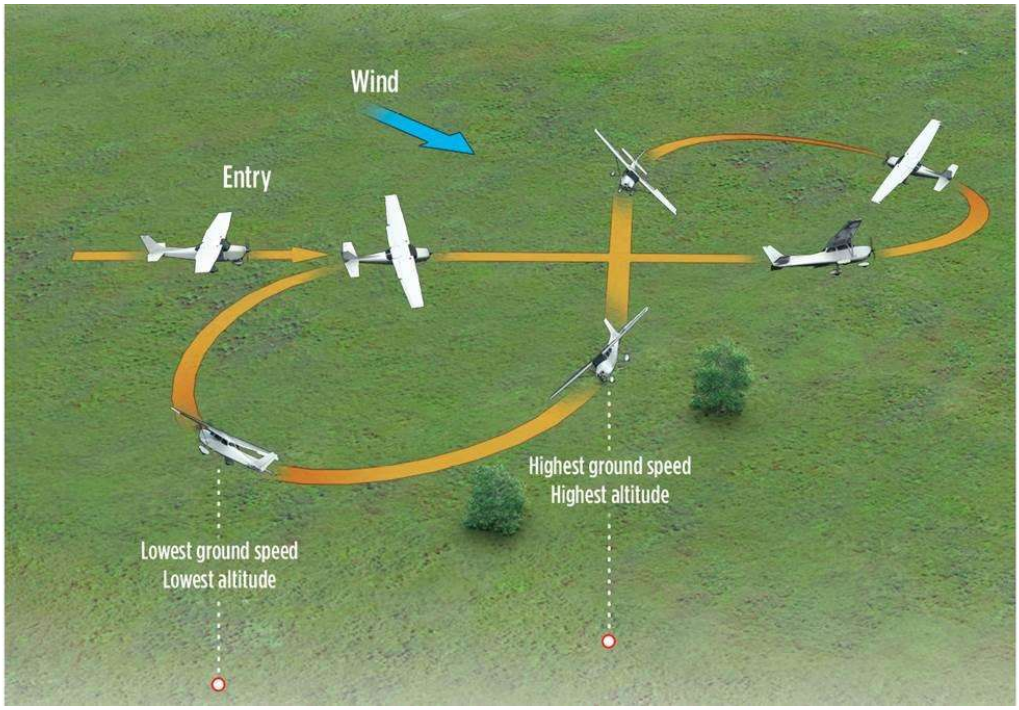


PIPER CHEROKEE 180D COMMERCIAL PILOT MANEUVERS GUIDE

SEP 2024

CHANGE LOG

01 SEP 2024	(1) Modified cover image to help this booklet stand out from other similar cover layouts. (2) Added notice disclaimer regarding differences between this document and the FAA Airman Certification Standards (3) Deleted section entitled “The Check Ride Process” as the responsibility for establishing requirements of that process fall upon the Airman Certification Standards, and not this document.

NOTICE

This maneuver guide is not meant to supplement nor replace the official FAA Airman Certification Standards; however, it is meant to be used as a companion piece to that document.

This manual's purpose is to help you "chair fly" various maneuvers that you will learn during your training, and be required to demonstrate to your examiner as a means of conveying your flight proficiency during the practical test. You should use this document as a method of study with regards to how to set up and recover from those maneuvers.

In the event that erroneous information should be discovered herein, the Airman Certification Standards are regulatory in nature, and shall be considered to have the most up to date information regarding the standards to be used.

Because every aircraft utilizes different systems, speeds, limitations, and nuance to method, the FAA Airman Certification Standards will not describe any specific procedure regarding how each maneuver is to be set up, flown, and recovered from. This manual establishes the procedures by which each maneuver shall be demonstrated, as appropriate to the Piper Cherokee 180D series of aircraft only. Procedures, speeds, and nuance & methodology will deviate from this manual in other aircraft types, even if slightly.

TAKEOFFS, LANDINGS, SLIPS, POWER OFF 180, AND GO AROUNDS

1. NORMAL TAKEOFF

SETUP – Use the following procedure for executing a normal takeoff

1. Complete the required normal takeoff checklist

2. Confirm that you are located at the correct runway on the airfield

3. Check final approach and runway area for traffic or obstructions

4. Check wind indication in the form of wind sock or wind tee etc. and apply wind correction with the ailerons if a crosswind exists

5. Make the appropriate radio calls, align the aircraft with the centerline of the runway and advance the power to full

6. Verbally acknowledge engine instrument indications are "green" & airspeed is "alive" and maintain centerline

7. Upon reaching Vr rotate to a slight nose high attitude and allow the aircraft to become airborne

8. Maintain a climb sight picture and Vy +5 / -0 knots

9. If remaining in the pattern, turn crosswind upon passing 500 above ground level OR comply with noise abatement procedures if in effect.

PRO-TIP – Don't *over* rotate the airplane. If you *over* rotate the airplane, you will notice an intermittent stall indication in the initial rotation. This means you just pulled the nose up slightly more than it needed.

PRO-TIP – Don't *under* rotate the airplane. If you *under* rotate the airplane, you will notice the nose wheel tends to make intermittent contact with the ground during your rotation.

PRO-TIP – Do establish a slight nose up pitch attitude that results in a momentary "wheely" where the mains remain on the ground, and the nose wheel departs the runway by a matter of about 6-10 inches. Then allow the airplane to lift *itself* off as it accelerates.

PRO-TIP – Do NOT carry out check list items or make configuration changes while the aircraft is in motion. STOP the airplane, hold the brakes, then go heads down to the checklist and config changes. Resume movement of the airplane only after your have completed checklist items.

2. SHORT FIELD TAKEOFF

SETUP – Use the following procedure for executing a short field takeoff

1. Complete the required before takeoff checklist

2. Confirm that you are located at the correct runway on the airfield

3. Check final approach and runway area for traffic or obstructions

4. Check wind indication in the form of wind sock or wind tee etc. and apply wind correction with the ailerons if a crosswind exists

5. Set flaps 25° (two notches)

6. Make the appropriate radio calls, align the aircraft with the centerline of the runway as near to the approach edge of the usable runway as possible and hold the brakes once aligned with the runway centerline

7. Apply full power with the brakes held, verbally acknowledge engine instrument indications are "green"

8. Release the brakes and verbally acknowledge "airspeed alive", maintain centerline

9. Upon reaching Vr rotate to a slight nose high attitude and allow the aircraft to become airborne

10. Maintain a climb sight picture and a Vx Climb speed +5 / -0 knots

11. Upon passing a height of 50' above ground, allow the aircraft to accelerate to Vy climb speed +5 / -0 knots

12. Once climb speed is stabilized at Vy, retract the flaps fully

13. If remaining in the pattern, turn crosswind upon passing 500 Above Ground Level OR comply with noise abatement procedures if in effect.

PRO-TIP – Your rotation should be brisk enough to lift off and go immediately into a Vx climb, but not so brisk that you get stall indications

PRO-TIP – Be aggressive enough with your initial climb pitch attitude that you maintain Vx but not so aggressive that you slow below Vx. If your pitch inputs are too timid, you'll prematurely accelerate to Vy which should be avoided prior to 50-foot AGL

PRO-TIP – Don't retract the flaps until you are stabilized at Vy, and during the retraction of the flaps, don't allow the airplane to settle into a sink rate

3. SOFT FIELD TAKEOFF

SETUP – Use the following procedure for executing a soft field takeoff

1. Complete the required before takeoff checklist

2. Confirm that you are located at the correct runway on the airfield

3. Check final approach and runway area for traffic or obstructions

4. Check wind indication in the form of wind sock or wind tee etc. and apply wind correction with the ailerons if a crosswind exists

5. Set flaps 25° (two notches)

6. Make the appropriate radio calls

7. Pull the yoke full nose up and hold it in this position as you align the aircraft with the centerline of the runway without stopping the airplane

7. While rolling onto the runway, apply full power and adjust the yoke back pressure as needed to keep the nose wheel from contacting the runway surface yet also not dragging the tail. Maintain centerline with rudder input.

8. Verbalize "Engine Instruments Green" and "Airspeed Alive"

9. Allow the aircraft to become airborne, lower the nose slightly to remain approximately 10-20 feet above ground while the airplane accelerates to Vy

10. Transition to a climb sight picture and a Vy Climb speed +5 /-0 knots

12. Once climb speed is stabilized at Vy, retract the flaps fully

13. If remaining in the pattern, turn crosswind upon passing 500 Above Ground Level OR comply with noise abatement procedures if in effect.

NOTE: Aircraft of higher horsepower turning the propeller at takeoff power while at a nose high attitude exhibits large left turning tendencies. Forward visibility over the nose will be limited, forcing you to perceive your proximity to runway centerline by sitting up to some degree, and incorporating peripheral vision to evaluate proximity to the runway edges / side drift. A large degree of right rudder will be needed to perform this takeoff correctly.

PRO TIP – It will be very easy to settle back onto the runway while attempting to remain in ground effect. Try "butterflying" the yoke back and forth gently making a series of small corrections rather than large corrections. The airplane accelerates quickly in ground effect, so you will only have to remain low to the ground for 3-5 seconds under most conditions.

4. NORMAL APPRAOCH AND LANDING

SETUP – Use the following procedure for executing a short field landing

1. Complete the required before landing checklist

2. Abeam the runway touchdown point, reduce throttle to 1,500 RPM

3. When the airplane enters the white arc, set flaps to 10° and slow to the appropriate approach speed. Check final is clear before turning base.

4. On the base leg, as appropriate, set flaps to 25°

5. On the final leg, as appropriate, when landing is assured, set flaps to 40° at the appropriate approach speed +5 / -0 knots with appropriate gust factor if needed

6. The aircraft should be touched down on the point designated by the evaluator +200 / -0 feet of distance on the runway, the touchdown should be main gear first, followed by the nosewheel with directional control being maintained throughout by use of aileron and rudder.

7. Execute a go around if the landing cannot be made within the parameters set above

NOTE: The touchdown should be mains first, nose wheel last, distance is not an issue.

PRO-TIP – In the landing roll out, avoid configuration changes until clear of the runway.

PRO-TIP – It is generally a good idea to readback the evaluator's requested demonstration to avoid executing a touchdown in the wrong point or executing the incorrect type of landing.

PRO-TIP – Evaluators love to see you "clear final" – that is on your base leg, look out onto the long final and check for traffic, if none is seen verbally acknowledge "final is clear" then resume the approach.

5. SHORT FIELD LANDING

SETUP – Use the following procedure for executing a short field landing

1. Complete the required before landing checklist

2. Abeam the runway touchdown point, reduce throttle to 1,500 RPM

3. When the airplane enters the white arc, set flaps to 10° and slow to an airspeed of 80 knots, check final is clear

4. On the base leg, as appropriate, set flaps to 25°

5. On the final leg, as appropriate, when landing is assured, set flaps to 40° with a final approach speed of Vref +5 /-0 knots with a gust factor if needed

6. The aircraft should be touched down on the point designated by the evaluator +200 / -0 feet of distance on the runway, the touchdown should be flat and firm, without being rough—maintain centerline. Flaps may or may not be retracted at touchdown at your discretion.

7. Apply maximum braking effort and increasing yoke back pressure and stop the airplane as quickly as possible without skidding the tires excessively

NOTE: The touchdown should be firm enough to plant all three tires at roughly the same moment, but not so firm as to risk over compression of the shock absorbing struts or damage to the airplane. When you apply maximum braking it is a best practice to keep the yoke pulled back to increase braking efficiency by placing more weight on the main tires, but not pulled back to the point than the airplane lifts back off the surface of the runway.

PRO-TIP – In the span of travel between “crossing the fence” and “crossing the numbers” it is possible to begin a slow abandonment of your approach speed allowing airspeed to decay considerably in ground effect during the lead-up to what little flare is actually exhibited during this maneuver thus allowing a touchdown at nearer to stall which will result in shortening the distance of ground roll.

PRO-TIP – In the landing roll out, the distance used during the short field landing can be reduced by retracting the flaps to 0° immediately after touchdown, PROVIDED this guidance can be found in the Pilot’s Operating Handbook. Otherwise, avoid configuration change.

PRO-TIP – It is generally a good idea to readback the evaluator’s requested demonstration to avoid executing a touchdown in the wrong point or executing the incorrect type of landing.

PRO-TIP – Evaluators love to see you “clear final” – that is on your base leg, look out onto the long final and check for traffic, if none is seen verbally acknowledge “final is clear” then resume the approach.

6. SOFT FIELD LANDING

SETUP – Use the following procedure for executing a Soft field landing

1. Complete the required before landing checklist

2. Abeam the runway touchdown point, reduce throttle to 1,500 RPM

3. When the airplane enters the white arc, set flaps to 10° and slow to an airspeed of 80 knots and check final is clear

4. On the base leg, as appropriate, set flaps to 25°

5. On the final leg, as appropriate, when landing is assured, set flaps to 40° and establish the appropriate final approach speed +5 / -0 knots

6. The aircraft should be touched down on the main tires first, while using enough yoke back pressure to prevent ANY nose wheel contact with the runway surface until it is aerodynamically impossible to prevent nose wheel contact

NOTE: The amount of runway used is *not* part of the test, this is *not* a short runway exercise, the evaluator wants to ensure you can touch down mains first, relatively softly, and keep the nosewheel off the runway for as long as possible.

PRO-TIP – Energy management is key. Unlike the short field landing where some excess speed can be dissipated in the last 100-200 yards of the final approach, you will need that airspeed for this to work correctly. So, try to carry *some* speed into the flare, rather than bleeding it off to a slow touchdown.

PRO-TIP – If executed properly, the tail still has plenty of aerodynamic authority, fly the airplane through the rollout and keep the nose elevated for as long as you possibly can.

PRO-TIP – It is generally a good idea to readback the evaluator's requested demonstration to avoid executing a touchdown in the wrong point or executing the incorrect type of landing.

PRO-TIP – Evaluators love to see you "clear final" – that is on your base leg, look out onto the long final and check for traffic, if none is seen verbally acknowledge "final is clear" then resume the approach.

7. GO AROUND / MISSED APPROACH

SETUP – Use the following procedure for executing a go around / missed approach

1. Increase power to full
2. Retract flaps to 25° in the event that flaps 40° was used during the approach
3. Establish a positive rate of climb at Vy +5 /-0 knots
4. Once the airspeed is stabilized, retract the flaps fully
5. A sidestep to the right of runway centerline should be considered during the climb out

PRO-TIP – If you don't like the way an approach is going on the check ride, or during a training exercise… GO AROUND. There are absolutely no points off for going around on a check ride! In fact, if anything, this demonstrates sound judgement and good decision making to your evaluator. With that said, you don't want to be going around on every other landing attempt on the check ride.

8. POWER OFF 180° ACCURACY LANDING

SETUP – Use the following procedure for executing a power off 180

1. Establish the aircraft on the downwind leg of the traffic pattern

2. Abeam the intended point of touchdown reduce power to idle and set best glide and trim

3. Set flaps 10° and maneuver the aircraft into the base leg, check final clear

4. Use additional flaps as needed and manipulate the base to final turn dependent upon the height above terrain, manage the glide so as to touch down on the designated point on the runway. The use of additional flaps, and / or a slip may be considered by the pilot.

5. The pilot should touch the airplane down on the designated point +200 / -0 feet

6. A sidestep to the right of runway centerline should be considered during the climb out

PRO-TIP – You should be constantly comparing your height to your progress toward the touchdown point, this is an energy management maneuver that should be carried out at best glide speed from start to touchdown.

9. SLIPS

SETUP – Use the following procedure for executing a slip

1. Rudder in the direction the wind is blowing TO
2. Bank in the direction the wind is blowing FROM
3. Lower the nose as needed to maintain approach speed
4. The more aggressive the control inputs the more aggressive the slip and sink rate are
5. Gradually release these inputs to stop the slip

NOTE: NEVER APPLY RUDDER EXCESSIVELY IN THE SAME DIRECTION AS YOU APPLY AILERON! This is a “SKID” not a “SLIP” and will likely cause the airplane to spin if stalled.

PRO-TIP – Know your wind direction! Keep in mind the indication of any wind sock or wind tee on the ground, pay attention to flags on flag poles, or direction of travel of smoke plumes to determine which direction you should slip. Rudder toward the tip of the wind sock, aileron toward the mouth of the wind sock.

PERFORMANCE MANEUVERS AND GROUND REFERENCE MANEUVERS

10. SLOW FLIGHT

SETUP – Use the following procedure for establishing slow flight

1. Conduct clearing turns to check the area for traffic conflicts or obstructions

2. Establish the aircraft on a cardinal heading as directly into the known wind direction as possible or as directed by the evaluator

3. Reduce Power to 1500 rpm and maintain altitude by applying slight back pressure on the control wheel as airspeed reduces

4. Upon entering the flap operating range, extend flaps to 40° incrementally

5. Slow the aircraft to a speed at which any further decrease in power or increase in pitch will activate the stall warning and maintain this speed +5 / -0 knots

6. Increase power to approximately 2,000 RPM so as to maintain altitude

7. Utilize pitch to maintain airspeed and power to maintain altitude must be held within +/-50 ft

8. Should the stall warning activate, increase speed promptly so as to stop the warning and maintain the new airspeed – verbally announce "stall warning, correcting"

9. Maneuver as directed by the evaluator (climb, turn, descend etc) while limiting bank angle to approx. 10° or less with a margin of error of +/-5°

RECOVERY – Use the following procedure for recovery from slow flight

1. Increase power to full and immediately retract the flaps to 25° (reduce by one click)

2. Reduce pitch attitude to increase speed

3. Maintain altitude +/- 50 feet

4. Retract the flaps fully upon passing Vy

5. Establish cruise speed and power / retrim as needed

PRO-TIP – Do not try to set power to 1500 perfectly during the setup, ballpark this. As you cherry pick an exact power setting, if you fixate on the tachometer, your altitude will suffer. Do apply flaps incrementally – Do NOT take all day doing it. About 2-3 seconds per each notch of flaps should suffice.

PRO-TIP – Do not wait until you attain min airspeed to begin adding power, start this approx. 10 knots early, generally around 2,000 RPM will hold an altitude at the required speed. Trimming aft will help with speed management, but will require resetting the trim when you recover.

11. POWER OFF STALL (ARRIVAL STALL)

SETUP – Use the following procedure for establishing a power off stall

1. Conduct clearing turns to check the area for traffic conflicts or obstructions

2. Establish the aircraft on a cardinal heading as directly into the known wind direction as possible or as directed by the evaluator

3. Reduce Power to 1500 rpm and maintain altitude by applying slight back pressure on the control wheel as airspeed reduces

4. Upon entering the flap operating range, extend flaps to 40° incrementally, ensuring that full flaps are set prior to reaching normal approach speed

5. Lower the nose so as to maintain a descent at Vref

6. Point to the altimeter and vertical speed indicator and verbally confirm "stabilized descent"

7. Reduce throttle to idle and pull slightly on the control yoke to raise the nose to a stalling pitch attitude

8. When the stall warning light activates, verbally acknowledge "Stall warning"

9. When the stall occurs (or at the first indication as directed by the evaluator), initiate recovery

RECOVERY – Use the following procedure for recovery from a power off stall

1. Increase power to full and lower the nose to slightly below a level sight picture

2. Immediately retract the flaps to 25° (reduce by one click)

3. As airspeed increases Vy retract the flaps fully to 0°

4. Increase the pitch attitude slightly, climb at Vy +5 /-0 knots to your entry altitude and level off

5. Establish cruise speed and power / retrim as needed

PRO-TIP – While you do want to apply flaps incrementally, the airspeed will decay quickly between Vfe and your target stabilized descent speed Vref, so the timing is everything. Do not yank the flaps to full straight away, but do not take a lot of time applying them either, you need to be flaps full before you reach Vref and begin the stabilized descent, this generally translates to applying one notch of flaps about every 2-3 seconds.

12. POWER ON STALL (DEPARUTRE STALL)

SETUP – Use the following procedure for establishing a power on stall

1. Conduct clearing turns to check the area for traffic conflicts or obstructions

2. Establish the aircraft on a cardinal heading as directly into the known wind direction as possible or as directed by the evaluator

3. Reduce Power to 1500 rpm and maintain altitude by applying slight back pressure on the control wheel as airspeed reduces

4. Upon reaching approximately Vref increase power to full

5. Raise the nose to an exaggerated nose high attitude, remain coordinated with rudder

6. When the stall warning light activates, verbally acknowledge "Stall warning"

9. When the stall occurs, (or at the first indication of a stall as directed by the evaluator) initiate recovery

RECOVERY – Use the following procedure for recovery from a power on stall

1. Increase power to full and lower the nose to slightly below a level sight picture

2. Establish cruise speed and power / retrim as needed, hold the new altitude so as to be fully recovered not less than 3,000 AGL

PRO-TIP – Ailerons gradually lose effectiveness as speed reduces, but, with the straight wing design of the Cherokee, some effectiveness will remain throughout the stall. If the aircraft tries to "break over" to the left or right during the stall, you cannot use aileron to correct this, as it will increase the roll rate in the unwanted direction by deepening the stall on the lower wing. Use rudder inputs instead by "stepping on the highest wing"

PRO-TIP – Do not confuse this maneuver with the power off stall. No flaps are used during this maneuver, it is important to remember the fundamental difference here; during this stall we simulate takeoff from approximately Vr. It might be a good idea to talk yourself through the maneuver before you execute it, this way any mistaking it for another procedure or maneuver might be easier to catch.

13. ACCELERATED STALLS

SETUP – Use the following procedure for establishing a power on stall

1. Conduct clearing turns to check the area for traffic conflicts or obstructions

2. Establish the aircraft on a cardinal heading as directly into the known wind direction as possible or as directed by the evaluator so that a recovery can be completed at not less than 3,000 AGL

3. Establish an airspeed approximately 10 knots below the given Va

4. Establish a 45° bank turn and input elevator / stabilator back pressure gradually until an impending stall occurs

5. Acknowledge the stall cues (buffet, horn, light etc.) and initiate a recovery

6. Unload the aircraft wings and roll wings level

9. Return to the heading, altitude and airspeed as directed by the evaluator

14. STEEP TURNS

SETUP – Use the following procedure for executing a steep turn

1. Conduct clearing turns to check the area for traffic conflicts or obstructions

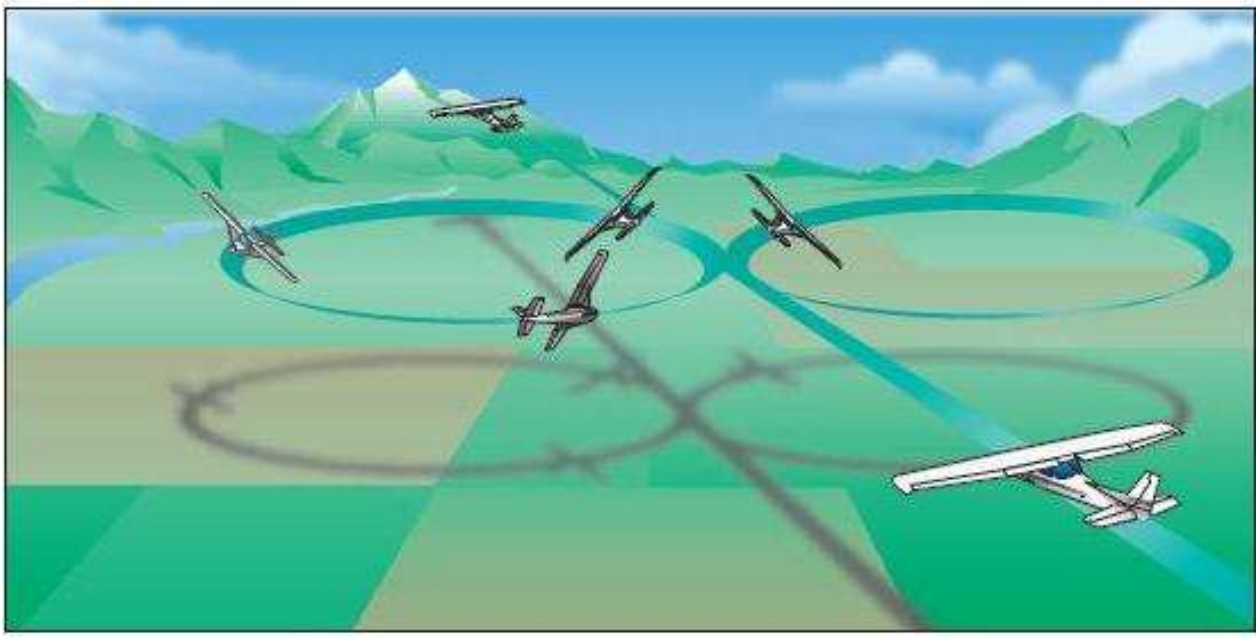
2. Establish the aircraft on a cardinal heading as directly into the known wind direction as possible or as directed by the evaluator

3. Establish the aircraft in cruise flight at at maneuvering speed

4. Using aileron and rudder, roll into a smooth 50° bank turn in the direction specified by the examiner, while simultaneously adding approximately 100 RPM to your power setting

5. Complete a 360° turn then roll out and execute the turn in the opposite direction, you should maintain the altitude +/- 100 feet, airspeed +/-10 knots and heading +/-10°

7. Re-trim the aircraft for straight and level flight



PRO-TIP – If you have trimmed approximately 2 ½ full swipes of nose up trim correctly, the airplane will take care of altitude for you, as long as you hold the bank angle accurately at 45° remember, you can roll 5° shallower if you begin sinking, or 5° steeper if you begin climbing.

PRO TIP – During the rollout, lead the desired heading 25° early and don't forget to lower the nose and re-trim for level flight so you don't "balloon" into a climb and bust altitude tolerances.

PRO TIP – Steps 4 and 5 above have to be completed relatively quickly, but also accurately! Don't take your time setting up for this.

15. STEEP SPIRAL

SETUP – Use the following procedure to set up for turns around a point

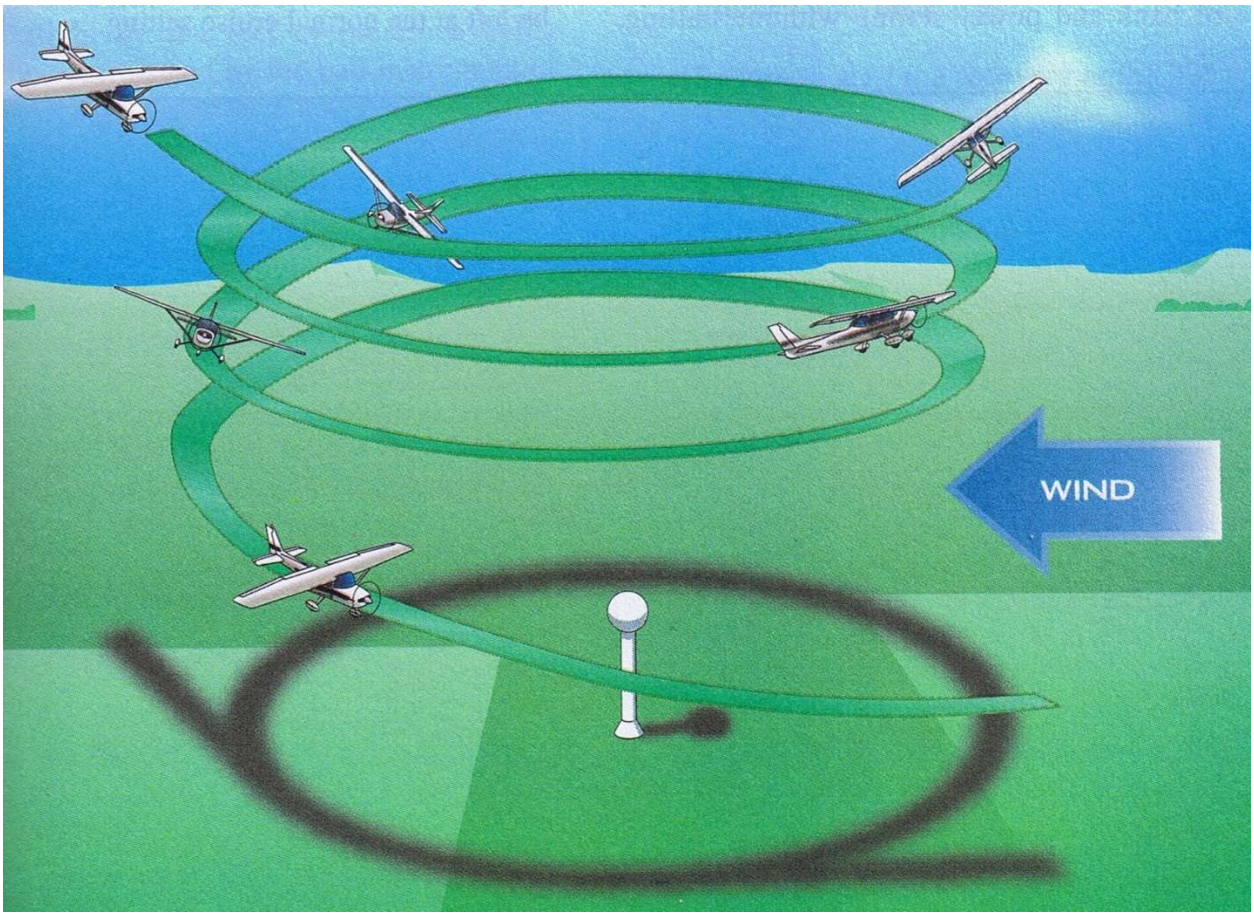
1. Conduct clearing turns to check the area for traffic conflicts or obstructions

2. Select an altitude suitable for the completion of three 360° rotations minimum

3. Establish the aircraft in cruise flight at 2,400 RPM at maneuvering speed with the point approximately 1/2 mile ahead of the aircraft – altitude should be high enough to complete the maneuver and all three turns not less than 1500 feet agl at the lowest.

4. Reduce power to idle and establish 80 knots +/- 10 knots, establish a rotation around the specified point (runway numbers for example) your bank may be as much as 60° at the steepest, manipulate the bank to maintain the same distance around the point on all sides.

5. Circle the point equidistance on each side at least three times, concluding the maneuver not less than 1,500 feet agl. Return to cruise flight unless the evaluator requests the maneuver be flown to a landing, in which case, enter the pattern and land the aircraft



16. CHANDELLES

SETUP – Use the following procedure to set up for Chandelles

1. Conduct clearing turns to check the area for traffic conflicts or obstructions

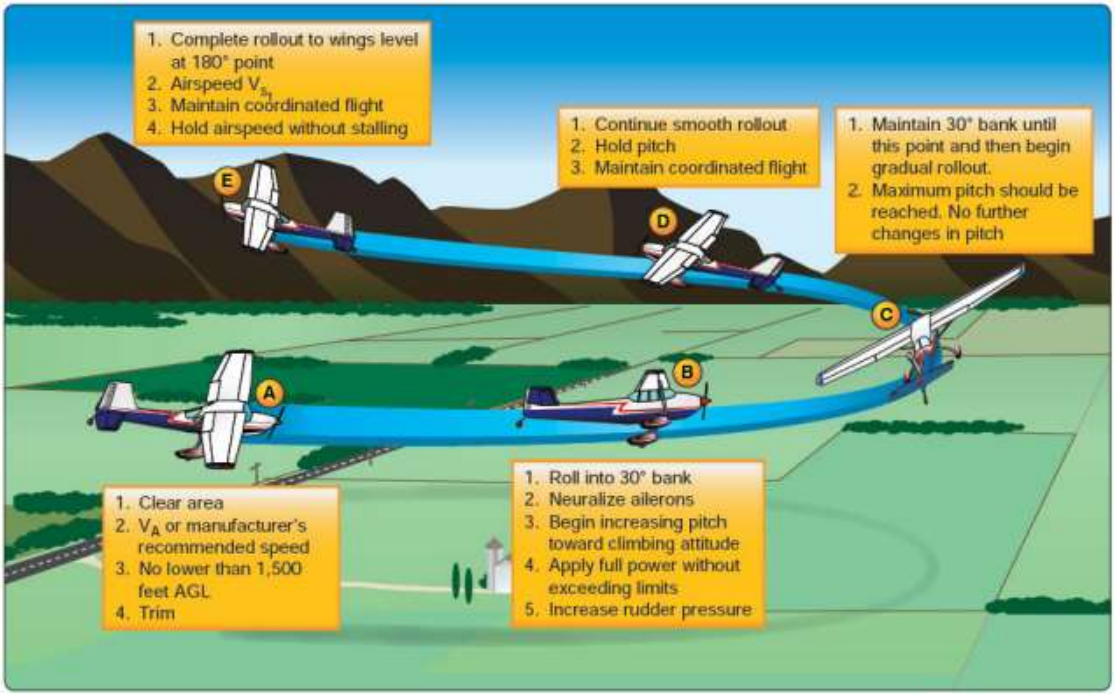
2. Select an altitude that would allow for completion of the maneuver at not less than 1500 feet AGL

3. Establish the aircraft in cruise flight at 2,300 - 2,400 RPM at maneuvering speed

4. Smoothly roll into a coordinated 30° bank turn to the left or right as specified by the evaluator and increase the power to full while simultaneously raising the nose

5. Once you have reached 90° of heading change begin a slow coordinated rollout so as to reach wings level at the 180° point heading +/-10° just above stalling speed and maintain that heading and speed momentarily.

6. Resume straight and level flight at the new altitude



17. LAZY EIGHTS

SETUP – Use the following procedure to set up for Lazy Eights

1. Conduct clearing turns to check the area for traffic conflicts or obstructions

2. Select an altitude that would allow for completion of the maneuver at not less than 1500 feet AGL and establish the aircraft in cruise flight at 2,300 - 2,400 RPM at the POH recommended entry speed for Lazy Eights

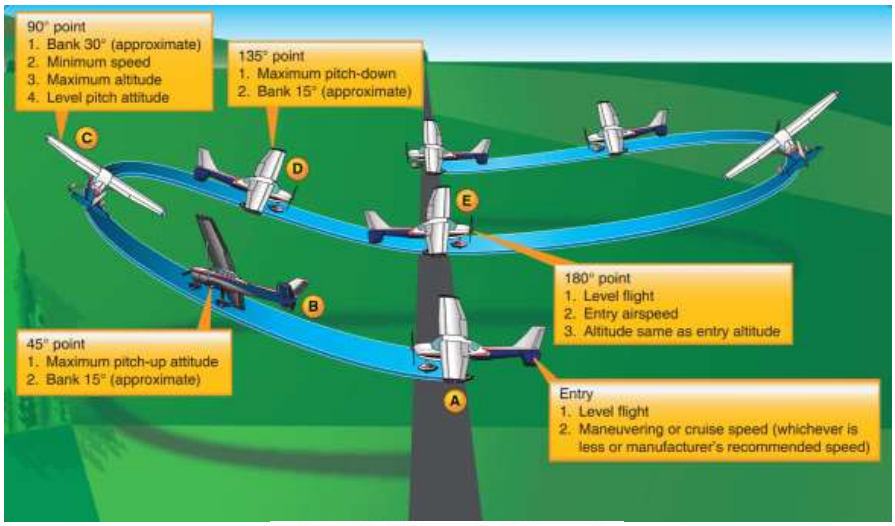
3. Select the 45° point of reference, the 90° point of reference, and the 135° point of reference.

4. Roll the aircraft into approximately a 5° bank left turn toward the 45° reference point and raise the nose so as to reach max pitch at the 45° reference point. Allow the aircraft to succumb to its overbanking tendency as the nose raises.

5. At the 90° point you should be at approximately 30° bank, coordinated, and the nose should be falling through the horizon into a descent.

6. at the 135° point you should be at your maximum amount of nose down and beginning to slowly roll out so as to place the 90° reference point off the right wing at your entry altitude+/- 100ft, at the reversal heading +/-10°, and entry airspeed +/-10 knots.

7. Repeat the maneuver in the opposite direction



18. EIGHTS ON PYLONS

SETUP – Use the following procedure to set up for Eights on Pylons

1. Conduct clearing turns to check the area for traffic conflicts or obstructions

2. Determine the pivotal altitude using the following formula

Pivotal Altitude AGL = groundspeed squared / 15 (for mph)

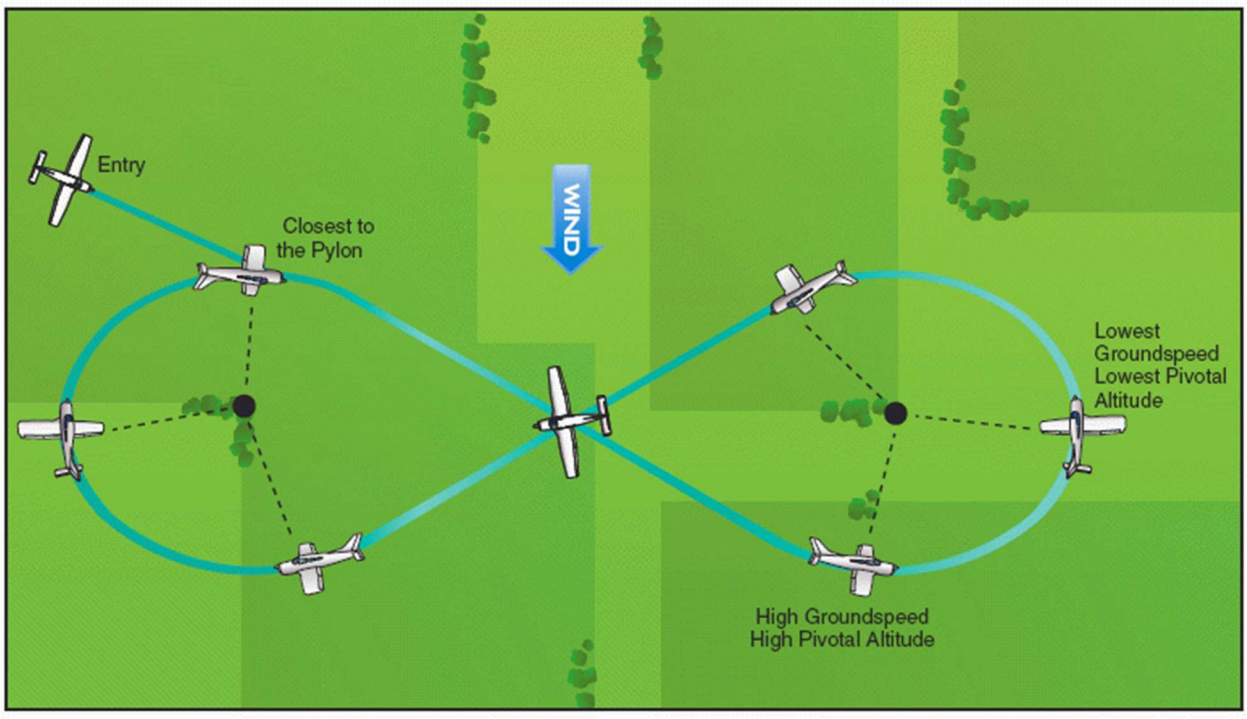
Pivotal Altitude AGL = groundspeed squared / 11.3 (for knots)

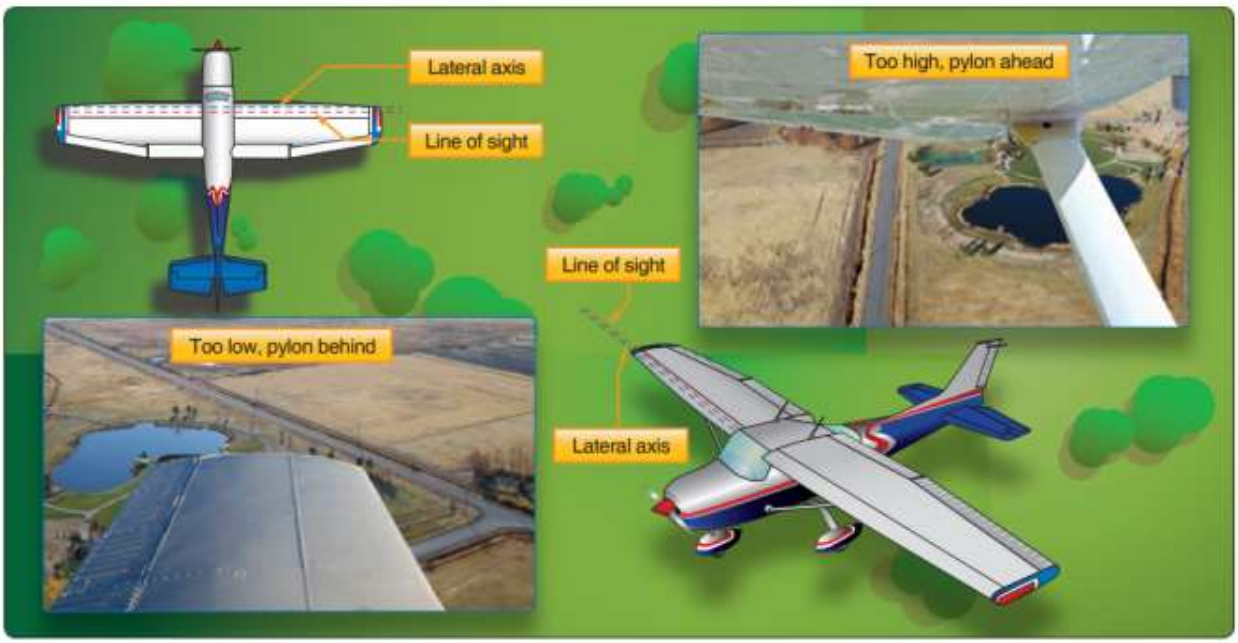
3. Select the two pylons so that a straight line between them would be perpendicular to the prevailing wind and enter between the points at approximately a 45° angle

4. the point of the maneuver is to change altitude as needed to maintain the appearance that the aircraft is tethered to the point, not a constant distance or altitude around the point. Your bank should never exceed 40°

5. If the point drifts toward the wing leading edge, you are too high, begin a descent to return the point to center, if the point drifts toward the trailing edge of the wing, you are too low, climb so as to return the point to the center of the wing

6. complete one turn around each point and exit the maneuver on the same direction you started.





PIVOTAL ALTITUDE CHART

GROUND SPEED SQUARED / 15 + ELEVATION

GROUND SPEED	500' ELEV	600' ELEV	700' ELEV
80	927	1027	1127
85	982	1082	1182
90	1040	1140	1240
95	1102	1202	1302
100	1167	1267	1367
105	1235	1335	1435
110	1307	1407	1507
115	1382	1482	1582
120	1460	1560	1660
125	1542	1642	1742
130	1627	1727	1827
135	1715	1815	1915
140	1807	1907	2007
145	1902	2002	2102
150	2000	2100	2200
155	2102	2202	2302
160	2207	2307	2407
165	2315	2415	2515
170	2427	2527	2627
175	2542	2642	2742
180	2660	2760	2860

NAVIGATIONAL SKILLSET

19. PILOAGE AND DEAD RECKONING

OBJECTIVE - Determine that the applicant exhibits satisfactory knowledge, risk management, and skills associated with pilotage and dead reckoning.

SKILL SET - You must satisfactorily demonstrate understanding of the following:

Pilotage and dead reckoning being the navigation from one point to another via reference to ground object check points and mathematical calculation of time, speed, distance, and wind correction angle so as to track across the surface of the Earth along a pre-determined path. Magnetic compass errors (acceleration, deceleration, deviation due to aircraft magnetic field etc).Topography, height of terrain, obstacles, risks.

Demonstrate the ability to selection an appropriate:

a. Route
b. Altitude(s)dependent upon flight direction
c. Checkpoints that can be easily identified from the air

Plotting a course, to include:
a. Determining heading, speed, and course
b. Wind correction angle
c. Estimating time, speed, and distance

True airspeed and density altitude
Power setting selection and performance charts.
Planned calculations versus actual observations and required corrections.

Demonstrate the ability to identify, assess and mitigate risks, including
a. Collision hazards, to include aircraft, terrain, obstacles, and wires.
b. Distractions, loss of situational awareness, improper task management.

TOLERANCES – You must demonstrate your ability to complete the following tasks:

Prepare and use a navigational flight log.
Navigate by pilotage (visual reference to landmarks)
Navigate by means of pre-computed headings, groundspeeds, and elapsed time
Turns to assigned headings by reference to compass and/or heading indicator.
Verify your aircraft's position within a two nautical miles margin of error of the flight-planned route.
Arrive at the selected check points within a margin of error of three minutes of the initial or revised estimated time of arrival.
Based on known data, provide a reasonable estimated time of arrival at the destination

Maintain the selected altitude, ±100 feet and headings, ±10°.

PRO TIP – Use your wristwatch to measure the time between checkpoints. The timing should be started as you take the runway for the first leg. Be sure to record takeoff time on the nav log.

20. NAVIGATIONAL SYSTEMS

OBJECTIVE - determine that the applicant exhibits satisfactory knowledge, risk management, and skills associated with navigation systems and radar services available to pilots.

SKILL SET – You will be required to demonstrate knowledge of the following:

How to use ground-based navigation (operating onboard equipment to track and intercept a VOR, locating position of the aircraft by reference to VOR, navigation to a VOR).

Satellite-based navigation ie. GPS

Knowledge of radar assistance to VFR aircraft (e.g., operations, equipment, available services, traffic advisories, flight following).

Transponder codes and modes.

Demonstrate the ability to identify, assess and mitigate risks, encompassing:

a. Failure to manage automated navigation and auto flight systems. (risks associated with) if the aircraft is equipped with auto pilot

b. Distractions, loss of situational awareness, and/or improper task management.

c. Limitations of the navigation system in use (line of site, weather etc).

TOLERANCES – You must demonstrate your ability to complete the following tasks:

Use any or all of the available navigational equipment aboard the aircraft
Determine the airplane's position using said navigation systems.
Intercept and track a given course, radial, or bearing, as appropriate.
Recognize and describe the indication of station or waypoint passage, if appropriate. (such as when crossing a VOR)
Recognize signal loss and take appropriate action should signal become lost.
Use proper communication procedures when utilizing radar services if utilized during the flight.
Maintain the appropriate altitude, ±100 feet and heading ±10°.

21. DIVERT TO AN ALTERNATE AIRPORT

OBJECTIVE - Determine that the applicant exhibits satisfactory knowledge, risk management, and skills associated with diversion.

SKILL SET – You will be required to demonstrate knowledge of the following:

Selecting an alternate destination from the sectional chart.

Understand situations that require deviations from flight plan and/or ATC instructions (weather, emergencies, medical emergencies, malfunctions.)

Demonstrate the ability to identify, assess and mitigate risks, including:

a. Collision hazards, to include aircraft, terrain, obstacles, and wires.

b. Distractions, loss of situational awareness, and/or improper task management.

c. Failure to make a timely decision to divert.

d. Failure to select an appropriate airport.

e. Failure to utilize all available resources (e.g., automation, ATC, and flight deck planning aids).

TOLERANCES – You must demonstrate your ability to complete the following tasks:

Select a suitable airport and route for diversion

Make a reasonable estimate of heading, groundspeed, arrival time, and fuel consumption to the divert airport.

Maintain the appropriate altitude, ±100 feet and heading, ±10°.

Update/interpret weather in flight.

PRO TIP – Before you takeoff on the cross-country portion of your check ride, have your flight computer and plotter handily accessible in a side pocket or in your kneeboard.

PRO TIP – While you may be familiar with the area, the evaluator wants to see you perform this task as if you were not familiar with the area. Place the plotter on the chart and draw a line from your approximate present position to the new destination, then use your plotter to determine a rough true course. Based on your present ground speed, use the E6B to come up with a rough estimated time to reach the alternate, then figure a rough fuel requirement based on a conservative 10 gallons per hour

22. LOST PROCEDURES

OBJECTIVE - Determine that the applicant exhibits satisfactory knowledge, risk management, and skills associated with lost procedures and taking appropriate steps to achieve a satisfactory outcome if lost.

SKILL SET – You must demonstrate an understanding of the following:

Methods to determine position. (Climb, Conserve, Communicate, Confess and Comply. Radio triangulation etc.)

Identify what assistance is available if lost (e.g., radar services, communication procedures).

a. Collision hazards, to include aircraft, terrain, obstacles, and wires.

b. Distractions, loss of situational awareness, and/or improper task management.

c. Failure to record times over waypoints. (risks associated with)

d. Failure to seek assistance or declare an emergency

TOLERANCES – You must demonstrate your ability to complete the following tasks:

Use an appropriate method to determine aircraft position.

Maintain an appropriate heading and climb as necessary.

Identify prominent landmarks visually and correctly.

Use navigation systems/facilities and/or contact an ATC facility for assistance.

EMERGENCY OPERATIONS

23. EMERGENCY DESCENT

SETUP – Use the following procedure to set up for Emergency Descents

1. Conduct clearing turns to check the area for traffic conflicts or obstructions

2. Pull the throttle to idle and and slow the aircraft below Vfe

3. Extend flaps to full and pitch for Vf3 +0 / -10 knots – careful not to exceed Vfe

4. Introduce shallow banks of up to 30° left or right to control load factor

5. Level off at the altitude specified by the evaluator +/-100 feet

Depending on the emergency scenario – such as fire, smoke in the cockpit etc. Consider ***simulating*** the following items

a. Fuel Selector OFF
b. Mixture IDLE CUT OFF
c. Heater OFF
d. Defrosters OFF
e. Vents CLOSED
f. Checklist COMPLETED

24. EMERGENCY APPROACH AND LANDING

OBJECTIVE - determine that the applicant exhibits satisfactory knowledge, risk management, and skills associated with emergency approach and landing procedures.

SKILL SET - The applicant demonstrates understanding of the following:

Immediate action items and emergency procedures. Airspeed, to include importance of best glide speed and its relationship to distance. Difference between best glide speed and minimum sink speed. Effects of atmospheric conditions, including wind, on emergency approach and landing. Stabilized approach, to include concepts of energy management. ELTs and/or other emergency locating devices. ATC services to aircraft in distress.

Demonstrate the ability to identify, assess and mitigate risks, including:

a. Failure to consider altitude, wind, terrain, obstructions, and available landing distance.

b. Failure to plan and follow a flightpath to the selected landing area.

c. Collision hazards, to include aircraft, terrain, obstacles, and wires.

d. Improper aircraft configuration.

e. Low altitude maneuvering/stall/spin.

f. Distractions, loss of situational awareness, and/or improper task management.

TOLERANCES – you will be required to execute an emergency approach and landing under simulated emergency conditions within the following parameters:

Establish and maintain the recommended best glide airspeed, ±10 knots.

Configure the airplane in accordance with POH/AFM and existing circumstances.

Select a suitable landing area considering altitude, wind, terrain, obstructions, and available glide distance.

Plan and follow a flightpath to the selected landing area and prepare for landing as specified by the evaluator.

Complete the appropriate checklist.

NOTE: emergency memory items, check list use and good judgement are critical factors in the evaluation of your execution of the emergency approach and landing. Normally, evaluators utilize a simulated engine failure at maneuvering altitude by pulling the throttle to idle in flight and announcing “Simulated Engine Failure”

Emergency Memory Items

1. Promptly and effectively establish best glide speed (80 MPH) and trim for the new airspeed
2. Mixture - RICH
3. Fuel Pump – ON
4. Fuel Valve – SWITCH TANKS
5. Ignition Switches - CHECKED
6. Primer - LOCKED
7. Throttle - CHECKED
8. Carburetor heat – ON
9. Attempt engine start
9. Mention use of 121.50 for mayday if situation warrants
10. Mention squawk code of 7700 as warranted
11. Refer to written checklist

PRO TIP – If your examiner gives you a "partial engine failure" of just a few hundred RPM, you can almost guarantee that any adjustment to power that you make from there, will result in them transitioning to a total power loss. Fly the airplane to the nearest point of intended landing at whatever the resultant airspeed is at the lower power setting. But avoid pulling power until you have the runway made, as a reduction in power, will guarantee the evaluator pulling the throttle to idle at that poin.t.

PRO TIP – You can fix being slightly high with slips and S-turns along final… nothing will fix being low. Manage your energy and judge your height smartly as you approach the field to land.

PRO TIP – Don't be too worried if you are going to land long down the runway a bit. Careening through the fence at the other end is way more survivable than a "vertical rate" impact with the ground and your evaluator will appreciate that you know not to try to dive on the runway.

PRO TIP – Reserve flap use for when you know you have the runway made, a common error is applying too much flaps too early which increases sink rate and reduces the odds you'll make it to the intended landing site.