VFR Pilot Study Questions

Fred A Sweet

Introduction

Reading without a problem to solve is like trying to memorize a phonebook. No struggle, no learning. In short, without a problem to solve, there is no motivation. No motivation, no learning. If there is motivation, it is rapidly vanquished if the material is to large or complex. The instructor's role is to break down the material into manageable "bites" or blocks. Then create a condition where there is a problem to solve so the material is read, thought about, and applied. This is best done with questions which guide the student to the core concepts and definitions that are the foundation for understanding and using the material. This helps focus their attention on what is important.

The problem with developing a set of questions is determining what the essential core knowledge is to have a functional use of the material. Additionally, is this core knowledge enough to allow the student to advance on to the next topic and do dangerous things? Like flying and airplane. There is no great answer. Alas, we have to start somewhere and commit to some foundation. This set of study questions is by no means complete and is not meant to be. These study questions were designed to the give the average pilot sufficient understanding of the "Ground School" (not specific flight maneuvers) to then continue the lifelong pursuit of aviation leaning and mastery. If a given pilot believes they can study a limited volume of information and be a competent and safe pilot or worse, an expert, they should find another hobby.

How to use these study questions.

For private, commercial and sport pilots, I will assign a limited amount of questions in a section for an upcoming ground and expect diligent pursuit of answers from the FAA reference texts. This prepares the student for a guided discussion where we can assess their knowledge and then challenge them with scenarios to develop their understanding, application and correlation. In short, make them use the knowledge so it is functional for them. The guided discussion is to assess what they learned from the homework and then find where they need to improve and synthesis a working knowledge of the material. Ground school without preceding homework is as effective as kindergarten painting lessons for adults trying to learn how to fly.

For pilots working toward the initial CFI certificate, they must answer ALL the questions. This gives them the fundamentals to do more study of the subject areas so they can gain the technical understanding for providing instruction. If the applicant only memorizes, they can only regurgitate what they memorized. Whomever their subject is would be better off just reading the book themselves.

After thorough research, I expect the CFI candidate to prepare a lesson to teach me as if I were a student. I typically start off with the easier subjects as the first several ground session are spent on instructional methods (principles of FOI).

About the Questions.

For the easy questions, the answers are referenced in the common text. For the more difficult questions, specific references are given to help the student track down the information. The actual answers are not provided. Learning is work. Without work, there is no learning. You cannot become an Olympic athlete by going to physical therapy and having the therapist move your appendages for you. This is, however, a popular concept. This is why the Oral Exam Guides are big sellers. These are great supplements to vigorous study. However, the applicants that rely on these as their primary study source typically do poorly on the oral exams. There is no substitute for hard work.

Table of Contents

Quiz 1 Aeronautic Decision Making

PHAK Chapter 2, FAA-H-8083-2A Risk Management Handbook, 2022

Risk Management-

1) Define Aeronautic Decision Making (ADM)
2) What is SRM (and CRM)? Give some examples of how you can use these to help ensure the safety of flight at the private pilot level of Pilot in Command (PIC).
3) Describe the risk management process, specifically how to stratify risk.
4) Identify the risks using IMSAFE and PAVE then stratify the risk according to Probability and Severity and discuss risk mitigation strategies of the following scenarios
    a. A cross country where winds are gusting 25 kts at destination
    b. Flying over lake Michigan in the summer
    c. Flying an aircraft with an inoperative airspeed indicator on a ferry permit
    d. Taking your best friend on their first flight. You were up late last night and feel a little tired. You discover the aircraft has a low nose strut. By the time you get the nose strut filled the sun is setting.
1) Recall the elements of the "DECIDE" model and how to use it
2) Recall the elements of the "IMSAFE" model and how to use it
3) Recall the elements of the "PAVE" model and how to use it
4) What are the 5 hazardous attitudes and their antidotes?
5) What are the 7 common operational pitfalls?

Quiz 2 Aeromedical Factors

PHAK Chapter 17
Medical Exams

All pilots need an initial 3rd class medical to exercise privileges to solo and a private pilot license. How do you obtain a 3rd class physical and how long is it valid if you are under age 40? Age 40 or greater?

1) What are 1st and 2nd class physicals and how long do they last?
2) What is Basic Med? What are the minimum requirements to obtain Basic Med Qualifications?
3) How often do you need to see a state licensed physician for Basic Med?
4) How often is it required to take the online Basic Med course?
5) What do you need to carry with you in the aircraft if flying under basic med?
6) What are the flying restrictions for Basic Med?
7) What are some of the disqualifying medical conditions that prevent a pilot from continuing to use basic med (and then get a special issuance medical from the FAA)?

Hypoxia

8) What is Hypoxia and how does it most frequently occur in aviation?
9) What altitudes does the FAA require supplemental oxygen for Crew in excess of 30 minutes? For crew anytime spent above this altitude? Passengers?
10) What are the symptoms and effects of hypoxia?
11) Where can we obtain oxygen appropriate for aviation use?
12) What is a pulse oximeter and how might they be used in aviation? (try google)
13) If you suspect hypoxia but do not have oxygen, what should you do?

Carbon Monoxide poisoning

14) How does Carbon Monoxide cause hypoxia?
15) How does Carbon Monoxide get into the aircraft cabin?
16) What are the symptoms and effects of Carbon Monoxide poisoning?
17) If you suspect Carbon Monoxide threat or poisoning while flying, what should you do?
18) How can you detect carbon monoxide? Can you smell it?

Hyperventilation

19) Why do people start hyperventilating? (try google)
20) Once hyperventilation begins, what happens to the anxiety and panic level? How do you interrupt it?
21) What should you do, immediately, if you passenger starts hyperventilating to ensure safety of flight?

Motion Sickness

22) How does motion sickness occur? Is it easily treated without pharmaceuticals in the aircraft? If so, what should you do if a passenger starts feeling sick?

Vestibular system- and spatial disorientation

23) Describe the vestibular system and semicircular canals of the inner ear and how they provide our sense of motion and balance. (google semicircular canals)
24) Describe the "leans" and what happens to a pilot flying into IMC (google "the leans")
25) Describe the "Coriolis Illusion" and how it occurs
26) What is a "Graveyard Spiral" and how does it happen. (most common cause of loss of control with continued flight into IMC)
27) What is the 'Somatogravic Illusion'? Note, this is very common taking off into low overcast. The pilot stairs at the oncoming clouds instead of the instruments, as IMC is penetrated, the pilot inappropriately pitches down toward ground!
28) Describe a "false horizon" and how it might occur
29) What is Autokinesis? How do you avoid it?
30) What things can you do to avoid or mitigate the effects of spatial disorientation?

Optical Illusions

31) Describe runway width illusions. How does a narrow than normal runway changes a pilot's approach round out to land? How about a wider than normal runway?
32) Describe how an upsloping or down sloping runway may change your approach path.
33) What conditions can be conducive to a "featureless terrain" illusion? Think of night flying to airport near a coastal waterway, approaching an airport over a remote area or farm land or if thick layer of snow on a moonless night. What kind of visual aids might you look to be present at your airport of intended landing that might help?
34) Describe how rain, haze and fog might interfere with your approach to landing.
35) What strategies can you implement to mitigate flying low approaches in these conditions?

Stress, Fatigue, Dehydration, Alcohol and drugs

36) Describe how stress, fatigue and dehydration can affect ADM, mental processes, routine operating practices, memory, and hand eye coordination
37) What is the minimum time from "bottle to throttle" for alcohol consumption?
38) How much does a "hangover" affect ADM, Mental processes, routing operating practices, memory, and hand eye coordination?
39) Where can you find a list of FAA prohibited over the counter and prescription medications?
40) What types of common over the counter medications should pilots avoid?

Decompression Sickness and the "Bends"

41) What is decompression sickness (the "bends") and how does it occur?
42) Why are scuba divers particularly prone to this after a dive?
43) How long should you wait after a scuba diving to fly?
44) If a passenger starts experiencing joint pains, headaches or disorientation after a scuba dive, what should you immediately do to mitigate the risks?

Night Vision

45) There are rods and cones that sense light in the eye. Which are used for night vision and what part of the visual field are they concentrated?
46) How long does it take to accommodate to night vision? How fast is this lost when exposed to bright light?
47) What altitude is it recommended to use oxygen at night and why?
48) Where do we have a "blind spot" in our visual field when flying at night and how might we compensate for this?
49) What is off center viewing at night?

Middle Ear and Sinus problems

50) What symptoms might you encounter if you have a stuffy nose or cold and have significant altitude changes? How severe can these be?
51) Describe a technique you can use to "clear" your ears if pressure builds
52) What is a sinus block? What can you do to reduce the pain if you or a passenger starts experiencing this during descent? Could you have made a different go-no go decision? These can be extremely painful and debilitating.

Currency requirements

53) How do maintain night landing currency to take passengers? Does the landings have to be to a full stop? How about daytime currency?
54) What is the difference between currency and proficiency?
55) How often do you need a flight review? Is there something you can use to substitute for a flight review?
56) If you move, how soon do you have to notify the FAA of your new address?
57) What time is required to log in your logbooks? Every flight?

Quiz 3 Aerodynamics

Reading Assignment:

FAA-H-8083-25B Pilot's Handbook of Aeronautical Knowledge (PHAK)
Chapter 4 and 5 Aeronautical Information Manual (AIM) 7-3-1 Review
Aircraft performance in PHAK and also the description in Aircraft Performance
in the syllabus for additional help

PHAK Chapt 3 and 4

Aircraft Categories and Certification

1) What are the differences between Normal, Utility, Aerobatic, Commuter and Air transport categories of aircraft?
2) When is a Type Certificate issued? What does a Type Certificate Data Sheet (TCDS) contain and where can you find the information included on the TCDS?
3) When and how is an Airworthiness certificate issued? How long is it good for?

Pressure and Temperature- questions in red are for CFI

a) **What is temperature a measure of?**
b) **How are pressure, temperature, and volume related?**
    a. **Give example of how pressure and temperature change as a volume of a gas expands or contracts. How does the density change?**
c) **What is the difference between "weight" and "mass"**
d) **How is density defined? What are its mathematical units?**
e) **Define velocity, acceleration and how they are represented mathematically.**
f) **What is the definition of Force? What mathematical units are used to express Force?**
g) **What is the definition of Pressure? What are its mathematical units?**

1) What is the concept of a "standard" atmosphere? What parameters (temperature, pressure) constitute a "standard" atmosphere?
2) What is a standard Temperature lapse rate? Name some conditions where it is not standard
3) What is a standard Pressure lapse rate? Up to what altitude is this lapse rate constant?
4) Name two ways to determine the pressure altitude at any given airport
5) How is barometric pressure determined at any given airport? Is it adjusted for a particular altitude or is it a raw measurement of the actual pressure at a given airport? (Check the current barometer at Telluride, Denver, and Key West and explain why they are all within 1" of each other given there is 5000 to 8000 ft difference in altitude between them).
6) If we assume the current barometric pressure is reported as 30.12"Hg at KRFD, what is the calculated pressure altitude at KRFD? Show your math. What if the barometric pressure is reported to be 28.92"Hg?
7) If we assume a standard pressure lapse rate on a standard day, what is the barometric pressure at 10,000 ft MSL? In a 182, with wide open throttle at this altitude, what will the manifold pressure gauge indicate approximately?

8) Assuming a standard adiabatic temperature lapse rate, if the temperature at C77 is reported to be 45 degrees F, at what altitude will the temperature reach freezing?
9) What is density altitude? How is it calculated? In performance charts for most GA aircraft, do the charts require density altitude calculations for performance? Check a POH for your aircraft as see if you can see how the data uses pressure altitude and temperature.
10) Describe how temperature, pressure and humidity affect air density.

Forces of flight and airfoil design

1) What are the four forces of fight? In what condition are they equally opposed?
2) Define each of the 4 forces of flight.
3) What if the aircraft is climbing or descending, are they equal at that time?
4) Describe Bernoulli's principle of differential pressure. Does this explain how a wing generates lift?
5) Define and draw the following parameters of wing design: Camber, Chord, Angle of attack
6) What is relative wind and how is it related to the direction of lift? Angle of attack?
7) What is wing "wash out" and how does that help during impending stall or stall recovery?
8) How do flaps change the Chord angle? Angle of Attack? Ailerons?
9) How is drag related to lift? What direction is the drag vector directed compared to lift? Compared to thrust?
10) Where on a wing, in general, is the center of lift (sometimes called center of pressure) located?
11) Does wind only flow from the front to the back of the wing? If not, what other direction does wind flow along the wind? (hint: see "third Dimension" Chapt 4 of PHAK)

Drag and wingtip vortices

1) Define the two general categories of drag and where or when they become the greatest
2) How rapidly does parasitic drag increase with increase in speed of aircraft?
3) If you double the horsepower an a given aircraft, it will nearly double the fuel burn, but does it double our maximum cruise speed? Why?
4) How is induced drag created and in what flight regimen is it most pronounced?
5) How does a pilot, right before landing, "induce" drag? (watch videos on birds landing and see if they do the same thing). How does this help the landing?
6) What is L/D max? How is power/fuel burn related to L/D max?
7) What is the region of reverse command and where does it occur relative to L/D max?
8) In what phases of flight are we in the region of reverse command? Does this make sense we need more power to fly slower?
9) How close to the runway does ground effect occur and how does it increase aircraft performance? Which type of aircraft gets more benefit from ground effect, High vs low wing?
10) If an aircraft is significantly overload past max gross, it may break ground

and fly initially, what is the danger once the aircraft starts climbing?

11) What are wing tip vortices and how do they occur? What dangers do they present to pilots?
12) What wind conditions favor wake turbulence lingering over runway?
13) What type of aircraft, configuration and flight regime produce the greatest wake turbulence?
14) You are at a controlled airport at the hold short line waiting for take off clearance. Shortly after a large jet lands, you are cleared for take off with "caution for wake turbulence". What strategies are you going to use to avoid disaster (being flipped over by wing tip vortices)?
15) Same situation as above, however a large jet takes off ahead of you and then you are given clearance to take off immediately after the jet with "caution for wake turbulence". What are your risk mitigation strategies?
16) You are cleared to land number 2 behind a large jet at a controlled airport, what techniques are you going to use to get on the ground safely?
17) On 2 mile final, tower clears a jet to take off in front of you just before you land, what risk mitigation strategies are you going to use to reduce risk of aircraft upset from wingtip vortices and wake turbulence?

Axes of Rotation and stability

1) Around which axis is pitch? Roll? Yaw?
2) How is static stability different than dynamic stability? Give examples of 3 types of each stability.

Longitudinal stability (about lateral axis: "PITCH")

3) Does the horizontal stabilizer produce lift? In what direction is it directed and why?
4) Where is the Center of Gravity relative to the Center of Lift (aka center of pressure)?
5) Consider any given aircraft is suspended at a point where the Center of lift occurs in the wing. As the aircraft's CG moves forward, what does the horizontal stabilizer have to produce to keep the nose from dropping? How does this affect the amount of lift required by the wing to keep the aircraft from descending?
6) As the aircrafts CG moves aft toward the center of lift, what happens to the lift required by the horizontal stabilizer? How does this affect the amount of lift required by the wing to support the aircraft?
7) What are two ways a wing can generate more lift? And what negative aerodynamic result occurs with any increase in lift? How does this affect required thrust and fuel burn? Maximum airspeed?
8) If the CG moves aft, how does this affect the required lift, thrust, fuel burn and maximum airspeed?
9) As an aircraft slows to land, the airflow over the tail decreases and consequently the effectiveness of the elevator. What concerns might we have with an aircraft loaded forward of its limit for the CG envelope? Loaded aft of the CG limit?
10) Upon entering a stall, the aircraft is likely flying slowly with reduced elevator effectiveness, how might extreme forward or aft CG affect the

ability to reduce the angle of attack and recover from a stall?

Lateral stability (about longitudinal axis: "Roll Stability") and Vertical "yaw Stability"

11) What aircraft design characteristics improve "roll stability"
12) Why does a high wing aircraft have better "Roll stability" than a low wing aircraft?
13) What aircraft design features improve "yaw stability"? Compare tricycle gear vs tailwheel aircraft while on the ground taxiing.

Controllability vs Maneuverability

1) What is critical difference between these two concepts? (hint one of them requires the aircraft to tolerate high G forces, the other doesn't)

Forces in climbs, descents and stalls

2) Why does an aircraft slow down when pitched up for a climb? Accelerate when pitched down?
3) What is the critical angle of attack?
4) Describe how an aircraft stall occurs. Does the wing totally stop producing lift?
5) At what pitch, attitude or airspeed is a stall not possible?
6) How does an angle of attack indicator help avoid stalls over airspeed indicator?

Turning Tendencies

1) Name the four turning tendencies, how they are produced and in what phase of flight and aircraft attitude they are most pronounced. (look up YouTube videos if you must!)
2) Is gyroscopic effect significant in tricycle aircraft? Tailwheel aircraft? What is difference?
3) During climb out, if the wings are held level to the horizon, which rudder are we using and how do we know how much rudder pressure to apply? What forces are we counter acting in this phase of flight? How does this compare to rudder forces required in power on stalls?

Load Factors

1) What is the gravitation force equivalent (aka G-force)? How does it affect the "weight" of an object?
2) What is the difference between weight and mass?
3) If an object at rest is determined to be 100 kg (about 220 lbs), then this object is subjected to a 2-G force, what is its "effective" weight? If it is subject to Zero- G force?
4) How many Gs is an aircraft subject too parked on the ramp? In straight and level flight?
5) If the same aircraft weighs 2800 lbs, how much lift is required to keep it in straight and level flight? How much lift is required to keep it flying if it is subject to a 2 G force?
6) What is Load factor and how is it determined? (Hint-search for "load factor-aeronautics" in Wikipedia)
7) When an aircraft banks to turn, what force causes the aircraft to deviate from its initial straight path and start turning? Draw a "vector diagram" showing this force.

8) In a level turn, what force keeps the aircraft from descending? Draw a vector diagram to show this force.
9) What is the "load factor" or G force on an aircraft in a 60 Degree LEVEL turn?
10) If an aircraft is in a 60-degree bank, but descending, does it still experience the same load factor? Why?
11) What is the stall speed for an aircraft in a 60-degree LEVEL turn?
12) What is an accelerated stall and how does it occur?
13) What are the "limit load factors" for an aircraft in the "normal" category? Aerobatic?
14) Look in your aircraft's POH and see if there is a published **Limit Load Factor** if flaps are deployed that is different than the "normal" category. Given this, what maneuvers should be avoided during stall recovery with full flaps?
15) What is a Vg diagram? Determine where "normal" stall speed occurs, accelerated stall speeds for G loads between 1 G and Maneuvering speed. In the PHAK figure 5-55, how many Gs occur at Maneuvering speed is on the diagram?
16) At what weight are stall speeds determined for most aircraft? For Maneuvering Speed?
17) How many Gs are on an aircraft once it has stalled and is "free falling" so to speak?
18) What is the definition of maneuvering speed? How does it change with the weight of the aircraft? For extra credit, why does Va change with weight? (Think in terms of G load which can be applied to a light vs heavy aircraft before it stalls)

Radius of turn

1) If you are mountain flying and find yourself flying up a blind canyon with rising terrain, how does your airspeed affect the size of the turn you can make? The bank angle? Is this the right time to be thinking about your turn radius with rising terrain?

Quiz 4 Flight Controls and Aircraft systems

PHAK Chapt 6 and 7, Airplane Flying handbook

Flight Controls

1) Describe the following **PRIMARY** control surfaces and which airplane movement they control: Ailerons, rudder and elevator
2) How do ailerons change angle of attack and cause roll?
3) What is adverse yaw and what are some aileron design strategies to mitigate its effect? (Hint: describe Frise ailerons, differential ailerons, coupled ailerons)
4) When does adverse yaw occur and what does the pilot do to counteract it?
5) What is the primary purpose of the rudder? What phases of flight/maneuvers do you need rudder and how do you determine how much rudder to use? Can this be done without referencing the slip skid indicator (the ball)? Hint, look in the syllabus for tips on rudder use
6) What is the difference between a stabilator and an elevator?
7) What are the three main functions of flaps?
8) Describe four basic types of flaps and how they affect lift and drag. **Plain, split, slotted, fowler**. (Describe how they change chord line/angle of attack, air separation on top of wing)
9) It is often said flaps move the center of lift aft and create a nose down pitching moment. Why then does the nose pitch up when flaps are first deployed? How does this compare to when aircraft is fully stabilized on final approach with full flaps?
10) How is the approach-descent angle differ between full flap and no flap landing? Why?
11) What is Vref speed and how is it calculated (see Airplane flying handbook)? What if you have no flaps, is the speed different? (hint: what is difference in V1 and V0)
12) Does stall speed change with aircraft loading-weight? If so, how might this change your approach speed if you are significantly over or under max gross?
13) How does trim work on a control surface? Does it deflect in the same direction as the control surface? How does this compare to an anti-servo tab?
14) What is the primary purpose of leading-edge devices?

Aircraft systems: reciprocating engines

15) Besides antique aircraft, how are most cylinders arranged? How are they cooled?
16) What are the two primary functions of engine oil?
17) Describe the Four-stroke operating cycle for the classic (otto cycle) internal combustion engine.

18) Describe the normal combustion inside a cylinder and then compare that to pre-ignition and detonation. What are the principal conditions that may lead to pre-ignition? Detonation?
19) How do you detect pre-ignition or detonation and how long do you have to intervene before potential catastrophic engine failure? What do you do to stop these from progressing to engine failure?
20) What are some ways you can determine if incorrect fuel (Jet-A or Mogas) has been accidently put into an aircraft that requires 100LL? What danger is this to flight? What should you do if this were to happen to correct the problem?

Magnetos and Spark plugs

21) How many magnetos are there typically per engine? How many spark plugs per cylinder?
22) How do magnetos develop electrical energy to create spark in the plugs? Does this require battery power? If you had total electrical system failure (battery and alternator), would the engine still run?
23) Can you turn a Magneto off? If so, how do you do this? What is the purpose of the P lead?
24) Why are there two spark plugs per engine? Does one magneto fire both spark plugs on a given cylinder? Why?
25) When you switch from both mags to just one mag, why is there an RPM drop? What would you do if the RPM drop was more than 100 RPM? What is the most likely reason and how would you address it?
26) How can you tell if you have a broken P lead and what danger does this pose?

OIL

27) What are the two primary purposes of oil?
28) How much does oil weigh per quart or gallon?
29) What would you do if you had a loss of oil pressure? Which instrument would you look at next? What flight actions would you take?

Carburetor:

30) Where is fuel and air mixed in a carbureted engine?
31) How is the "mixture" (proportion of fuel/air) adjusted in a carburetor?
32) How does Carb ice form? What temperature range does it occur? What meteorological conditions are conducive to carb ice? What power settings promote the most carb ice?
33) How do you detect carb ice in a fixed pitch aircraft? What about an aircraft with constant speed prop? What actions do you take?
34) In general, what power settings do you start to think you should routinely add carb heat?
35) What happens to the relative air fuel mixture ratio when you add carb heat and how does this affect the performance of the aircraft?
36) It is July and 90 degrees. Out of standard operating procedures during training, you have applied carb heat in the downwind when you reduced

power below the green arc. After round out and flare, as you touch down, you bounce really high or start to porpoise and decide to execute a go around and apply full throttle…. The engine coughs and sputters and doesn't respond as you start settling quickly at a high rate of descent toward the runway… What has happened and what could you have done to prevent this scenario?

37) There are several negative effects of over priming (flooding) engine. The most common are running down the battery and overheating/damaging the starter. Frequently the engine will backfire. What are the two potentially damaging/risky results of a backfire especially with a flooded engine?

Fuel Injection:

38) Where is fuel and air mixed together in a fuel injected system? How is this different than a carbureted system?
39) What is a throttle body? A fuel control unit? What are their functions respectively?
40) Why are fuel injected systems prone to difficult "hot starts"? Does your POH have a "hot start procedure if you have a fuel injected aircraft?
41) Are fuel injected systems prone to carb ice or induction icing outside of flying in instrument conditions?

Quiz 5 Aircraft systems

Phak Chapt 7

Fuel System

1) What is the difference in how fuel is delivered to the carburetor on a high wing vs low wing aircraft? Why is this?
2) Does the aircraft your training in have both and electric and engine driven mechanical fuel pump? Why?
3) Why is it important to not over prime an engine for starting? Are there any dangers?
4) Where are the fuel tanks located in your training aircraft, how much fuel do they hold? How much is "usable" for flight?
5) If landing with 30 minutes of reserve fuel for VFR minimums, how many gallons should there be left in EACH tank for your training aircraft? Is there a way you can be sure this is how much you really have?
6) Print out a copy of your fuel system and review with your instructor the following components and what they do: Fuel tanks, Fuel selector, Fuel shut off, Strainer/Gascolator, sump drains (for wings, fuel selector, strainer etc) , fuel vents. Now locate and inspect them on the aircraft.
7) What fuel grades are available? Which can you safely use in your aircraft?
8) What should be done if you discover your aircraft was filled with the wrong type of aviation fuel? What danger could this pose if not detected and corrective action taken?
9) How does water get into aircraft fuel? What do you do if you find water while sumping drains?
10) What conditions leads to detonation? What do you do if you suspect detonation shortly after take-off?

Electrical System

11) Describe the functions of the following components of the electrical system
    a. Battery- including voltage and purpose
    b. Alternator- including voltage and purpose
    c. Generator- how is it different than an alternator
    d. Master/battery switch
    e. Alternator/generator Switch-
    f. Alternator Control Unit or Voltage regulator
    g. How a bus bar distributes "positive" current, where is the "ground/Negative"
    h. Circuit breakers and relationship to buss bar
    i. Ammeter vs load meter vs Voltmeter- and how do you interpret each one
12) What is "field" current and what does it do with the alternator? Will the alternator work if there is a dead battery? Why?
13) What is the advantage of an alternator over a generator?
14) Does the ignition system require any power from the battery or alternator? Will the engine still run if you have a complete electrical system failure? Why?

15) Why is there a separate "avionics" switch and "avionics" buss from the "primary" buss?
16) What equipment and instruments rely on electric power in the aircraft?
17) In flight, you notice the "low voltage" or "Alternator" light illuminate. What would you do to
trouble shoot the system? How might you bring alternator back on line?
18) If you have an alternator failure in flight, what would you do? How long would you be able to operate electrical equipment? Any way to extend or conserve the amount of battery reserve power?
19) How would you handle a popped circuit breaker in flight?
20) How would you handle the smell of burning plastic under panel and possibly some smoke coming from under panel?
21) What is the longest amount of time you should you engage the starter before letting it cool down? Why?
22) How should batteries be charged, in or out of the aircraft and why?

Hydraulic Systems

23) What systems on your training aircraft are hydraulically activated? How do they work? Any reservoirs, actuators or lines to inspect?
24) What type of fluid is the system serviced with?

Fixed Pitch Prop

25) Why does a propellor blade "twist" to flat at the tips? (see propellor basics, Chapt 5 PHAK)
26) How does a propellor generate thrust?
27) What items are you looking for when you inspect a propellor?
28) What size limit is there for scratches, nicks or cracks that need further mechanical evaluation?

Constant Speed Prop -for high performance/complex aircraft endorsements

29) How does propellor pitch effect a change in RPM?
30) How is pitch changed on a constant speed prop?
31) How does a prop governor work?
32) What pitch setting does the prop default to with loss of oil pressure in a single engine aircraft?
33) What would you do if you had an engine "overspeed"? What does this mean is happening in the engine?
34) Describe how manifold pressure changes with engine running and full throttle, closed throttle and why?
35) Why does manifold pressure rise when RPM is reduced?
36) What will the manifold pressure read when the engine is off on a standard day at sea level? In Denver on a standard day?
37) Define the relationship between manifold pressure and RPM to % engine power produced
38) With loss of engine power, what can you do with the prop control to reduce drag, slow descent rate and increase glide range?
39) When pre-flighting a constant speed prop, what else should be inspected besides the blades? What are you looking for?

Quiz 6 Flight Instruments

PHAK Chapt 8, 14 CFR 91.205, 91.213

Required equipment and in-operative equipment

1) What are the 4 places to look to determine the required equipment for your aircraft to make a flight in day or night VFR? 91.213
2) Is there an anacronym to help you remember the day VFR equipment listed in 91.205? What is the point of using this when everything else in flying is done with a check list? And you have to look up the other three sources?
3) What would you do if you had an inoperative piece of equipment and it was not required by any of the 4 checklists/sources from 91.213? Can you still fly? How would you document that to make it legal?
4) You are on a cross country and land at an airport with an on-duty mechanic. You discover you have a piece of equipment that is malfunctioning which is required by one of the four references listed in 91.213, how are you going to get the aircraft back home?

Pitot Static Instruments

1) Describe how a pitot tube is designed, specifically the opening in the front and the drain hole in the back. What is the purpose of both?
2) What is total pressure in a Pitot tube and what are its two components?
3) How does an airspeed indicator determine the "dynamic pressure" to indicate airspeed?
4) Describe how an altimeter works and the function of the "Kohlmann" window.
5) Describe the Airspeed indicator markings and what V speeds they are related to.
6) Define Indicated Air Speed and where you find it
7) Define Calibrated Air Speed (CAS) and where you would find it for your aircraft. How much difference is there between CAS and IAS at very low speeds vs cruise in your training aircraft?
8) What is True Air Speed (TAS)? What parameters (variables) do you need to calculate TAS?
9) If you substituted IAS for CAS in the calculation, how much would the error be in cruise?
10) Under what conditions does IAS=TAS?
11) If your IAS is 160 kts at 10,000 ft MSL, nearest airport reports barometric pressure is 30.07" Hg, outside air temperature (OAT) at your altitude is 14 degrees Celsius, what is your TAS? If you had zero headwind/tail wind, what would be your ground speed?
12) For the question above, what would your ground speed be with a 20 kts headwind?
13) How does non-standard temperature and pressure effect the altimeter?
14) Describe how a vertical speed indicator works and the function of the calibrated leak.
15) How are barometric pressures reported at airports? Are they the actual measured pressure or are they "adjusted" for a particular level or altitude? Why do you think this is?
16) What are the units of Barometric pressure reported in? How many feet of altitude does 1" of Hg corresponded to??
17) How would the Airspeed indicator behave if the tip of the pitot tube was plugged by a mud dauber or ice? (the drain hole remains open)

18) How would the Airspeed indicator behave if both the tip and drain hole were plugged?
19) You are flying at 10,000 ft MSL and ice occludes your static ports. How would the Airspeed indicator indicate if you stayed at that altitude? If you descended to an airport to land?
20) How would the Altimeter and VSI work with iced over static ports? What would you do to get them to work?
21) In a naturally aspirated aircraft during flight, what is the pressure in the cabin relative to the ambient outside pressure? (hint, think about the Bernoulli principle). How would this affect the function of the three pitot static instruments if "alternate static" air was used?
22) How does your transponder report your altitude to ATC? Where does it get this information? (hint: search Altitude Encoder) Is this part of your static system?
23) Given the above, why do you think Pitot static and transponder are checked at the same time? Every how many months?

Gyroscopic instruments

1) What are some typical vacuum driven instruments? Which one is usually electronically driven?
2) What is the principle of rigidity? Precession?
3) On what principle does the Attitude indicator (AI) and Directional Gyro (DG) work?
4) What does it mean if your attitude indicator (AI) "tumbles"?
5) What does it mean if your DG "precesses"?
6) How many degrees will a DG "drift" per hour even if there is no frictional precession?
7) On what principle does the Turn Coordinator work? What type of motion does it detect?
8) What is an "inclinometer"? how does it work? What does "step on the ball" mean?
9) During level flight the "ball" sits in the center? Why?
10) IF you bank to the left without rudder, the ball "falls" into the bank (left). What type of uncoordinated flight is this called?
11) If you bank to the left and the ball "falls" into the bank, then you step on the "ball" (left rudder) to yaw (direct nose) into the turn, what force displaces the ball back toward the center?
12) If you are in straight and level flight and step on the left rudder without banking the aircraft, which way does the inclinometer ball travel? Why? What type of uncoordinated flight is this called?
13) What is a standard rate turn? How do you determine you are making a standard rate turn? Is the turn coordinator the only way to make a standard rate turn?
14) Is there a formula to calculate or approximate a bank angle that will provide a standard rate turn? (hint: search for "how to calculate bank angle for standard rate turn")
15) Why might it be helpful to estimate a bank angle that gives you a standard rate turn? (hint: how many instruments to do you want to reference if you flew into instrument conditions?)
16) How do you tell if one of your gyroscopic instruments is not working correctly?

Magnetic Compass

1) What is magnetic variation? Deviation?
2) How is magnetic course different than true course? If you are in the Seattle area, what magnetic course corresponds to true north? How about in Vermont?
3) What is a magnetic dip angle? Where are they the largest?
4) When turning toward North, does the compass lead or lag? How about turning south?
5) When traveling east or west, describe how the compass would behave if the aircraft were accelerated by descending and adding power simultaneously. How about decelerating by pitching up and pulling power?
6) How is a compass "calibrated" or adjusted (aka "swinging the compass")?

Electronic Displays

1) What type of unit provides attitude and heading information to modern electronic displays? Do they require gyros? Vacuum source? Are these more or less reliable than traditional "steam gauges"?

Quiz 7 Aircraft Documents and Maintenance

PHAK Chapt 9, 14 CFR 91.403, 14 CFR 43 Appendix A- preventative maintenance

1) Who is primarily responsible for maintaining an aircraft in an airworthy condition? 91.403
2) Who is directly responsible for, and is the final authority as to the operation of an aircraft? 91.3
3) Which aircraft require an annual inspection? 100 hr inspection? Is there any difference in the required elements to be performed for a 100 hr vs annual inspection? PHAK 9-8
4) If an aircraft requires a 100 hr inspection, but is not at a facility where it can be performed, how many hours and in what circumstance can the aircraft be flown beyond the 100 hrs? PHAK 9-8
5) What is the difference between the Pilot's Operating Handbook (POH) and Airplane information manual (AIM)? PHAK 9-1. Which one is required to be on board the aircraft?
6) Since 1975, POH and AFM have been standardized to include 10 sections. Name the 10 sections and the general information contained in each section. PHAK 9-2 thru 9-6.
7) What are the "AROW" and "AVIATE -A" anacronyms?
8) Your best friend has just purchased a newer 172, the same make and model you have trained in. He hands you the keys since you are a private pilot rated in the same make and model and says you can go fly for the day for no charge. What must you do, as pilot in command, to make sure the aircraft is airworthy before you fly?
9) You got your pilots license a few years ago and finally purchased your first aircraft. But you are on a budget. What types of maintenance can you do without the authorization of a certified aviation maintenance technician? What is your reference? (Hint: look at the top of this page for references)
10) What are Airworthiness Directives and how do they apply to our aircraft?
11) What is a ferry permit and when might it be required?

Quiz 8 Weight and Balance

PHAK Chapt 10

1) Compare Standard Empty Weight to Basic Empty Weight.
2) What is maximum Gross Weight?
3) How are max landing, ramp and takeoff weights used?
4) How is useful load calculated?
5) Consider if you have two Cessna 172 that come out of the factory at the same time, but one has lots of options (air conditioning, weather radar, oxygen system, cargo pod, back up attitude indicator, back up GPS, extended range fuel tanks, back up alternator, back up vacuum pump, heavier 3 bladed prop), Are the Standard Empty weights the same? How about Basic Empty weight? Which aircraft has a better Useful Load?
6) Define Center of Gravity (CG).
7) Where can a Datum (reference) be located? How do you determine a Station (Arm)? Where do you find this information for your aircraft?
8) What is the relationship of Weight, Arm and Moment?
9) What are the standard weights for Avgas? Oil?
10) For your training aircraft, calculate the weight, CG, moments and arms for two pilots in the front seats weighing 180 lbs, 40 lbs of baggage in back seat or back storage as applicable, max fuel. Recalculate if the baggage is moved to sit on the lap of on of the pilots in the front. How about if you burn all but 1 hour of reserve fuel?
11) At what weight are V speeds determined for your training aircraft? Discuss how the performance of the aircraft changes at reduced weights. Is there a way you can estimate the performance change for the following:
    a. V_1
    b. V_0
    c. V_a
    d. V_{ref} (approach speed)

12) Where is CG generally located relative to the Center of Lift (Center of Pressure)?
13) If the normal range limits of CG location is always forward of the Center of Lift, what force is used to balance the aircraft to maintain level flight?
14) How does the location of CG affect the lift required by the wing? What are two ways to increase the lift of the wing to accommodate greater loads imposed by the change in location of CG? How might this affect the performance of the aircraft?

15) Discuss the differences in performance for an aircraft at max allowable forward CG vs aft CG for the following parameters:
    a. Stall speed
    b. Cruise speed
    c. Fuel efficiency/range

d. Stability/recovery from stalls
e. Flair to land

Quiz 9 Aircraft Performance

PHAK Chapt 11, POH

Structure of Atmosphere and Atmospheric Pressure

1) What percentage of the atmosphere is Nitrogen? Oxygen?
2) Define Atmospheric pressure and how it occurs. Is it a weight?
3) At Sea level, what is the approximate "weight" of the atmosphere in pounds per square inches?
4) Why does pressure decrease as altitude increases?
5) What is a "standard" pressure lapse rate? Up to what altitude is this constant?
6) What is a "standard" temperature lapse rate? Up to what altitude is this constant?
7) Are pressure and temperature lapse rates always constant in these altitudes?
8) How does the "low pressure" found at higher altitudes change aircraft performance? Describe effects on power, thrust, take off, landing performance and climb performance. How does high temperatures affect these parameters?
9) What is the "standard" temperature and pressure at sea level?
10) How is barometric pressure reported? Is it adjusted? If so, how?
11) Consider if barometric pressure is adjusted to "sea Level pressure" (SLP), how might this help pilots know their altitude above sea level (MSL)? Or should the actual pressure at the airport be reported?

Pressure, Density altitude

12) Define pressure altitude. How is it calculated for any given location?
13) Calculate the pressure altitude at KRIL if the barometer is 30.92. and for 29.92.
14) Calculate the pressure altitude at KRFD for a reported SLP of 28.82 and 30.02.
15) You are flying at 10,000 ft indicated with altimeter set to 30.42. What is your pressure altitude?
16) Define Density altitude. What parameters are required to calculate it?
17) What happens to the density of air as you climb to a "High Density Altitude"? (I think we should change the name to "High Altitude Density")
18) Calculate density altitude at both KRIL and KRFD with the above barometric pressures using temperatures of 0^0C and 37^0C
19) Define True Air Speed (TAS). How is it calculated?
20) Calculate the True Air Speed (TAS) at KRIL and KRFD in the above examples if your indicated air speed (IAS) on final approach is 70 kts. In a no wind situation, what is your ground speed crossing the threshold in each of these situations?
21) Describe the difference between IAS and CAS. How close are they at cruise? At slow airspeeds?
22) If you are flying into an airport such as Telluride Colorado, does your IAS for approach, landing and stalls change?
23) How does TAS change relative to IAS as you gain altitude? When does IAS=TAS?
24) How does ground speed relate to TAS?
25) How does humidity affect aircraft performance? Do we have performance charts or formulas to factor this in?

Aircraft climb, cruise, glide performance

26) What is the difference between thrust and power?
27) If you double the horsepower on your aircraft, how much speed do you think you would gain in cruise? Double? If not, why?
28) If you double your horse power on your aircraft, how will it affect climb performance? Why?
29) How does gross weight affect climb performance? Why?
30) Define Vs1, Vso, Va, Vle,Vfe, Vno, Vne, Vr. Vg
31) At what weight is Vg determined? Does Vg change with weight? How does pitch attitude relate to Vg? https://www.aopa.org/news-and-media/all-news/2019/april/flight-training-magazine/in- range, Airplane Flying handbook 3-22.
32) Is L/D max related to Best Glide? How?
33) How far can your training aircraft power off glide per 1000 ft of altitude? Does this distance change with weight? How does this change with a headwind or tailwind? Airplane flying handbook 3-22.
34) What is Vx and at what weight is it determined? Does it change with gross weight? Altitude?
35) What is Vy and at what weight is it determined? Does it change with gross weight? Altitude?
36) What are Vx and Vy at the absolute ceiling?
37) Define Absolute ceiling and compare to Service ceiling.
38) What is L/D max and how is it determined?
39) Define max endurance and how it is determined.
40) Define max range? How is it related to L/D max? How is this different than max endurance?
41) On your training aircraft, approximately what power setting or airspeed gives you max range? Does it depend on altitude? How might this be helpful for flight planning or unanticipated arrival delays, weather or required diversions?
42) Describe where the region of reverse command occurs.
43) Refer to figure 11-14 in PHAK "power required curve". What region does slow flight and final approach speeds occur?
44) In the region of reverse command, what changes airspeed the most rapidly, pitch or power? What controls altitude the most effectively? Pitch or power?

Take off and landing performance

45) Determine the Landing and take-off distance to clear a 50 ft obstacle in your training aircraft under the following conditions at C77 using a maximum performance short field technique:
    a. Max Gross weight, 10 kt headwind, Barometer 28.92, temperature 30^0C
    b. 300 lbs below max gross, 10 kt headwind, barometer 30.42, Temp 0^0C
    c. Max Gross weight, 10 kt tailwind, barometer 28.92, Temp 30^0C
    d. Max Gross weight, Dry grass, no wind, barometer 28.92, Temp 30^0C
    e. Same parameters as (a.) but at KRIL and KTEX
46) How much longer will your landing roll be on Runway 21 at KSEZ compared to a level runway?
47) How much longer would your landing be on a wet grass runway, with a 2% down slope, 5 kts tailwind, and approach speed 10% higher than recommended by POH?

48) For your training aircraft, review with your instructor the performance charts, including Fuel- Time-Distance to top of climb, TAS, power settings, fuel burn and cruise performance calculations

See references for assistance on runway contamination and landing performance:

https://www.boldmethod.com/learn-to-fly/performance/runway-surface-and-slope/

AC 91-79A mitigating risks of runway overrun

AIM 4-3-9 runway condition reports

Approach and Landing Accident Reduction(ALAR) FlightSafety.org **https://flightsafety.org/wp-content/uploads/2016/09/alar_bn8-3-distances.pdf**

Quiz 10 Weather Theory

FAA-H-8083-28 A Aviation Weather Handbook, PHAK Chapter 12

HIGHLY recommended: https://www.weather.gov/jetstream/ and review Atmosphere, Clouds, and Thunderstorms.

The Atmosphere, Pressure and Heat Transfer

1) Describe the basic composition of the atmosphere **PHAK 12-2**
2) Describe the Troposphere and where most of the weather occurs
3) How is atmospheric pressure measured? Roughly how many PSI at sea level? What barometric pressure does this correlate too?
4) Roughly, what is the atmospheric pressure at 18,000 feet relative to see level? Why is this?
5) Describe the three general types of heat transfer, Conduction, Convection, Radiation and give examples of each.
6) Describe the differences between Temperature and Heat. (Google if you must, will help you understand more about weather)
7) How is energy transferred from the sun through **space** then through **the atmosphere** then finally to the **surface of the earth**? What type of energy is this called? Is it all visible or some invisible? (Consider how a microwave (electromagnetic radiation) heats food without heating air inside of the microwave) https://www.weather.gov/jetstream/energy

8) Once the energy is absorbed by the earth's surface, what happens to the surface of the earth?
9) Why does the earth heat un-evenly? (Think of amount of sunlight that strikes the north/south pole and temperature difference between poles and the equator, and the difference between walking barefoot in summer on grass vs blacktop). https://www.youtube.com/watch?v=7fd03fBRsuU
10) How much of the "radiant" heat passes through the atmosphere without warming it? How does the Air get heated? Is it mostly from the Sun or by contact with the earth?
11) Once the Air is heated, what does it do and how does it mix with the rest of the atmosphere?
12) What are convective currents and how are they produced? Where are updrafts likely to occur? Down drafts? (Think of large global areas of warm air vs large areas of poorly heated planet. Also consider how might happen in a local environment parcel of land or water) **PHAK 12-7**
13) Describe atmospheric Circulation on a global scale in simple terms. PHAK **12-4** **https://www.youtube.com/watch?v=xqM83_og1Fc**
14) Describe how the Coriolis effect makes a wind from the south seem to deflect easterly (in the northern hemisphere) and a wind from the north deflect to the west. https://www.youtube.com/watch?v=PDEcAxfSYaI (PHAK 12-13)
15) How is atmospheric pressure measured? **PHAK 12-5**
16) What is the "Standard" sea level pressure and temperature? **PHAK 12-5**
17) How are local barometric pressure readings at any given airport adjusted?

Why**? (PHAK 12-5, figure 12-8)**

18) At what rate does barometric pressure decrease with increasing altitude? Up to what altitude is this constant? (consider what the pressure is above 30,000 ft MSL, is it zero?)
19) Increasing barometric pressure at a local station is associated with what type of weather? A falling barometer is associated with what type of weather?
20) Describe how air travels in a low-pressure system. Clockwise or counterclockwise? Cyclonic or anti-Cyclonic. In ward and up? Or down and out? How about a high-pressure system?
21) Review a wind aloft chart and see if you can detect where high- and low-pressure systems are based on the wind circulation direction.
22) Compare how a convective current might be induced in the middle of a sunny summer day over large rocky area vs over a large body of cold water?
23) What is sea breeze and how does it happen? What about a land breeze? **PHAK 12-8, fig 12-13**
24) How might buildings or trees near a runway affect aircraft attempting to land?
25) Which side of a mountain is the most dangerous in regard to down drafts and turbulence? **PHAK 12-10**
26) What is low level wind shear? Which directions do they occur, vertical? Horizontal? Variations in gust factor? What conditions are associated with Low level wind shear? **PHAK 12-11**
27) Why is low level wind shear so dangerous to an aircraft?
28) What is a microburst? How strong can the down drafts be? Quantify in knots how much headwind/tailwind can shift? How does this affect an aircraft performance approaching or departing an area with a microburst? **PHAK 12-11**
29) How might a microburst be detected visually in flight? What is virga? **PHAK 12-11**
30) Describe how a wind barb represents wind direction and speed. **PHAK 12-12**.
31) What are Isobars? What does it mean if they are closely spaced and what type of wind pattern will be associated with this? **PHAK 12-12**
32) Define atmospheric stability vs instability**.** Which direction is air flowing when stable? Unstable?
33) What is the "Adiabatic" process? Generally, what happens to pressure, volume, and temperature of air as it rises? Descends? **PHAK 12-12 and 12-13**
34) What is a temperature inversion? Name at least two ways a temperature inversion can occur. **PHAK 12-13.**
35) How does temperature affect how much water vapor the local atmosphere can hold?
36) What are the three phases or "states" of water? As water changes from one state to another, is there any energy absorbed or released? **PHAK 12-13**.
37) Define Evaporation, sublimation, condensation. Give examples.
38) Google latent heat and sensible heat. How many calories of heat are exchanged in the evaporation or condensation of 1 gram (1 cc) of water? How much in a kg (1 liter) water?
39) Compare Condensation heat transfer and Evaporative heat transfer
40)

Relative humidity, Dew Point, Fog

41) How are temperature and dew point related?
42) Define dew point. On a weather report, the recorded temperature is only 1^0C above the dew point just before sunset, what weather related flying risk may occur?
43) What is the temperature dew point convergence rate? **PHAK 12-14**. The reported Dew point is 15^0C and the current temperature is 20^0C. Given a convergence rate of 4.4 degrees Celsius, approximately how high above the ground will clouds start forming?
44) Name 4 ways are can cool to its saturation point and fog/clouds form. **PHAK 12-14**
45) Describe how dew forms. What conditions produce frost? Is frost dangerous if it forms on an aircraft?
46) If the Earth surface is heated by radiation that passes freely through the visible atmosphere, how does the earth surface cool? Does it cool faster or slower on a clear night? A cloudy night? Why? (google "radiation cooling", why does a calm wind promote cooling- hint: look up how wind machines prevent frost on farm produce)
47) What is "radiation" fog? What conditions promote its formation? Why do you think it is called "Radiation" fog?
48) What is "advection" fog and give an example of how it might form and where it is most common
49) What is "upslope" fog and where is it found?
50) What is "Sea Smoke"?

Cloud Types and naming conventions

51) There are several naming conventions for clouds. Define the following terms: Alto, Stratus, Cumulus, Cirrus, Nimbus. Then consider what they mean when they are combined, such as Nimbostratus or Cumulonimbus.
52) What altitudes do you generally find stratus clouds? Cirrus? Cumulonimbus?
53) What state or form of water is in Cirrus clouds? **PHAK 12-16**
54) What are cumulonimbus? What causes them and Why are they so dangerous?
55) For aviation purposes, how is a ceiling defined? What is the difference between overcast and broken?
56) How are ice pellets formed? What do they indicate about the overlying atmosphere and what inflight hazard is there above?
57) What is the difference between hail and ice pellets? Where does hail come from? **PHAK 12-17**
58) You leave your aircraft outside overnight on a trip and discover in the morning it is covered in frost. Is there anything you should do before you fly? If so, how are you going to remove the frost from the aircraft efficiently without scratching the paint or windows?

Airmasses and Frontal systems

59) Where do Air Masses typically occur? What does Polar vs Tropical mean? Maritime vs continental? **PHAK 12-17**

60) Give examples of where a Maritime Polar airmass might originate. A Continental Tropical? Maritime Tropical? **Figure 12-23 PHAK**,
61) As a cool large air mass passes over a warm geographic area, what happens to it? If it is a dry airmass, describe its stability and visibility. If it is a moist airmass, what kind of weather would you associate with it? Where in the US is this type of weather common?
62) A relatively warm airmass passes over a colder surface, how does this affect its stability, visibility and what type of weather is associated with it? Where in the US do think this type of weather is common?
63) Define a Front and how it forms.
64) Name the four types of fronts and describe how they are represented symbolically on weather charts. **Figure 12-24 PHAK**.
65) Describe how a Warm Front occurs, its relative speed and what happens to the warm air as it collides with the cooler air ahead of it.
66) **Examine Figure 12-25** from the PHAK. Over what distance does the warm front spread from where it is depicted on a chart? What types of clouds, visibility and precipitation are generally associated with warm fronts (excluding possible thunderstorms in summer).
67) Describe how a cold front occurs, its relative speed, density and stability. Describe what happens to the cold air as it collides with the warmer air ahead of it.
68) What cloud types and weather are the most typical of a fast-moving cold front? How steep is the frontal "surface" or interface compared to a warm front? (how spread out is the weather from the front) **See figure 12-26 PHAK**.
69) What is a Stationary Front and how does it occur? What type of weather is associated with it and how long does it last?
70) What is an "Occluded Front" and how does it occur? How is this different than a "stationary front"? **see figure 12-27 of PHAK**
71) How does a cold occlusion differ from a warm occlusion? (hint look on Wikipedia for "Occluded front" for a quick easy explanation
72) Name and describe the three stages of a thunderstorm. How high can they get? What type of hazards can be encountered flying through a thunderstorm? How far away should you stay from a thunderstorm?
73) What is the difference between an air mass thunderstorm and steady state thunderstorms? Where might you encounter each?
74) Where do you find "roll" clouds in a thunderstorm? And what is the "gust front"?
75) Which direction does the anvil point?
76) Is it safe to fly under the anvil, even though you might be 20 miles from the intense part of the storm? **PHAK 12-25**
77) What are embedded thunderstorms? If you can't see them, is it safe to fly under them?
78) What is a "squall line"? how long can they be?
79) Where do tornadoes originate from?
80) How is hail formed? (Try google)

EXTRA CREDIT:

1) What type of "lifting" actions promote thunderstorms? Name two sources of lifting.
2) Why is moist air less stable than dry air? Consider the molecular weight of water vapor H2O=18 compared to the molecular weight of N2=28 and O2=32.
3) Why do you think the adiabatic lapse rate of moist air is lower rate than dry air? (hint: consider the latent heat of condensation)
4) Consider a moist parcel of air is in a larger area of dry air. What is the relative density of the moist air compared to the dry air? As the moist air rises, moisture begins to condense, releasing latent heat. What happens to the temperature of that parcel relative to the surrounding dry air? So then what happens as it continues to rise and condensation progressively keeping the parcel from cooling as fast as the surrounding air?
5) Consider there is a rapidly rising parcel of air that starts dumping large amounts rain that rapidly descends toward the earth pulling air down in the same location, what do you think

   the frictional forces of the two shafts of air will produce? **See Figure 12-28 PHAK, Mature Stage** (Hint: static electricity on steroids and severe turbulence)
6) If a warm front from the Gulf of Mexico (Marine Tropical airmass) converges with a Cold (Continental Polar airmass from northern Canada) over the Midwest, What type of weather can we predict?

Quiz 11 Aviation Weather Services

PHAK Chapter 13

FAA-H-8083-28A Aviation Weather Handbook

AIM 7-1 Meteorology

https://aviationweather.gov/
https://www.1800wxbrief.com
https://www.weather.gov/media/aviation/A%20Pilots%20Guide%20to%20Aviation%20Weather%20 Services.pdf

1) Where does most of our aviation weather information come from? **AIM 7-1-1**
2) What is the **NOAA** and what do they do? **FAA-H-8083-28A Aviation Weather Handbook**
3) What is the **Aviation Weather Center** and what types of weather reports to they produce? How do you access the information? **AIM 7-1-1, https://aviationweather.gov**
4) What is Leidos Flight Services and how can you access this product? **AIM 7-1-2 https://www.1800wxbrief.com**
5) If you don't have internet, how can you get a weather briefing? What number do you call? **(hint: phone number is same as the Leidos Flight Service web address)**
6) Describe three commercially available computer applications or web sites that offer Aviation Weather products and how you access them: **Foreflight, Garmin Pilot, FLTPLAN.com**
7) What are the three types of weather briefings available from Flight Service Station (FSS) and what information do they contain? **PHAK 13-4**
8) Describe FIS-B and XM Weather, how does the information get to the cockpit? **AIM 7-1-9, PHAK Chapter 13**
9) What is a METAR? A SPECI? **PHAK 13-6, FAA-H-8083-28A Aviation Weather Handbook**
10) How often are METARS reported? How large of a geographic area do they cover?
11) What does the "Z" mean in the date/time stamp of a METAR/SPECI? How do you convert it to local time?
12) What does "AUTO" in a METAR/SPECI mean?
13) Decode this **wind report** 31015G22KT. Is this in magnetic or true? **PHAK 13-6**
14) Decode **wind** "VRB".
15) Decode **visibility reports**: 5SM, 3/4SM, R12/2400FT
16) What do the following **present weather** codes mean?

    RA SN DZ GR BR FG HZ FU SH TS FZRN FZFG BLSN BLDU VCLTG VCSH

17) What do these mean +SN +RA +TSRA verses SN RA TS verses -SN -RA?

18) What do the following **sky condition** codes mean?
SKC CLR
FEW004
SCT023
BKN100
OVC250 VV001
FEW012
SCT046
VV002 FAA-H-8083-28A Aviation Weather Handbook

19) What is the difference between CLR and SKC? **FAA-H-8083-28A Aviation Weather Handbook**

20) How much of the sky cover is there for SKC, CLR? FEW? SCT? BKN? OVC? **PHAK Figure 13-6**

21) What cloud types are CB and TCU?

22) Decode Temperature/Dewpoints: 18/16, 04/M02. Are these in Fahrenheit or Celsius?

23) How is the Altimeter reported in a METAR?

24) Decode the following METARS:

METAR KOKC 011955Z AUTO 22015G25KT 3/4SM
+TSRA BR OVC010CB 18/16
A2992 RMK AO2 GR 1 3/4 TS
OHD MOV E SLP132

METAR KRFD 021252Z AUTO
31012G20KT 10SM OVC010CB 18/16
A2992 RMK AO2 PK WND 29032/15
WSHFT 30 FROPA LTG DSNT W SLP132

METAR KORD 112355Z AUTO VRB03KT R10L/1800FT BR VCFG
FZDZ VV300 M02/M01 A2983 RMK A02

25) What is a PIREP? When should a pilot make a PIREP? Who do they report it too?

26) Decode the following PIREPS **FAA-H-8083-28A Aviation Weather Handbook**

UA/OV JVL12015/TM2030/FL 040/TP C172/SK 020 OVC/WX RA/TA

10/WV 30012KT/TB LGT UUA/OV BUU/TM1532/FL 090/TP PA28/SK

CLR/TB MOD-SVR/RM LLWS -15KT SFC-030 DURC

27) What is a TAF? What geographic area does it cover? Where do find them?

28) How long is a TAF valid for? How often are TAF updated?

29) How do you decode the following valid date/time: 0812/0912?

30) What does a forecast of P6SM mean? TEMPO mean? PROB30 mean?

31) What does this mean in a TAF? WS020/07040KT

32) Decode the following TAF

TAF
KOKC 051130Z 051212 14008KT 5SM BR BKN030 TEMPO 1316
1 1/2SM BR FM1600 16010KT P6SM SKC
BECMG 2224 20013G20KT 4SM SHRA OVC020 PROB40 0006 2SM
TSRA OVC008CB BECMG 0608 21015KT P6SM NSW SCT040 =

TAF KRFD
020251Z 0203/0224 34012KT P6SM
OVC060 TEMPO 0209/0213 2sm -SN
OVC030 FM02150 36013G21KT P6SM
BKN050

TAF KSTL

020146Z 0202/0306 36012KT 5SM RA BR
OVC005 FM020800 02012G18KT 2 SM
FZRAPL BR OVC007 FM021000 01013G23KT
1 1/2SM PLSN BR OVC007 FM021300
02013G26KT 2SM -SN BR OVC008 FM030300
01010G22KT 5SM -SN BR OVC020

33) What are AIRMETS, and their information is of operational concern to what type of aircraft? Hazardous in particular for which aircraft?
34) What type of information does an AIRMET ZULU, TANGO, and SIERRA contain respectively? Where can you find this information? PHAK 13-12
35) What are SIGMETs, and their information is potentially hazardous to which aircraft?
36) What are Convective SIGMETs? What winds, size of hail and area of coverage call for issuance of a Convective SIGMET? What about tornadoes? **PHAK 13-12**
37) Concerning Winds and Temperature Aloft Forecast (FB), winds are reported in magnetic or true? How would winds reported at FL240 as 731960 be decoded? How about 9900? **PHAK 13-13**
38) Can you find an example of Winds and Temperature Aloft Forecast on Aviation Weather Center web site? Of your favorite weather app?
39) How frequently are Surface Analysis Charts produced/transmitted? Can you find an example on AWC web site?
40) How are Low- and High-pressure areas depicted? Cold fronts, warm fronts?
41) How are a low pressure "Trough" depicted? High pressure "Ridge"?
42) How is an occluded front depicted? A stationary front? **FAA-H-8083-28A Aviation Weather Handbook**
43) What are Low Level Significant Prognostic charts? How often are they published? What altitude do they include weather up to? **PHAK 13-13**
44) How do Prognostic Charts depict "Chance of Rain", "Likely Rain", "Chance Thunderstorm",

"Likely Thunderstorm", "Chance of Snow", "Likely Snow"? do these depictions predict intensity
of the precipitation or just the probability of precipitation? **PHAK Figure 13-12**

45) What is the difference between the "issued time" and "Valid Time"?

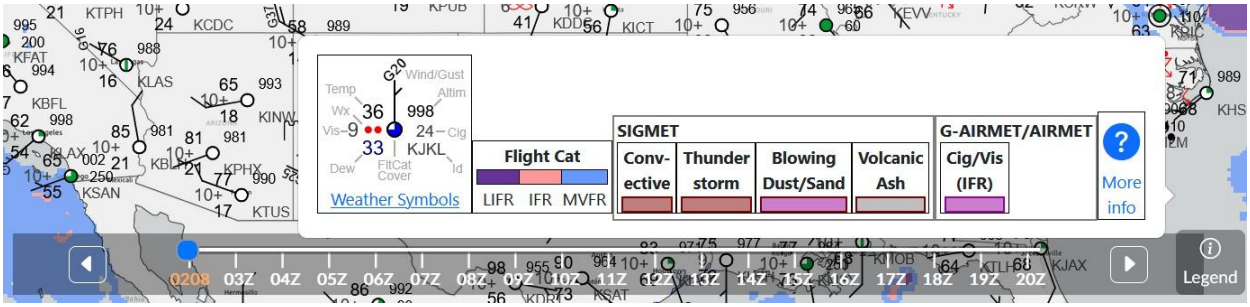
46) What is "NEXRAD"? What is the time lapse from the actual weather to the displayed weather in the cockpit by data link weather (XM or FIS-B)? **PHAK 13-19**. Can this information be safely used to penetrate fast moving (40+MPH) severe weather? What is the utility of this data link streaming weather into the cockpit?

47) What is FIS-B data link weather and how does it get into the cockpit? What about XM? **PHAK 13- 23**

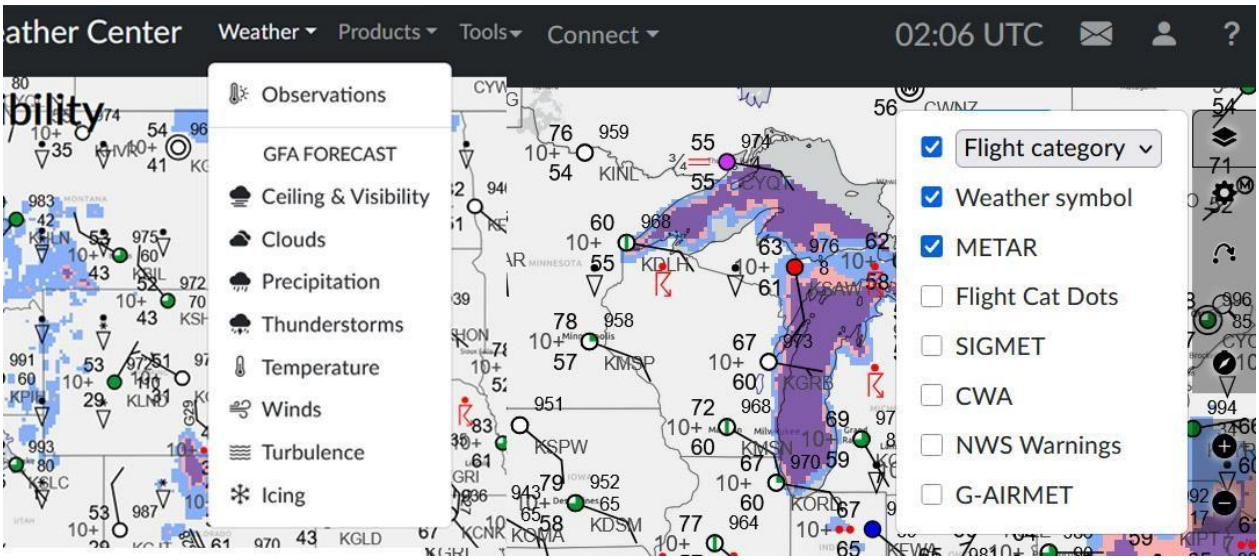
Review with your instructor weather products, where to get them and how to interpret the information. For a full briefing, consider the briefing product in Foreflight, from FSS, or 1-800-Weatherbrief.com. For self-study, the FAA-H-8083-28A Aviation Weather Handbook downloadable from the FAA website.

Go to Aviation Weather Center at https://aviationweather.gov

1) Click on "Weather", then "Observations"
   a. Click on "Legend" on bottom right for pop up list to decode symbols
      i. There are "sub" legends… keep clicking!



   b. Select "Active Layers" on the top right
      i. Toggle various products to overlay on chart



c. Center mouse over "weather station" to get a pop up of local METAR
d. Practice interpreting the weather symbols on the station with the pop-up legend
e. Interpret the flight categories VFR, MVFR, IFR, LIFR. Based on legend, what type of weather is characterized by each category?

2) Click on "Weather", then select the following GFA products and explore
   a. Ceiling and Visibility
   b. Clouds
   c. Precipitation
   d. Thunderstorms
   e. Temperature
   f. Winds
   g. Turbulence
3) Click on "Products" Main page and explore the following products using the legends to interpret
   a. SIGMET
   b. G-AIRMET
   c. Center Weather Adv
   d. Prog Charts
   e. TAF map
   f. Forecast Discussions – Meteorologists tell you what they are thinking
   g. METAR/TAF data -practice decoding
   h. PIREP data
   i. Wind/Temp Data (best for Navigation and Performance Charts!)

4) If you have an EFB such as Foreflight, Garmin pilot or you obtain a brief from 1800WXBrief.com, practice pulling up weather briefs and similar weather products. Make sure you can find the reference legends appropriate to the weather product.

NOTE: Flight briefs from the EFB and website apps do not generally include a radar image to interpret “near” real time location of precipitation and convective activity. Be sure to include this as part of your weather brief.

Practice looking at weather every day, even if aren’t flying. Compare to the actual weather you observe.
This will help you become familiar with the weather products.

Anything or any symbol you don’t understand, look it up or know where to look it up.

Quiz 12 Airport Operations

PHAK 14

AIM Chapt 2, Chapt 4-1-9, Chapt 4-3-3

FAA Advisory Circular 90-66, Non-Towered Airport Flight Operations

Airplane Flying Handbook Chapter 8

1) At a towered airport, when may a pilot deviate from ATC instruction? What communication must the pilot make after the deviation? **PHAK 14-2**
2) What does CTAF stand for and what is it used for? **AIM 4-1-9**
3) What does UNICOM stand for and what is it used for? Can it be the same frequency as the CTAF?
4) What is the MULTICOM frequency for the US and when would you use it? **AIM 4-1-9 g.3**
5) Give examples of when radio communications are recommended for each phase of aircraft movement departing and arriving at a non-towered airport. **Figure 14.1 PHAK, AIM 4-1-1**
6) What is the recommended traffic pattern entry procedure including altitude**? AIM 4-3-3**
7) What are two alternate traffic pattern entries? **AIM 4-3-3, PHAK 14-3**
8) **There is a popular radio call "Flying over airport at 2500 for the right tear drop into the left downwind runway 24".**
    a. What is a VFR tear drop procedure?
    b. Does this phraseology conform to the recommendations of AIM 4-1-9?
    c. How far away from the airport should the aircraft descend to traffic pattern?
    d. How should you then enter the pattern?
9) Where can you find information about Airport communication frequencies, services available, closed runways?
10) What is ATIS and how often is it updated? What airports can you expect to find an ATIS? Who do you have to notify that you have the updated ATIS? **PHAK 14-5**
11) What type of information does the "Chart Supplement" contain? How often are they published? (Hint: https://www.faa.gov/air_traffic/flight_info/aeronav/Digital_Products/dafd/)
12) Open the digital Chart Supplement for East Central (CS EC) on the FAA web site in the address above. Review the Alton/St Louis Airport and answer the following questions:
    a. What is the airport identifier for Alton Airport?
    b. How many miles is this Airport from the City of Alton and what direction
    c. What time zone is the airport and do they observe daylight savings?
    d. What is the field elevation of the Alton airport?
    e. Is there a airport beacon on the field?
    f. If you are flying to Alton at night, is there a runway with a glide path lighting system? Which runway does NOT have a glide path indicator?

g. What is length and width of the two runways?
h. What are the hours of operation in UTC and Local time? How about the hours for the Tower?
i. If you are flying in to Alton at 2 in the AM, is the Tower open? If not, what frequency to you announce your location? Do you need clearance to land?
j. Landing after hours, do you need to activate the runway lighting system or is it already on? Can you adjust the lighting? If so, how?
k. You land after hours and need fuel or other assistance, is there a number to call?
l. On landing, you notice the engine runs really rough and you think you have a bad magneto or possibly a bad cylinder. Under "service" is lists S4 in the supplement. Is this good news or bad?
m. Is there self-serve fuel available?
n. What phone number do you call to listen to the airport AWOS?
o. Under communications, what does the "R" inside a circle mean next to St Louis APP?
p. What is the name of the VORTAC and how far away is it from the field? Are there any unusable radials?
q. What class airport is Alton?

13) Review page 16 of the Chart Supplement, under "communications". What are two ways to get NOTAMS?

14) Refer to the EC Chart Supplement, is there self-serve fuel available at Dixon Municipal (C73) airport? What hours is it available? Are there any maintenance services there? Is there a way to find out if there is a courtesy car available? (try airport manager)

15) At the Decator Airport (KDEC) what are the runway declared distances mean? TORA, TODA, LDA?

16) Refer to the EC Chart Supplement, at the Canton Airport (KCTC). What is the traffic pattern altitude?

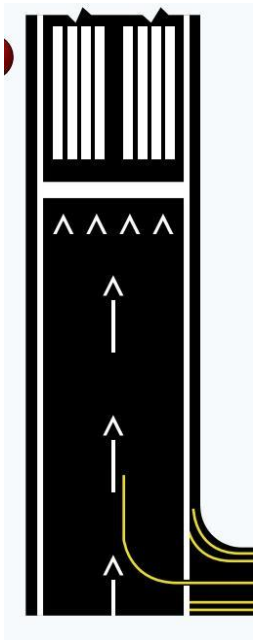
17) Refer to the EC Chart Supplement, what is the traffic pattern altitude for piston aircraft at KFEP Freeport, IL? For Ultralights?

18) At the Champaign Airport KCMI, land and hold short (LAHSO) operations are in effect. You anticipate landing Runway 04 with the winds forecast to be out of the north east, to hold short of 14L-32R, what is your available landing distance?

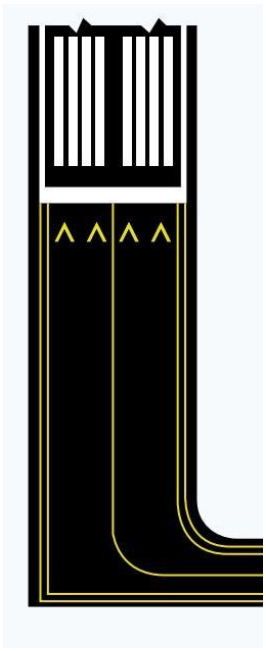
19) What is the difference between a displaced runway threshold and a relocated runway threshold? Which one can be used for take off or landing roll out? Which one can you taxi on?

20) Which of the below represents a displaced threshold? Relocated threshold? Blast pad?

1



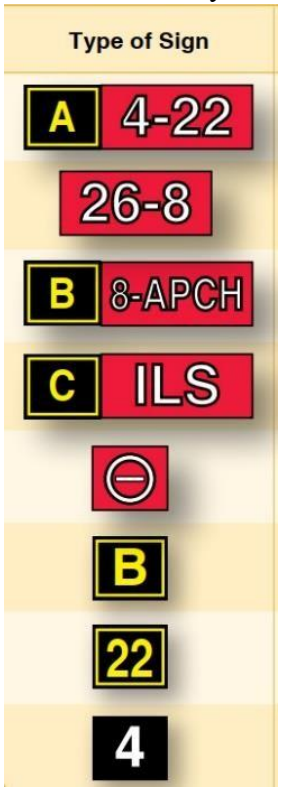
2

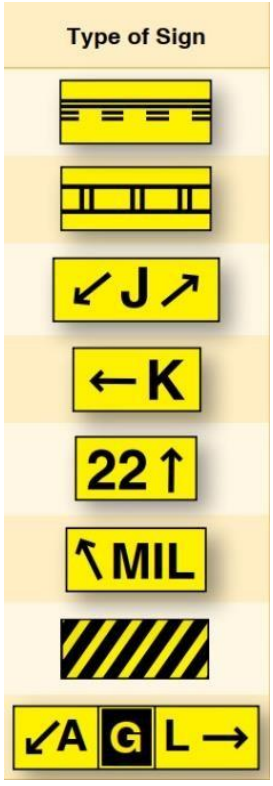


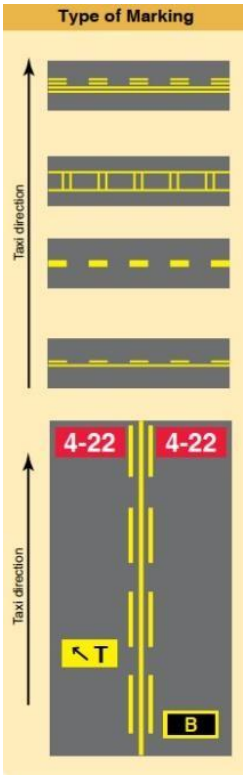
3

21) Identify the following signs and markings:

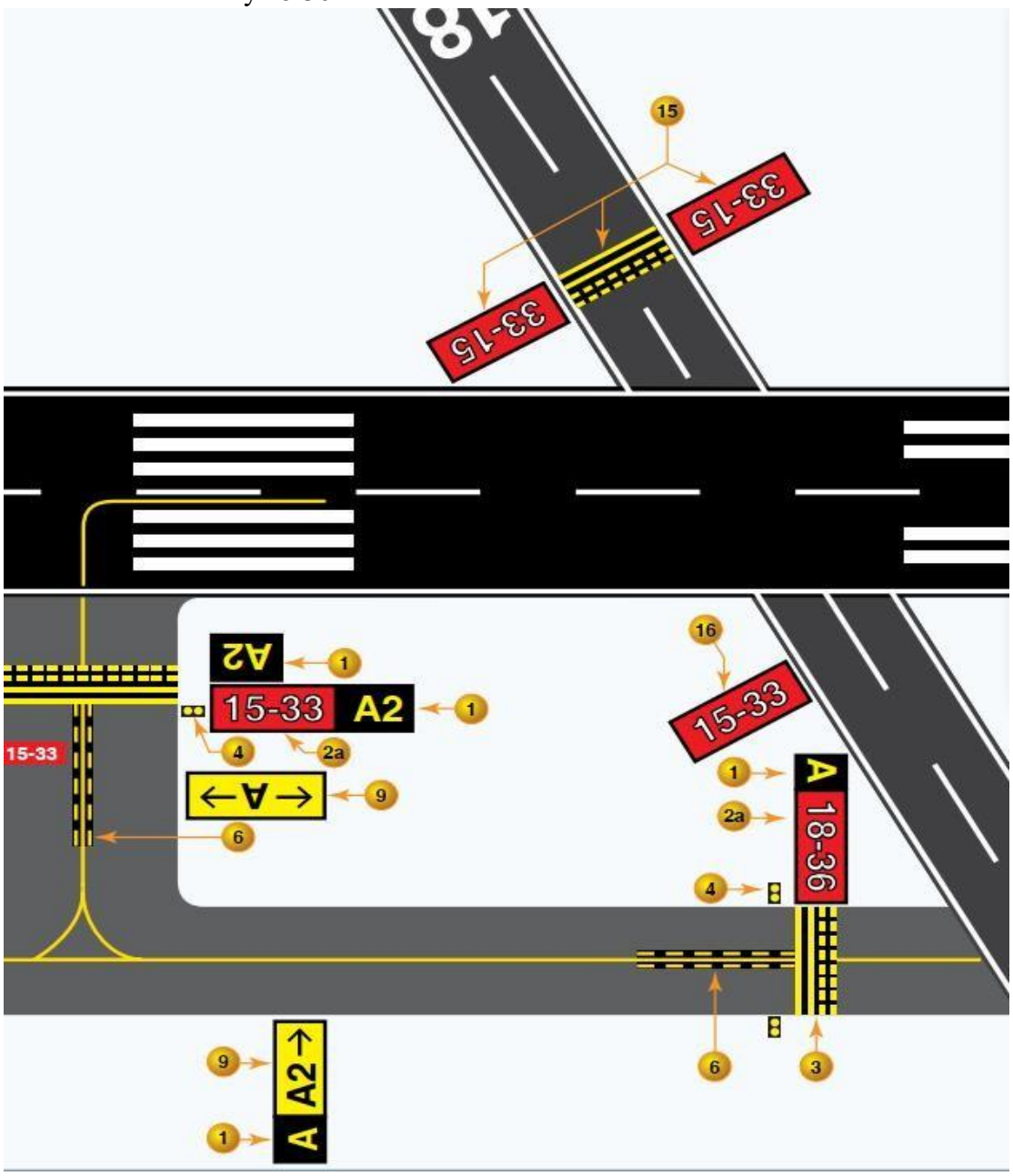
a. ILS Critical Area on taxi Charlie
b. You are on Taxi Alpha intersecting a runway
c. You are on Taxi Bravo on holding short of approach end of runway
d. Runway 22 straight ahead
e. Marks Non-Movement (Ramp/Parking) from Movement area (taxiway)
f. Enhanced taxiway markings to Hold short position
g. There is 4 thousand feet remaining on runway
h. You are on Runway 22
i. Do NOT enter this area
j. Taxi Tango to your left
k. Taxiway marking of ILS critical area
l. You are on taxiway Golf, Alpha is behind and left, Lima taxi to your right







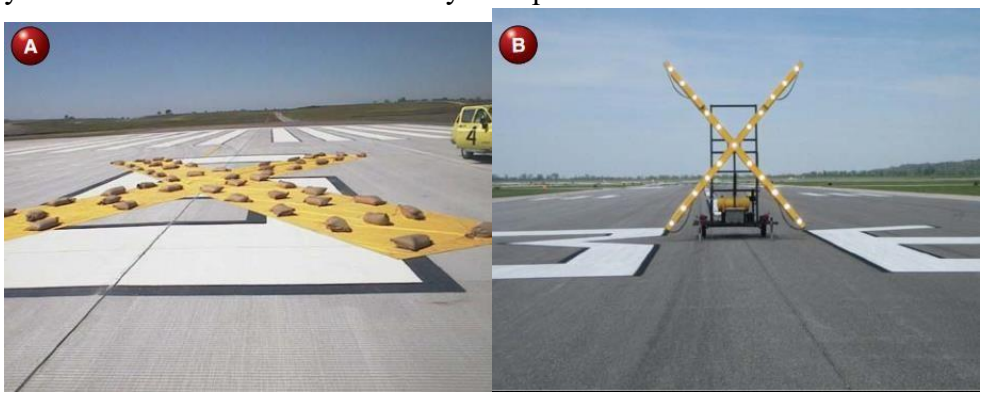
22) Using the diagram below, find the following items and mark with the appropriate labeled number:

a. Land and Hold Short of intersecting runway
b. Enhanced taxiway markings leading to runway hold short position
c. You are on taxiway "Alpha"
d. Taxiway "Alpha 2" is to your right
e. Hold Short of runway 18-36
f. 

23) Do you need a clearance to cross the yellow lines in the direction of the arrow below? Where are these markings located?

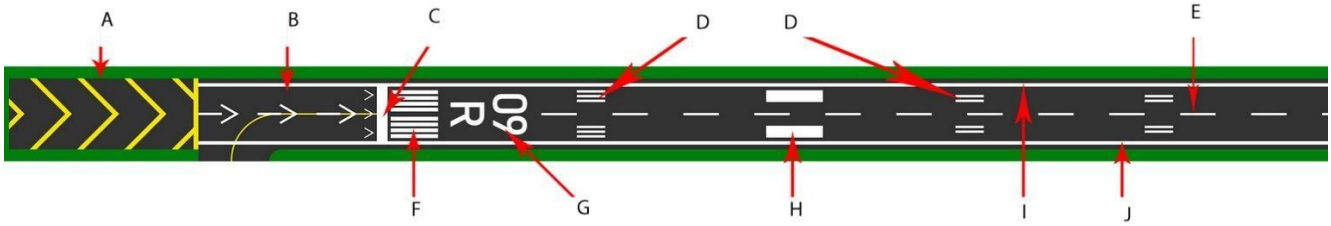
24) Can you cross these lines without a clearance?

25) You are flying over a runway with these markings, can you land? How could you have known about this before you departed ?



26) Identify the following runway markings below:

i. Runway touch down zone
ii. Runway aiming point
iii. Displaced threshold
iv. Runway number
v. Runway threshold
vi. Runway blast pad (overrun for emergency use)
vii. Runway Centerlines

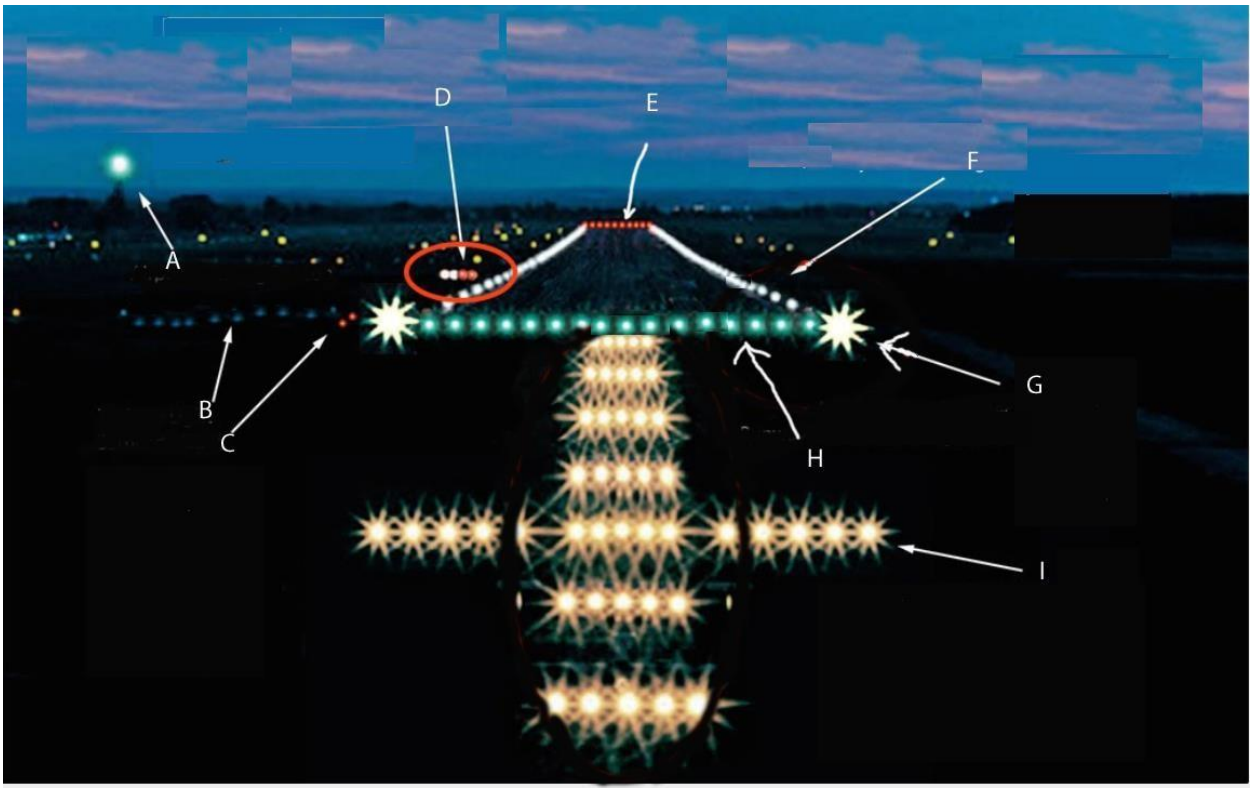


27) How far from the threshold is the Aiming point located?
28) On a standard runway, how long are the center line stripes and what is distance between them?
29) Can a blast pad be used for normal operations?
30) When must you hold short of an ILS critical area?
31) When can you cross from a non-movement (ramp) to a movement (taxiway) area?
32) You are looking for your airport and see two quick white flashes alternating with a green flash. What type of airport is this? Can you land there?
33) What is the beacon flashing type for a civilian airport? Helipad?
34) Compare and contrast VASI and PAPI glide path systems and how they are used.
35) If you are flying to an unfamiliar airport at night, how would the presence of a VASI or PAPI on a runway affect your decision to land there vs a runway without glidepath system?

36) What are runway "Guard" lights and what are they used for?

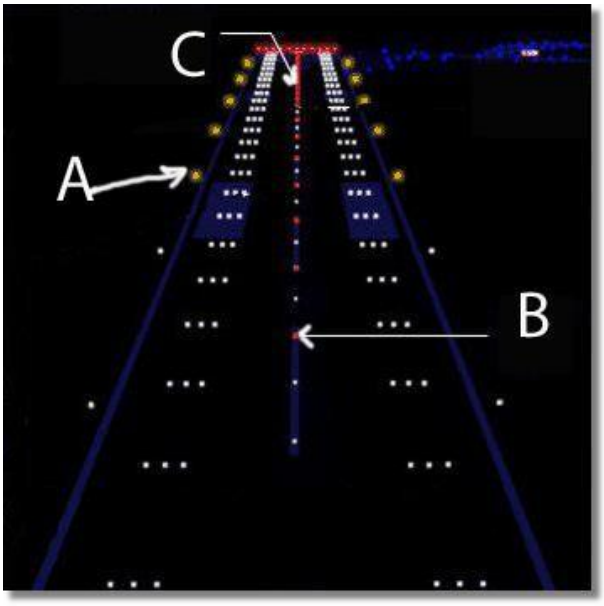
37) Using the figure below Identify the following:

i. Runway end lighting (departure)
ii. Runway threshold lighting (approach)
iii. Runway End Identifier Lights (REIL)
iv. Airport beacon
v. Taxiway edge lights
vi. Runway edge lights
vii. PAPI
viii. Runway "Guard" Lights
ix. MALSR approach lighting system



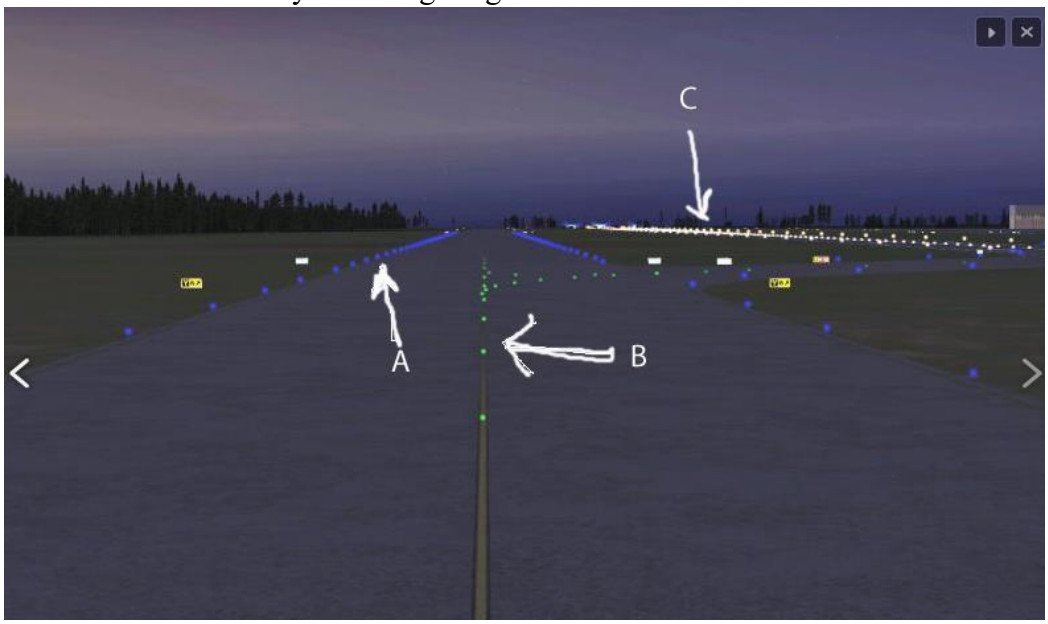
38) Using the following diagram, what lighting corresponds to the following distance remaining on the runway?

i. 3000 ft
ii. 2000 ft
iii. 1000 ft



39) In the picture below, identify the following lighting?

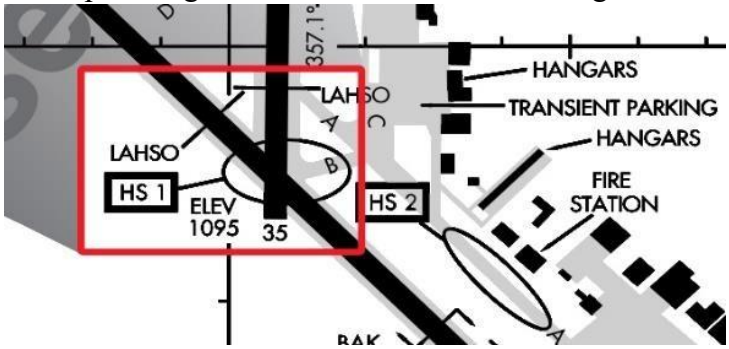
i. Taxiway edge lighting
ii. Runway edge lighting
iii. Taxiway center lighting



40) Which of the below is a MALSR and Which is a ALSF approach lighting system?

41) What are these flashing lights called and what do they mean?

42) On airport diagram below, what is the meaning of HS 1 in the red box? **PHAK 14-8**



43) How do you determine if there is pilot controlled lighting at your destination airport? And how do you activate High, medium and low intensity prior to approach to landing? **PHAK 14-9**

44) Name three types of wind direction indicators that might be on an airfield and how they present wind direction. **PHAK 14-21, figure 14-37**

45) What is the standard traffic pattern entry altitude unless otherwise published in the chart supplement? When is it recommended to descend below Traffic pattern Altitude (TPA)? And about how far from the runway should you turn base?

46) On departure or a go-around when is it advised to begin your turn into the crosswind and at what altitude if remaining in the pattern?

47) On departure or a go-around and departing the traffic pattern, what is the recommended path to exit?

48) If you have lost radio communications (radio transceiver failure, both transmission and receiving) and you just have no other option but to land at a controlled class D airport (clearly there is an emergency above and beyond your radio equipment failure…. 2 strikes), You should remain clear of class D until you have determined what information? Can you enter the Class D before you see light gun signals? What weather minima must be present? When can you actually land? What should you do with your transponder? **PHAK 14-25k, FAR 91.125, 91.126 (d), 91.129 (d) (do these rules apply to class C or B? (91.130(c))**

49) If in flight, what does a steady green light mean? And flashing green light? Steady red light? Flashing red? How about alternating red and green?

50) If you are on the ground what do these same light signals mean?

51) What does it mean if you are instructed to "Squawk" a 4-digit code? What does "Squawk VFR" mean? "Ident"?

52) What is ADS-B and how does it work? Is a radar environment required? **PHAK 14-26**

53) What are the two frequencies ADS-B operates on in the US?

54) How is wake turbulence created? At what point does wake vortices start being produced? And when do they stop? (**This is critical to knowing where it is safe to take off/land)**

55) Which type of aircraft produce the strongest wake turbulence?

56) Does a pilot have to be concerned with wake turbulence En Route at altitude?

57) Describe how wingtip vortices travel vertically and horizontally, especially close to the ground.

58) How does a cross wind or a quartering tailwind affect how long they stay on the runway?

59) Describe how you would avoid wake turbulence in the following situations: **PHAK 14-28**

a. You are departing on same runway as Large/Heavy landing aircraft
b. You are departing on same runway as Large/Heavy departing aircraft
c. You are landing behind a large aircraft landing on same runway
d. You are landing behind a large aircraft departing same runway
e. On departure, you notice a large aircraft cross in front of you a couple of miles and a 1000ft above your altitude.
f. While waiting to depart, A large aircraft makes a low approach but goes around without touching down.

g. A Large aircraft taking off on a parallel runway that is fairly close and upwind to your runway.

60) Give two examples of airborne pilot deviations and five ground pilot deviations. **PHAK 14-30**

61) Name 10 practices that will help prevent runway/taxiway incursions. **PHAK 14-30**

62) What is a "progressive taxi" and when might you request this?

63) How should you respond to a controller if they instruct you to do something you don't understand or do not feel comfortable doing?

64) How must you respond to an instruction to hold short of a particular runway? PHAK 14-32.

65) What does "line up and wait" mean?

66) Immediately after landing at an airport with a control tower, can you turn off on the first available taxiway without clearance? What about exiting onto a crossing runway?

67) When exiting a runway, how much of the aircraft has to cross past the holding position markings?

Quiz 13 Airspace

PHAK Chapt 15

FAR 9.155, 91.157, 91.126, 9127, 91.129, 91.130, 91.131, 91.133, 91.137, 91.138, 91.141, 91.144.

1) Describe the location and vertical limits of the following airspace: **91.155, PHAK 15-2**
   a. Class A
   b. Class B
   c. Class D
   d. Class E
   e. Class G
2) What is equipment pilot certifications, communications and clearances are required to operate in the following Airspace: **PHAK Fig 15-9**
   a. Class A
   b. Class B
   c. Class C
   d. Class D
   e. Class E
   f. Class G
3) What are the Basic VFR minima to operate VFR in the following airspace
   a. Class B
   b. Class C, D, E, G at night
   c. Any airspace above 10,000 ft MSL (excluding class A)
   d. Class G below 1200 ft AGL during day
   e. Class G above 1200 ft AGL during day
4) What are the weather minima to fly VFR into any controlled airspace (class B,C, D, E)? **FAR 91.155(c), 9155(D)**
5) If you don't have the basic VFR minima required in the above question to fly into controlled airspace, what type of "clearance" do you need to fly into these airports VFR? What are the weather minima associated with this "special" clearance? **FAR 91.157.**
6) What are Prohibited areas and how are they designated on VFR sectionals? Is VFR traffic able to be "cleared "into these areas?
7) What are Restricted areas and how are they designated on VFR Sectionals? Can VFR traffic be cleared into these areas? If so, how?
8) Where are "Warning areas" and how are they charted on VFR sectionals? Do you need a clearance to enter these?
9) What are Military Operation Areas (MOAs) and how are they charted on VFR sectional charts? Where on a sectional chart can you determine their vertical boundaries and times of operation? **PHAK 15-4, AIM 3-4-5**
10) What Is an "alert area" and how is it depicted on a VFR sectional? Do you need clearance to enter an "alert Area"? **PHAK 15-4 and 15-5, Figure 15-6**
11) What are controlled firing areas? Are they charted on VFR sectionals**?**
12) Where is a transponder/ADS-B required? **FAR 91.215**

13) What are military training routes and how are they depicted and labeled on a VFR Sectional**? PHAK 15.6**

14) What is a TRSA and how is depicted on a VFR Sectional? (see KRFD, KPSP, KAZO, KMKG). What Class of airport are these and do you need two Way radio comms or clearance to enter the TRSA service area?

15) What is a TFR and name two ways to identify and localize TFRS. **PHAK 15-6. AIM 5-1-3, 7-1-19**

16) What are military training routes and how are they depicted on a sectional?

Quiz 14 Navigation

PHAK Chapt 16

1) What is Pilotage? Give an example. **PHAK 16-12**
2) What is Dead Reckoning and give an example. **PHAK 16-13**
3) Compare the scale and use of the following charts: VFR Terminal, VFR Sectional and World Aeronautical Charts (WAC).
4) Describe the difference between Longitude and Latitude.
5) How many degrees of latitude exists between the equator and the north or south pole?
6) What is the "Prime Meridian" and where is it located? How are the lines of longitude named? **See PHAK 16-4 and figure 16-4.**
7) You depart c77 at 12 noon Central Standard Time for KBEH, with a flight time of 1 hour. What is the local time at KBEH when you land? What is the Zulu (UTC) time when you depart C77 and land at KBEH?
8) How can you tell what time zone (how many hours to adjust for UTC for local time)? **See Chart Supplement.**
9) Describe how you determine your True Course **(TC)** on a sectional or WAC. **PHAK 16-5**
10) If you are plotting a direct course from East to West in Northern United states over a longer distance such as from KRFD to KCPR, does your True Course **(TC)** remain the same? Why? How can you adjust for this to increase your accuracy in navigation?
11) How is True Heading (TH) different than True Course (TC)? Are they ever the same? **PHAK 16-6**
12) Where is Magnetic North (MN) actually located? How far is it from the actual north pole (True North, TN)?
13) How well do magnetic meridians (lines of longitude) match up to the True North (TN) Meridians (lines of longitude)? How straight are these magnetic lines? **See figure 16-8, PHAK**
14) What is Magnetic Variation (also referred to as magnetic declination)? How does it change across the country (compare the variation in North East, Lake Michigan/Chicago area and the North West United States)? **PHAK 16- 7**
15) On a sectional chart, what are isogonic lines? What is an Agonic line?
16) How do you convert your True Course (TC) to a Magnetic Course (MC, also referred to as a "compass course")?
17) If your plotted TC is 270 degrees and the magnetic variation is 7 degrees East, what magnetic course (MC) would equal a 270 degree TC? If the Variation is 5 degrees West, what is your magnetic course?
18) What is Magnetic Deviation? Where is this information for a particular aircraft? **PHAK 16-7 and figure 16-12**
19) How is a Magnetic Deviation for a particular aircraft determined? **PHAK 16-8**
20) What is the difference between True Heading (TH), Magnetic Heading (MH) and Compass Heading (CH)? **PHAK 16-9, figure 16-16**

EFFECT of Wind on Navigation and Dead Reckoning

21) What is the ground speed of an aircraft with a True Air Speed (TAS) of 100 kts in a no wind condition? With a 20 kt head wind? With a 20 kt tail wind? **PHAK 16-9**
22) Define and distinguish between heading, track and (desired) course?
23) What is a drift angle? Wind Correction Angle?
24) Convert 100 kts to MPH
25) Consider an aircraft that intends to fly a true course (TC) of 330 degrees at a True airspeed of 120 kts. The winds aloft for the planned altitude of 6500 ft MSL are predicted to be 25 kts from the west at 270 degrees. Using a Wind triangle, determine the following:
    a. Wind Correction Angle (WCA)
    b. True Heading
    c. Magnetic heading if the Variation is 5 degrees **East**
    d. Compass heading if the Deviation on the compass card indicates to STEER 328 for 330
    e. Ground speed
    f. Time to fly a distance of 450 nm.
    g. Fuel burn in cruise if POH estimates 10 gal/hr at this altitude and power settings used

26) Consider an aircraft that intends to fly a true course (TC) of 330 degrees at a True Airspeed of 120 kts. The winds aloft for the planned altitude of 8500 ft MSL are predicted to be 30 kts from south west at 200 degrees. Using a Wind triangle, determine the following:
    a. Wind Correction Angle (WCA)
    b. True Heading
    c. Magnetic heading if the Variation is 5 degrees **WEST**
    d. Compass Heading if the deviation on the compass card reads STEER 332 for 330
    e. Ground Speed
    f. Time to fly a distance of 450 nm
    g. Fuel burn in cruise if POH estimates 10 gal/hr at this altitude and power settings used
27) Do the same calculations for the above questions with an E6B flight computer
28) List all the things a pilot should review or investigate before making a cross country flight (Hint, there is a check list in the Private Commercial Syllabus)
29) What publication can you find specific information on an airport such as field elevation, runway lengths, hours of operation, fuel availability, types of aircraft services available, time zone, communication frequencies, nearest nav aids.

VFR Cross Country Planning

30) Using an available paper sectional and a plotter, Plot a course between two airports at least 100 nm apart. Determine the following:
    a. True Course (or courses if not a straight line to fly around controlled or restricted airspace)

b. Identify and record on a flight log easily identifiable visible way points 20 to 30 nm apart
c. Identify all airspace you will be traveling through and any frequencies or times of operations to be able to safely and legally transit these airspaces
d. Review course for Maximum Elevation figures and obstructions to determine your minimum safe altitude, EVEN or ODD thousand plus 500 ft for direction of travel. **FAR 91.159 VFR cruising altitude**
e. Determine the winds aloft for the time of the flight and calculate the WCA and TH for each segment of the flight and record on the flight log
f. Find the nearest Isogonic line to the course plotted and determine the magnetic variation, calculate the Magnetic heading (MH) and adjust for Magnetic Deviation of your aircraft to determine the Compass heading. Record the calculations on the flight log for each segment. **TC ± WCA = TH ± V = MH ± D = CH**
g. Calculate weight and balance for the aircraft, pressure altitude at departure airport, cruise altitude and destination airport. Record on flight log
h. Based on weather reporting, determine runway use for departure and at arrival airport, record runway lengths on flight log
i. Using the aircrafts performance charts determine
    i. Take off distance over 50 ft obstacle at departure airport
    ii. Time Fuel and Distance to top of climb
    iii. fuel burn per hour and estimated True Airspeed at cruise altitude
    iv. Landing distance required at destination airport
j. Calculate and record in flight log Ground speed, estimated time enroute, and fuel burn between each check point and record on flight log
k. Determine total fuel burn and flight time and record in flight log
l. Determine total fuel plus VFR reserves needed for flight and record in log **FAR 91.151**

31) Fill out a VFR flight plan form. List at least three ways to file and activate a VFR flight plan.

Ground Based Navigation and GPS

32) What does VOR stand for?
33) Which types of VOR have distance measuring equipment?
34) What exactly is a Radial on a VOR? How does this differ from a Bearing?
35) How does altitude affect the effective range of using a VOR?
36) Does terrain potentially interfere with VOR reception? Why?
37) What are four ways to determine if a particular VOR is working and has reliable signal?
38) What are three ways to check the accuracy of your VOR? What is maximum allowable error for each method?
39) For VFR flights, are VOR checks required?
40) Where can you find a list of VOR check facilities and check points?

41) Define CDI, CDI needle, Omni bearing Selector (OBS), NAV flag and what each component does. PHAK 16-24, figure 16-29
42) When centering the CDI needle by rotating the OBS to a particular "course Index", a "To" flag represents what? A "from" flag represents what? How does this relate to radials and bearings?
43) Describe how you would identify a VOR station, determine its relative bearing from your current location and then fly to the VOR station.
44) How would you determine your actual wind correction angle (WCA) in flight? **PHAK 16-26**
45) How many degrees does each dot represent when using the CDI for VOR navigation?
46) When you are 60 miles from a VOR station, each degree off course represents how much distance? When 30 miles from VOR? 15 miles from VOR?
47) If you are flying away from the VOR with a "TO" flag or toward the VOR with a "FROM" flag,
how will the CDI needle respond to course deviations?
48) What is the "Zone of Confusion" when flying toward a VOR and when does this occur?
49) You are flying a bearing toward a VOR with a "To" flag, as you pass over the VOR and head outbound, what happens to the "TO" flag? If continuing in the same direction outbound, do you need to change the OBS and adjust the course indicator 180 degrees or just leave it alone to keep the CDI needle responding appropriately.
50) Describe how you would intercept a radial on a VOR.
51) If you are established inbound toward a VOR and notice the CDI needle is deviated to the right about 4 degrees, describe how many degrees you are going to turn toward the needle to re- establish on your course? Once re-established, how are you going to keep from flying through the course and then begin a series of S turns? PHAK 16-26, 16-27
52) What three components are combined to make a Horizontal Situation Indicator (HSI)?
53) What does RNAV stand for? What types of devices are capable of "RNAV"?
54) What is an ADF?
55) What advantage does an NDB have over a VOR in regards to reception ability?
56) What is the difference between tracking and homing to an NDB?
57) What are the minimum number of satellites required to get a GPS fix?
58) What does RAIM stand for and what does it do? How many satellites does this require to operate? How many to isolate and exclude a bad satellite signal? PHAK 16-31
59) Do VFR or portable GPS units have RAIM alerting capability?
60) How important is a current GPS database to avoid airspace violations?

Lost Procedures

61) If you get lost, what is the first thing you should do to increase your visual range to find landmarks?
62) How might you use a VOR or GPS to help find out where your are?
63) How might you find radio frequencies to an ATC facility that could make radar contact and give you vectors home?

64) If you can raise anyone on the radio and things become very concerning or hazardous, what radio frequency would you use to contact someone for help? What code would you put in your transponder?
65) Describe reasons you might divert to an alternate airport during a cross country trip and how you would do that.

Quiz 15 Regulations and Airman Information Manual

14 CFR part 1, 21, 39, 43, 61,91, 830 and AIM

1) In regard to Airmen certificates, define Category and Class. Give an example for the rating you are seeking. **FAR 1.1**
2) In regard to certification of Aircraft, define Category and Class. Give examples of each. **FAR 1.1**
3) What is an airworthiness directive? **FAR 39.3**
4) What types of maintenance may an owner/operator pilot make to his own aircraft without an airframe power plant certification? **Appendix A to Part 43**
5) What three documents must a private pilot have in their possession while operating an aircraft in the United States (excluding operations under Basic Med)? **FAR 61.3**
6) Despite the several states' legalization of Marijuana, what potential consequence could possession of or if convicted of operating a motor vehicle while impaired by marijuana (or THC) have on your pilot certificate or ratings? FAR 61.15
7) If you have either a conviction or an administrative action on your driver's license such as being cancelled, suspended or revoked, how soon do you have to report this to the FAA? **FAR61.15**
8) If you fail to report an administrative action or conviction for alcohol or drugs to the FAA in the required time, what potentially could happen to your certificate or application for another rating? FAR 61.15
9) What type of pilots require a 1st class medical? Second class medical? FAR 61.23
10) What type of medical is required to exercise privileges for a student pilot (solo) or private pilot? FAR 61.23.
11) What is the duration of a 1st, second and 3rd class medical under age 40? Age 40 and above? **FAR 61.23(d)**

BASIC MED

12) What requirements must be met for a pilot to exercise the privileges of a private pilot certificate using a driver's license (and not a current 3rd class medical or higher)? **FAR 61.239(c)(3)**
13) What are the limitation on a private pilot using a driver's license to exercise privileges of a private pilot without a current 3rd class medical? **FAR 61.113(i).** FAR 68.

Additional Training

14) Define complex, high performance and tailwheel aircraft. Is there additional training required to be documented to fly these types of aircraft? How do you get authorization to fly these types of aircraft? **FAR 61.31(e) thru (i)**
15) How often must a pilot obtain a flight review? **FAR 61.56(c)**
16) How might an additional rating or certificate requiring a practical test be used toward a flight review? **FAR 61.56(d)(1)**
17) How might an FAA sponsored pilot proficiency award program ("WINGS") be used toward a

flight review? **61.56(e)**

18) You passed your practical for a private pilot test about 5 months ago in a Cessna 172. You also have your tailwheel endorsement in a 1946 J3 Cub (tailwheel), but do to winter and a recent pandemic, it has been 4 months since you have flown. What do you have to do and record in your log book to act as PIC with passengers in the Cessna 172? What about night flight? **FAR 61.57(a)&(b)**

19) What about taking someone for a ride in the J3 Cub after not flying for 4 months? If you get currency on landings in the Cub, does that count for the 172? Or in the 172, does it count for the Cub? **FAR 61.57**(a)

20) Unfortunately, your addiction to flying has created a domestic dispute and you have been expelled from your home and have to move to an apartment. Do you have to notify the FAA? How soon? **FAR 61.60**

21) Can a private pilot tow a glider? How many hours of PIC in the tow plane do you need? Who can authorize and endorse you? **61.69**

22) What is required for a student pilot to fly solo in Class B airspace? **FAR 61.95**

23) As a private pilot, when can you be paid for flying? What are the conditions? **FAR 61.113**

24) Who is the final authority to the operation of an aircraft?

25) When may a PIC deviate from any rule? When must this deviation be reported? **FAR 91.3**

26) Who is responsible for determining whether an aircraft is in condition for a safe flight (airworthy)? FAR **91.7**

27) Can you drop or throw anything from an aircraft legally? **FAR 91.15**

28) How long must you wait after consuming alcohol to act as PIC or crewmember? **FAR 91.17**

29) Is there a legal limit for PIC or crewmember blood alcohol concentration? **FAR 91.17**

30) Are there any limitations on carrying passengers who might be under the influence of alcohol or drugs? What are the limitations? **FAR 91.17**

31) What preflight information must a pilot in command be familiar with before beginning a flight? **FAR 91.103**

32) What responsibilities does the PIC have in regard to use of seat belts and shoulder harnesses by the occupants of the aircraft? **FAR 91.107**

33) What are the seating requirements for infants less than age 2? Do they have to sit on an adult's lap or can a "car seat" type restraining device be utilized? **91.107(a)(3)(i) and (iii)**

34) What are the requirements to operate in a formation flight? **FAR 91.111**

35) Describe the right of way for converging aircraft of the same category. **FAR 91.113**

36) If you are in a single engine land aircraft such as a Cessna 172 or Piper Arrow, describe the right of way if you are converging on an aircraft without power such as a balloon/glider, or slow aircraft such as an ultralight, airship or aircraft towing a glider.

37) Describe the recommended evasive maneuver for approaching another aircraft nearly head on.

38) Describe the right of way of an aircraft on final approach or in the landing phase.

39) Describe the right of way for two aircraft approaching an airport at different altitudes. **FAR 91.113**

40) What are the speed limitations for aircraft in following circumstances? **FAR 91.117**

a. Below 10,00 ft MSL
b. At or below 2500 ft AGL within 4 miles of Class C or D

c. Under Class B
d. If minimum safe airspeed is greater than those listed above

41) Except during takeoff or landing the minimum safe altitudes and horizontal distance should be in the following circumstances? **FAR 91.119**

a. Over congested areas (including small neighborhoods or groups of buildings)
b. Over other than congested areas or open water
c. Anywhere else

42) Flight at or above 18,000 ft MSL (FL180) the altimeter should be set to what? **FAR 91.121**

43) Under what circumstances may a pilot deviate from ATC clearance or instructions when in controlled airspace? FAR 91.123

44) If a deviation from an ATC clearance or instruction is required in response to an emergency or collision avoidance, what communication is required with ATC? FAR 91.123 (c).

45) If a pilot is given priority by ATC in an emergency, when is it required to submit a report to an ATC facility? 91.123. (d)

46) You are flying to a class D airport and loose radio communications. There are no other non- controlled airports within your fuel range (not likely, but for the sake of answering FAA knowledge questions…)… how will you get into the Class D if you think your receiver is inop? How about if your transmit is in op? how about if complete radio failure? **See AIM 4-2-13, Aim 6-4-1, FAR 91.3(b) FAR 91.126(d)**

47) Do you have to wait for light gun signals to enter the class D? Do the regs say anything about entering Class C or B with lost comms?(maybe you shouldn't wait for light gun signals from Atlanta or O'Hare class B tower???) **AIM 4-2-13, AIM 6-4-1, FAR 91.126 (d), FAR 91.3(b), FAR 91.130(c), (d), FAR 91.131(c)**

48) What three things are required to land at a towered airport after loss of radio communications? **FAR 91.126(d), 91.3(b), 91.129(d)**

49) What code do you put into your transponder with lost comms? **AIM 6-4-2**

50) What do the following light gun signals mean while on the ground and in the air? **FAR 91.125**

a. Steady green
b. Flashing green
c. Steady red
d. Flashing Red
e. Flashing white
f. Alternating red and green.

51) You are departing an uncontrolled airport that is within the boundaries of an adjacent Class D or Class C airport. You are unable to contact ATC on the ground. How and when do you contact the controlling ATC? **FAR 91.129(c) and FAR 91.130(c).**

52) What are the day and night minimum fuel requirements for a VFR flight? **FAR 91.151**

53) What are the basic VFR minimums for operating an aircraft under VFR conditions in the following class of airspace: **FAR 91.155, AIM 3-1-4**

a. Class C, D, E during day, below 10,000 ft MSL and G at night?
b. Class E or G at or above 10,000 ft MSL?

c. Class B?
d. Class G during day at or below 1200 ft AGL?
e. Class G ore than 1200 feet AGL, less than 10,000 ft MSL during day?

54) What are the Basic VRF weather minimums to fly into or out of controlled airspace (Class B, C, D or E) such as flying into a class D or C airport, or an airport that has Class E to the surface? **FAR 91.155(c)&(d).**

55) Special VFR is frequently used by VFR pilots in remote areas such as Alaska or VFR pilots in deteriorating weather conditions to get into or out of a controlled airport when the ceilings and visibility are below that required in FAR 91.155(c)&(d). Special VFR operations may only be conducted under what weather conditions and is a clearance required? **FAR 91.157(b).**

56) You are flying to a destination airport that is a Class C or D with predicted weather of VFR. You are only 15 miles from your destination. Unfortunately, the weather is deteriorating, and you find yourself scud running with ceilings of 800 ft, visibility of maybe 3 miles at best and cell phone towers and windmills everywhere. You call the control tower and report you are 15 miles west at 700 ft with the ATIS information Delta. The tower responds, "Remain clear of the class D and state your intentions". How are you going to get on the ground safely? **AIM 4-4-6, FAR 91.157**

57) What requirements are there to obtain a special VFR at night? **AIM 4-4-6**

58) In general, to Class B airports permit special VFR? If not, how do you tell which ones don't? **FAR 4-4-6(e)?**

59) When operating above 3000 ft AGL, what VFR cruising altitudes are recommended between 360 and 179 degrees magnetic? 180 and 359 magnetic? **FAR 91.159, AIM 3-1-5**

60) What two certifications must be displayed in the cockpit or aircraft entrance for passengers or crew may view? **FAR 91.203**

61) Which regulation determines the minimum equipment required for VFR day and VFR night for powered civil aircraft in the standard category**? FAR 91.205.** Do you really think it appropriate to actually memorize this list or is it more appropriate to know where it is and use it as a check list (like we do for ALL other aircraft operations)?

62) Which four resources must you use to determine if a inoperative device or equipment is required for your flight? **91.213(d)(2)**

63) If the inoperative equipment is not required by the elements of 91.213(d)(2), what must be done to complete the flight? **91.213(d)(3).**

64) If the inoperative equipment is required by one of the four elements of 91.213(d)(3), it is technically considered Unairworthy. One option is to have a local mechanic fix the inoperative equipment. What if the local mechanic doesn't have the parts or tools he needs, what can you do to get the aircraft to a repair facility if you think the aircraft is actually safe to fly? **FAR 21.197, FAR 21.199**

65) When must ELT batteries be replaced or recharged? **FAR 91.207(c)**

66) When must aircraft position lights (NAV lights) be turned on or used? **FAR 91.209**

67) AT what altitudes must oxygen be provided for the pilot and crew? For passengers? **FAR**

91.211

68) In what airspace and altitudes is a (ADS-B) transponder required**? FAR 91.215**

69) What is an Aerobatic flight and what are the limitations of where an aerobatic flight may be operated**? FAR 91.303**

70) Under what flight pitch and bank limits is a parachute required? **FARA 91.307(c)**

71) Who is primarily responsible for maintaining an aircraft in an airworthy condition? **FAR 91.403.**

72) How often is it required for a general aviation aircraft not used for instruction or commercial use to have an inspection by a certified aircraft technician/Inspection authorization mechanic**?**

73) How often must an aircraft used for instruction or commercial use have an inspection by a certified aircraft technician/inspection authorized mechanic**? FAR 91.409**

74) How often must the transponder be tested**? FAR 91.413**

75) List the conditions or situations where the operator of a civil aircraft must notify the NTSB immediately**. FAR 830.5**

76) How soon after an accident must an operator report be filed with the NTSB**? FAR 830.15**

AIM

1) Is a VOR check required for VFR flights? **AIM 1-1-4**

2) Where do you find a Mode C veil**? AIM 3-2-3**

3) Generally, what are the upper limits of Class B airspace**? AIM 3-2-3**

4) What equipment and communications must a VFR flight do to be able to enter or land at Class B airspace**? AIM 3-2-3(d)(2) &(e)**

5) **W**hat equipment and communications are required to enter Class C airspace**? AIM 3-2-4**

6) What equipment and communications are required to enter Class D airspace**? AIM 3-2**

7) Generally, where are Warning Areas located? Is there a clearance or approval required to transition or fly through these airspaces? What hazards might a pilot encounter**? AIM 3-4-4**

8) What are restricted areas and can a VFR pilot fly through them**? AIM 3-4-3**

9) What type of activities occur in MOAs? Do you need a clearance to fly through them**? AIM 3-4-5**

10) What are alert areas**? AIM 3-4-6**

11) What are Military Training routes? How are they depicted on VFR sectionals**? AIM 3-5-2**

12) If you are flying near or through a Parachute Jump area, what should you do or monitor in theses areas**? AIM 3-5-4.**

13) What is a VFR flyway or corridor? Where can they be found**? AIM 3-5-5**

14) What is a CTAF and what are some of the recommended communications procedures at a uncontrolled airport? **AIM 4-1-9**

15) Where is a mode C transponder and ADS-B required**? AIM 4-1-20 (f).**

16) What are the recommended traffic pattern altitudes and aircraft pattern entry procedures at uncontrolled airports**? AIM 4-3-3**

17) What is a segmented circle, landing direction indicator and traffic pattern indicators**? AIM 4-3-4**

18) Are pilots always required to participate in Land and Hold Short (LAHSO) operations? If not, when? **AIM 4-3-11**

19) When are aircraft required to use navigation lights? Anti-collision lights (Strobes and Beacons)? **AIM 4-3-23**

20) When should visual clearing procedures be used**? AIM 4-4-15**

21) What is the emergency response time in a 121.5 vs a 406 MHz ELT**? Why? AIM 6-2-4**

22) When should an 121.5 ELT be tested? **AIM 6-2-4(b)**

23) How should a distress call be made? **AIM 6-3-1**

24) Describe Vortex Avoidance procedures**. AIM 7-4-6**

25) What is the lowest altitude flights may be made over charted wildlife refuge areas? **Aim 7-5-6**

26) At what altitude does night vision become affected where oxygen use might be considered? **AIM 8-1-2**

27) When are pilots encouraged (but not required) to use supplemental oxygen**? AIM 8-1-2(6)**

28) What techniques can a pilot use to overcome Ear Block during a descent**? AIM 8-1-2(b)**

29) How might an Upper Respiratory infection such as a cold or sinus infection incapacitate a pilot or crew member? How might it be prevented**? AIM 8-1-2 (4)**

30) What are the recommended waiting times for flight after scuba diving for a non-decompression dive up to 8000 ft? for dives requiring decompression or flights above 8000 ft? **AIM 8-1-2(d)**

31) How should you respond to a passenger or crewmember with symptoms of hyperventilation**? AIM 8-1-3.**

32) Carbon Monoxide is odorless and colorless. It produces symptoms identical to the effects Hypoxia. How should you respond to possible Carbon monoxide poisoning**? AIM 8-1-4.**

33) Describe the following illusions of flight that can lead to spatial disorientation: **AIM 8-1-5:**

a. The Leans (happens in IMC if Attitude indicator not relied on)
b. Graveyard Spiral (most common lost of control after continued flight in IMC)
c. Somatogravic Illusion (common flying into low overcast looking at clouds instead of instruments, occurs as penetrating IMC)
d. False Horizon (common with layered clouds, or night or near water while hazy)
e. Autokinesis (fixating on lights at night, eyes start twitching back and forth)

34) Describe how the following Illusions may lead to landing Errors: **AIM 8-1-5**

a. Narrow than usual runway
b. Wider than usual runway
c. Upsloping runway
d. Approach Landing over water
e. Approach to landing at night over featureless terrain (corn fields, remote areas, water)
f. Rain, haze, severe glare on windshield
g. Night Approach to airport in Urban area or adjacent Lighting along a straight road

35) What is Dark Adaptation and how long does it take to fully develop. **AIM 8-1-16**

a. Describe how altitude (above 5000ft), mild hypoxia, smoking, or even brief exposure to bright light affects Dark Adaptation
b. What are some mitigation strategies to prevent loss of dark adaptation in these situations?

36) Describe the difference in visual acuity (sharpness of focus) from our central vision (foveal) vs that of our peripheral vision. Then describe the recommended visual scan techniques **AIM 8-1-6.**
37) Studies recommend what proportion of our time should be looking outside the cockpit for traffic? **AIM 8-1-6**
38) How might you determine the relative altitude of an approaching aircraft to your own? **AIM 8-1- 8**
39) What visual clues suggests you are likely on a collision course with another aircraft? **AIM 8-1-8**
40) Describe what evasive action you would take for an aircraft approaching head on**. FAR 91.113**
41) Describe collision risk mitigations strategies such as how to identify and avoid high risk collision areas, maximizing pilot/aircraft visibility, any other ancillary support devices or services. **AIM 8- 1-8**