Miscellaneous tough stuff

- 15 CFR Part 1: Category for certification of airmen: airplane, rotorcraft, glider, lighter-than-air
- Category for certification of aircraft: transport, normal, utility, acrobatic...
- Class for certification of airmen: SE, ME, Land, water, gyroplane, helicopter, airship, free balloon
- Class for certification of airplane: airplane, rotorcraft, glider, balloon, landplane, seaplane
- Quick table for F-C: 212=100, 104=40, 86=30, 68=20, 50=10, 32=0, delta: 1.8°=1.0°, or for every 10°F you get 18°C.
- See http://www.risingup.com/fars/info/91-index.shtml

Regulations

- Minimum safe altitudes (91.119)
    - Anywhere: high enough to allow safe emergency landing
    - Congested: 1,000 over nearest ≤2000 ft.
    - Other: 500 ft above surface except over water or sparsely populated, then ≥500 ft from structure/person/vessel
    - Aerobatics (91.303)
- Max speed below 10,000 feet MSL: 250 knots (91.117)
- Max speed in Bravo, including VFR corridors in them: 200 knots (91.117)
- Max speed in C: 200 knots (AIM 3-2-4)
- Max speed in D: 200 knots (AIM 3-2-5)
- AIM 4-3-2: not all towers are in class D/C/B! Missing weather reporting capabilities. Still required to contact them in E/G (91.126, 91.127)
- Mode C also required 10K+ in 48 states (AIM 4-1-9)
- If radio fails under VFR, conditions before landing at towered airport (91.126-129)
    - Weather conditions are at or above basic VFR weather minimums (3sm ground visibility, ceiling at least 1,000 feet -- NOTE that Class B is clear of clouds)
    - Visual contact with the tower is maintained;
    - A clearance to land is received.
- Special VFR: 1sm ground visibility and clear of clouds (AIM 4-4-5). Day only unless plane/pilot IFR.
- Marginal VFR (from weather): 1,000-3,000 ceilings, 3-5sm visibility
- There are five different ways to get logable pilot in command (PIC) time according to FAR 61.51(c)(2)
    1. Sole manipulator of the controls in an aircraft rated for.
    2. Sole occupant of aircraft
    3. Certified Flight Instructor acting as CFI
    4. Applies to ATPs
    5. Applies to two pilots required for aircraft

Private Pilot - Airplane Practical Test Prerequisites

An applicant for the Private Pilot - Airplane Practical Test is required by 14 CFR part 61.103 to:

1. be at least 17 years of age;
2. be able to read, speak, write, and understand the English language;
3. have passed the appropriate private pilot knowledge test since the beginning of the 24th month before the month in which he or she takes the practical test;
4. have satisfactorily accomplished the required training and obtained the aeronautical experience prescribed;
5. possess at least a current third class medical certificate;
6. have an endorsement from an authorized instructor certifying that the applicant has received and logged training time within 60 days

preceding the date of application in preparation for the practical test, and is prepared for the practical test; and
7. also have an endorsement certifying that the applicant has demonstrated satisfactory knowledge of the subject areas in which the applicant was deficient on the airman knowledge test.

Aircraft and Equipment Required for the Practical Test

The private pilot - airplane applicant is required by 14 CFR section 61.45, to provide an airworthy, certificated aircraft for use during the practical test. This section further requires that the aircraft must:
1. be of U.S., foreign or military registry of the same category, class, and type, if applicable, for the certificate and/or rating for which the applicant is applying;
2. have fully functioning dual controls, except as provided for in 14 CFR section 61.45(c) and (e); and
3. be capable of performing all AREAS OF OPERATION appropriate to the rating sought and have no operating limitations, which prohibit its use in any of the AREAS OF OPERATION, required for the practical test.

I. AREA OF OPERATION: PREFLIGHT PREPARATION

NOTE: The examiner shall develop a scenario based on real-time weather to evaluate TASKs C and D.

A. TASK: CERTIFICATES AND DOCUMENTS

REFERENCES: 14 CFR parts 43, 61, 91; FAA-H-8083-3, AC 61-23/FAA-H-8083-25; POH/AFM.
Objective. To determine that the applicant exhibits knowledge of the elements related to certificates and documents by:
1. Explaining
   a. private pilot certificate privileges, limitations, and recent flight experience requirements.
      - *privileges/limitations (61.113)*
        - *ASEL private pilot can fly single-engine aircraft*
        - *Can carry passengers/cargo*
        - *Cannot carry passengers or cargo for compensation*
        - *Cannot fly for hire, can fly in furtherance of a business (if only incidental to business)*
        - *Can get pro rata share of gas/oil/rental/fees from passengers*
        - *Can be paid for certain charity flights and have passengers pay to charity if 200+ hours*
        - *Can be paid for certain search/rescue operations (only fuel/oil/fees/rentals)*
        - *Salesmen (200+ hours) can fly potential customers*
        - *Can tow gliders/unpowered ultralights*
      - *flight review, 1 hour flight, 1 hour ground, 24 calendar months, logbook endorsement (61.56)*
      - *recent flight experience, PIC (61.57)*
        - *3 T/L within last 90 days, sole person at controls, aircraft of same category, class, type (if type rating required for aircraft)*
        - *Tailwheel: full stop*
        - *Night (1 hour after sunset until 1 hour before sunrise): 90 days, 3 T/L, full stop*
      - *Have 30 days to notify FAA Airmen Certification branch of new mailing address (61.60).*
   b. medical certificate class and duration.
      - *Third-class, expires after 24th month or after 36th month if age 40 or less on date of exam (61.23)*

c. pilot logbook or flight records (*61.51)*
- *Must "document" training to meet requirements for a certificate, rating, or flight review*
- *Can satisfy recent flight experience requirements*
- *Must present to Administrator, NTSB, police on "reasonable request"*
- *Student pilot must carry logbook/certificate on all solo CC flights*

2. Locating and explaining *(AROW, int'l R = radio license, 91.203, 91.9)*
   a. airworthiness and registration certificates.
   - *Expiration of registration (HAK)*
     - *Aircraft registered with foreign country*
     - *Holder of cert requests cancellation*
     - *Aircraft totally destroyed*
     - *Ownership of aircraft transfered*
     - *Holder of cert loses U.S. citizenship*
     - *Holder has died >30 days ago*
   - *Expiration of airworthiness cert (HAK): never as long as aircraft received required maintenance and is properly registered in the U.S.*
   - *Airworthiness cert must be displayed so legible to passengers/ crew.*

   b. operating limitations, placards, instrument markings, and POH/AFM.
   c. weight and balance data and equipment list
   - *How do you know if your plane has a Mode C transponder? Look at current W/B equipment list.*

3. *PIC must have pilot certificate, medical certificate, photo ID in plane (61.3)*
4. *Endorsements for special types of aircraft (61.31)*
   - *High-performance aircraft (more than 200 horsepower): need ground/flight training for HPA and a one-time endorsement.*
   - *High-altitude airplane, pressurized airplane with service ceiling/max operating altitude of 25,000 feet MSL: training and one-time endorsement.*
   - *Tailwheel airplane: flight instruction, one-time endorsement.*
   - *Complex airplane (retractable gear, flaps, constant-speed prop): ground/flight training, one-time endorsement.*

B. TASK: AIRWORTHINESS REQUIREMENTS

REFERENCES: 14 CFR part 91; AC 61-23/FAA-H-8083-25.
Objective. To determine that the applicant exhibits knowledge of the elements related to airworthiness requirements by:

1. Explaining
   a. required instruments and equipment for day/night VFR.
   - *TOMATO FLAMES, 91.205.*

- *temp gauge (if liquid-cooled engine, NOT 172)*
- *oil temp gauge (if air-cooled engine, YES 172)*
- *manifold pressure gauge*
- *airspeed*
- *tachometer*
- *oil pressure gauge*
- *fuel gauge for each tank*
- *light (anticollision) for certain post-1996 airplanes*
- *altimeter*
- *magnetic direction indicator*
- *ELT*
- *safety belt for each occupant age 2 and older, and for certain post-1978 airplanes, shoulder harness for front seats*
- *VFR flight at night requires position lights, anticollision light, electrical energy for all electrical equipment, spare set of fuses, and IF FOR HIRE one electric landing light*
  - *ELT, 91.207, must be inspected in last 12 calendar months, replace when in use for 1 hour total or 50% of useful life has*

expired. New expiration must be in maintenance logs and marked on battery.
- *OK to test ELT in first five minutes of each hour*
- *Tune to 121.5 and listen for a chirp*

- *Aircraft lights, 91.209*

- *sunset-sunrise: position lights required*
- *anticollision light required to be lighted if present UNLESS safety dictates otherwise*

b. procedures and limitations for determining airworthiness of the airplane with inoperative instruments and equipment with and without an MEL (*91.213*).
- *if no MEL, then you can't take off with inop instruments/ equipment unless*
  - *inop instrument/equip not required for VFR day operation*
  - *inop instrument/equip not required by aircraft's equipment list or KOEL (kinds of operations equipment list) for type of flight operation*
  - *inop instrument/equip not required by AD*
  - *inop instrument/equip is removed from aircraft and cockpit control is placarded *AND* maintenance recorded in logs per 43.9, *OR* deactivated and placarded "inoperative" possibly in accordance with chapter 43*
  - *determination made by pilot or A&P mechanic that it's still safe*
- *if MEL *and* letter of authorization, and aircraft complies with MEL and letter*

c. requirements and procedures for obtaining a **special flight permit**.
- *Aircraft must still be capable of safe flight*
- *91.213(e): "in accordance with 21.197 and 21.199 of this chapter." Get form from FSDO or "Designated Airworthiness Representative."*

1. Locating and explaining
   a. airworthiness directives.
      - *HAK: how FAA notifies owners of unsafe conditions in existing airplanes, and what must be done to deal with them. Compliance mandatory. Owner/operator has responsibility to ensure compliance.*

   b. compliance records.
   c. maintenance/inspection requirements.
      - *AVIATE: annual, VOR every 30 days (not for VFR), 100-hour, Altimeter/Pitot/Static every 24 mos, Transponder every 24 mos, ELT every 12 mos or 50% of battery life*
        - *Annual - (within the preceding 12 calendar months). Reference to annual inspections is located in the Airframe Logbook because of the scope and detail of items included in the Annual inspection (see FAR 91.409 and Appendix D to Part 43). You can identify the annual inspection by the last line in the log entry stating, "…this aircraft has been inspected in accordance with an annual inspection…" An annual inspection can be performed in place of a 100-hour inspection; but not vice versa.*
        - *VOR check - (within the preceding 30 days for IFR flight). VOR checks are not logged in the maintenance records, but must be located in the aircraft itself.*
        - *100 hour - (within the preceding 100 hrs if for hire only) 100-hour inspections are located in the Airframe Logbook and Engine Logbook because of the scope and detail of items included in the 100-hour inspection (see FAR 91.409 and Appendix D to Part 43).*
        - *Altimeter & Pitot-Static check - (within the preceding 24 calendar months for IFR flight). The Altimeter and Pitot-Static checks are located in Airframe Logbook (see FAR 91.411 and Appendix E (d) to Part 43).*

- *Transponder - (within the preceding 24 calendar months). Transponder checks are located in the Airframe Logbook (see FAR 91.413 and Appendix F to Part 43).*
- *ELT - (within the preceding 12 calendar months or expiration date). ELT checks are located in the Airframe Logbook (see FAR 91.207(c)(2)). The expiration date on the battery will also be noted in the Airframe Logbook.*
- *Airworthiness Directives (AD's) Compliance with AD's are located in the Airframe Logbook and Engine Logbook depending on the scope and detail of the AD. For example, with an AD to inspect the seat locking mechanism, the records of that inspection will be located in the Airframe Logbook. Compliance with ADs may also be located in an Airworthiness Directive Compliance Report. This Compliance Report serves as a reference tool to identify every applicable and non-applicable AD for the aircraft model. Reviewing this report allows you to determine which ADs apply to your aircraft, the method of compliance, whether the AD is recurring, and the next due date for inspection and research dates.*
- *AD types: one-time or recurring*
- *737PZ*
  - *Annual 11/22/2006*
  - *Next 100-hour 4268*
  - *Altimeter/Pitot-Static 1/14/2006*
  - *ELT 11/22/6, and battery OK (date 10/2008 listed on annual cert)*
  - *Next OH is due 5885*
  - *ADs*
    - *AD87-20-03R2, seat roller*
    - *AD2001-23-03*
    - *SB 96-2*
    - *AD87-20-03R2*
    - *AD80-04-03R2 (engine)*
  - *Weight/balance in logs: 1484.88/38.78/57577.49*

- *Annual and 100-hour inspection - OK to exceed by 10 hours while en route to inspection (91.409)*
  - *Part 43: need "Inspection Authorization" for A&P to be allowed to do annual*
- *Owner/operator primarily responsible for maintenance (91.403)*
- *PIC responsible for determining aircraft is safe for a given flight (91.7)*
- *Check aircraft and engine logbooks to verify inspections/ADs (91.405)*
- *NO FLIGHT after serious maintenance until... private pilot or better must fly aircraft, make operational check of maintenance performed, and log flight in aircraft records (91.407)*

d. appropriate record keeping.

C. TASK: WEATHER INFORMATION

REFERENCES: 14 CFR part 91; AC 00-6, AC 00-45, AC 61-23/FAA-H-8083-25, AC 61-84; AIM.

Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to weather information by analyzing weather reports, charts, and forecasts from various sources with emphasis on

   a. METAR, TAF, and FA.
   - *METAR: an abbreviation for "Routine Aviation Weather Observation" in French*
     - *METAR KORD 041656Z 19020G26KT 6SM -SHRA BKN070 12/08 A3016 RMK AO2*
     - *Type METAR, location ORD, 4th of the month at 16:56 Zulu, winds from 190 true at 20 knots, gusting to 26 knots, six*

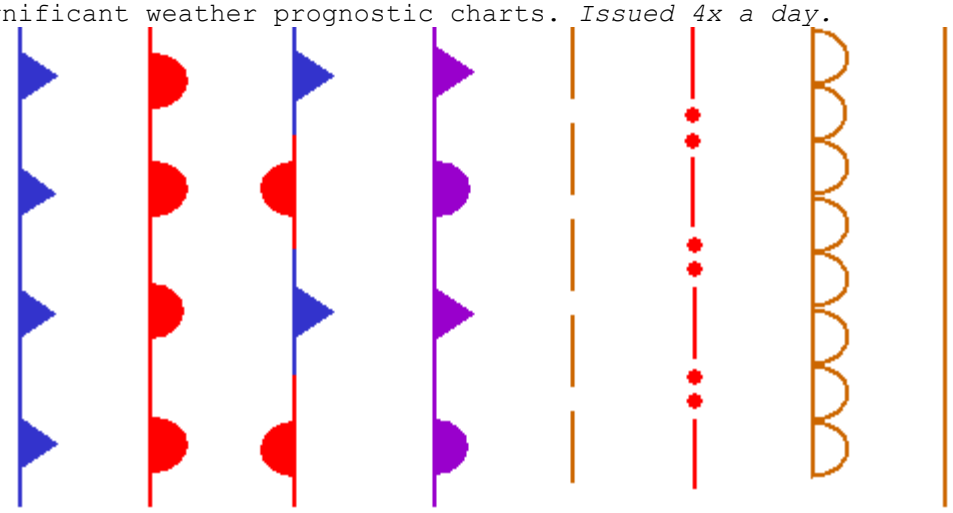
statute miles visibility, light rain showers, ceiling 7,000 feet broken (5/8-7/8), temperature 12°C, dew point 8°C, altimeter 30.16, remarks AO2 (automated with precipitation sensor)

- *TAF: Terminal Area Forecast*
  - *Updated 4x a day*
  - *5SM from airport's runway complex*
  - *OVC = 8/8, BKN = 5/8-7/8, SCT = 3/8-4/8, FEW = 0-2/8*
- *FA: Area Forecast*
  - *Updated 3x a day, 6 large areas of 48 states*

b. surface analysis chart. *Looks a lot like a prog chart: isobars, fronts, cyclones, winds, temperatures, etc. Every 3 hours.*
c. radar summary chart. *Shows precipitation. Hourly.*
d. winds and temperature aloft chart.

- DATA BASED ON 010000Z
  VALID 010600Z FOR USE 0500-0900Z. TEMPS NEG ABV 24000
  FT 3000 6000 9000 12000 18000 24000 30000 34000 39000
  MKC 2426 2726-09 9900-14 2930-21 2744-32 2751-41 275550 276050 731960
- first day of month, 0000 Zulu
- Valid day 1, 0600 Zulu.
- MKC: station
- 3000 true: 240 true at 26 knots
- 6000 true: 270 true at 26 knots, -9C
- 9000 true: light and variable at -14C
- 18000+ is pressure altitude
- 39000 pressure: 230 at 119 (73 - 50 = 23, which means 19 + 100), -60C

e. significant weather prognostic charts. *Issued 4x a day.*



- 1 -- Cold Front
  2 -- Warm Front
  3 -- Stationary Front
  4 -- Occluded Front
  5 -- Trough ("TROF")
  Also used to depict Outflow Boundary ("OUTFLOW BNDRY")
  6 -- Squall Line
  7 -- Dry Line
  8 -- Tropical Wave ("TRPCL WAVE")

-

f. convective outlook chart. *Shows you when/where convective SIGMETs are expected. Issued 5x a day.*

g. AWOS, ASOS, and ATIS reports.

- *TIBS = AFSS: Telephone information Briefing Service*
  - *800-WX-BRIEF*
  - *Other numbers in A/FD*
  - *Standard, abbreviated, outlook, inflight*
  - *adverse conditions, VFR flight not recommended, synopsis, current conditions, enroute forecast, destination forecast, winds aloft, NOTAMs, ATC delay, ON REQUEST: MTR/MOA, density altitude, rules (ATC/customs/ADIZ etc.), search/rescue...*
- *EFAS: 122.0, Enroute Flight Advisory Service, Flight Watch. Get destination weather and get/file PIREPs*
- *TWEB: transcribed weather broadcasts*
  - *4x a day 0200Z*
  - *for 200+ routes/vicinities*
  - *Text*
  - *Route forecast 50nm wide*
  - *Vicinity 50nm radius*
  - *Sustained surface winds 25+ knots, vis, weather, obscuration, sky conditions, wind shear*
- *DUATS*
- *ADDS: not logged, not official, not necessarily up to date*
- *CWA: center weather advisory, valid for 2 hours, helps avoid adverse conditions enroute*
- *AC: convective outlook, national forecast of TS. Lasts for two days.*
- *HIWAS: Hazardous In-flight Weather Advisory Service, continuous broadcast of warnings, SIGMETs, Convective SIGMETs, AIRMETs, urgent PIREPs, etc.*
- *SD (radar weather reports): precipitation, all heights above MSL*
- *AWOS: automated weather observing system: minute-by-minute, computer-generated.*
  - *Level 1: Altimeter settings: Wind speed and direction, Temperature and dewpoint, Density altitude*

        - *Level 2 adds visibility*
        - *Level 3 adds ceiling and sky cover*
        - *AWOS 3 = same capabilities as ASOS*
    - *ASOS: automated surface observing system: tied in with METARs by network. Single vendor.*
    - *Difference between AWOS and ASOS:*
        - *"According to the FAA's Web site, the basic difference between ASOS and AWOS is that ASOS generally comprises a standard suite of weather sensors that have all been procured from one contractor, whereas AWOS is a suite of weather sensors of many different configurations that were either procured by the FAA or purchased by individuals, groups, or airports that are required to meet FAA standards to be able to report weather parameters."*
        - *ASOS is networked and thus easily available to weather briefers.*
2. Makes a competent 'go/no-go' decision based on available weather information.
3. *From King "Weather Wise"*
    - *pressure: high to low (pressure or temp), look out below*
    - *Crosswind might dissipate as you approach to landing! Coriolis effect is lessened at ground level -- just emanate straight out of high-pressure area rather than getting turned to the right.*
    - *Left crosswind aloft: might indicate traveling toward low-pressure area, which indicates worsening weather*
    - *Mountains: wind >25 knots leads to turbulence (mountain wave, lenticular clouds)*
    - *Mountains: wind >40 knots leads to severe turbulence*
    - *You should be 3-5,000 feet above mountains to avoid downdrafts*
    - *Approach mountain ridge at 45-degree angle to make it easier to escape downdrafts if they get you*
    - *Clouds that produce significant precipitation are usually at least 4,000 feet high (thick)*
    - *Thicker clouds ==> heavier precipitation*
    - *20° increase in air temp doubles its water-holding ability*
        - *This is why carb heat is still a threat around 70°F: that air can hold lots of water!*
    - *Dew point: temperature at which air is 100% saturated*
        - *Expect fog when spread is 5°F or less and temperature is decreasing*
    - *Air coming in off the ocean/big lakes: moisture content higher, more likely to be foggy*
    - *Moist wind blows up a mountain: upslope fog forms as air cools*
    - *Estimating base of cumulus clouds: lapse rate = 2°C (3.5°F) per thousand feet. So divide the spread by 3.5 and add field elevation, and that's where the clouds start*
    - *If winds aloft are different from forecast, beware that all weather forecasts might be wrong!*
    - *Round-trip flight with wind **always** slower than same trip without wind (common brain trap assumes that time lost with headwind is exactly made up with tailwind -- that's incorrect)*
    - *Flight planning to take ice into account: don't fly at limits. E.g., if you need to descend but are already at lowest safe altitude, trouble; and if at plane's service ceiling and need to climb, trouble.*
    - *Call Flight Watch (122.0) for updated weather info.*
4. *Other stuff*
    - *Cold front: good vis behind front, bumpy (warm air being pushed up), showers as warm air rises and condenses, cumulus clouds, possibility of clear icing*
    - *Warm front: poor vis (pollutants trapped in warm layer), flight conditions good, light rain, stratus/layered clouds, possible rime ice*

- *Occluded front: cold front overtakes a warm front and lifts it off surface -- everything bad*

5. *Weather Theory and stuff from ASA Oral Exam Guide*
    - *Coriolis Effect: high pressure = clockwise, low pressure = CCW*
    - *Trough is elongated area of low pressure. Since air is rushing toward it, it goes up. Rising air = cloudiness and precipitation; therefore, bad weather.*
    - *Ridge is area of high pressure; descending air; good weather.*
    - *Isobars:*
        - *Line connecting areas of equal pressure*
        - *Close together: windy. Winds flow across isobars at an angle because of surface friction*
    - *Pressure decreases 1 inch Hg per 1,000 feet.*
    - *Structural icing: visible moisture + freezing temperature at point moisture strikes aircraft*
    - *Ice types: clear, rime, mixed, frost*
    - *Thunderstorm*
        - *Ingredients: unstable air, moisture, and a source of lift*
        - *Stages: cumulus, mature, dissipating*
        - *In front of TS: gust front with wind-shear threats*
        - *Under TS: turbulence, rain, wind shear*
        - *Behind TS: wind shear*
        - *Stay 20 miles away from TS!*
        - *Look out for the "anvil" of the TS; it can throw out hail*
        - *Lightning indicates **severe** TS; stay away!*
    - *Temperature inversion*
        - *increase in temperature with height*
        - *warm rain can fall through cold air below, which can cause ice*
        - *ground-based inversion: poor visibility because crap is trapped*
        - *stable air, little/no turbulence*
    - *Fog types*
        - *radiation: ground cools air to dew point*
        - *advection: warm humid air moves over cool surface*
        - *upslope: adiabatic cooling as air moves up side of mountain*
        - *precipitation-induced*
        - *ice fog*
    - *Convective SIGMET: severe+ turbulence, severe icing, low-level wind shear, thunderstorms, issued hourly, valid for 2 hours. Severe thunderstorms, lines of thunderstorms, embedded thunderstorms*
    - *SIGMET: non-convective but hazardous to all aircraft: severe icing/turbulence not associated with TS, dust storms, ash*
    - *AIRMET: not rising to level of SIGMET but of interest to all pilots for planning purposes. Every 6 hours starting at 0145Z.*
        - *Sierra: IFR, Mountain Obscuration*
        - *Tango: turbulence*
        - *Zulu: ice, freezing levels*

D. TASK: CROSS-COUNTRY FLIGHT PLANNING

REFERENCES: 14 CFR part 91; AC 61-23/FAA-H-8083-25, AC 61-84; Navigation Charts; A/FD; AIM.
Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to cross-country flight planning by presenting and explaining a pre-planned VFR cross-country flight, as previously assigned by the examiner. On the day of the practical test, the final flight plan shall be to the first fuel stop, based on maximum allowable passengers, baggage, and/or cargo loads using real-time weather.
2. Uses appropriate and current aeronautical charts.
3. Properly identifies airspace, obstructions, and terrain features.

4. Selects easily identifiable en route checkpoints.
5. Selects most favorable altitudes considering weather conditions and equipment capabilities.
6. Computes headings, flight time, and fuel requirements.
7. Selects appropriate navigation system/facilities and communication frequencies.
8. Applies pertinent information from NOTAMs, AF/D, and other flight publications.
9. Completes a navigation log and simulates filing a VFR flight plan.
10. *Factoids from OEG*
    - *NDB is near AM frequency (190-535 KHz)*
    - *VORs 108-117.95 MHz*
    - *DME: 960-1215 MHz*
    - *VOR classifications: Terminal, Low, High*
    - *VORTAC = VOR + DME*
    - *RNAV = { GPS, INS, LORAN, VOR/DME }*
    - *Preflight action for IFR or not in vicinity of airport*
        - *Weather reports/forecasts*
        - *Fuel requirements*
        - *Alternative courses/airports*
        - *Any traffic delays*
        - *Runway lengths *** = ON ANY FLIGHT, EVEN LOCAL*
        - *Takeoff/landing distances *** = ON ANY FLIGHT, EVEN LOCAL*
            - *Max weight, 20 degrees Celsius, short-field technique*
            - *Minimum landing distance is no more than 1265 feet*
            - *Minimum takeoff less than 1490 feet*
    - *Heavy line around NAV box = FSS (122.2 and 121.5)*
    - *Additional frequency above heavy box is FSS frequency*
    - *Frequency above thin box is "remoted to NAVAID site" and R means FSS can receive only on that frequency*
    - *H = HIWAS, T = TWEB*

E. TASK: NATIONAL AIRSPACE SYSTEM

REFERENCES: 14 CFR parts 71, 91; Navigation Charts; AIM.
Objective. To determine that the applicant exhibits knowledge of the elements related to the National Airspace System by explaining:

1. Basic VFR weather minimums for all classes of airspace.
    - *Basic VFR weather minimums (91.155): ceiling at least 1,000 feet, ground vis 3sm.*
    - *Special VFR weather minimums: ATC clearance, clear of clouds, 1 mile vis, only daytime between sunrise & sunset (unless IFR) (91.157)*
    - ---

Airspace	*Flight visibility*	*Distance from clouds*
Class A.....	*Not Applicable.....*	*Not Applicable.*
Class B.....	*3 statute miles.....*	*Clear of Clouds.*
Class C.....	*3 statute miles.....*	*500 feet below.* *1,000 feet* *above.* *2,000 feet*

horizontal.		
Class D.....	3 statute miles.....	500 feet below. 1,000 feet above. 2,000 feet horizontal.
Class E:		
Less than 10,000 feet MSL...	3 statute miles.....	500 feet below. 1,000 feet above. 2,000 feet horizontal
At or above 10,000 feet MSL.	5 statute miles.....	1,000 feet below. 1,000 feet above. 1 statute mile horizontal.
Class G:		
1,200 feet or less above the surface (regardless of MSL altitude).		
Day, except as provided in § 91.155(b).	1 statute mile.....	Clear of clouds.
Night, except as provided in § 91.155(b).	3 statute miles.....	500 feet below. 1,000 feet above. 2,000 feet horizontal.
More than 1,200 feet above the surface but less than 10,000 feet MSL		
Day.....	1 statute mile.....	500 feet below. 1,000 feet above. 2,000 feet horizontal.
Night.....	3 statute miles.....	500 feet below. 1,000 feet above. 2,000

feet

horizontal.
More than 1,200 feet above the surface and at or above 10,000 feet MSL. *5 statute miles.....* *1,000 feet below. 1,000 feet above. 1 statute mile horizontal.*

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2. Airspace classes: their operating rules, pilot certification, and airplane equipment requirements for the following
    - *Class A. IFR (plane and pilot), ATC clearance, FL160+, 2-way, Mode C (91.215)*
    - *Class B. ATC clearance, PPL or endorsement, 2-way, Mode C (91.131). Mode C Veil around Bravo: 30nm. Mode C transponder required in or above B to 10,000 MSL (91.215(b)(4)).*
    - *Class C. 2-way, Mode C, radio contact (91.130). Mode C transponder required in or above C to 10,000 MSL (91.215(b)(4)). Airspaces tend to be 5nm radius, surface to 4,000 AGL, then 1,200-4,000 for 10nm radius, then outer-radius area 20nm*
    - *Class D. 2-way, radio contact (91.129). OK to land if no radio IF: VFR mins, visual contact with tower, tower clearance given. Airspaces tend to be 4.4nm radius, some only 3.1nm radius, but no official standard size. 2,500 AGL ceiling to surface.*
    - *Class E. 91.127: communicate with control towers outside 4nm from airport up to 2,500 feet. Always from 14,500-17,999 feet, also in other places (e.g., around Bay Area, Golf sfc-699, Echo 700-.*
    - *Class G. 91.126(g): communicate with control towers outside 4nm from airport up to 2,500 feet. Surface to 14,500 feet.*
    - *Victor airways are class E, 8nm wide. 1200-foot AGL floor, FL180 ceiling.*
3. Special use and other airspace areas.
    - *restricted/prohibited (91.133): no flight (contrary to rules of restricted) without permission of "controlling agency"*
    - *TFR, 91.137 (hazards): OK to fly if helping with rescue, carrying cops, IFR, to/from airport in TFR, ((carrying news reporters OR VFR flight impractical) and ATC/FSS notified as specified in NOTAM)*
    - *Other TFRs (91.138-91.145): in general it's OK to fly only with ATC clearance and not contrary to NOTAM*
    - *MTR: Three-digit routes are flown above 1,500 feet, are marked "IR," and are primarily IFR. Four-digit routes are flown at or below 1,500 feet, are marked "VR," and are primarily VFR. You can contact your friendly local FSS for more info about specific routes (e.g., widths, actual altitudes, and frequency of usage). It's OK to fly through them, but you should be careful.*
    - *Prohibited: never fly (AIM 3-4-2). You can theoretically get permission from "controlling agency," but it's never granted (91.133).*
    - *Restricted: don't fly when active unless you have prior permission from "controlling agency" (AIM 3-4-3, 91.133).*
    - *Warning Area: 3nm outward from U.S. coast, possibly containing hazardous activity (AIM 3-4-4).*
    - *MOA: OK to fly in them, but very smart to contact the controlling authority (AIM 3-4-5).*
    - *Alert Area: be careful, unusually high activity (AIM 3-4-6).*

- *Controlled Firing Area: be careful, hazardous activity. They have spotter aircraft looking out for you and suspend activity. Not charted (3-4-7).*
- *National Security Area: you're "requested to avoid" flying through these areas (AIM 3-5-7).*
- *Airport Advisory Area (AIM 3-5-1): within 10sm of airport with FSS but no tower. FSS provides "advisory" service to arriving aircraft. Not mandatory for pilots to participate.*
- *TRSA - Terminal Radar Service Area: around big airports with good radar. Typically Class D airports with Echo having floor of 700 or 1,200 feet. Depicted with solid black lines on sectionals. AIM 3-5-6.*
- *ADIZ - Air Defense Identification Zones: identify yourself before entering from foreign spots (AIM 5-6-1).*

F. TASK: PERFORMANCE AND LIMITATIONS

REFERENCES: AC 61-23/FAA-H-8083-25, FAA-H-8083-1, AC 61-84, POH/AFM.
Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to performance and limitations by explaining the use of charts, tables, and data to determine performance and the adverse effects of exceeding limitations.
    - *DA = PA + (120 x V) where V = actual temp - standard temp for that altitude*
    - *A good estimate of standard temp is 15°C - 2 x (number of thousands of feet above SL)*
    - *E.g., 2,000 feet and 30°C: DA = 2,000 + (120 x (30 - 11)) = 4,280*
    - *172N speeds*
        - *VS0 42, VS1 47, Vx 59, Vy 74, Vr 55, Vfe 110/85, Va 80-97, Vno 128, Vne 160, Best Glide 65, Max X-wind: 15*
        - *Normal landing: 85 downwind, 75 base, 65 final*
        - *Short/soft-field landing final: 61*
        - *No-flap final: 70*
        - *10-degree short-field Vr/Vx: 56*
2. Computes weight and balance. Determines the computed weight and center of gravity is within the airplane's operating limitations and if the weight and center of gravity will remain within limits during all phases of flight.
    - *TO DO: run through all the 172 charts*
    - *Empty weight: airplane + unusable fuel + undrainable oil and other standard liquids (hydraulic)*
    - *Gross weight: max allowable weight of plane + contents (people, bags, fuel, oil)*
    - *Useful load: weight of contents (including usable fuel and drainable oil)*
    - *Arm: length from reference datum line to object's CG*
    - *Moment: item's weight x arm (pound-inches)*
    - *CG: point about which airplane would balance. Expressed as inches from datum.*
    - *Datum: imaginary vertical line used as reference point for W/B matters.*
    - *CG = moment/weight.*
    - *CG too far forward: higher stall speed, slower cruise speed, more stable, more back elevator pressure required*
    - *CG too far aft: lower stall speed, faster cruise, less stable.*
    - *Standard weights: pax 170/person, gas 6/gal, oil 7.5/gal (4 quarts in gal), water 8.35/gal*
    - *737PZ*
        - *CG limits: FWD 35 from 0 to 1950 lbs; then sloping to 38.5 at 2300 lbs. AFT 47.3 at all wts.*
        - *Empty: 1484.4, 38.76*
        - *Front: 37.0*
        - *Rear: 73.0*

        - *Baggage: 95.0*
        - *Fuel: 48.0*
        - *Baggage max: 120 pounds*
        - *MGTW, MRW, MLW: 2,300 pounds*
3. Demonstrates use of the appropriate performance charts, tables, and data.
    - *TO DO: run through all the 172 charts*
4. Describes the effects of atmospheric conditions on the airplane's performance.
    - *High to low (temp or pressure): look out below!*
    - *Things that affect performance:*
        - *Density altitude*
        - *Wind*
        - *Runway surface*
        - *Runway slope*
        - *Weight*
        - *Engine condition*
        - *Cleanliness of plane*
    - *Kinds of altitude*
        - *true altitude: actual aircraft's height above sea level usually expressed as MSL (mean sea level); all elevations on aeronautical charts are expressed in terms of true altitude*
        - *absolute altitude: the height of an aircraft above the terrain over which it is flying*
        - *indicated altitude: after setting the altimeter at the current altimeter setting this is the uncorrected altitude read directly from that altimeter*
        - *pressure altitude: after adjusting the altimeter's setting to 29.92", this is the altimeter reading that corresponds to the altitude in the standard atmosphere where the pressure is the same as you are; a change of one inch in the pressure setting will change the altimeter reading by 1,000 feet*
        - *density altitude: the pressure altitude corrected for temperature variations (this is most important to takeoff and climb performance of an aircraft)*
5. *Misc from OESG*
    - *Lift = gravity, thrust = drag: steady-state, straight-and-level, unaccelerated flight*
    - *Angle of incidence: built-in angle of attack for wings*
    - *Relative wind: direction of wind relative to wing. Flight path & relative wind always opposite.*
    - *Angle of attack: angle between wing chord and relative wind*
    - *Bernoulli's Principle: high speed = low pressure.*
    - *Torque effect: for every action, equal and opposite reaction. Twisting motor/prop turns plane in other direction. Makes airplane want to roll left in flight; puts more pressure on left gear on ground.*
    - *Four left-turning tendency factors*
    1. *Torque of engine/prop*
    2. *Gyroscopic precession of prop*
    3. *Corkscrewing slipstream*
    4. *P-factor: more thrust on downward side of prop*

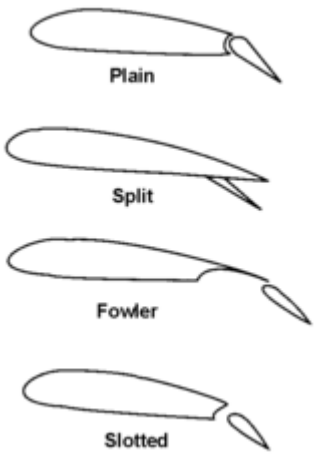
- *Load factor: total load supported by plane divided by actual weight of plane + contents. E.g., in a weird attitude, 3x weight of plane might be loaded on the wings, so 3G load factor. Interesting because of risk of structural failure, and increased stalling speed (higher angle of attack to generate sufficient lift for higher load factor).*
- *Three things that increase load factor: level turns, turbulence, speed*
- *Maneuvering speed is speed at/below which plane will stall before load becomes excessive.*
- *Three operational categories: normal (3.8 to -1.52), utility (4.4 to -1.76), aerobatic (6.0 to -3.0)*

- *Maneuvering speed **decreases** with decrease in weight.*
- *Adverse yaw: in a turn, outside wing's aileron is going faster and producing more lift, therefore more drag, thereby pulling the plane's nose to the outside of the turn. This is called a slip. Not enough rate of turn for the amount of bank. If you're slipping, you need more "bottom" rudder!*
- *Ground effect*
    - *Ground interferes with upwash, downwash, wingtip vortices.*
    - *Improved performance.*
    - *Within one wingspan of ground.*
    - *Can cause pilot to try to lift off before Vr.*
    - *Often causes plane to float on landing.*

G. TASK: OPERATION OF SYSTEMS

REFERENCES: AC 61-23/FAA-H-8083-25; POH/AFM. Objective. To determine that the applicant exhibits knowledge of the elements related to the operation of systems on the airplane provided for the flight test by explaining at least three (3) of the following systems.

1. Primary flight controls and trim.
    - *conventional aileron, rudder, elevator (7-8)*
    - *Mechanical linkage*
    - *Nose trim*
    - *(Optional) rudder trim: lift and move*
2. Flaps, leading edge devices, and spoilers.
    - *Flaps are "single-slot" but they're actually Fowlers (7-9)*
    - *General types are plain, split, Fowler, slotted*



    - *10-20-30-40*
    - *15-amp CB*
    - *40: avoid slips*
3. Powerplant and propeller.
    - *Lycoming 320cc, 160 HP @ 2,700 RPM (7-16)*
    - *4-cylinder, air-cooled, carbureted*
    - *Propeller: 2-blade, fixed-pitch, aluminum, 75 inches*
    - *Ram air for cooling in two cowling intakes (7-20)*
4. Landing gear.
    - *Fixed, tricycle (7-10)*
    - *Steerable nose wheel*
    - *Hydraulic disc brakes in main gear*
    - *Two master cylinders, one for each pedal set*
    - *34 psi nose, 28 psi mains*
5. Fuel, oil, and hydraulic.
    - *100LL blue, 100 green (2-9)*

- *6 quarts of oil, not less than 4 qts, 5 qts for "normal" flights of < 3 hours (7-18). Two types of oil are mineral and ashless dispersant (mineral plus additives)*
- *Gravity-fed (7-19)*
- *43 gallons, 3 unusable (7-20)*
- *Fuel gauges are electric (7-22)*
- *Brakes are hydraulic, single-disc, one master cylinder per brake that's connected to BOTH rudder pedals (7-23)*

6. Electrical.
   - *My POH says 14-volt, 60-amp alternator and 12-volt, 25 Ah battery (7-23)*
   - *Actual POH says same, but placard on side of cowling says 24-volt system*
   - *ALT on left of master, BAT on right*
   - *(Not installed): ground service plug receptacle*
7. Avionics.
   - *King KX 155*
   - *Apollo GX50*
   - *King KN 64*
   - *King KT 76A*
   - *Top antennas, front to back*
     - *GPS (bump-shaped)*
     - *Two COMs*
     - *ELT is above baggage*
     - *ADF is long wire attached to vertical stabilizer*
     - *Two VORs in V shape*
   - *Bottom antennas, front to back*
     - *Transponder is short rod with ball at end*
     - *An unknown IFR contraption is a flat raised surface*
     - *DME looks like small shark fin*
     - *IFR glide slope (bump-shaped) behind DME*
8. Pitot-static vacuum/pressure and associated flight instruments.
   - *Airspeed, rate-of-climb, altimeter (7-30)*
   - *Internal and external static ports*
   - *True airspeed indicator: first get pressure altitude (set briefly to 29.92 and read), then spin ring for right altitude/ OAT (7-31)*
   - *Attitude and directional are run from engine-driven vacuum system, 4.6-5.4 normal*
   - *The turn coordinator is gyro-based, but the gyro is ELECTRIC!*
   - *Attitude markings: 10, 20, 30, 60, 90 degrees (7-33)*
9. Environmental.
   - *Cabin air, cabin heat levers (7-30)*
   - *Ventilators for comfort*
   - *Defrosters via knobs*
10. Deicing and anti-icing.
    - *Just pitot heat*
11. *Other instruments*
    - *Compass. Errors/quirks*
      - *Oscillation error. Bumps around in turbulence*
      - *Deviation error. Airplane housing interferes*
      - *Variation error. Magnetic north is in Canada*
      - *ANDS (accelerate north, decelerate south): when on east-west headings, compass does this*
      - *UNOS (undershoot north, overshoot south): compass leads in south half of a turn, and lags in north half of a turn. So you should undershoot a north turn, because the compass is telling you you're behind where you really are.*

J. TASK: AEROMEDICAL FACTORS

REFERENCES: AC 61-23/FAA-H-8083-25; AIM. Objective. To determine that the applicant exhibits knowledge of the elements related to aeromedical factors by explaining:

1. The symptoms, causes, effects, and corrective actions of at least three (3) of the following
   a. hypoxia. *Oxygen deficiency. Can be a problem as low as 5,000 feet. Typical at 12K+. Severe at 15K+. Headache, drowsiness, dizziness, well-being/belligerence, judgment/memory/alertness/coordination/analytical problems. CO, smoking, anemia, some drugs can increase susceptibility. Address with O2 at 10K+ day, 5K+ night. Requirements: 91.211: passengers above 15,000 feet MSL. Crew above 14,000 feet and from 12,500-13,999 for durations > 30 min.*
   b. hyperventilation. *AIM 8-1-3: lightheadedness, suffocation, drowsiness, extremity tingling, uncoordination, disorientation, muscle spasms, unconsciousness. Correct by regulating breathing and/or breathing into paper bag.*
   c. middle ear and sinus problems. *Ear block. Eustachian tube used for equalization. Can be blocked if you have a cold. AIM 8-1-2*
   d. spatial disorientation. *Not knowing which way is up. Happens when outside visual references are lost or confusing. Trust your gauges!*
   e. motion sickness. *Caused by repeated messing with inner ear. Vomiting, loss of appetite, saliva, sweating. Get air, look outside. Land (take a break).*
   f. carbon monoxide poisoning. *Headache, drowsiness, dizziness. Open air vents, shut off heater, get treatment on ground.*
   g. stress and fatigue. *AIM 8-1-1(e): Coordination, alertness, and general performance worsen.*
   h. dehydration. *Headache, dizziness, unconsciousness, can feel like hangover. In addition to obvious cause, happens under stress (sweat) and high altitude (dry air dries you out). Fix by drinking water.*
2. The effects of alcohol, drugs, and over-the-counter medications.
   - *AIM 8-1-1, things that are cause for concern:*
     - *Tranquilizers*
     - *Sedatives*
     - *Strong pain relievers*
     - *Cough suppressants*
     - *Antihistamines*
     - *Blood pressure drugs*
     - *Muscle relaxants*
     - *Antidiarrhea medications*
3. The effects of excesses nitrogen during scuba dives upon a pilot or passenger in flight. *Flights to 8K feet: wait 12 hours or 24 hours if controlled-ascent dive. Flights 8K+: wait at least 24 hours.*

II. AREA OF OPERATION: PREFLIGHT PROCEDURES

A. TASK: PREFLIGHT INSPECTION

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to preflight inspection. This shall include which items must be inspected, the reasons for checking each item, and how to detect possible defects.
2. Inspects the airplane with reference to an appropriate checklist.
3. Verifies the airplane is in condition for safe flight.
4. *Other stuff*
   - *Runway lengths and takeoff/landing distances (91.103)*

B. TASK: COCKPIT MANAGEMENT

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to cockpit management procedures.
2. Ensures all loose items in the cockpit and cabin are secured.
3. Organizes material and equipment in an efficient manner so they are readily available.
4. Briefs occupants on the use of safety belts, shoulder harnesses, doors, and emergency procedures.
    - *Three emergency exits, how to use doors*
    - *91.105: Crew must wear seatbelts at all times, and harness during TO/L unless impractical*
    - *91.107: How to use seatbelts and harnesses*
    - *91.107: passengers must wear seatbelts/harnesses during taxi, takeoff, landing*

C. TASK: ENGINE STARTING

REFERENCES: FAA-H-8083-3, AC 61-23/FAA-H-8083-25, AC 91-13, AC 91-55; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to recommended engine starting procedures. This shall include the use of an external power source, hand propping safety, and starting under various atmospheric conditions.
2. Positions the airplane properly considering structures, surface conditions, other aircraft, and the safety of nearby persons and property.
3. Utilizes the appropriate checklist for starting procedure.

D. TASK: TAXIING

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to safe taxi procedures.
2. Performs a brake check immediately after the airplane begins moving.
3. Positions the flight controls properly for the existing wind conditions.
4. Controls direction and speed without excessive use of brakes.
5. Complies with airport/taxiway markings, signals, ATC clearances, and instructions.
6. Taxis so as to avoid other aircraft and hazards.

F. TASK: BEFORE TAKEOFF CHECK

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to the before takeoff check. This shall include the reasons for checking each item and how to detect malfunctions.
    - *If engine runs very rough during magneto check, plugs might be fouled; run at higher RPM for a bit with mixture leaned*
2. Positions the airplane properly considering other aircraft/vessels, wind and surface conditions.
3. Divides attention inside and outside the cockpit.
4. Ensures that engine temperature and pressure are suitable for runup and takeoff.
5. Accomplishes the before takeoff checklist and ensures the airplane is in safe operating condition.
6. Reviews takeoff performance airspeeds, takeoff distances, departure, and emergency procedures.

- *Rotate at 55*
- *Abort plan: general rule is 70% of Vr (40 knots) by 50% of runway*
- *Emergency plan for engine-out: below TPA, straight-ahead (90-degree turn might be OK)*

7. Avoids runway incursions and/or ensures no conflict with traffic prior to taxiing into takeoff position.

III. AREA OF OPERATION: AIRPORT BASE OPERATIONS

A. TASK: RADIO COMMUNICATIONS AND ATC LIGHT SIGNALS

REFERENCES: 14 CFR part 91; AC 61-23/FAA-H-8083-25; AIM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to radio communications and ATC light signals.
   - *91.125*
   -

Color and type of signal	*Meaning with respect to aircraft on the surface*	*Meaning with respect to aircraft in flight*
Steady green	*Cleared for takeoff.*	*Cleared to land.*
Flashing green	*Cleared to taxi...*	*Return for landing (to be followed by steady green at proper time).*
Steady red	*Stop.....*	*Give way to other aircraft and continue circling.*
Flashing red	*Taxi clear of runway in use.*	*Airport unsafe_do not land.*
Flashing white	*Return to starting point on airport.*	*Not applicable.*
Alternating red and green	*Exercise extreme caution.*	*Exercise extreme caution.*

2. Selects appropriate frequencies.
3. Transmits using recommended phraseology.
4. Acknowledges radio communications and complies with instructions.

B. TASK: TRAFFIC PATTERNS

REFERENCES: FAA-H-8083-3, AC 61-23/FAA-H-8083-25, AC 90-66; AIM. Objective. To determine that the applicant:
Exhibits knowledge of the elements related to traffic patterns. This shall

include procedures at airports with and without operating control towers, prevention of runway incursions, collision avoidance, wake turbulence avoidance, and wind shear.

- *Wake turbulence: stay above their flight path*
- *Wind shear: avoid it if possible, gust rule (add half the gust factor to your approach speed), stay higher than lower*

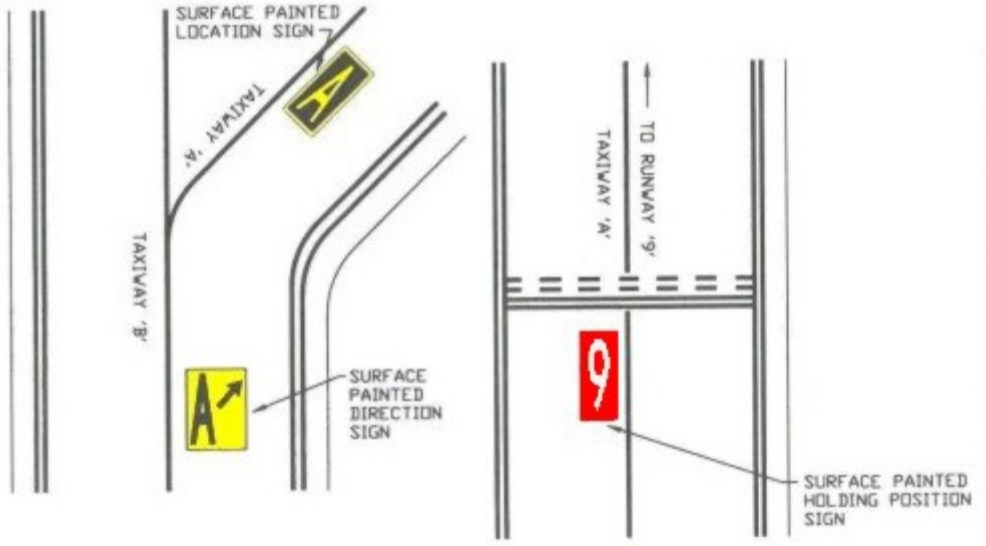
1. Complies with proper traffic pattern procedures.
2. Maintains proper spacing from other aircraft.
    - *Right of way*
        - *oncoming, veer right*
        - *overtaking: guy being overtaken has right; overtaker should pass on the right*
        - *converging: guy on right has right of way (if you see red, get out of the way)*
        - *above/below: guy below has right, but don't swoop to take advantage*
        - *landing has right of way over taking off*
        - *BGAAR: balloons, gliders, airships, airplanes, rotorcraft. Towing/refueling have right of way over all others*
3. Corrects for wind drift to maintain the proper ground track.
4. Maintains orientation with the runway/landing area in use.
5. Maintains traffic pattern altitude, ±100 feet (30 meters), and the appropriate airspeed, ±10 knots.

C. TASK: AIRPORT/SEAPLANE BASE, RUNWAY, AND TAXIWAY SIGNS, MARKINGS, AND LIGHTING

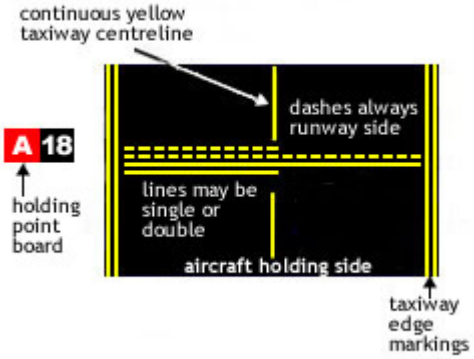
REFERENCES: AC 61-23/FAA-H-8083-25; AIM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to airport/seaplane base, runway, and taxiway operations with emphasis on runway incursion avoidance.
2. Properly identifies and interprets airport/seaplane base, runway, and taxiway signs, markings, and lighting.
    - *Taxiways have yellow stripes*
    - *Runways have white stripes*
    - *Any sign that has white letters on red is mandatory.*
    - *VASI: like SQL, lights over lights.*
    - *PAPI: row of lights.*
    - *POMOLA: Poor Man's Optical Landing Aid*
    - *Displaced threshold, OK to taxi/takeoff, but not to land*

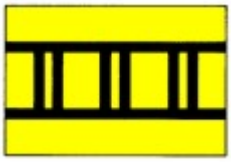
    - *Blast pad, for emergency use only*



runway side



taxiway holding point

- *Runway Boundary* 
- *ILS Critical Area Boundary* 

IV. AREA OF OPERATION: TAKEOFFS, LANDINGS, AND GO AROUNDS

A. TASK: NORMAL AND CROSSWIND TAKEOFF AND CLIMB

NOTE: If a crosswind condition does not exist, the applicant's knowledge of crosswind elements shall be evaluated through oral testing. REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to a normal and crosswind takeoff, climb operations, and rejected takeoff procedures.
    - *Flaps up*
    - *Full throttle*

    - *Check gauges (oil temp/pressure, RPM OK, airspeed live)*
    - *Vr = 55*
    - *Vy = 74*
2. Positions the flight controls for the existing wind conditions. *Climb into, dive away*
3. Clears the area; taxis into the takeoff position and aligns the airplane on the runway center/takeoff path.
4. Advances the throttle smoothly to takeoff power.
5. Lifts off at the recommended airspeed *(55)* and accelerates to Vy *(74)*.
6. Establishes a pitch attitude that will maintain Vy +10/-5 knots.
7. Retracts the landing gear, if appropriate, and flaps after a positive rate of climb is established.
8. Maintains takeoff power and Vy +10/-5 knots to a safe maneuvering altitude.
9. Maintains directional control and proper wind-drift correction throughout the takeoff and climb.
10. Complies with noise abatement procedures.
11. Completes the appropriate checklist.

B. TASK: NORMAL AND CROSSWIND APPROACH AND LANDING

NOTE: If a crosswind condition does not exist, the applicant's knowledge of crosswind elements shall be evaluated through oral testing. REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to a normal and crosswind approach and landing.
    - *Level off at TPA*
    - *Power to 2,200*
    - *Flow check (carb heat on)*
    - *Downwind 85, Base 75, Final 65*
    - *Add flaps while turning so balloon of flaps counters dive of turn*
    - *Stabilized: trimmed off for descent at 65 by 300 feet AGL*
2. Considers the wind conditions, landing surface, obstructions, and selects a suitable touchdown point.
3. Establishes the recommended approach and landing configuration and airspeed, and adjusts pitch attitude and power as required.
4. Maintains a stabilized approach and recommended airspeed, or in its absence, not more than 1.3 VS0 *(42 * 1.3 = 55)*, +10/-5 knots, with wind gust factor applied.
5. Makes smooth, timely, and correct control application during the roundout and touchdown.
6. Touches down smoothly at approximate stalling speed *(VS0 42)*.
7. Touches down at or within 400 feet (120 meters) beyond a specified point, with no drift, and with the airplane's longitudinal axis aligned with and over the runway center/landing path.
8. Maintains crosswind correction and directional control throughout the approach and landing sequence.
9. Completes the appropriate checklist.

C. TASK: SOFT-FIELD TAKEOFF AND CLIMB

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to a soft-field takeoff and climb.
    - *10 degrees flaps*
    - *Control wheel full back while taxiing*
    - *Smoothly advance throttle*
    - *Control wheel forward to keep front wheel just off ground*
    - *At liftoff, level pitch attitude to stay in ground effect*
    - *Accelerate to Vr (55), establish climb*
    - *Flaps up*

- *Climb at Vy*

2. Positions the flight controls for existing wind conditions and to maximize lift as quickly as possible.
3. Clears the area; taxis onto the takeoff surface at a speed consistent with safety without stopping while advancing the throttle smoothly to takeoff power.
4. Establishes and maintains a pitch attitude that will transfer the weight of the airplane from the wheels to the wings as rapidly as possible.
5. Lifts off at the lowest possible airspeed and remains in ground effect while accelerating to Vx or Vy, as appropriate.
6. Establishes a pitch attitude for Vx or Vy, as appropriate, and maintains selected airspeed +10/-5 knots, during the climb.
7. Retracts the landing gear, if appropriate, and flaps after clear of any obstacles or as recommended by the manufacturer.
8. Maintains takeoff power and Vx or Vy +10/-5 knots to a safe maneuvering altitude.
9. Maintains directional control and proper wind-drift correction throughout the takeoff and climb.
10. Completes the appropriate checklist.

D. TASK: SOFT-FIELD APPROACH AND LANDING

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to a soft-field approach and landing.
    - *Full flaps*
    - *61 knots final*
    - *Touchdown at 1200-1400 RPM*
    - *Keep weight off mains*
    - *Reduce power slowly to idle*
2. Considers the wind conditions, landing surface and obstructions, and selects the most suitable touchdown area.
3. Establishes the recommended approach and landing configuration, and airspeed; adjusts pitch attitude and power as required.
4. Maintains a stabilized approach and recommended airspeed, or in its absence not more than 1.3 VS0 (55), +10/-5 knots, with wind gust factor applied.
5. Makes smooth, timely, and correct control application during the roundout and touchdown.
6. Touches down softly with no drift, and with the airplane's longitudinal axis aligned with the runway/landing path.
7. Maintains crosswind correction and directional control throughout the approach and landing sequence.
8. Maintains proper position of the flight controls and sufficient speed to taxi on the soft surface.
9. Completes the appropriate checklist.

E. TASK: SHORT-FIELD TAKEOFF AND MAXIMUM PERFORMANCE CLIMB

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to a short-field takeoff and maximum performance climb.
    - *Flaps 10*
    - *Taxi to take up the most runway possible*
    - *Hold brakes*
    - *Full throttle, check engine*
    - *Release throttle*
    - *Elevator: slightly tail low*
    - *Liftoff @ Vr 55*
    - *Climb @ Vx 59*

- *After clearing obstacle, climb @ Vy 74*
- *Flaps up*

2. Positions the flight controls for the existing wind conditions; sets the flaps as recommended.
3. Clears the area; taxis into takeoff position utilizing maximum available takeoff area and aligns the airplane on the runway center/ takeoff path.
4. Applies brakes (if appropriate), while advancing the throttle smoothly to takeoff power.
5. Lifts off at the recommended airspeed, and accelerates to the recommended obstacle clearance airspeed or Vx (59).
6. Establishes a pitch attitude that will maintain the recommended obstacle clearance airspeed, or Vx (59) +10/-5 knots, until the obstacle is cleared, or until the airplane is 50 feet (20 meters) above the surface.
7. After clearing the obstacle, establishes the pitch attitude for Vy (74), accelerates to Vy, and maintains Vy, +10/-5 knots, during the climb.
8. Retracts the landing gear, if appropriate, and flaps after clear of any obstacles or as recommended by manufacturer.
9. Maintains takeoff power and Vy +10/-5 to a safe maneuvering altitude.
10. Maintains directional control and proper wind-drift correction throughout the takeoff and climb.
11. Completes the appropriate checklist.

F. TASK: SHORT-FIELD APPROACH AND LANDING

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to a short-field approach and landing.
    - *Full flaps (40 degrees)*
    - *61 knots*
    - *Steepest possible approach*
    - *Precise touchdown, idle throttle*
    - *Flaps up*
    - *Control wheel full back*
    - *Brake hard*
2. Considers the wind conditions, landing surface, obstructions, and selects the most suitable touchdown point.
3. Establishes the recommended approach and landing configuration and airspeed; adjusts pitch attitude and power as required.
4. Maintains a stabilized approach and recommended approach airspeed, or in its absence not more than 1.3 VS0 (55) +10/-5 knots, with wind gust factor applied.
5. Makes smooth, timely, and correct control application during the roundout and touchdown.
6. Touches down smoothly at minimum control airspeed.
7. Touches down at or within 200 feet (60 meters) beyond a specified point, with no side drift, minimum float and with the airplane's longitudinal axis aligned with and over the runway center/landing path.
8. Maintains crosswind correction and directional control throughout the approach and landing sequence.
9. Applies brakes as necessary to stop in the shortest distance consistent with safety.
10. Completes the appropriate checklist. FAA-S-8081-14A 1-16

K. TASK: FORWARD SLIP TO A LANDING

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to forward slip to a landing.

- *4-19: avoid steep slips with flaps > 20 degrees, tendency of elevator to oscillate*
- *Full rudder in one direction*
- *Ailerons opposed to compensate*
- *Watch speed -- control wheel forward!*

2. Considers the wind conditions, landing surface and obstructions, and selects the most suitable touchdown point.
3. Establishes the slipping attitude at the point from which a landing can be made using the recommended approach and landing configuration and airspeed; adjusts pitch attitude and power as required.
4. Maintains a ground track aligned with the runway center/landing path and an airspeed, which results in minimum float during the roundout.
5. Makes smooth, timely, and correct control application during the recovery from the slip, the roundout, and the touchdown.
6. Touches down smoothly at the approximate stalling speed, at or within 400 feet (120 meters) beyond a specified point, with no side drift, and with the airplane's longitudinal axis aligned with and over the runway center/landing path.
7. Maintains crosswind correction and directional control throughout the approach and landing sequence.
8. Completes the appropriate checklist.

L. TASK: GO-AROUND/REJECTED LANDING

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to a go-around/rejected landing.
    - *Full throttle*
    - *Carb heat off*
    - *Flaps to 20 degrees (if they were higher) IMMEDIATELY after power*
    - *If obstacles need to be cleared, flaps to 10 degrees*
    - *Remove flaps as climb established*
2. Makes a timely decision to discontinue the approach to landing.
3. Applies takeoff power immediately and transitions to climb pitch attitude for Vy (74), and maintains Vy +10/-5 knots.
4. Retracts the flaps as appropriate.
5. Retracts the landing gear, if appropriate, after a positive rate of climb is established.
6. Maneuvers to the side of the runway/landing area to clear and avoid conflicting traffic.
7. Maintains takeoff power Vy +10/-5 to a safe maneuvering altitude.
8. Maintains directional control and proper wind-drift correction throughout the climb.
9. Completes the appropriate checklist.

V. AREA OF OPERATION: PERFORMANCE MANEUVER

TASK: STEEP TURNS

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to steep turns.
    - *Flow check (but carb heat should be OFF)*
    - *Clear area*
    - *1,500+ AGL, 3,000 preferred*
    - *2,200 RPM to slow to Va (~90 knots)*
    - *Add power to 2,300*
    - *Roll into turn quickly, target 45°*
    - *At 30° begin pulling back to counter nose-down resulting from bank*

2. Establishes the manufacturer's recommended airspeed or if one is not stated, a safe airspeed not to exceed VA.
3. Rolls into a coordinated 360° turn; maintains a 45° bank.
4. Performs the task in the opposite direction, as specified by the examiner.
5. Divides attention between airplane control and orientation.
6. Maintains the entry altitude, ±100 feet (30 meters), airspeed, ±10 knots, bank, ±5°; and rolls out on the entry heading, ±10°.

VI. AREA OF OPERATION: GROUND REFERENCE MANEUVERS

NOTE: The examiner shall select at least one TASK.

A. TASK: RECTANGULAR COURSE

REFERENCE: FAA-H-8083-3. Objective. To determine that the applicant:
1. Exhibits knowledge of the elements related to a rectangular course. *See below (turns around a point)*
2. Selects a suitable reference area.
3. Plans the maneuver so as to enter a left or right pattern, 600 to 1,000 feet AGL (180 to 300 meters) at an appropriate distance from the selected reference area, 45° to the downwind leg.
4. Applies adequate wind-drift correction during straight-and-turning flight to maintain a constant ground track around the rectangular reference area.
5. Divides attention between airplane control and the ground track while maintaining coordinated flight.
6. Maintains altitude, ±100 feet (30 meters); maintains airspeed, ±10 knots.

B. TASK: S-TURNS

REFERENCE: FAA-H-8083-3. Objective. To determine that the applicant:
1. Exhibits knowledge of the elements related to S-turns. *See below (turns around a point)*
2. Selects a suitable ground reference line.
3. Plans the maneuver so as to enter at 600 to 1,000 feet (180 to 300 meters) AGL, perpendicular to the selected reference line.
4. Applies adequate wind-drift correction to track a constant radius turn on each side of the selected reference line.
5. Reverses the direction of turn directly over the selected reference line.
6. Divides attention between airplane control and the ground track while maintaining coordinated flight.
7. Maintains altitude, ±100 feet (30 meters); maintains airspeed, ±10 knots.

C. TASK: TURNS AROUND A POINT

REFERENCE: FAA-H-8083-3. Objective. To determine that the applicant:
1. Exhibits knowledge of the elements related to turns around a point.
    - *Flow check*
    - *Figure out the winds*
    - *Clear the area*
    - *600-1,000 AGL*
    - *2,100 RPM is good for Va (around 90 knots)*
    - *Enter and exit on downwind*
2. Selects a suitable ground reference point.
3. Plans the maneuver so as to enter left or right at 600 to 1,000 feet (180 to 300 meters) AGL, at an appropriate distance from the reference point.

4. Applies adequate wind-drift correction to track a constant radius turn around the selected reference point.
5. Divides attention between airplane control and the ground track while maintaining coordinated flight.
6. Maintains altitude, ±100 feet (30 meters); maintains airspeed, ±10 knots.

VII. AREA OF OPERATION: NAVIGATION

A. TASK: PILOTAGE AND DEAD RECKONING

REFERENCES: AC 61-23/FAA-H-8083-25. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to pilotage and dead reckoning.
2. Follows the preplanned course by reference to landmarks.
3. Identifies landmarks by relating surface features to chart symbols.
4. Navigates by means of precomputed headings, groundspeeds, and elapsed time.
5. Corrects for and records the differences between preflight groundspeed and heading calculations and those determined en route.
6. Verifies the airplane's position within three (3) nautical miles of the flight-planned route.
7. Arrives at the en route checkpoints within five (5) minutes of the initial or revised ETA and provides a destination estimate.
8. Maintains the appropriate altitude, ±200 feet (60 meters) and headings, ±15°.

B. TASK: NAVIGATION SYSTEMS AND RADAR SERVICES

REFERENCES: FAA-H-8083-3, AC 61-23/FAA-H-8083-25; Navigation Equipment Operation Manuals, AIM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to navigation systems and radar services.
2. Demonstrates the ability to use an airborne electronic navigation system.
3. Locates the airplane's position using the navigation system.
4. Intercepts and tracks a given course, radial or bearing, as appropriate.
5. Recognizes and describes the indication of station passage, if appropriate.
6. Recognizes signal loss and takes appropriate action.
7. Uses proper communication procedures when utilizing radar services.
8. Maintains the appropriate altitude, ±200 feet (60 meters) and headings ±15°.

C. TASK: DIVERSION

REFERENCES: AC 61-23/FAA-H-8083-25; AIM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to diversion.
    - *GPS*
        1. *NRST*
        2. *Turn large to select AIRPORT type*
        3. *Turn small to select desired airport*
        4. *D->*
        5. *Enter*
        6. *Turn toward heading*
    - *Note current time*
    - *Estimate your current location on sectional*

- *Find the airport on the sectional*
- *Estimate heading*
- *Turn to that heading*
- *Calculate winds-adjusted heading, and adjust heading*
- *Announce ETA, distance, adjusted heading, fuel required*

2. Selects an appropriate alternate airport and route.
3. Makes an accurate estimate of heading, groundspeed, arrival time, and fuel consumption to the alternate airport.
4. Maintains the appropriate altitude, ±200 feet (60 meters) and heading, ±15°.

D. TASK: LOST PROCEDURES

REFERENCES: AC 61-23/FAA-H-8083-25; AIM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to lost procedures.
    1. *GPS, press map, zoom as necessary*
    2. *Keep your altitude and begin circling*
    3. *Pick two reasonable guesses for VORs*
    4. *Tune in VOR 1 to NAV 1*
    5. *Press NAV 1 button and verify Morse code*
    6. *Tune in VOR 2 to NAV 2*
    7. *Press NAV 2 button and verify Morse code*
    8. *Dial OBSes until needles are centered, preferably FROM*
    9. *Draw the X on the chart*
    10. *Announce your position!*
2. Selects an appropriate course of action.
3. Maintains an appropriate heading and climbs, if necessary.
4. Identifies prominent landmarks.
5. Uses navigation systems/facilities and/or contacts an ATC facility for assistance, as appropriate.
6. *Climb, Communicate, Confess, Comply*
7. *VORs in Bay Area*
    - *OSI 113.9 --- ... ..*
    - *SJC 114.1 ... .--- -.-.*
    - *SAU 116.2 ... .- ..-*
    - *OAK 116.8 --- .- -.-*
    - *ECA 116.0 . -.-. .-*
    - *MOD 114.6 -- --- -..*

VIII. AREA OF OPERATION: SLOW FLIGHT AND STALLS

A. TASK: MANEUVERING DURING SLOW FLIGHT

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to maneuvering during slow flight.
    - *Clearing turns*
    - *Identify emergency landing area*
    - *Flow check (taxi light on, mixture full, carb heat on, fuel selector both)*
    - *At least 1,500 AGL, preferably 3,000 AGL*
    - *1,700 RPM*
2. Selects an entry altitude that will allow the task to be completed no lower than 1,500 feet (460 meters) AGL.
3. Establishes and maintains an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in an immediate stall.
4. Accomplishes coordinated straight-and-level flight, turns, climbs, and descents with landing gear and flap configurations specified by the examiner.

5. Divides attention between airplane control and orientation.
6. Maintains the specified altitude, ±100 feet (30 meters); specified heading, ±10°; airspeed, +10/−0 knots; and specified angle of bank, ±10°.

B. TASK: POWER-OFF STALLS

REFERENCES: FAA-H-8083-3, AC 61-67; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to power-off stalls.
    - *Stalling speed increases with square root of load factor.*
    - *Clearing turns*
    - *Identify emergency landing area*
    - *Flow check (taxi light on, mixture full, carb heat on, fuel selector both)*
    - *At least 1,500 AGL, preferably 3,000 AGL*
    - *1,700 RPM*
2. Selects an entry altitude that allows the task to be completed no lower than 1,500 feet (460 meters) AGL.
3. Establishes a stabilized descent in the approach or landing configuration, as specified by the examiner.
4. Transitions smoothly from the approach or landing attitude to a pitch attitude that will induce a stall.
5. Maintains a specified heading, ±10°, in straight flight; maintains a specified angle of bank not to exceed 20°, ±10°; in turning flight, while inducing the stall.
6. Recognizes and recovers promptly after the stall occurs by simultaneously reducing the angle of attack, increasing power to maximum allowable, and leveling the wings to return to a straight-and-level flight attitude with a minimum loss of altitude appropriate for the airplane.
7. Retracts the flaps to the recommended setting; retracts the landing gear, if retractable, after a positive rate of climb is established.
8. Accelerates to Vx or Vy speed before the final flap retraction; returns to the altitude, heading, and airspeed specified by the examiner.

C. TASK: POWER-ON STALLS

NOTE: In some high performance airplanes, the power setting may have to be reduced below the practical test standards guideline power setting to prevent excessively high pitch attitudes (greater than 30° nose up). REFERENCES: FAA-H-8083-3, AC 61-67; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to power-on stalls.
    - *Clearing turns*
    - *Identify emergency landing area*
    - *Flow check (taxi light on, mixture full, carb heat on, fuel selector both)*
    - *At least 1,500 AGL, preferably 3,000 AGL*
    - *1,400 RPM to slow down to Vr (55), and keep altitude throughout!*
2. Selects an entry altitude that allows the task to be completed no lower than 1,500 feet (460 meters) AGL.
3. Establishes the takeoff or departure configuration. Sets power to no less than 65 percent available power.
4. Transitions smoothly from the takeoff or departure attitude to the pitch attitude that will induce a stall.
5. Maintains a specified heading, ±10°, in straight flight; maintains a specified angle of bank not to exceed 20°, ±10°, in turning flight, while inducing the stall.
6. Recognizes and recovers promptly after the stall occurs by simultaneously reducing the angle of attack, increasing power as appropriate, and leveling the wings to return to a straight-and-level flight attitude with a minimum loss of altitude appropriate for the airplane.

7. Retracts the flaps to the recommended setting; retracts the landing gear if retractable, after a positive rate of climb is established.
8. Accelerates to Vx or Vy speed before the final flap retraction; returns to the altitude, heading, and airspeed specified by the examiner.

D. TASK: SPIN AWARENESS

REFERENCES: FAA-H-8083-3, AC 61-67; POH/AFM. Objective. To determine that the applicant exhibits knowledge of the elements related to spin awareness by explaining:

1. Aerodynamic factors related to spins.
    - *Spin: helical descent at angle greater than critical angle of attack. Occurs when you stall while uncoordinated.*
2. Flight situations where unintentional spins may occur. *Typical spin situations -- generally, all cases that also involve stalling*
    - *engine failure on takeoff, causing pilot to pull back and turn back to runway while uncoordinated*
    - *cross-control turn from base to final, especially on crosswind*
    - *engine failure on landing, pilot tries to stretch glide and stalls*
    - *Go-around with full nose-up trim. Very easy to stall here while badly uncoordinated*
    - *Go-around with flaps retracted too soon, causing pull-back and stall*
3. Procedures for recovery from unintentional spins.
   3-13: throttle idle, ailerons neutral, rudder full stop to counter direction of spin, elevators briskly full forward, hold until spin ends, gradually recover from resulting dive.

IX. AREA OF OPERATION: BASIC INSTRUMENT MANEUVERS

NOTE: The examiner shall select task E and at least two other TASKs.

A. TASK: STRAIGHT-AND-LEVEL FLIGHT

REFERENCES: FAA-H-8083-3, FAA-H-8083-15. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to attitude instrument flying during straight-and-level flight.
2. Maintains straight-and-level flight solely by reference to instruments using proper instrument cross-check and interpretation, and coordinated control application.
3. Maintains altitude, ±200 feet (60 meters); heading, ±20°; and airspeed, ±10 knots.

B. TASK: CONSTANT AIRSPEED CLIMBS

REFERENCES: FAA-H-8083-3, FAA-H-8083-15. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to attitude instrument flying during constant airspeed climbs.
2. Establishes the climb configuration specified by the examiner.
3. Transitions to the climb pitch attitude and power setting on an assigned heading using proper instrument cross-check and interpretation, and coordinated control application.
4. Demonstrates climbs solely by reference to instruments at a constant airspeed to specific altitudes in straight flight and turns.
5. Levels off at the assigned altitude and maintains that altitude, ±200 feet (60 meters); maintains heading, ±20°; maintains airspeed, ±10 knots.

C. TASK: CONSTANT AIRSPEED DESCENTS

REFERENCES: FAA-H-8083-3, FAA-H-8083-15. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to attitude instrument flying during constant airspeed descents.
2. Establishes the descent configuration specified by the examiner.
3. Transitions to the descent pitch attitude and power setting on an assigned heading using proper instrument cross-check and interpretation, and coordinated control application.
4. Demonstrates descents solely by reference to instruments at a constant airspeed to specific altitudes in straight flight and turns.
5. Levels off at the assigned altitude and maintains that altitude, ±200 feet (60 meters); maintains heading, ±20°; maintains airspeed, ±10 knots.

D. TASK: TURNS TO HEADINGS

REFERENCES: FAA-H-8083-3, FAA-H-8083-15. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to attitude instrument flying during turns to headings.
2. Transitions to the level-turn attitude using proper instrument crosscheck and interpretation, and coordinated control application.
3. Demonstrates turns to headings solely by reference to instruments; maintains altitude, ±200 feet (60 meters); maintains a standard rate turn and rolls out on the assigned heading, ± 10°; maintains airspeed, ±10 knots.

E. TASK: RECOVERY FROM UNUSUAL FLIGHT ATTITUDES

REFERENCES: FAA-H-8083-3, FAA-H-8083-15. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to attitude instrument flying during unusual attitudes.
    - *Low speed: add power. Level pitch and roll immediately.*
    - *High speed: power off. Level roll. Gradually level pitch. Add power back.*
2. Recognizes unusual flight attitudes solely by reference to instruments; recovers promptly to a stabilized level flight attitude using proper instrument cross-check and interpretation and smooth, coordinated control application in the correct sequence.

F. TASK: RADIO COMMUNICATIONS, NAVIGATION SYSTEMS/FACILITIES, AND RADAR SERVICES

REFERENCES: FAA-H-8083-3, FAA-H-8083-15, AC 61-23/FAA-H-8083-25. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to radio communications, navigation systems/facilities, and radar services available for use during flight solely by reference to instruments.
2. Selects the proper frequency and identifies the appropriate facility.
3. Follows verbal instructions and/or navigation systems/facilities for guidance.
4. Determines the minimum safe altitude.
5. Maintains altitude, ±200 feet (60 meters); maintains heading, ±20°; maintains airspeed, ±10 knots.

X. AREA OF OPERATION: EMERGENCY OPERATIONS

A. TASK: EMERGENCY APPROACH AND LANDING (SIMULATED)

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to emergency approach and landing procedures.
2. Analyzes the situation and selects an appropriate course of action.
3. Establishes and maintains the recommended best-glide airspeed, ±10 knots.
4. Selects a suitable landing area.
5. Plans and follows a flight pattern to the selected landing area considering altitude, wind, terrain, and obstructions.
6. Prepares for landing, or go-around, as specified by the examiner.
7. Follows the appropriate checklist.

B. TASK: SYSTEMS AND EQUIPMENT MALFUNCTIONS

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to system and equipment malfunctions appropriate to the airplane provided for the practical test.
2. Analyzes the situation and takes appropriate action for simulated emergencies appropriate to the airplane provided for the practical test for at least three (3) of the following
   a. partial or complete power loss.
      - *Carb heat on.*
      - *Best glide (65).*
      - *Flaps up.*
      - *Identify emergency landing area. Note wind direction.*
      - *Restart procedure: check fuel, check mixture, check throttle, check primer, flip magnetos.*
      - *If no restart: if < 800 AGL, straight ahead with only shallow turns. Otherwise this is a power-off 180.*
      - *Squawk 7700. Declare emergency.*
      - *Check seat belts/harnesses.*
      - *Unlatch doors.*
      - *Fuel off, mixture off.*
      - *Full flaps.*
      - *Mags/master off.*
      - *Advise occupants to brace themselves.*
      - *Approach 60 knots.*
      - *Land tail-low.*

   b. engine roughness or overheat. *Pull carb heat. Enrichen mixture to cool engine. Flow check. Reduce power.*
   c. carburetor or induction icing. *Carb heat. Expect further roughness.*
   d. loss of oil pressure. *3-14. If oil temp remains normal, this could indicate a bad gauge or a slow leak. Don't panic, but landing at next airport to check is a great idea. If oil temp begins rising, this is bad. Engine failure imminent. Pull throttle. Best glide. Carb heat on. Land at nearest airport as long as emergency landing spots are available at all times.*
   e. fuel starvation. *Best glide (65) and carb heat on. Switch tanks. Jiggle tank selector. Try priming. Make sure you're not inverted.*
   f. electrical malfunction.
      - *High voltage light comes on. Avionics off. Check alternator CB. Master off. 30 seconds, then back on. Avionics on. If still bad, ALT off. Nonessential equipment off. Land soon.*
      - *Ammeter indicates excessive charge. ALT off. If CB, pull it. Nonessential equipment off. Land soon.*

g. vacuum/pressure, and associated flight instruments malfunction. *The airspeed indicator and DG (heading indicator) will have undefined readings. Will probably be frozen in one place.*
h. pitot/static. *Symptom is strange altitude/speed/vsi readings. Pitot heat on. Alternate static. Consult POH for corrections.*
i. landing gear or flap malfunction. *No-flap landing: final 70 knots. Not an emergency.*
j. inoperative trim. *Not an emergency. Might have to exert extra effort on the wheel. Will have to pay more attention to pitch attitude while landing.*
k. inadvertent door or window opening. *No big deal in 172. Will be noisy, but doesn't appreciably affect flight characteristics. Land at leisure. If you can't land, airspeed 70. Pressure: window open, vents closed. Push door open and let wind slam it shut.*
l. structural icing. *Pitot heat on. Ascend or descend, and make a standard-rate 180 turn to get back to where you came from.*
m. smoke/fire/engine compartment fire.
- *Engine fire in flight: fuel off, mixture off, ignition off, master off, 100 knots, vents closed, emergency landing.*
- *Wing fire: master off, 100 knots, slip to keep flames away from cabin.*
- *Engine fire on ground: keep cranking, throttle full.*
  - *If fire continues, throttle/mix/ignition/master off. Get out!*
  - *If engine starts, 1700 RPM for 1 min. Stop and inspect.*
- *Cabin fire: vents/windows open so you don't die right away. Land immediately if you don't die first.*

n. any other emergency appropriate to the airplane.
- *General emergency descent: carb on, throttle idle, mix full rich, flaps all the way down, glide at 85.*
- *Radio out: if possible, land at uncontrolled field but consider repair options.*

3. Follows the appropriate checklist or procedure.

C. TASK: EMERGENCY EQUIPMENT AND SURVIVAL GEAR

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant: Exhibits knowledge of the elements related to emergency equipment and survival gear appropriate to the airplane and environment encountered during flight. Identifies appropriate equipment that should be aboard the airplane.

- *ELT is only required equipment for this plane*
- *Also good idea: warm clothes, water, matches, signaling device, PLB*
- *Discuss differences between 121.5 and 406MHz ELTs (obsolete in 2008, location info, too many false positives)*

XI. AREA OF OPERATION: NIGHT OPERATION

TASK: NIGHT PREPARATION

REFERENCES: FAA-H-8083-3, AC 61-23/FAA-H-8083-25, AC 67-2; AIM, POH/AFM. Objective. To determine that the applicant exhibits knowledge of the elements related to night operations by explaining:

1. Physiological aspects of night flying as it relates to vision.
   - *Cones, color, day, around center of retina. Less sensitive to light. Take 10-15 min to adjust to darkness.*
   - *Rods, grayscale, night, distributed around retina. Better around periphery. OK at detecting motion. Take 30 min to adjust to darkness.*
   - *Ground lighting illusions: faraway lights might look like stars. Landing over water when runway lights are only source of light can be disorienting.*

- *Featureless terrain illusion: brightly lit runway without surrounding ground features. Tends to cause low approach.*
- *To improve night vision: adapt eyes 30 min before flight, use oxygen, close one eye when exposed to bright light, move eyes slowly, blink more frequently, concentrate on seeing things, force eyes to view off center.*

2. Lighting systems identifying airports, runways, taxiways and obstructions, and pilot controlled lighting.
   - *REIL: Runway End Identifier Lights, synchronized flashing lights at approach end (AIM 2-1-3).*
   - *Runway Edge Light System (AIM 2-1-4): white edges, yellow toward end. Red at the end. Green at the beginning. HIRL, MIRL, LIRL.*
   - *RCLS: Runway Centerline Lighting System. White until last 3K feet, then alternating R/W, then R for last 1K feet.*
   - *Touchdown Zone Lights: along centerline for 3,000 feet, make the centerline touchdown area look fatter so you can see it better.*
   - *Taxiway lighting: edges are omni blue, center are green, clearance bar are yellow, runway guards are flashing at taxiway/ runway intersections; stop bar lights are a red row and indicate areas where you need clearance to enter.*
   - *Airport rotating beacons*
     - *W/G: lighted land*
     - *W/W/G: lighted military*
     - *W/Y: lighted water*
     - *G/Y/W: Lighted heliport*
3. Airplane lighting systems.
   - *Position lights: red left, green right, white back.*
   - *Position lights required to be on during flight from sunset to sunrise (91.209).*
   - *Anticollision light required during night flight unless PIC determines it's safer otherwise.*
   - *FLAPS: 91.205, fuses, landing light (if for hire), anticollision light system, position lights, source of electrical energy*
4. Personal equipment essential for night flight.
   - *Red flashlight*
   - *White flashlight*
   - *Clips for charts*
   - *Extra batteries*
5. Night orientation, navigation, and chart reading techniques.
   - *Avoid clouds and fog -- look out for halos as an early hint of visible moisture*
   - *Be good at straight-and-level flight*
   - *Use red flashlight*
6. Safety precautions and emergencies unique to night flying.
   - *Instrument lighting out: use flashlight*

XII. AREA OF OPERATION: POSTFLIGHT PROCEDURES

A. TASK: AFTER LANDING, PARKING, AND SECURING

REFERENCES: FAA-H-8083-3; POH/AFM. Objective. To determine that the applicant:

1. Exhibits knowledge of the elements related to after landing, parking and securing procedures.
2. Maintains directional control after touchdown while decelerating to an appropriate speed.
3. Observes runway hold lines and other surface control markings and lighting.
4. Parks in an appropriate area, considering the safety of nearby persons and property.
5. Follows the appropriate procedure for engine shutdown.
6. Completes the appropriate checklist.
7. Conducts an appropriate postflight inspection and secures the aircraft.

OTHER STUFF

Aeronautical Decision Making

- Five hazardous attitudes
    - Anti-authority: follow the rules, they're usually right.
    - Impulsivity: Think first. Take your time.
    - Invulnerability: It could happen to me.
    - Macho: Taking chances is foolish.
    - Resignation: I can make a difference; I am not helpless.
- CRM: Cockpit resource management
- Checklist usage: read and do, or do and verify
- DECIDE
    - Detect the fact that a change has occurred.
    - Estimate the need to counter or react to the change.
    - Choose a desirable outcome for the success of the flight.
    - Identify actions which could successfully control the change.
    - Do the necessary action to adapt to the change.
    - Evaluate the effect of the action.
- IMSAFE
    - Illness. Any Symptoms?
    - Medication. Prescription or OTC drugs?
    - Stress. Psychological, money, health, family?
    - Alcohol. Within 8 hours? Within 24 hours?
    - Fatigue. Adequately rested?
    - Eating. Enough proper foods for nourishment?

NTSB

- Notify NTSB field office immediately when (830.5):
    - Aircraft accident
    - Flight control system malfunction
    - Crewmember unable to perform normal duties
    - Turbine engine failure
    - Inflight fire
    - Aircraft collision inflight
    - Property damage to non-aircraft estimated > $25,000
    - Overdue aircraft
- Aircraft incident: not an accident but could affect safety of operations (830.2)
- Aircraft accident: an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage. (830.2)
- Serious injury means any injury that:
    - requires hospitalization for more than 48 hours, commencing within 7 days from the date of the injury was received;
    - results in a fracture of any bone (except simple fractures of fingers, toes, or nose);
    - causes severe hemorrhages, nerve, muscle, or tendon damage;
    - involves any internal organ;
    - involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.
- Substantial damage means damage or failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered substantial damage.

- Aviation Safety Reporting Program (91.25): FAA won't use in enforcement actions. Submit within 10 days of incident.

AIM Stuff

- ARTCC (Air Route Traffic Control Center): provides flight following
- Arriving aircraft: ATIS, Approach, Control Ground
- Departing aircraft: ATIS, Clearance Delivery, Ground, Tower, Departure
- NOTAMs
    - D - wide dissemination, beyond FSS responsibility, navaids, airports
    - L - local, taxiway closures, birds, etc., given by voice
    - FDC - National Flight Data Center, regulatory stuff, TFRs, amendments to IAPs (instrument approach procedures)
    - D and FDC types won't be given in briefing unless pilot requests it. L distributed locally only. Need to ask for L types for other areas.
- VFR flight plans never required except for ADIZ and DEWIZ(?), and those are called DVFRs.
- Wake turbulence worst when generating aircraft is heavy, clean, and slow.
- LAHSO: must decline if student pilot, not familiar with program, will compromise safety, or below basic VFR (3sm, 1,000-foot ceiling).