

Pilot Qualifications

What do you need in order to remain current as a private pilot?

A flight review every 24 calendar months. 3 takeoffs and landings in the preceding 90 days, full stop landings if at night.

What kind of medical do you have and how long is it valid? (61.23)

Under 40: 1st class medical allows you to exercise 1st class privileges for 12 calendar months. After that, your privileges revert to 3rd class for 48 calendar months. 2nd class medical allows you to exercise 2nd class privileges for 12 calendar months. After that, your privileges revert to 3rd class for 48 calendar months. 3rd class medical allows you to exercise 3rd class privileges for 60 calendar months.

Over 40: 1st class medical allows you to exercise 1st class privileges for 6 calendar months. After that your privileges revert to second class for another 6 calendar months, then to 3rd class privileges for 12 calendar months. 2nd class medical allows you to exercise 2nd class privileges for 12 calendar months. After that, your privileges revert to 3rd class for 12 calendar months. 3rd class medical allows you to exercise 3rd class privileges for 24 calendar months.

What are your required personal documents?

Pilot certificate, medical, government issued photo ID.

I want to pay you for our flight! Explain pro-rata share.

Pro-rata share is what is proportionate. If you take one other person flying you can split the operational costs of the flight 50/50. They can help pay for fuel, oil, ramp fees, etc. However, they cannot pay for maintenance because it is not an operational cost of the flight. For example, if you take 2 of your friends flying you have to pay at least a third of the flights operational costs.

What is the difference between being current and being proficient?

Current is legal and proficient is safe. It is proficient to have 10 takeoffs and landing in the past 14 days. But you are still current if you only have 3 takeoffs and landings in the last 89 days.

Airworthiness Requirements

What are the required aircraft documents? (ARROW)

Airworthiness, Registration, Radio station license (international only), Operating limitations (POH), Weight and balance.

Does the airworthiness expire? Registration?

Airworthiness does not expire as long as the aircraft is maintained properly. The registration expires every ~~5~~ years. 7 years

What are the required aircraft inspections? (AAVIATE)

AD's are complied with, Annual every 12 calendar months, VOR check every 30 days for IFR only, 100 hr. inspection every 100 hrs., Altimeter and static system every 24 calendar months, Transponder every 24 calendar months, and ELT every 12 calendar months.

Explain what airworthiness directives are.

Think of an airworthiness directive as a car recall. It is simply a means the FAA uses to inform aircraft operators of malfunctioned equipment discovered following the aircrafts manufacture. It is mandatory to comply with them.

Which aircraft need a 100 hr. inspection?

Only aircraft used for hire need 100 hr. inspections.

What is the difference between a special flight permit and a supplemental type certificate?

A special flight permit is issued to an aircraft that does not meet airworthiness requirements but is capable of safe flight. An example would be evacuating an aircraft that does not have a current annual or flying an aircraft with an overdue annual to a location the inspection can be performed. A supplemental type certificate is the FAA's approval of a major design change. An example would be adding winglets to your plane.

Where would you get an SFP and/or STC?

The Flight Standards District Office (FSDO).

What are your VFR equipment requirements and where would you find them? (91.205)

Day: Think A TOMATO FLAMES. Airspeed indicator, Tachometer, Oil pressure gauge, manifold pressure gauge, Altimeter, Temperature gauge, Oil temperature gauge, Fuel gauges, Landing gear position lights, Anti-collision lights, Magnetic ~~compass~~, ELT, Safety belts.
direction indicator

Night: Think FLAPS. Fuses, Landing light, Anti-collision lights, Position lights, Source of power.

What is pilot performed preventive maintenance? (Part 43 Appendix A)

Preventive maintenance is maintenance we are allowed to perform as pilots. See part 43 Appendix A for what we are allowed to do.

What would you do if you discover a piece of inoperative equipment?

If you discover a piece of inoperative equipment prior to your flight you should check the AD's, the comprehensive equipment list in the POH, and the Regulations (91.205). If the piece of equipment is not required by any of these then you should placard and deactivate it.

Does our aircraft have a minimum equipment list?

No. We have a comprehensive equipment list in the POH but not a minimum equipment list. A minimum equipment list is the sole thing to be used if a piece of inoperative equipment is discovered.

Do you have personal minimums? If so, what are they?

Yes, you should 110% have personal minimums. Print out a personal minimums checklist provided by your instructor

Weather Information

What kind of weather is associated with a cold front? Warm? Stationary? Occluded?

With a cold front, you can expect towering cumulus and cumulonimbus clouds, heavy rain, lightening, thunder, hail, tornadoes, and strong wind. With a warm front, you can expect stratus clouds, drizzle, low visibility, low ceilings, and light wind. The weather associated with stationary and occluded fronts depends greatly on the air's stability and moisture content. The exact weather can vary and is usually a mix between cold and warm front weather occurrences.

What 3 things are needed for a thunderstorm to form?

Unstable air, sufficient moisture, and lifting action.

What kind of weather is associated with high and low pressure? Airflow around these?

The airflow around a low-pressure system moves inward, upward, and counterclockwise. We can expect bad weather with low pressure because it has one of the ingredients for a thunderstorm, rising air. The air-flow around a high-pressure system is outward, downward, and clockwise. These high-pressure systems are associated with good weather due to the dissipating clouds.

What kind of weather can we expect with a close temperature and dew point spread?

Fog.

What are your VFR cloud clearance requirements and where would you find them?

These are pretty lengthy. See 91.155.

What is a Convective Sigmet?

A convective sigmet is severe weather that is hazardous to all aircraft and they are valid for 2 hours. They include thunderstorms, embedded thunderstorms, squall lines, tornadoes, hail, and severe winds/turbulence.

How far should you stay away from a thunderstorm?

Roughly 20 NM.

What is a Sigmet?

A sigmet is severe weather not associated with a thunderstorm that is hazardous to all aircraft. They include severe icing, severe turbulence, dust storms, and volcanic ash.

What is an Airmet?

An airmet is significant weather phenomena that is not as severe to meet the requirements of a sigmet. There are 3 types: Sierra refers to IFR condition and/or mountain obscurations, Tango refers to turbulence, and Zulu refers to icing.

What is a microburst?

A microburst is a severe downdraft that can result in a multiple thousand feet per minute descent due to rapidly sinking air from a cumulonimbus cloud. They are extremely dangerous and typically happen when the aircraft is somewhat near the ground.

Is icing hazardous to our aircraft? Is frost?

Icing and frost are both hazardous to our aircraft because they change the shape of the airfoil and disrupt the smooth flow of air. They both decrease the aircrafts performance and risk the safety of flight.

What conditions cause structural icing?

In order for the aircraft to experience structural icing the temperature of the collecting surface must be at or below freezing and the aircraft must be in visible moisture.

What would you do if you accidentally entered a cloud? If you entered icing?

If you accidentally enter a cloud you should climb, descend, or turn around depending on what phase of flight you are in. I would advise turning around because you know there are no clouds where you just came from. If you encounter icing you should turn on pitot heat, climb, descend, or turn around, add carb heat if needed, turn on the defrost/heater, and then declare an emergency.

What are the 3 types of icing and which is the most severe?

The 3 types of icing are clear, rime, and mixed. The most severe is clear ice because it is heavy and harder to remove.

What are the limitations of our digital weather displays in the cockpit?

Our digital weather display does not show real-time weather, it is lagged. It should not be used to navigate around a storm.

What is the difference between a trough and a ridge? What's an Isobar?

A trough is an area of low pressure and a ridge is an area of high pressure. An isobar is a line of constant pressure.

What is wind shear?

A change in wind speed and/or direction.

How would you obtain a weather briefing?

By calling 1-800-WX-BRIEF.

How would you obtain updated weather along your route?

A few options include ATC (workload permitting), Flight service station, and ATIS/AWOs.

What is a PIREP?

A PIREP is a pilot report of weather. These include the location of cloud bases, turbulence, icing conditions, etc.

Interpret a Metar and TAF.

What weather information should you review before your flight? Where would you look?

I would obtain a weather briefing and also check the weather on aviationweather.gov. You should check Sigmets, Convective sigmets, airmets, icing, prog charts, TAF's, METARS, and winds aloft; just to name a few.

Cross-Country Flight Planning

Complete a nav log with a route given by your instructor. Review it with your instructor.

Why did you choose the altitude you did?

East (0-179) would be odd thousands plus 500 and West (180-359) would be even thousands plus 500. Obviously choose an altitude above the Maximum Elevation Figure.

What are your VFR day and night fuel requirements?

For day, you need enough fuel to fly to your destination plus 30 minutes at normal cruise. For night, you need enough fuel to fly to your destination plus 45 minutes at normal cruise.

What is the purpose of a VFR flight plan? How do you activate and close one?

The purpose of a VFR flight plan is for search and rescue procedures. You would activate and close it through a Flight Service Station (FSS).

How will you mitigate risk for our cross-country?

I would perform the PAVE checklist. Pilot: I would do a self-assessment with the IMSAFE checklist. Aircraft: I would review the maintenance logs and perform a proper preflight making sure we have adequate fuel and oil. environment: I would thoroughly check the weather, airspace, terrain, and airport we will be flying in. External pressures: I will slow down and ensure I am not rushed or experiencing any stress.

What do the various airport beacons tell us about the airport?

Alternating white and green: civilian land airport.

Alternating white and yellow: civilian water airport.

Dual peak white and green: military airport.
White, green, and yellow: heliport.

What are the light gun signals?

These are somewhat lengthy. See 91.125.

What should you do if you are taxiing at an unfamiliar airport?

You could request progressive taxi instructions, they will tell you when to stop, turn, etc.

How low are you allowed to fly?

In a congested area, you need to fly 1,000 ft. above the highest obstacle in a 2,000-ft. radius. In a non-congested area, you need to fly 500 ft. above the nearest structure, person, or vessel.

National Airspace System

Understand airspace and special use airspace symbology on a VFR sectional.

What equipment is required for Class A, B, C, D, E, and G airspace?

Class A: you need to be instrument rated on an instrument flight plan, and a Mode C transponder. Class B: you need a Mode C transponder, 2-way radio communication, and a clearance. Class C: you need a Mode C transponder, and 2-way radio communication. Class D you need 2-way radio communication. There are no radio or transponder requirements for class E and G; however, you need a mode C transponder above 10,000 MSL regardless of where you are.

What are the various types of special use airspace?

MOA, Controlled firing area, Prohibited area, Restricted area, Alert area, Warning area, National security areas, Special flight rules area, Terminal radar service areas (TRSA), and Temporary flight restrictions (TFR).

What is a MOA? Can you fly through one?

Military operations area. You can fly through them as long as you use extreme caution.

What is a prohibited area? Can you fly through one?

Entry is prohibited, you are not allowed to fly through them.

What is a restricted area? Can you fly through one?

You may fly through a restricted area with approval from the controlling agency.

What is a Special Flight Rules area? Can you fly through one?

A SFRA is a region where normal regulations of flight don't apply in part or in whole. You need to complete an online course in order to fly through them. Examples include the Grand Canyon and Washington D.C.

What is a TFR? Can you fly through one?

You may fly through a TFR if you have a squawk code and are in communication with ATC.

Performance and Limitations

Complete a weight and balance given by your instructor.

Know your V-speeds.

What is the angle of attack? Critical angle of attack?

The angle of attack is defined as the angle between the wing chord line and the relative wind. Increasing back elevator pressure increases our angle of attack. The critical angle of attack is the angle in which the wing will stall.

Is a higher or lower altimeter setting better for performance?

A higher altimeter setting is better for performance because the air is denser.

Is cold or warm air better for performance? Why?

Cold air is better for performance because the air is denser.

What is CG?

Center of Gravity is the point where the aircraft would remain balanced if suspended in the air.

Discuss the characteristics of a forward vs. aft CG.

With a farther forward CG you will have a slower cruise speed, faster stall speed, and will be more stable. With a farther aft CG you will have a faster cruise speed, slower stall speed, and will be less stable.

What is the purpose of flaps?

Flaps allow for a steeper descent without an increase in airspeed.

What happens to our stall speed as bank angle is increased?

It increases.

What is ground effect? Explain how it occurs.

Ground effect is an increase in aircraft performance within a wingspan of the ground. This is due to a reduction in induced drag.

What can we expect with an overloaded aircraft?

We can expect a longer takeoff roll, higher takeoff speed, reduced rate of climb, shorter range, slower cruise speed, higher stall speed, higher landing speed, and longer takeoff roll.

What are the 4 forces of flight?

Lift, weight, thrust, and drag. All forces are equal in straight and level un-accelerated flight.

What is Bernoulli's principle?

States that as the velocity increases, pressure decreases.

Which primary flight controls rotate their respective axis?

The ailerons (roll) rotate around longitudinal axis. The elevator (pitch) rotate around the lateral axis. The rudder (yaw) rotate around the vertical axis.

What is density altitude?

Density altitude is pressure altitude corrected for nonstandard temperature. This simply means that density altitude is the altitude the aircraft performs as though it is at. An increase in altitude, temperature, and humidity increase density altitude. For example, if the density altitude here at West Houston Airport were 3,000ft, the aircraft will already perform as though it is at 3,000 while on the ground.

What are the left turning tendencies?

P-factor: The downward (descending) propeller blade on the right produces more thrust. Thus, causing a yaw to the left.

Spiraling Slipstream: The rotation of the air around the aircraft, due to the propeller, contacts the vertical stabilizer on the left. Thus, causing a yaw to the left.

Torque: Newton's 3rd law. As the propeller rotates to the right, there is a force felt to the left. Thus, yawing the aircraft to the left.

Explain load factor.

Load factor is the total weight supported by the wings. If our aircraft weights 2,000lbs and we are in a 45-degree banked turn, then the weight supported by the wings (load factor) would be 3,000lbs.

What causes an aircraft to turn?

The horizontal component of lift causes an aircraft to turn. As we turn, we trade vertical lift for horizontal lift.

What is wingtip vortices? How are they avoided?

Wingtip vortices is a circular rotation of air that comes off of the wing as it generates lift. Every aircraft produces them; however, they become greater the larger the aircraft gets. If taking off behind a 737, you want to wait at least 3 minutes to allow the vortices to dissipate.

Why do we lean our mixture?

To compensate for the decreasing air density at higher altitudes.

Operation of Systems

What are our primary flight controls? Secondary flight controls?

Primary flight controls include the ailerons (roll), elevator (pitch), and rudder (yaw). Secondary controls include the flaps and trim.

What kind of engine do we have? (LHAND)

Lycoming 180 BHP fuel injected, Horizontally opposed, Air cooled, Normally aspirated, Direct driven.

What kind of propeller do we have?

Fixed pitch metal propeller.

What is our minimum oil quantity?

5 qts.

Describe how our brakes work.

Our brakes have a single-disc and are hydraulically actuated on each main wheel.

Describe our landing gear.

Fixed tricycle type landing gear with a steerable nose wheel and two main wheels.

What kind of fuel do we use and what color is it?

100LL, blue.

How many gallons of fuel does our aircraft hold? GPH burned?

Our 172 holds 56 total gallons, with 53 of them being usable. See the POH for gph burned on your flight (Be conservative and round up to 10 gph).

What is the function of the magnetos?

To provide power to the spark plugs so they generate a spark.

How many spark plugs do we have?

8 total, 2 per cylinder.

List the 4 step cycle each piston in each cylinder goes through.

Intake, compression, power, exhaust.

How are oil pressure and oil temperature related?

They work in accordance with one another. If we have low oil pressure we can expect an increase in oil temperature.

Describe our electrical system.

28-volt system consisting of a 60 amp. Alternator and a 24-volt battery.

How does our heater work?

Our heater uses ram air from outside of the aircraft and directs it through an exhaust shroud. Then this heated air is ducted into the cabin.

Briefly explain the pitot-static system.

The pitot tube only supplies information to our airspeed indicator. The static port provides information for all 3 pitot static instruments (airspeed, altimeter, vertical speed).

What are our gyroscopic instruments and how are they operated?

The 3 gyroscopic instruments are our attitude indicator, heading indicator, and our turn coordinator. Attitude and heading indicator use vacuum power while the turn coordinator uses electrical power.

What would be an indication of an alternator failure? Is it an emergency?

An indication of an alternator malfunction would be signified by a discharge in our main battery amps. If this happens we can expect a full loss of electrical power.

If we lose total electrical power will the engine still remain on?

Yes, the engine system is completely independent of the electrical system.

Human Factors

What is the IMSAFE checklist?

It is a self-assessment to determine if you are fit to fly. Illness, Medication, Stress, Alcohol, Fatigue, Eating/emotion.

What is hypoxia? What are the signs of hypoxia? How do we mitigate the possibility of hypoxia?

Hypoxia is the state of oxygen deficiency in the body. Cyanosis (turning blue) is a common symptom. We can mitigate this possibility by using supplemental oxygen.

What are our supplemental oxygen requirements? Recommended?

Above 12,500 feet the flight crew needs to use supplemental oxygen if the flight is longer than 30 minutes. Above 14,000 feet the flight crew needs to use supplemental oxygen for the entire flight at those altitudes. Above 15,000 feet the flight crew needs to use supplemental oxygen for the entire flight at those altitudes and each occupant must be provided supplemental oxygen. It is recommended to use oxygen above 10,000 during the day and 5,000 at night.

What would you do if you have a hyperventilating passenger?

Give them a paper bag to breathe in if you have one and try and talk to them to slow their breathing. If that does not work let them pass out. Their breathing will then stabilize on its own.

What would you do if you have a passenger who is experiencing motion sickness?

I would try and direct their attention elsewhere such as talking to them, having them look at a fixed point outside, and maybe even letting them fly.

What is one thing we want to be cautious of while using our heater?

Since our heater uses air directed by the exhaust, we run the risk of carbon monoxide poisoning. If there is a crack in the exhaust this would become a problem. Keep a carbon monoxide detector in the plane. If it is suspected turn off the heater and open the windows.

What should you do if you are taking medication that may alter your flights safety?

If you are unsure about the medication call your AME.

What would you do if you became lost? (5 C's)

Call ATC, Confess that you're lost, Climb, Comply with directions, Conserve fuel.

What are some optical illusions you can experience while flying? (PHAK CH. 17)

A wider than usual runway can create the illusion of being lower, causing a higher approach. And vice versa. Flying over water or dark areas at night can cause you to fly a lower approach. Haze can create the illusion of being farther away from something. Staring at a light at night can create the illusion of that light moving. Lastly, an obscured horizon can create an illusion of not knowing where the horizon is.

Miscellaneous

Runway Safety Flashcards <https://www.nxtbook.com/nxtbooks/aopa/runwaysafetyflashcard/index.php>

Airspace Flashcards

https://www.nxtbook.com/nxtbooks/aopa/flashcards_2019/index.php

Electrical System Interactive Trainer

<http://avitmedia.aero.und.edu/c172sElectrical/index.html>

YouTube

Here is a short list of great YouTube channels for aviation:

- MzeroA
- Fly8MA

- ERAU Special VFR

This study guide is a great resource. This is not everything so continue to study the FAR/AIM, Airplane Flying Handbook, Pilot's Handbook of Aeronautical Knowledge, POH, etc.