PRIVATE PILOT
COURSE STUDY GUIDE

FLIGHT
APPRENTICE

Course Study Guide

This guide is intended to help students prepare for the Flight Apprentice end-of-course practice exams, which mimic the real FAA Private Pilot Written Exam. It contains a summary of the information presented in the Private Pilot Online Ground School, including all of the 'Flashcard Questions'. We have also included questions designed to help you apply concepts so that you are prepared, not only for the written exam, but for the real world.

We recommend that you take your time while reviewing this material. In particular, if you don't understand a concept, be honest with yourself and take extra time to learn that material. It will pay dividends in the end: applicants with higher written exam scores often have an easier time on the oral portion of the checkride. Plus, if you put in the work now, you'll know that much more, and have that much more confidence when it's game time.

We are dedicated to providing the very best material that we can. If you find any errors, confusing phrasing, or have any recommendations for changes to this guide, please don't hesitate to reach out to us at support@flightapprentice.com, on social media or at FlightApprentice.com

Thanks for your continued support,

The Flight Apprentice Team

PILOT QUALIFICATIONS

LEGAL

Do you need to have your pilot's license with you when you fly?

What three documents must you carry with you when you fly?

Does a private pilot need to carry a logbook? What about a student pilot?

When does your medical certificate expire?

You arrive to the airport only to realize that you've left your logbook at home. As a private pilot, can you still fly?

You recently lost your wallet, but you have a student ID in your backpack. Can you use that to fulfill the photo ID requirement?

Your friend has a 3rd class medical issued July 17th, 2018 and is 41 years old. What is the last day she may use her medical certificate?

Your friend has a 1st class medical issued Aug 15th, 2018 and is 34 years old. What is the last day he may use his medical certificate for an operating requiring 3rd class privileges?

FITNESS FOR FLIGHT

Why would you personally not want to fly sick?

What are the rules regarding alcohol consumption and flying?

Your dog just died a few hours before you were scheduled to go fly with a friend. Are you safe to fly?

You wake up for a 5am flight, have a quick cup of coffee while you review the weather and head out. Your return by noon, only to find a friend waiting at the airport clubhouse. He seems eager to fly and asks you if you can take him flying What might you consider in your IMSAFE assessment?

Is the IMSAFE assessment a legal requirement or just good practice?

ADM

What does ADM stand for?

What are some examples where pilots are often called upon to exercise good ADM?

These next questions are more to get you thinking about applying ADM in the real world…

Can experienced pilots neglect ADM?

You're flying to a wedding, and are running late. Headwinds were slightly higher than expected, but you're fairly confident you'll have enough fuel. What will you do?

Now you're in flight and surprisingly receiving good tailwinds. But your right fuel gauge is decreasing alarmingly fast. What do you do?

Can someone be a good pilot and still exercise poor ADM?

You are returning to land at your home airport which is relatively remote. The airport does not have a weather station, and you fly over the airport to check the windsock only to realize that the only open runway has a crosswind that exceeds your skill level. The only other possible landing surface is a taxiway that faces into the wind. Alternatively, you can proceed to a neighboring town which has more favorable weather, but is about 30 minutes away. You have 40 minutes of gas. What will you do?

CRM

When could a general aviation pilot use CRM?

You're flying with a friend who is also a pilot. He wants to fly into an area of marginal weather and neither of you have an instrument rating. He assures you that his GPS has an amazing terrain feature and it's so simple that anybody could figure it out. How do you approach this situation?

SRM

What resources do you specifically have to use?

What is the problem with relying on GPS during all of your flights?

Why should pilots know how to use all systems available to them?

You're flying into a very busy airspace environment and you know that you are task saturated between navigating and coordinating with ATC. You have autopilot available, but you know that

pilots who use autopilot often become reliant upon it, so you elect to leave it off. Is this good SRM?

You are flying at approximately 6,000 feet AGL when you experience an engine failure. You are halfway through a 100nm flight, near an area you aren't particularly familiar with. What resources do you have available to you?

AIRWORTHINESS

DOCUMENTS

What are the ARROW Documents?

When is a Radio Operator's permit required?

What **must** be on the weight and balance data?

Your local flight club recently bought a new, cheap Cessna 172. The club owners casually mention that the previous owner lost the Operations and Limitations Handbook for the aircraft, but they were able to find one for the same make and model online. They downloaded and printed it and left it in the airplane. Does this fulfill the legal requirement for the Operations and Limitations Handbook?

You remove the rear passenger seats in your Beechcraft in order to use it for baggage. Do you need a new weight and balance data sheet?

INSPECTIONS

What is a calendar month?

What inspections are due every 24 calendar months?

Is the pitot-static inspection required for VFR only aircraft?

What are the inspection time-frames for the ELT?

What kind of mechanic is needed to complete an annual inspection?

If your transponder test was last completed in February 2018, when will it expire?

Memorize the acronym for either A1TAPE or AV1ATE.

Your last annual inspection was completed on June 15th, 2018. What is the last day your airplane may be flown before a new annual inspection is required?

Your friend just became an A&P mechanic, and you'd like him to perform and sign you off on your next annual inspection. Do you foresee any issues with accomplishing this?

You arrive to fly your flight school airplane on a day VFR flight only to realize that the Pitot-Static inspection is overdue. Are you legal to fly?

In the previous scenario you fly, and then come back to give the airplane to the next pilot who is panning to take it on an IFR flight to an airport with marginal weather. Is there anything you might mention to him?

Can you fly with an expired transponder inspection if you are only flying in airspace not requiring a transponder?

DAY AND NIGHT VFR REQUIREMENTS

Memorize ATOMATOFLAMES and FLAPS

When is a manifold pressure gauge required? Do you have a manifold pressure gauge in your airplane?

What is the difference between a temperature gauge and an oil temperature gauge?

When is the night-VFR equipment required? Is it sunset, end of evening civil twilight, etc?

You rent a 1960s Cessna 170, which you notice does not have an anti-collision light. You inquire to the flight school about this, and they say that it's not legally required. Are they correct?

You are out for a late afternoon flight, and expect to land just before sundown. You don't have any of the required night VFR equipment on board. As you return to the airport, you are told that the only runway is closed because an airplane landed gear up. You have 5 minutes until sunset, 30 minutes of fuel and there are several other airports within a 10 minutes flight. What do you do?

You have invited a friend to go for a short night flight. It is a cloudless night with a full moon. When you preflight the airplane you find that the landing light is inoperative. Is it required for your flight?

INOPERATIVE EQUIPMENT

What four steps are required to determine if one can legally fly with inoperative equipment? (without an MEL)

Why would we want to disable/remove inoperative equipment?

What is the TCDS?

What are ADs?

Know how to access (and ideally have a copy of) your aircraft's ADs, TCDS and, if you have one, KOEL.

You are the proud owner of a small airplane. You find out that the manufacturer has issued an AD to reinforce the tail structure. Compliance is required effective immediately. How long do you have until you cannot fly before complying with the AD?

You discover upon preflight that your airplane has an inoperative taxi light. It is daylight, and you'll only be out for about 30 minutes, so you decide to take the airplane and have the local mechanic fix it after you land. Is this legal? More importantly, is there any safety issue associated with this? How does the safety situation change if this is a club airplane that will be flown by other pilots later in the day?

MEL.CDL

What equipment is listed on the MEL? Is it broken equipment or working equipment?

What does MEL stand for?

Your flight club airplane has an MEL. You preflight the airplane and find that the parking brake is inoperative. You look in the MEL and discover that there is no MEL for the parking brake. The flight club says that because it is not required equipment per 91.205 that you can legally fly it. Are they correct?

AIRWORTHINESS REVIEW

No review questions for this topic

AERODYNAMICS

FOUR FORCES OF FLIGHT

If speed doubles, what happens to drag?

What is un-accelerated flight?

You are flying at 70 knots, with a parasite drag force of 400lbs. How does parasite drag force change when you increase your speed to 140 knots?

To establish an unaccelerated climb, what is required?

A 60 degree level turn results in a 2G loadfactor, meaning your airplane is effectively twice as heavy as it would be in unaccelerated flight. How much does lift increase?

AIRFOILS

What is the purpose of an airfoil?

How does an airfoil produce lift?

What other components of the airplane are airfoils besides the wings?

What is the boundary layer?

What happens to pressure as the speed of a fluid increases?

What happens to the temperature of a fluid as speed increases?

You notice at an airshow that as a jet pulls tightly in a turn, vapor forms over the wings. Why is this?

In what way does an airfoil act like a Venturi?

Your airplane can takeoff at 50 knots. You are taxiing at 10 knots into the wind when you experience a 45 knot gust. Could your airplane accidentally become airborne?

You put your Cessna 152 on the world's largest conveyor belt which moves backward at 50 knots. You apply full power. Will the airplane, which requires 50 knots in order to takeoff, be able to takeoff?

AOA

What is AOA?

How does lift change as AOA increases?

What is a stall?

What is critical AOA and why is it important?

Does an airfoil's critical AOA change depending on airspeed?

A propeller is an airfoil. How do we change the propeller AOA?

In a level turn your airplane is closer to critical AOA that it is in straight and level flight, assuming the same airspeed. Why is this?

How could an airplane be stalled at a high speed, in a nose down attitude?

Do all airfoils have an angle of attack or just the wings?

Some airplanes have horizontal stabilizers in front of the wings (normally called a canard). Often these designs have are designed so that the canard reaches critical AOA before the wings. What is an advantage of such a design?

You transition from a 80 knot climb to a 115 knot cruise. How has the AOA change as you level off?

During a turn from downwind to final, and airplane maintains the same descent rate, airspeed and airplane configuration. What happens to AOA through the turn?

DRAG

If you increase your speed at L/D Max, what happens to your drag?

If you are below L/D Max and speed up, what happens to your drag?

Is the drag created by landing gear sticking out into the air flow considered parasite drag or induced drag?

What determines an airplane's best glide airspeed?

Down low near the ground, wingtip vortices are often broken up by the ground before they can fully induce drag on the wings. What effect might this have for airplanes landing or taking off?

Slow flight is a maneuver in which the pilot flies the airplane with flaps (and gear if, retractable) in the down position and sustains level flight at a slow airspeed. Often, slow flight requires a large amount of power to maintain level flight and sufficient airspeed. Why is this?

CHANGING LIFT

What 3 ways can a pilot change lift?

How does a pilot change the AOA?

What wing shape generally generates more lift for a given airspeed/AOA? What generates less?

Why does a higher airspeed create more lift?

What flight control most directly is used to change the AOA?

There is a limit to how much lift can be increased by changing the AOA. What is this limit called?

If an airplane with a symmetrical airfoil has a 0° AOA, what will be its flight path? Will this change with an increase in airspeed?

Are elevator position and AOA directly linked? Are elevator force and AOA directly linked?

FLIGHT CONTROLS

Which flight controls help us pitch? To roll? To yaw?

If an airplane rolls left, what do the ailerons do?

How to the elevators move to pitch down?

What moves the flight controls? How does movement of the flight controls happen from the pilot moving the stick/yoke?

A fellow pilot tells you that an airplane cannot be turned without an elevator or equivalent pitch flight control. In what way are they correct?

Theoretically speaking, if a flight control was moved too far or too abruptly, could it cause the flight surface to stall? Why do you think this is generally not a concern in light training airplanes?

ADVERSE YAW

What is adverse yaw?

Once we are established in the turn, do we still experience adverse yaw?

How does the amount of aileron deflection change the magnitude of adverse yaw?

How does airspeed change the magnitude of adverse yaw?

At very slow airspeeds, some airplanes are able to slowly turn right by deflecting the ailerons in a slight left turn, and vice versa. Why is this?

TURNING TENDENCIES

What is P-factor?

What is slipstream?

What is torque?

What factors (airspeed, power, etc) affect each turning tendency?

What flight regimes have the highest left turning tendencies?

How does a pilot counteract left turning tendencies?

Which is likely to require more rudder input, a turn to the left or a turn to the right? Assume starting from a neutral rudder position and all other variables being equal.

What flight condition is likely to have the least amount of left turning tendency?

A pilot is practicing slow flight, flying just above stall speed (just below stall AOA). Lacking sufficient rudder correction, the airplane begins a gradual left turn. The pilot corrects by adding right aileron and gently pulling back. The airplane promptly flips over to the left and nose dives. Why?

SYSTEMS

PARTS OF AN AIRPLANE

What is a semi-monocoque design? What about monocoque?

What is the advantage to using a frame and thin metal to build an airplane, instead of solid metal?

Why is weight such a critical design factor in airplanes?

You are preflighting your airplane when you notice a wrinkle in the skin. Your friend, who is the owner, says not to worry about it because it doesn't change aerodynamics very much. Is there still a reason you might be concerned?

PRIMARY AND SECONDARY FLIGHT CONTROLS

What are the primary flight controls?

What are the secondary flight controls?

In your airplane, how are the primary flight controls actuated? Cables? Hydraulics?

In your airplane, how are the flaps actuated?

In your airplane, how is trim actuated?

Just before takeoff, you perform a flight control check. As you move the yoke to the left, the left aileron goes down and the right aileron goes up. Is this correct?

While performing a flight control check you notice that there is a lot of resistance and a kind of jerky motion as you check the elevator. Is this normal?

On your downwind to base turn you add the first flap selection and feel the airplane quickly steepen the turn. What may have happened?

PISTON POWERPLANT

What provides electrical power to the spark plugs?

What functions can exhaust heat serve?

How many magnetos are present in a 6 cylinder engine?

How many spark plugs are present in a 6 cylinder engine? 4 cylinder engine?

You go flying with a long-time friend who is a car mechanic. Halfway through the flight, your alternator quits. Your friend is worried, thinking that the spark plugs will soon lose power and the engine will quit. What do you tell your friend?

In your airplane, fresh air passes through an exhaust shroud to provide cabin heating. One day, you turn on the cabin heat as you climb into cooler air, and immediately smell exhaust. What may be happening? What is the major risk? What will you do to mitigate that risk?

CARBURETED ENGINES

What is the major disadvantage to a carbureted system?

What brings fuel from the float chamber to the venturi?

What distributes fuel-air mixture to each cylinder after if passes through the venturi?

Describe how the throttle plate operates.

Mechanically speaking, how does the mixture control operate?

What happens to air temperature inside the venturi? Why?

You are flying on a humid day and notice the engine starting to run rough and see a drop in RPM. Suspecting carburetor icing, you turn carburetor heat on. You notice a drop in RPM. Is this normal?

When you suspect an engine problem is related to carburetor ice it is imperative that you turn on the carburetor heat as quickly as possible. Why?

FUEL INJECTED ENGINES

Describe how a fuel-injection system differs from a carbureted system.

What is the role of the spider valve?

What are the advantages and disadvantages of a fuel injected system?

A pilot goes out to their fuel-injected airplane for a return trip back home after a quick lunch at the airport restaurant. It is a hot summer day. They crank the engine, but cannot get it to start. What is likely the problem? What is the solution?

FIXED PITCH PROPELLER

Does your airplane have a fixed-pitch or a constant speed propeller?

What instrument do we use to measure power in an airplane with a fixed-pitch propeller?

What are the advantages of a fixed-pitch propeller?

Fixed pitch propellers are set at a specific pitch to yield a corresponding performance profile. If you wanted a propeller pitched for maximum takeoff performance, would that be a propeller with a low or high pitch?

CONSTANT SPEED PROPELLER

Describe the steps that occur as you move the propeller lever forward.

If you began a dive, would this create a temporary overspeed or underspeed condition on the propeller?

What are the advantages of a constant speed propeller?

In the event of a loss of oil pressure in a single-engine airplane, it is desirable that the propeller moves to a low pitch, high RPM position. Why is this?

Why is it desirable that, in a multi-engine airplane, a loss of oil pressure causes the propeller to move to high pitch, low RPM position? How might the design of the system be changed to reflect this?

LANDING GEAR OVERVIEW

Does your airplane have fixed or retractable gear?

What is the difference between a convention and tricycle configuration?

Does your airplane have bungees, springs, oleo struts or a combination of those?

You are interested in buying an airplane to fly in the back-country, which you are going to base at a dirt strip near your house. You talk to a friend involved in sales and he recommends you look for a tailwheel airplane. Why does he make that recommendation?

OLEO STRUT

What is the advantage of an oleo strut compared to a spring or bungee system?

You go out to pre-flight the airplane and find dark red/black fluid pooled around the nose gear. What does this probably mean?

Does your airplane have oleo struts? If so, which wheel assemblies use oleo struts?

You preflight a Piper Archer and find that the right oleo strut sits several inches higher than the left. You rock the wings a bit and the struts mostly even out. What might cause this issue?

You fly formation with a friend in your Piper Warrior which has three oleo struts. Your friend takes photos of your airplane in flight. You later look at the photos and see that your oleo struts are much lower in the photos than they normally are when you preflight. Why is this?

RETRACTABLE LANDING GEAR

What are the advantages to a retractable gear system?

What are the disadvantages of a retractable gear system?

What are some ways that retractable gear can be actuated?

In a retractable gear system, what typically holds the gear down?

What mechanisms can hold the gear up in a retractable system?

Would hydraulic pressure ever be used to hold the gear down? Why would this be a bad idea?

Does your airplane have a retractable gear system? If so, how is it actuated?

You're at the club house talking to friends about gear failures. Your friend asserts that if they experienced a landing gear failure that they would make a normal approach and then kill the engine right before touchdown to avoid denting the propeller on landing. Do you think there is merit in doing so?

Another friend says that if they had a gear failure that they would land in the grass alongside the runway instead of landing on the pavement, in an effort to avoid damaging the airplane more than necessary. Why is this a bad idea?

FUEL

How many fuel pumps does your airplane have?

What type of fuel does your airplane use?

Is your airplane certified to use any other fuel octanes?

Does your airplane have wet wings or bladders?

How would you recognize a fuel leak during preflight?

Your airplane is certified for 100LL. You land at an airport and refill it with 80/87 octane. Will the airplane run safely on 80/87?

OIL

What function does oil serve?

What are the advantages of a wet sump system?

What main factor dictates the type of oil used in your airplane?

How does oil circulate through the engine?

In cruise, you notice your oil pressure gauge indicating zero. Oil temperature remains at normal levels. What does this likely indicate?

In cruise, you notice your oil pressure gauge decreasing rapidly. Oil temperature, meanwhile, is increasing rapidly. What is this likely indicating?

Why might a mechanic recommend that you change oil types between summer and winter?

You depart a mountain airstrip and climb at your best-angle climb speed, which is relatively slow, to avoid terrain. You notice that your oil temperature is getting rather high. Why is this, and how could you improve the situation while still avoiding terrain?

HYDRAULIC

What are your airplane's hydraulic systems?

The incompressible characteristic of fluids allows us to use hydraulics to:

Aeration is the condition where air/gas enters a fluid line. Why might this be a major issue in a hydraulic system like brakes?

What is the advantage mechanical actuation as opposed to hydraulic actuation in a system like flight controls? What is the disadvantage?

ELECTRICAL

A master switch usually has two sides. What is each one for?

The battery discharges while supplying electrical power to systems. What re-charges the battery?

If your engine stopped, would the battery discharge?

If your alternator failed, would the battery discharge?

What is a bus?

Many airplanes have an avionics master switch. What does this switch do?

What advantage do circuit breakers have over fuses? What extra risk do they create for uneducated/careless pilots?

Before takeoff, many pilots turn on a light or electric pump and while watching the ammeter. What are they testing in doing this?

In an electrical emergency in busy airspace, how could you limit battery discharge while also maintaining communication with ATC?

INSTRUMENTS

What instrument shows airspeed?

What instrument shows the airplane's altitude?

What instrument shows the airplane's heading?

Does the DG have a compass inside it?

Which instruments are gyroscopic?

Which instruments are pitot-static?

If your static port becomes clogged, how would instruments will be affected?

The directional gyro and compass essentially provide the pilot with the same information. Why have two different instruments instead of one?

On an easterly heading, you transition from a climb to level flight. You notice that the compass momentarily indicates a turn to the left. Is this normal? Why or why not?

Under which condition will your airspeed indicator function as an altimeter? That's to say that as your altitude increases your indicated airspeed increases.

In flight, you notice something wrong with your instruments: The turn coordinator indicates a turn to the left, while the attitude indicator shows a descending turn to the right. The altimeter and VSI indicate level flight, and the airspeed indicator indicates cruise speed. What has likely occurred?

AVIONICS

What is the purpose of a standby frequency in a radio?

Do communication and navigation radios operate on the same frequency band?

After starting the airplane you turn on the avionics and immediately hear a lot of static. What could be the cause?

While on the ground you attempt to use Com Radio #2 to pick up the weather, while you monitor ground using Com Radio #1. The signal on Radio #2 comes in broken. What could be the reason for this?

AIRPORT OPERATIONS

TRAFFIC PATTERN

What is the standard traffic pattern direction?

What is the purpose of the segmented circle?

When would a pilot use a teardrop entry? What about a forty-five entry?

You're at traffic pattern altitude on an 8 mile 45° to the downwind. You make your first position report. Immediately after, another airplane calls in on a 7 mile 45°. Is there an issue here? How will you react?

At a towered airport, you call in and are told to make a left base for runway 32. How will you do this?

You are in cruise when you notice the local weather deteriorating rapidly. You decide to divert to a small non towered airport, which has left traffic for both runways. As you near the airport, you see that there are clouds at traffic pattern altitude along the 45 to the favorable runway. How do you proceed?

On short final, another airplanes taxis on to the runway to begin their takeoff roll. They are totally unaware of your presence, and without a radio. You initiate a go around. Why is it critical that you also side step away from the downwind leg?

AIRPORT SIGNS AND MARKINGS

A fully horizontal wind sock indicates winds of approximately what speed?

Does the pointy side of a wind triangle point into or away from the wind?

What color indications should a pilot receive on a PAPI/VASI if they are on glidepath?

When may a pilot need to hold short of a critical ILS area?

When must pilots hold short of runways?

Runway 15 has a segmented circle, that indicates right traffic for runway 15. What is the traffic pattern direction for runway 33?

Can you use a displaced threshold to begin a takeoff roll? What about to land?

You listen to a non-non-towered airport's automated weather and learn that the winds are favoring runway 9. As you proceed over the airport to make a teardown entry, you look down at

the windsock at notice it slightly favoring runway 27. What is likely happening, and how will you proceed? What wind conditions might you expect as you continue approaching the airport.

FARS

FAR OVERVIEW

What is 14 CFR Part 1?

What is 14 CFR Part 21?

What is 14 CFR Part 39?

What is 14 CFR Part 43?

What is 14 CFR Part 61?

What is 14 CFR Part 71?

What is 14 CFR Part 73?

What is 14 CFR Part 91?

What is NTSB830?

You and a friend are discussing the maximum speed within a class B airspace. What section of the FARs would that information be found?

Your friend is a student pilot, seeking his private pilot's license. She wants your help to make sure she is meeting all the hour requirements to obtain her license. What section of the FARs would this information be found?

PART 61 SUMMARY

If you haven't already, please refer to the Part 61 summary document in the Flight Bag. That outlines every single regulation you need to know from Part 61. The questions below are to help you apply your knowledge of those regulations, but to commit the regulations to memory, you need to first go through the Part 61 summary and memorize the regulations using flashcards, or whatever method works best for you.

Your friend says that, because he is never going to seek another flight certificate or rating, he does't need to log his time. Is he correct?

You have been flying a tailwheel Piper Cub for the last 4 months, and have been practicing full stop landings often. Your friend asks to go on a night flight. You know that you are tailwheel current, because you have completed far more than 3 full stop landing in 90 days. Because the landings are to a full stop, are you also night current? If not, what must be accomplished before you can take your friend flying?

If a pilot never takes passengers flying, what is the bare minimum of flight time they must log?

Your friend offers to pay the cost of fuel if you take him flying to a business meeting in a town 100 miles away. You are close friends, and have been looking for a reason to fly together anyway. She is a business executive that makes far more money than you and is more than willing to cover the costs of the flight. Is this legal?

PART 91 SUMMARY

If you haven't already, please refer to the Part 91 summary document in the Flight Bag. That outlines <u>every single regulation</u> you need to know from Part 91. The questions below are to help you apply your knowledge of those regulations, but to commit the regulations to memory, you need to first go through the Part 91 summary and memorize the regulations using flashcards, or whatever method works best for you.

You overfly a friend's house and drop a tennis ball on his front lawn. You are the star of the high school baseball team and have perfect aim. You are 100% confident that you will not endanger people or property in doing this. Is this legal? How could the FAA deem your action to be illegal?

You are going on a night flight. The airport is empty, so as you start your engine you don't bother yelling clear out of the window to alert those nearby that you are about to start your engine. Have you broken any rules? Could this be considered reckless?

You go to your friend's bachelor party where you stay out partying and drinking until 2:00am. You know you will fly the next day at 10:00 so you make sure to stop your drinking promptly at 2:00. Are you legal to fly at 10:00?

Your friend lives in the suburbs and has a little brother that is very ill and loves airplanes. Your friend asks you if you could fly over his house this afternoon to cheer up his brother. You agree.

What is the lowest you can fly? Can you fly lower than the standard MSA because you have your friend's permission?

Your flight school training airplane comes out of the maintenance hangar just as you pull up. They say it's ready to fly, that is was just having a 100-hour inspection performed but is now good to go. They mention that although the inspection is complete, they've been having printing issues and have not printed out the logbook entry yet. They say not to worry and that they'll take care of it when you get back. Is this legal?

ATC AND RADIO PROCEDURES

COMMUNICATIONS OVERVIEW

What are the 5Ws?

NON-TOWERED RADIO PROCEDURES

Is a radio required at a non-towered airport?

If you call in 10 miles out and another airplane calls in from a similar location, what will you do?

Exercise: What radio calls should you make at your local non-towered airport? Practice these radio calls so that you can say them without thinking too hard about it.

Approaching an airport you call "Jackson Traffic, Cessna 123FA, 10 miles south, Jackson". What information have you left out?

TOWERED RADIO PROCEDURES

What is ATIS?

What is the purpose of ground frequency?

What is the purpose of tower frequency?

What must ATC say in order for an airplane to cross a runway while taxiing?

You call ground control with the following: "Executive ground, Cessna 123FA, ready taxi". They respond: "Cessna 123FA, verify you have Tango." What information did you leave out, and what is ground control asking from you?

You receive a clearance to taxi to runway 20 via M and B. That taxi route will cause you to cross runway 31. Are you cleared to cross the runway, or do you need to clarify with ATC?

FLIGHT FOLLOWING / EN-ROUTE

What is flight following?

Is flight following a mandatory service?

Is ATC required to provide pilots with flight following?

What is the advantage of using flight following?

What is a squawk code?

You call ATC requesting flight following and they tell you to ident. What does that mean?

You depart a non-towered airport and, once in range, call center requesting flight following. Your first call to center is the following: "Center, Cessna 123FA, 10 miles north Georgetown, 3 thousand climbing niner thousand request flight following to Lincoln." What mistake did you make?

SCENARIOS

These aren't necessarily questions for Flashcards… more like thinking questions. You need to have an idea of how to act when things get weird in the airport environment.

You're on a one-mile final, cleared to land, when tower clears another aircraft to takeoff on the same runway. You know there won't be enough spacing for them to takeoff and you to land. What do you do?

You're on a 5 mile final and ATC clears another aircraft to make a 2 mile base and land, ahead of you. You're not sure if it'll be enough spacing. What do you do?

As you're in left downwind to land on runway 25, another airplane calls in, for the first time, saying they're on left downwind to land on runway 07. What do you do?

On short final for runway 23, you notice another airplane on the runway, departing runway 5, directly at you. They've made no calls on the radio. What do you do?

Immediately after takeoff, in a Cessna 172, a pilot calls in saying they are on the crosswind leg for the runway you just departed. Is there a potential traffic conflict? What do you do?

NATIONAL AIRSPACE SYSTEM

AIRSPACE OVERVIEW

What are the six types of airspace?

What three types of airspace make up most of the National Airspace System (NAS)?

Which types of airspace are established specifically around certain airports?

What is the fundamental difference between controlled and uncontrolled airspace?

What types of airspace require a mode C transponder?

ALPHA

Where does class A start?

What requirements must be met to enter class A airspace?

When is DME required in class A?

What do pilots do as they enter class A?

You are on an instrument flight plan and instructed to "climb and maintain FL260". Do you need to hear ATC say "cleared into class A"?

ECHO

What are the weather requirements in class E below 10,000′ MSL?

What are the weather requirements in class E above 10,000′ MSL?

When is a transponder required in class E?

What does it mean that class E is “controlled airspace”?

If an airport is uncontrolled, does that mean that it is in uncontrolled airspace?

GOLF

What is meant when we say that class G is “uncontrolled?”

Where is class G typically found?

What are the weather requirements in class G below 10,000’MSL, but above 1200′ AGL?

What are the weather requirements in class G below 1200′ AGL?

What are the weather requirements in class G above 10,000’MSL?

Your airport is class G until 700’AGL and then becomes class E. The traffic pattern altitude is 1,000 AGL. In a closed traffic pattern, are you operating in both class G and class E?

Weather is 3/4sm visibility at night in class G. Can you operate legally as long as you stay in the traffic pattern?

Weather is now 1 1/4sm visibility at an airport in class G. Can you operate legally long as you stay within the traffic pattern?

BRAVO

What are the weather requirements in class B?

What is the mode C veil?

What is the speed limit under a class B?

Is there a speed limit in the class B?

Typically aircraft in a class B are restricted to 250 knots. What rule causes this restriction?

To enter a class B airspace, what must a VFR pilot hear from the controlling facility?

CHARLIE

What are the weather requirements in class C?

What kind of ATC communication is required to enter class C?

Is a transponder required in class C? What about above the airspace within the lateral bounds?

What are the normal dimensions of class C?

You launch a rocket from within class C airspace, with permission of the relevant controlling facilities. Assuming there is not overlaying B airspace, what airspace types will your rocket pass through on its way to space?

DELTA

What are the weather requirements in class D?

What radio communications are required to enter class D?

What are the typical dimensions of class D?

Can you operate in class Delta with less than the basic weather requirements for the airspace? How?

You call: "Tower, Cessna 123FA, 10 miles south with Juliet". Tower says "last aircraft proceed inbound". Is that sufficient for you to proceed inbound?

You call again, and this time tower says "Cessna 123FA, roger." Is that sufficient?

SPECIAL USE AIRSPACE

How can a pilot identify a type of special use airspace on a sectional chart?

Where can a pilot find the frequency for the controlling facility of a special use airspace?

Another pilot asks you if there is any Prohibited Airspace on your local sectional chart. What is the quickest way you could find out?

MOA, RESTRICTED, PROHIBITED

What is the purpose of MOAs?

Can VFR pilots enter MOAs?

What is the purpose of Prohibited Airspace?

Can VFR pilots enter Prohibited Airspace? If so, how?

What is the purpose of Restricted Airspace?

Can VFR pilots enter Restricted Airspace? If so, how?

What is the functional difference between Restricted and Prohibited Airspace?

CFA, WARNING AREA, ALERT AREA

Where are Warning Areas found?

Why might a Warning Area be established?

Why might an Alert Area be established?

Can VFR pilots enter a Warning Area?

Can VFR pilots enter an Alert Area?

Where could aircraft flying in excess of 250 knots be found, other than in special use airspace?

TEMPORARY FLIGHT RESTRICTION

Can VFR pilots enter TFRs? If so, how?

Why may TFRs be established?

NOTAM

What are NOTAMs?

When should a pilot check for NOTAMs?

What kind of information might be displayed in NOTAMs?

CHARTS

How often are sectional charts published?

WEATHER

BIG PICTURE

What is ultimately responsible for earth's weather?

How does warm air circulate?

How does cool air circulate?

Why does much of the weather in North America come from the west?

What is the Coriolis effect?

Weather on the west coast of the U.S. usually comes from the West, while weather in Hawaii often comes from the East. Why is this?

There is a small mass of air with a temperature of -25°C while the surrounding air is -45°C. Describe this situation referencing pressure instead of temperature.

ATMOSPHERIC PRESSURE

What happens to atmospheric pressure at altitude increases?

What is standard atmospheric pressure?

What is standard atmospheric temperature?

True or false: There is proportionally less oxygen the higher in the atmosphere you go.

Using your knowledge of air density, why do airplanes have maximum altitudes?

PRESSURE ALTITUDE

What is pressure altitude?

What is standard pressure at 3,000′ MSL?

If the current altimeter is 29.90, and you are at 1,000 feet MSL, what is your pressure altitude?

DENSITY ALTITUDE

What is density altitude?

What is the difference between pressure altitude and density altitude?

Which is a better measurement for performance: pressure altitude or density altitude?

Does density altitude increase or decrease with temperature?

True or false: An aircraft's performance is directly related to the density of the air.

TEMPERATURE/DEWPOINT AND CLOUD TYPES

The shape of clouds is largely dependent on what?

What kind of clouds are formed from a stable atmosphere?

What kind of clouds are formed from an unstable atmosphere?

What is dewpoint?

What often happens with a close temperature and dewpoint spread?

What does the suffix "nimbus" mean in relation to clouds?

The temperature lapse rate, normally 2°C/1000 feet, is 5°C per 1,000 feet up to 4,000 feet. Is this a stable or unstable atmosphere.

You are flying into a valley and notice a lot of smog and poor visibility down low. The weather clears around 2,000 feet. Is this indicative of a stable or unstable atmosphere?

As you approach your local airport, you see small puffy clouds. If you were to fly through one, what would you expect?

Your friend remarks to you that to avoid turbulence on warm summer days, you should avoid flying directly under clouds. Is this reasonable advice? Why or why not?

CLOUD FORMATION AND FRONTAL SYSTEMS

What is an airmass?

What is a front?

What is a cold front?

What is a warm front?

Why do fronts often produce weather?

What would likely create more intense weather? A fast moving cold front or a slow moving cold front? Why?

THUNDERSTORMS

What are the 3 stages of a thunderstorm?

What marks the mature stage of a thunderstorm?

What hazards do thunderstorms present to pilots?

Your friend returns from a flight with significant hail damage. There were thunderstorms in the area, but your friend swears he didn't go in one — that would be crazy after all! What likely happened?

You are flying in the desert and notice a large ring of dust being kicked up underneath a dark cloud. What is this, most likely?

TURBULENCE

What are some ways turbulence can be generated?

What shape of cloud is likely to have the most turbulence? The least amount?

While crossing a mountain range you see thin, lens-shaped clouds near the mountain peaks. What weather conditions are indicated by these clouds?

On approach to an airport, you fly over a cold lake, then a very hot parking lot and then a large public park. Where are you likely to encounter updrafts?

ICE

Why is ice so dangerous?

What other kind of ice are carbureted engines subject to?

How can water stay liquid below a freezing temperature?

What are some methods pilots can use to escape from icing conditions?

Can ice still cause a fuel-injected engine to quit? If so, how?

You are flying on a cold day with showery precipitation. Along your flight you encounter freezing rain at 2,000 feet, with cloud bases at 6,000 feet. What should you do?

You are flying on a cold day with stable atmospheric conditions. It begins to rain and you notice you are accruing ice very quickly. Cloud bases are only 500 feet above you. What do you do?

What does freezing rain suggest?

While flying you notice a opaque white powder start forming on the leading edge of your wing. What kind of ice is this?

BRIEFING TOOLS

You are departing in the early morning and you'd like to get a quick weather brief before you go to bed. When you call Flight Service, what kind of brief will you request.

You have 10 minutes until departure, but have not received any type of weather brief at all. What kind of weather brief will you request when you talk to Flight Service?

WEATHER PRODUCTS

METARS

What are METARs?

Are cloud heights in METARs measured in AGL or MSL?

A SPECI has been issued for your airport in the last 10 minutes. What does that suggest?

TAFS

What is a TAF?

How often are TAFs published?

What does “FM” indicate on a TAF?

What does “BCMG” indicate on a TAF?

PIREPS

What are PIREPs?

What is the difference between PIREPs coded with UA and PIREPs coded with UUA?

What is the advantage of PIREPs over METARs and TAFs?

WINDS ALOFT FORECASTS

How are winds that are light and variable coded?

How does a pilot decode winds above 100 knots?

WEATHER DEPICTION AND PROG CHARTS

What information can be found on a prog chart?

What information can be found on a weather depiction chart?

What do shaded areas on a weather depiction chart indicate?

What do contoured areas without shading indicate?

If you were concerned about determining freezing levels, would you consults a prog chart or a weather depiction chart?

PERFORMANCE

PERFORMANCE OVERVIEW

What factors can affect an airplane's performance?

Why should pilots not plan on getting the *exact* performance that's stated in the performance chart?

What performance charts are common-use in your airplane?

You are departing you local airport which has a 2,400 foot runway. You calculate your takeoff ground roll required to be 2,100 feet. Do we have enough information to know if this is a safe takeoff? If not, what are we missing?

Generally speaking low temperatures are good for performance. What is a performance metric for which low temperatures are not desirable?

WEIGHT AND BALANCE EQUATION

What is the equation for weight and balance?

In general terms, how does a pilot solve a weight and balance problem?

What is moment?

What is arm?

What is the common term for total moment divided by total weight?

TAILDOWN FORCE AND BALANCE

Why does an aft CG increase performance?

What are the disadvantages to an aft CG?

What are the advantages to a forward CG?

What are the disadvantages to a forward CG?

Do pilots control the amount of tail down force, separately from the weight and balance of the aircraft?

VX AND VY

If a pilot needs to gain the most altitude in a given time, which speed should they climb at?

If a pilot needs to clear obstacles in a given distance, which speed should they climb at?

Which speed is higher, Vx or Vy?

While out flying, you notice that when you start from cruise flight, you can climb much steeper at 55 knots than you can at 65 knots. 65 knots is your published Vx climb speed. Why is this the case?

Why might some pilots want to climb a little faster than Vy under normal conditions?

CHARTS

What is interpolation?

When interpolating with temperature, is it better to round up or round down?

When dealing with pressure altitudes, is it better to round up or round down?

When it comes to headwind, is it better to round up or round down? What about with tailwind?

Must a pilot reference a takeoff and landing distance chart every time they fly? Why not?

PILOT TECHNIQUE

At a high density altitude airport, you rotate and try to climb and the airplane doesn't climb, even though your performance calculations said it should. Why is this, and what should you do?

You are approaching an airport with a 8,000 foot density altitude. On approach, although you are flying at the published final approach speed of 65 knots, you feel like you are very fast. Why is this? Do you need to make any correction?

NAVIGATION SYSTEMS

VOR

In simple terms, how does a VOR work?

What navigational information can a VOR provide?

What does the TO/FROM arrow on a VOR instrument indicate?

What is the difference between a radial and a bearing? Can they ever be the same?

What condition will create reverse sensing?

What is the primary danger in reverse sensing?

TUNING A VOR

What are the steps to tuning a VOR?

Why is it important to hear the morse code identifier on a VOR?

HOW TO FLY A RADIAL

What will happen if a pilot tries to fly a course with the wrong TO/FROM indication?

Why might the airplane's heading required to hold a radial not be equal to the bearing to or from the station?

CROSSING OVER A VOR

What is the cone of confusion?

If a pilot crosses over a VOR from east to west, do they need to re-tune the omni-bearing selector to continue outbound from the station?

When is station passage determined to have occurred?

DME

What is DME?

How does DME work?

Do all VORs have DME? How do we know if a VOR has DME equipment?

Do VORTACs have DME capability?

What is slant-range error?

NDB

What is an NDB?

What equipment in the airplane is used to track to an NDB?

What is the advantage of an NDB over a VOR? What are the disadvantages?

ADF

What is the difference between fixed-card and moveable card ADFs?

Why might the best route to a station not be to follow the exact heading on the ADF needle?

GPS

How does GPS work?

How many GPS satellites are needed to establish a 3 dimensional position?

What is the advantage of GPS compared to VORs or NDBs?

Why do many GPS systems require contact with 5 satellites in order to function properly?

CROSS COUNTRY PLANNING

USING A PLOTTER

Calculating true course requires lining up the plotter's black line along the _____ and then referencing the true course by moving directly _____.

TOP OF CLIMB AND TOP OF DESCENT

Why is Top of Climb and Top of Descent calculated before we pick checkpoints in the middle?