Advantage Aviation Inc.
Mountain Checkout Written Examination

Student _____ DATE_____

Instructor _____

Aircraft Used _____ Horsepower _____

Section 1 - - Aircraft Performance and High Altitude Physiology

1. What is the approximate density altitude for the following conditions: field elevation 6,264 feet MSL, altimeter setting 28.50", outside air temperature 75 degrees Fahrenheit?
    A. 7,600
    B. 9,500
    C. 10,400
    D. 11,300

2. Maneuvering speed, Va, is sometimes called the **ROUGH AIR** speed and:
    A. Must be computed by the pilot using an E6B or Jeppessen type computer.
    B. Its use in moderate or greater turbulence assures the airplane will produce a momentary aerodynamic stall rather than causing structural damage.
    C. Varies with Aircraft Gross Weight, decreasing with a reduction in Gross Weight.
    D. Both B and C above.

3. The minimum expected rate of climb recommended for takeoffs from mountain airports is:
    A. 100 feet per minute.
    B. 300 feet per minute.
    C. 500 feet per minute.
    D. 700 feet per minute.

4. Before each takeoff, the Pilot in Command is responsibility for determining the Aircraft's performance figures to be used on that flight. With regard to climb performance you should know that:
    A. Vx, is the speed for steepest climb angle – providing the most altitude gain per unit of horizontal distance
    B. Vy, is the best rate of climb – providing the most altitude gain per unit of time.
    C. Both of the above are correct.
    D. None of the above are correct.

5. Which of the following is true regarding climb performance:
    A. The best rate of climb airspeed for an aircraft loaded to its maximum gross weight does not change with altitude provided that standard pressure and temperature exist at your departure airport , that there is a standard lapse rate and the engine is properly leaned.
    B. The best rate of climb airspeed listed in the POH will produce the maximum climb rate that the aircraft can achieve and likely less than the value in the POH, provided the listed rate of climb airspeed is maintained for the current density altitude and the engine is properly leaned.
    C. The best rate of climb airspeed is constant for any weight of the aircraft provided the listed rate of climb is maintained for the current density altitude and the engine is properly leaned.
    D. The best rate of climb airspeed can be increased by adding 10 degrees of flap to provide additional lift and the engine is properly leaned.

6. Hypoxia, called *mountain sickness or altitude sickness*, is a lack of oxygen at the cellular level of the body due to a decreased partial pressure of oxygen in the inspired air. Hypoxia may be caused by:
    A. Climbing to an altitude where the body is susceptible to a loss of arterial oxygen below that required by the body.
    B. Equipment failure due to a mechanical malfunction of a supplemental oxygen system.
    C. The decreased ratio of oxygen to other gases in the atmosphere at higher altitudes.
    D. Both A. and B. are correct.

7. A person who lives at 5,000 feet elevation (compared to sea level) becomes acclimated to altitude and his body produces more hemoglobin, the oxygen-transporting agent in the blood. Because of this:
    A. The acclimated person can fly 5,000 feet higher than the FAR's specify because they assume the worst case scenario.
    B. The person might get by with an additional 1,000 or 2,000 feet, but his tolerance is not extended an additional 5,000 feet.
    C. Crewmembers must use supplemental oxygen for all flights above 10,000 feet.
    D. The oxygen regulation is unnecessarily conservative because the body responds to the density altitude while the regulation is based upon physical altitude.

8. Smokers must be alert for the effects of hypoxia at lower altitudes than non-smokers because:
    A. The carbon dioxide from cigarettes has an affinity for the red blood cells that is much less than that for oxygen.
    B. The carbon monoxide from cigarettes has an affinity for the red blood cells that is much greater than that for oxygen.
    C. The smoker's physiological altitude will rise to between 3,000 feet to 8,000 feet while operating at sea level.
    D. Both B. and C. are correct.

9. Concerning weight and balance as it affects aircraft performance:
    A. Overloading is frequently cited as a cause of accidents for aircraft operating in

the mountains.

B. A 10 percent increase in aircraft weight causes over a 9 percent decrease in acceleration and a 21 percent increase in takeoff distance with a corresponding decrease in acceleration.
C. Density altitude (high pressure altitude, high temperature and high humidity) may restrict an airplane from being operated safely at its maximum certificated gross weight
D. All the above are true statements.

10. Choose the most correct statement:
    A. Density altitude is the altitude above sea level corrected for non-standard temperature and pressure variations.
    B. Both density altitude and aircraft weight have a tremendous effect on aircraft performance.
    C. The rate-of-climb airspeed is the most important consideration when departing a mountain airport.
    D. A reduction of 100 pounds of maximum gross weight has only a negligible effect on climb performance.

11. Choose the correct statement(s):
    A. The Valsalva maneuver may be required to equalize pressure in the middle ear to ambient pressure.
    B. It is important to have sunglasses and sun screen that block UV-A and UV-B wavelength ultraviolet radiation and use it during high altitude flight operations.
    C. When flying in the mountains it is prudent to carry enough warm clothing to allow you to survive a night in the open following an off-field landing.
    D. All of the above are correct.

Section 2 — Mountain Weather

12. Examine the winds aloft forecast below. What weather conditions would you expect in the areas around these reporting points?

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FD Winds Aloft Forecast          DATA BASED ON 141200Z
VALID 141800Z  FOR USE 1700-2100Z.  TEMPS NEG ABV 24000 FT
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	3000	6000	9000	12000	18000	24000	30000	34000	39000
BIH	2123	2335+00	2441-06	2480-17	2493-29	740744	742350	752854	
WJF	2619+07	2626+02	2542-02	2471-15	2475-27	259141	751148	752655	
ONT	2605	2717+09	2642+04	2540+00	2464-15	246827	258441	760448	761956

A. Strong lift on the windward sides of ridges and sink on the leeward side ridges that would be encountered when within 500 feet of terrain.
B. Stratus clouds obscuring mountain valleys.
C. Very strong up and downdrafts downwind of ridges and rotor turbulence from the surface to many times the height of the ridge.
D. A fast moving cold front, unstable air conditions leading to towering cumulus, thunderstorms, icing and hail.

13. Although extreme caution should be exercised when flying in the presence of a standing wave (usually marked by the lenticular cloud), the air flow and conditions causing the wave may provide a smooth ride, even while producing climbs or descents of several thousand feet per minute.
    A. True
    B. False

14. Which is the most correct statement or statements:
    A. Moderate winds in the presence of ridges rising 5,000 feet or higher above the local terrain often create their own mini-weather systems.
    B. The wind flowing through a mountain pass or over mountain ridges is subject to the venturi effect. The velocity can accelerate two or three time that of steady state winds in the local area.
    C. The established weather patterns caused by the prevailing westerly winds aloft are not modified by an east wind.
    D. Both answers A. and B. are correct.

15. What is a mountain wave?
    A. Orographic lifting that creates thunderstorms on the lee side of mountains.
    B. A weather phenomenon that causes low clouds and fog around the mountains.
    C. An atmospheric condition that creates strong updrafts, downdrafts and rotor turbulence.
    D. A weather phenomenon where lenticular clouds cause severe icing.

16. Clouds often indicate the areas in which it is safe to fly and the areas to avoid during mountain wave conditions. The pilot should avoid:
    A. The rotor.

B. The windward side of the lenticular cloud.
C. The windward side of the mountain range.
D. The mother-of-pearl cloud.

17. Lenticular clouds in the vicinity of the mountains that are causing the wave will always be present to identify a standing wave.
    A. True
    B. False

18. Concerning mountain weather, which is the most correct statement or statements:
    E. The base of the clouds can be estimated by subtracting the dew point from the temperature in Fahrenheit and dividing by 4 (add two zeros).
    F. A valley wind of about 6 - 8 knots, caused by convection, causes wind to blow up canyons in the morning.
    G. A mountain breeze of 10 - 12 knots, occurs in the late afternoon or evening when cooling air slides down the terrain.
    H. All of the above are true.

19. Thunderstorm activity in the mountains may be caused by:
    A. Frontal systems.
    B. Orographic lift.
    C. Convective action.
    D. All of the above.

20. If you fly 2,000 feet above mountain ridges on a windy day with winds in excess of 20 – 30 knots, you will avoid turbulence and downdrafts.
    A. True
    B. False

21. Vaporization of fuel and expansion of the air while passing through the carburetor causes a sudden cooling of the fuel/air mixture leading to the possibility of carburetor icing.
    A. The temperature may drop as much as 60 degrees Fahrenheit.
    B. Favorable carburetor icing occurs with a high relative humidity when the temperature is between 45 and 85 degrees Fahrenheit.
    C. Carburetor heat should be used when the throttle is reduced to a power indication below the green arc (RPM for fixed-pitch prop aircraft, manifold pressure for constant speed prop aircraft)
    D. All of the above are correct.

22. One of the early indications of carburetor ice is:
    A. Increase in RPM on fixed-pitch prop airplanes, an increase in MP on constant-speed airplanes.
    B. Decrease in RPM on fixed-pitch prop airplanes, a decrease in MP on constant-speed airplanes.
    C. Decreasing outside air temperature, regardless of humidity.
    D. Surges in engine RPM.

23. After detecting carburetor ice, you apply carburetor heat and then lean the mixture to produce maximum power. The engine operates normally this way for some time. You then decide to turn OFF the carburetor heat and the engine immediately starts to loose power.

Turning the carburetor heat ON restores power. What is the most likely cause of this problem?

A. There is still ice in the carburetor.
B. The engine inlet that provides NORMAL filtered air is iced over.
C. Turning the carburetor heat OFF has made the mixture too lean for the engine to operate.
D. Turning the carburetor heat OFF has made the mixture too rich for the engine to operate.

24. The differences between mountain flying versus flatland flying include:
    A. Terrain features modify the steady state wind flow patterns, creating localized conditions.
    B. Moving air creates updrafts, downdrafts and turbulence.
    C. Operation at higher altitudes affects engine power, prop thrust, and lift of the wing.
    D. All of the above.

Section 3 — Mountain Flying

25. When flying at altitudes ranging from 1,000 feet below to 1,000 feet above a ridge, descending while continuing to fly toward the leeward side of the ridge:
    A. Can cause the airplane to fly through a wind shear of up to double the wind speed.
    B. Can cause the airplane to stall immediately without any advance warning.
    C. Should be avoided.
    D. All of the above.

26. What are the basic premises of mountain flying?
    A. Always remain in a position to turn toward lowering terrain.
    B. Never fly beyond the point of no return.
    C. Reduce operating weight to a minimum.
    D. Both A. and B. are correct.

27. You are approaching the leeward side of a mountain ridge which you intend to cross over. Which is the correct procedure:
    A. Maintain the original heading if 2,000 feet or more above the ridge top.
    B. Fly perpendicular to the ridgeline at 2,000 feet or more above the ridge top.
    C. Turn to approach the ridge at 45 degree angle when within 1/4 to 1/2 mile
    D. Fly the original heading if there are no downdrafts or turbulence

28. When flying in moderate or greater turbulence, it is important to:
    A. Immediately divert to and at the nearest airport due to unsafe flying conditions.
    B. Call the nearest FSS and ask if the turbulence is expected to continue along your route.
    C. Immediately slow to Va, the maneuvering speed for your operating weight and try to maintain a constant ATTITUDE.
    D. Immediately slow to Vno, the maximum structural cruising speed, and try to maintain a constant ALTITUDE.

29. The recommended maneuver for course reversal (180 degree turn) with minimum turn diameter and minimum forward distance flown is the:
    A. Chandelle
    B. wingover
    C. “canyon turn”
    D. Immelmann

30. From the following statements, which is the most correct statement or statements regarding flying in and around canyons.
    A. Flying the terrain or contour of a canyon requires the pilot to cut across small gullies and ravines to prevent entering an area which is too narrow for a course reversal.
    B. The pilot with good judgement never enters a canyon while flying upslope if there is not room to turn around.
    C. To fly in narrow canyons, the airplane is flown from the head of the canyon down toward the lower terrain (top to bottom).
    D. All the above are correct.

31. Flying up canyons without sufficient altitude to cross the ridge at the head of the canyon is sometimes necessary and can be accomplished safely by:
    A. Flying up the canyon beyond the point of no return providing the airplane has power to spare.
    B. Flying up the center of the canyon if the wires across the canyon are marked with colored balls.
    C. Flying up the side of the canyon that is wide enough to allow a turnaround maneuver, while never flying beyond the point of no return.

32. A pilot flying an airplane which has a maximum rate of climb of 400 feet per minute at the current altitude is approaching a ridge when an unexpectedly strong downdraft is encountered. Airspeed is changed to Vy and maximum power is applied, but the airplane is still descending at 500 fpm. The pilot should:
    A. If terrain clearance is a concern, reverse course.
    B. Speed up to cruise speed.
    C. Transition to 1.3 Vso.
    D. Both A and B.

33. Operating safely in a mountain environment requires you to establish some personal safety standards relating to mountain flying such as weather and aircraft loading:
    A. Weather conditions of less than a 3,000 foot ceiling and less than 5 miles suggest landing and waiting until conditions improve.
    B. Weather is the most dangerous aspect, and the primary cause of all general aviation accidents.
    C. Density altitude variables (altitude, pressure, temperature and humidity) may combine to prevent the pilot from operating the airplane safely at its certificated maximum allowable gross weight.
    D. All of the above are true.

34. In straight and level flight at night with mountains in front of you, you are able to distinguish the light of a town in the distance ahead of you on the far of the mountain. Will you clear the mountain?

A. Yes
B. No

35. Mountain airports are often obstructed by high terrain in close proximity to the runway. The pilot should:
    A. Always fly a left traffic pattern.
    B. Ignore flying left or right traffic and fly a straight in approach.
    C. Obtain information from a reliable reference source or person for specific information on such airports before attempting to land at them.

36. Select the correct statement concerning a flight approaching a mountain ridge:
    A. Approaching from the windward (upwind) side will expose the pilot to a downdraft.
    B. Approaching from the lee side (downwind) side with a wind velocity of 20 knots or more, will expose the airplane to an updraft.
    C. It is possible to encounter eddy currents and downdrafts when approaching a ridge, making it prudent to approach the ridge at a 45 degree angle.

37. The “point of no return” is a critical position that must be understood by all pilots who operate in mountainous terrain and wish to survive. It is defined as:
    A. The last airport in a series of airports, that can be used for an emergency landing if unforecast weather conditions occur.
    B. An imaginary point where a full power course reversal allows an escape from rapidly rising terrain.
    C. The position where, if the throttle is reduced to idle, the aircraft can be turned around during a glide without impacting the terrain.”

38. Choose the correct statement/s concerning the do’s and don’ts of mountain flying:
    A. Don’t rely on cloud shadows on the ground for wind direction unless flying at or near the cloud base.
    B. Don’t fly close to rough terrain or cliffs when the wind exceeds 20 knots.
    C. Don’t fly up the middle of a canyon as it places you in a poor position to make a turnaround.
    D. All of the above are correct.

39. When departing a mountain airport near a large lake such as Tahoe or Big Bear, you should:
    A. Circle over the lake while climbing for maximum clearance from steep terrain.
    B. Fly close to and parallel to windward / sun-lit terrain to take advantage of lift.
    C. Fly no closer than 1 mile from all steep terrain.
    D. Climb at Vx airspeed for maximum clearance from terrain.

40. On a hot day at a mountain airport, the airspeeds you should use for takeoff and landing:
    A. Increase as density altitude increases.
    B. Are the same as for sea level operations.
    C. Decrease as density altitude increase.
    D. Increase for landing but decrease for takeoff as density altitude increases.

41. You should refuel the aircraft after landing at mountain airports:
    A. Before each departure when fuel is available as mountain airports can be far

apart and not all of them have fuel.

B. Never, as minimum takeoff weight is essential for best climb performance.
C. So that you have enough fuel to reach your final destination with at least one hour of fuel remaining.
D. Only when needed for the next leg, as lower weight is desirable for better takeoff performance.

Section 4 — Palo Alto Flying Club Rules

42. A mountain checkout from an authorized instructor is required prior to landing at any airports higher than what altitude?
    A. 3500 feet MSL
    B. 5000 feet MSL
    C. 3500 feet density altitude
    D. 5000 feet density altitude

43. After completing a mountain checkout, what restrictions apply to future operations at mountain airports?
    A. You can fly any club airplane to any mountain airport.
    B. You can only fly to mountain airports in aircraft of equal or greater horsepower than the airplane in which you received the mountain checkout.
    C. You can take any club airplane to a mountain airport provided the aircraft has at least 60 horsepower per occupied seat.
    D. You can only fly to mountain airports the type of aircraft in which you completed the mountain checkout.

44. After completing a mountain checkout, which additional rule applies for flight in mountainous areas?
    A. You must always fly a flight plan for these flights.
    B. For flights into terrain above 10,000' MSL, you must have your flight planning reviewed by a club instructor.
    C. You must calculate expected climb performance for the expected weather conditions and not take off if the rate of climb will be less than 500 fpm.
    D. B and C above.

45. Unless approved by the club director, the minimum horsepower for flight of club airplanes to airports above 3500' MSL is
    A. More than 160 horsepower for more than two people on board
    B. More than 180 horsepower for more than three people on board
    C. More than 200 horsepower for more than four people on board
    D. Both A and B above

Section 5 — Fill-in Questions

46. List four critical elements of the "canyon turn" for making a 180 degree turn in level flight with minimum turning radius.

    1) _____
    2) _____

3) _____
4) _____

47. What is the rule of thumb for how high you should fly over mountainous terrain to allow for the effects of wind?

_____
_____
_____

48. List the performance airspeeds for your airplane:

Vr	_____		
Vx sea level	_____	Vx 10,000'	_____
Vy sea level	_____	Vy 10,000'	_____
Va	_____	Va @10% below max gross weight	_____
Vs	_____		
Vso	_____		
Vlo	_____		
Vle	_____		
Vfe	_____		
Vapp	_____	short field approach speed	_____
best glide	_____		

49. Some aircraft flight manuals show performance data to a maximum of about 7,000 feet density altitude, and in addition include a note indicating that extrapolation beyond the maximum altitude on the chart is not allowable. Density altitude at mountain airports in California in the summer is often 8,000 to 10,000 feet. How can you determine takeoff and climb performance for such high altitude conditions for these aircraft?

_____
_____
_____

50. Calculate aircraft performance for the airplane you will use for the mountain checkout for the following conditions: Maximum gross weight, no wind, and:

	Sea level 10° C	6000' MSL 30° C
Takeoff distance ground run	_____	_____
Takeoff distance over 50' obstacle	_____	_____
Takeoff distance ground run	_____	_____
Takeoff distance over 50' obstacle	_____	_____
Rate of climb	_____	_____
Landing distance ground run	_____	_____
Landing distance over 50' obstacle	_____	_____

51. Describe leaning procedure for:

1) climb from sea level to 10,000’ of altitude
2) takeoff from an airport above 5000’ density altitude
3) landing at an airport above 5000’ density altitude

_____
_____
_____

52. Why is it that when we get a weather report, we want to pay particular attention to low ceilings reported at mountain airports? (review topography on sectional)

_____
_____
_____

53. Name three ways to get weather for a mountain flying trip:

_____
_____
_____

54. What should you do if you encounter moderate or severe turbulence?

_____
_____
_____

55. Is it a good idea to fly down the center of a canyon? Why or why not?

_____
_____
_____

56. What is a rotor? What specific hazards and flight conditions can you expect to find in rotors?

_____
_____
_____

57. Generally it is preferable to fly down canyons rather than up them. Name at least three conditions under which flying up a canyon can be safe:

_____
_____
_____

58. Describe at least three alternative actions you can take if your calculated takeoff and climb performance will be marginal for departure from a mountain airport :