: AIM 4-3-23

- Seeing red alone: you face its left side — it is crossing from your right to your left.

Source: AIM 4-3-23

- Seeing green alone: it is crossing from your left to your right.

Source: AIM 4-3-23

- Seeing white alone: it is moving away from you — or you are overtaking it.

Source: AIM 4-3-23

- Autokinesis: a single light stared at in the dark appears to move; the fix is to keep the eyes scanning, never staring.

Source: AIM 8-1-5

- False horizon: sloping cloud decks, lit shorelines, or highway strings masquerade as the horizon; the attitude indicator settles the argument.

Source: AIM 8-1-5

- The black-hole approach: a lighted runway across dark, featureless terrain invites a dangerously LOW approach — fly the VGSI or a computed descent, not the picture.

Source: AIM 8-1-5; AFH

- Roads and light strings get mistaken for runways at night; the beacon, the layout, and the CTAF picture confirm before descent continues.

Source: AFH night ops ch.

- Night collision avoidance is slower and geometric: overlapping off-center scan segments, with position-light logic replacing silhouette recognition.

Source: AIM 8-1-6

- Night currency is the legal floor; night proficiency — recent night landings, this airplane, this airport — is the personal-minimums question, asked separately.

Source: 14 CFR 61.57(b); PHAK ch. 2

- A dead position light after sunset grounds the flight unless the 91.213 inoperative-equipment process clears it — "it worked in daylight" is not a dispatch theory.

Source: 14 CFR 91.209; 91.213 (1-4/3-2 process)

- Night forced landing doctrine: glide toward lighted areas or a known airport, configure early, and save the

landing light for late — darkness hides the surface until it matters.

Source: AFH night ops ch.

GOING DEEPER

- The lead/lag of the compass in turns is roughly equal to the latitude of the flight.

Source: IFH ch. 5

- An EFB is an aggregator: its weather and NOTAM feeds carry the limits of the underlying products, so the raw product — not the app's summary — is the authority when they disagree.

Source: AC 91-92

- VFR cruising altitudes key to magnetic course, not heading: the wind correction you fly never changes which altitudes are legal.

Source: 14 CFR 91.159

- The common private-pilot intercept cause is an unchecked TFR; the preflight NOTAM check is the mitigation.

Source: AIM 5-6; 14 CFR 91.103

- A fuel decision point is computed before flight: a named point where, if fuel is below plan, the flight lands and refuels — the decision is made on the ground, not renegotiated in the air.

Source: AC 91-92 §8 doctrine

- Night cross-country routes favor lighted corridors and staying within glide of lighted airports, even at some distance cost.

Source: AFH night ops ch.

- Winds aloft forecasts and METAR winds are in degrees true; winds voiced by a tower or ATIS are magnetic.

Source: AWH FAA-H-8083-28; AIM

- A persistent planned-vs-actual heading disagreement means the wind is not as forecast: update the wind correction angle rather than re-intercepting again and again.

Source: PHAK ch. 16

- Each dot of a VOR CDI is about 2° of course displacement; full-scale deflection is 10° or more off course.

Source: PHAK ch. 16

- VOR accuracy checks are required for IFR (91.171), not VFR — but a VOT ground check ($\pm 4^\circ$ tolerance) is the free habit that catches a lying receiver.

Source: 14 CFR 91.171; AIM 1-1-4

- DME and GPS distances are slant range: directly over a station at altitude, the readout shows your altitude in miles, not zero.

Source: PHAK ch. 16

- The VOR network is shrinking to a minimum operational network: never assume every charted VOR is in service — check NOTAMs.

Source: AIM 1-1-3

- RAIM needs a fifth satellite to detect a faulty signal and a sixth to isolate and exclude it; barometric aiding can stand in for one satellite.

Source: AIM 1-1-17

- IFR GPS operations require RAIM/integrity prediction before flight; the VFR pilot borrows the habit — know before takeoff whether the box can be trusted today.

Source: AIM 1-1-17

- GPS interference and jamming are real (military test NOTAMs); a sudden unexplained GPS anomaly means crosscheck against ground references immediately.

Source: AIM 1-1-17; GPS NOTAMs

- WAAS augments GPS with corrected, integrity-monitored signals — better accuracy and availability than unaugmented GPS.

Source: AIM 1-1-18

- Mode C reports pressure altitude; ATC's computer applies the correction — the pilot never adjusts the transponder for the altimeter setting.

Source: AIM 4-1-20

- When lost, read from ground to chart — pick the landmark first, then find it on paper; chart-to-ground invites forcing the match.

Source: AFH

- A standing safety factor on computed takeoff and landing distance (North Aero teaches +50%) turns book numbers into planning numbers.

Source: AFH; internal doctrine

- An abort point is chosen before takeoff: a spot on the runway where, if the airplane is not flying or not accelerating on plan, the takeoff stops.

Source: AFH

- Density altitude rises roughly 120 ft for every 1 °C above standard temperature.

Source: PHAK ch. 11 (1% guide)

- Humidity is the weakest of the three levers — fully saturated warm air is only about half a percent to one percent less dense — real, but temperature and altitude dominate.

Source: NWS High Density Altitude (1% guide)

- High density altitude is not a red light by itself; it is a number you plan runway, weight, and climb around.

Source: 1% guide; PHAK ch. 11

- High density altitude is a landing problem too: the same indicated approach speed means higher true and ground speed, so the runway goes by faster and the rollout is longer.

Source: 1% guide; PHAK ch. 11

- Max demonstrated crosswind component is a demonstrated value, not a limitation — but beyond it you are the test pilot.

Source: POH/AFM sect. 4

- Maneuvering speed V_a decreases as weight decreases: a lightly loaded airplane has a lower V_a , not a higher one.

Source: POH/AFM; PHAK ch. 5

- Where the POH distinguishes ramp weight from takeoff weight, the difference is the taxi and runup fuel allowance.

Source: POH sect. 2/6

- Some types set a maximum landing weight below maximum takeoff weight; when they do, fuel burn en route is part of the landing plan.

Source: POH sect. 2

- Many trainers hold utility-category approval only inside a smaller weight-and-CG envelope, and the steeper maneuvers that category approves are legal only there. The Warrior's placard prohibits spins in both categories.

Source: POH sect. 2; PA-28-151 placards

- V_a promises that a single, full deflection of one control below it stalls the airplane before breaking it — it is no guarantee for repeated or combined inputs.

Source: PHAK ch. 5

- Certified limit load factors, flaps up: normal category +3.8/-1.52 g; utility +4.4/-1.76 g.

Source: PHAK ch. 5; POH sect. 2

- Maximum range and maximum endurance live at different power settings: going far and staying up long are different plans.

Source: PHAK ch. 11; POH sect. 5

- Tracking actual versus computed performance is a habit: an airplane consistently under book is a bigger-margin airplane and a maintenance conversation.

Source: AFH

- EFB weather is aggregated NWS/FAA data: convenient, but when the app's summary and the raw product disagree, the product is the authority.

Source: AC 91-92 (1% material)

- The source hierarchy: the Aviation Weather Center makes the products; Flight Service delivers and logs briefings; EFBs repackage both.

Source: AIM 7-1-5; AC 91-92 (1% material)

- Briefings taken through a Flight Service account are recorded to that account — documentation that the 91.103 weather requirement was met.

Source: Leidos 1800wxbrief (non-FAA; pin)

- Flight Watch (122.0) and HIWAS are gone; the current AIM no longer mentions either, and materials still teaching them are out of date.

Source: AIM (verified absence, 2026-07-12)

- The briefing cadence: outlook early, standard close to departure, abbreviated again if the picture is over an hour old or the weather is questionable.

Source: AC 91-92 §8.1

- VV (vertical visibility) means the sky is obscured: an indefinite ceiling with no layer base to sneak under.

Source: AWH FAA-H-8083-28

- AO2 in remarks means an automated station with a precipitation discriminator; automated stations can miss what a human observer would catch, like a distant thunderstorm.

Source: AWH FAA-H-8083-28

- An amended TAF (TAF AMD) supersedes and cancels the previous TAF the moment it issues — planning never continues on the old one.

Source: aviationweather.gov TAF docs (verbatim, 2026-07-12)

- CB is the only cloud type a TAF names; its appearance is a convective warning for that window.

Source: AWH FAA-H-8083-28

- The continue/divert decision point is set before launch: the place, plus the conditions there that trigger the divert.

Source: AC 91-92 (Erick doctrine, depth std.)

- About two-thirds of GA accidents in reduced-visibility weather are fatal: the go/no-go call is the highest-leverage safety decision a private pilot makes.

Source: NTSB SA-020

- A minus sign before the boxed Class D figure means "up to but not including" that altitude.

Source: Chart User's Guide

- Communications are established when the controller says your callsign: "N123AB, standby" is established; "aircraft calling, standby" is not.

Source: AIM 3-2-1

- The Class B words matter: without "cleared into the Class Bravo," you stay out — vectors, a squawk, or flight following do not open the door.

Source: AIM 3-2-3

- A short list of the busiest Class B airports prohibits student-pilot operations entirely, endorsement or not.

Source: 14 CFR 91.131; pt. 91 app. D §4

- Above the ceiling of Class B or C, up to 10,000 ft MSL within their lateral boundaries, the transponder and ADS-B requirements still apply.

Source: 14 CFR 91.215(b)(4); 91.225(d)(3)

- ADS-B Out mirrors the transponder airspace and adds Class E at and above 10,000 ft MSL (minus the 2,500-AGL cushion) and 3,000+ MSL over the Gulf within 12 NM of the coast.

Source: 14 CFR 91.225(d)

- Flying into rule airspace without the equipment takes an ATC authorization arranged in advance (ADAPT for ADS-B) — not a request made airborne at the boundary.

Source: 14 CFR 91.215(d); 91.225(g)

- At and above 10,000 ft MSL the minimums jump to 5 SM and 1,000/1,000/1 SM, because the 250-knot cap is gone and closure rates double.

Source: 14 CFR 91.155(a); 91.117(a)

- After a possible airspace deviation: fly the airplane, comply with ATC, and file a NASA ASRS report within 10 days — the safety system's learning channel, with sanction protection attached.

Source: AC 00-46

- Night vision is the first thing mild hypoxia takes, well below the altitudes of daytime symptoms; supplemental oxygen above about 5,000 ft at night is the FAA's recommendation.

Source: PHAK ch. 17; AIM 8-1-2

- Carbon monoxide, smoking, fatigue, and low blood sugar each degrade night vision before they produce any other symptom you would notice.

Source: PHAK ch. 17

- Beacon color codes extend past land airports: white/yellow marks a water airport, green/yellow/white a heliport.

Source: AIM 2-1-10

- An airport beacon running in daytime in B/C/D/E surface airspace often means weather below basic VFR minimums — advisory, not guaranteed, and no substitute for a METAR.

Source: AIM 2-1-10

- The landing light is required at night only when the flight is for hire — a private night flight without one is legal, and still unwise.

Source: 14 CFR 91.205(c)(4)

- The fuse requirement is specific: one spare set, or three spare fuses of each kind required, accessible to the pilot in flight.

Source: 14 CFR 91.205(c)(6)

- Three definitions of night, three different clocks: civil twilight for logging (1.1), sunset-to-sunrise for lights (91.209), sunset+1 to sunrise-1 for currency (61.57(b)) — knowing which clock a question runs on is the exam trap.

Source: 14 CFR 1.1; 91.209; 61.57(b)

- The recency rule now says "carrying persons," not "passengers" — the wording changed in the November 2024 rule, and older materials carry the old word.

Source: 14 CFR 61.57(a)-(b) (Amdt. 61-157)

- Ground lights disappearing along a line means something — cloud, ridge, fog bank — now stands between you and them: the night IMC/CFIT tripwire.

Source: AFH night ops ch.

- Unusually bright runway lighting makes the runway seem closer than it is; unrecognized, the result is a high approach — the mirror error to the black hole.

Source: AIM 8-1-5

- A failed landing light in flight is a technique change, not an emergency: normal approach, flare read from the runway-edge picture.

Source: AFH night ops ch.

- Night fuel practice is fatter than the 45-minute floor: reserves grow and fuel stops are planned where fuel is actually available at that hour — FBO and self-serve hours live in the Chart Supplement.

Source: Chart Supplement; 14 CFR 91.151