FLIGHT INSTRUCTOR LESSON PLANS

Fourth Edition

CFI Bootcamp
Flight Instructor Training

Flight Instructor Lesson Plans

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Mike Shiflett

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Fourth Edition
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Visit the CFI Bootcamp's website (www.cfibootcamp.com) for updates posted for this book.

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Mike Shiflett's Aviation credentials and experience are as follows:

FAA Certificates
Airline Transport Pilot Certificate – Airplane Multi-Engine Land. CE-525 Type rating
Commercial Pilot Privileges: Airplane Single Engine Land and Sea
Flight Instructor Certificate – Airplane Single and Multi-Engine Land, Instrument Airplane
Former FAA Designated Pilot Examiner – Recreational – ATP including Initial CFI, CFII, MEI

UK Certificates
Commercial Pilot – Airplane Single Engine Land
Former UK Flight Examiner for Private Pilot and IMC ratings

Mike has amassed over 16,000 hours of which most were in general aviation aircraft. He also administered around 3,000 practical tests (Checkrides) for the FAA.

Mike has authored numerous courses used by top flight schools and Universities in his previous company. At CFI Bootcamp he authored all the course content including 42 hours of video, 10 books used by students at CFI Bootcamp, and has been featured in many aviation media organizations. He has also presented at EAA Airventure – Oshkosh, WI, Sun-n-Fun, and Aviation conferences as a speaker. He also produced a Podcast "Flight Training the way I see it", and has a weekly webinar called "The Power Hour". The CFI Bootcamp website has links to the webinar and previous Podcasts.

He continues to innovate in the aviation industry and is particularly focused on creating courses and training materials to produce better flight instructors.

Mike currently lives in both San Jose, CA, and more often in Miami Beach, FL. He flies from the Opa-Locka airport just north of Miami International.

Introduction

Thanks for purchasing our Lesson Plans. This is the fourth edition. The content was reviewed for errors and updated. This complete set of lesson plans can be used for teaching flight maneuvers for Sport, Recreational, Private, Commercial Pilots, and Flight Instructors. There are also lesson plans for the technical subject areas such as Aerodynamics, Runway Incursion Avoidance, etc., for Private, Recreational and Commercial students.. Most of the technical subject areas for Flight Instructor students are also included.

These lesson plans are the same ones used by CFI Bootcamp students who go through our program in Miami, FL and Palo Alto, CA. They are time tested with hundreds of students that have used them for their checkrides and for teaching students once they got their Flight Instructor Certificate.

As always, if you find any errors, please send them to info@cfibootcamp.com..

Mike Shiflett – November 9th, 2021 - Miami Beach, FL

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The lesson plans can fit into almost any training syllabus. If you don't have a training syllabus you can use ASAs or King Schools as a starting place. Both are very good.

Each flight maneuver lesson plan has an Objective, Motivation, Presentation (Elements), time for how long it should take, Key Points, 172 Maneuvers Guide, Common Errors, Questions to ask the students, Completion Standards, and Risk Management. The ground lessons have an Objective, Motivation, Presentation with how long it should take, Instructor's actions, Student's Actions, and references. There is also additional content behind the lesson plan that includes things like images, graphs, etc.

Note: Where a maneuver is common to both Private and Commercial pilots such as Steep Turns, the Private Pilot Knowledge Area, Risk Management and Skills (Completion Standards) are from the Private Pilot ACS. Refer to the Commercial Pilot ACS for Completion Standards for those maneuvers.

IMPORTANT: You need to teach each lesson plan out loud with a whiteboard and/or monitor. You will never know if you can teach the material in the plan until you do this. Simply reading over the lesson plans is NOT good enough. I realize this is a lot of work, but you will catch problems in your own understanding, flow issues and much more if you will take this on.

When teaching an actual student, you should teach from the lesson plan, and at the end of your lesson you should ask the student to tell you how they will perform the maneuver. Demonstrating with a model airplane is very helpful. The idea is you don't want to get into the airplane until you are sure the student understands what they are going to do on that flight.

There are also lesson plans for ground instruction: All of the Technical subject areas in the Flight Instructor PTS are included. They contain the full lesson and include a lot of artwork and explanations.
I hope you find this book useful. Our instructors at CFI Boot Camp teach every day from these lesson plans, so they are field-tested.

If you are working on your CFI now, consider purchasing our CFI Workbook. This book is intended to cement your knowledge by providing you with scenarios, assessment, and study questions.

Thanks again for purchasing the Lesson Plans. Let us know how they work out for you.

Mike Shiflett - CFI Boot Camp Web: www.cfibootcamp.com

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FLIGHT MANEUVERS LESSON PLANS FOR SPORT, RECREATIONAL, PRIVATE, COMMERCIAL PILOTS AND FLIGHT INSTRUCTORS

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The following lesson plans are for teaching students pursuing the Private, Recreational, Sport, and Commercial Pilot certificates.

They can be used in any order. They fit into the syllabus in the next chapter to form a complete course of training for the Private Pilot.

The lesson plans can also be used for the Flight Instructor Practical test if the flight instructor applicant personalizes them in such a way as to be able to teach from them.

Note: The Instructor's Actions and Student's actions are the same for all the maneuvers lessons, so they are not included on the Lesson Plans.

Instructor's actions are always: Present the lesson, demonstrate the maneuver with the model airplane, and ask the student questions to assess their knowledge.

Student's actions are always: Take notes on the presentation, demonstrate the maneuver to the instructor describing the key points of how to do it, and state any completion standards for today's lesson.

	Maneuvers Lesson Plans Include:
1	**Objective and motivation** for each maneuver. The objective describes what will be accomplished and the motivation describes why it needs to be done.
2	**Presentation -** The Elements that should be taught in the order presented in the lesson plan. The step-by-step order of the lesson. Also includes the lesson
3	**Key Points -** These are areas to place extra emphasis after the presentation has been delivered. Not every lesson has key points.
4	**Risk Management -** In most lesson plans. These can be brought out at any point in the lesson. You may want to integrate them into the Presentation at the appropriate points, or you can teach them as separate topics at the end.
5	**Common errors -** Included for most lesson plans. They are from the Airplane Flying Handbook and Instructor Certification Standards.
6	**Completion Standards** and are reproductions from the Airman Certification Standards (ACS). Note: References to complex airplane standards have been removed from these lesson plans.

Sport, Recreational & Private Flight Maneuvers Lesson Plans

Objective

To maintain a constant altitude and constant direction while keeping the airplane coordinated.

Motivation

On most flights the majority of the time the airplane needs to be in straight and level flight, so it's an essential skill.

Presentation: Time 10 Minutes

1. Definition - Constant altitude, constant direction, coordinated.
2. Setting the cowling 3 to 4 inches below the horizon - Constant Altitude.
3. Level horizon - No banking, equal spacing under left/right wingtips -Constant direction.
4. Not sliding left or right in the seat - Coordinated.
5. Altimeter = Altitude, Heading Indicator = Direction, Inclinometer = Coordination.
6. Trim to eliminate aerodynamic pressure - Set attitude then trim.

Key Points:

- After setting the attitude - Cross check the altimeter so measures the results.
- The cowling won't be on the horizon in level flight - 4 inches below.

Questions for the Student:

1. How can you determine if the airplane is coordinated without using the inclinometer?
2. How can straight and level flight be verified?
3. How can straight and level flight be observed while looking outside?

Common Errors

- Failure to adequately clear the area.
- Failure to adequately anticipate the level-off.
- Failure to coordinate the flight controls.
- Failure to use visual cues and instrument indication in combination to achieve straight and level flight.
- Failure to scan for traffic.

Completion Standards

At the end of this lesson, the student should understand the basic concepts of straight and level flight. The student should be able to perform this maneuver with the assistance of a flight instructor.

There are no required Airman Certification Standards (ACS) identified for straight and level flight. A proficient student pilot should be able to maintain altitude at +/- 100 feet and maintain a heading of +/- 10 degrees. Coordinated flight should be maintained. The pilot should also understand how to properly trim the airplane for straight and level flight.

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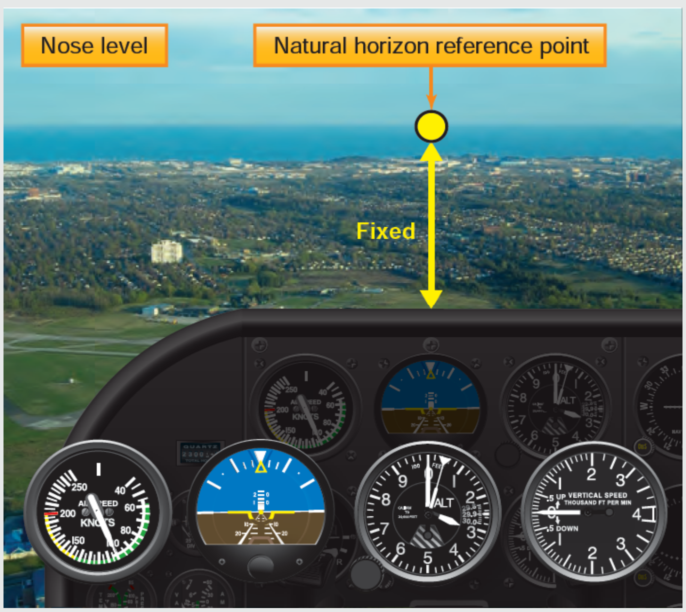
Lesson Additional Images



Objective:

To establish a climb at a constant airspeed and direction while keeping the airplane coordinated.

Motivation:

Every flight involves a climb. As one of the four fundamentals of flying, mastering this skill is part of a pilot's basic skills to control the airplane.

Presentation: Time 10 Minutes

1. Constant Airspeed or Rate? - Explain V_X and V_Y.
2. Attitude - Cowling to horizon - Target Airspeed with pitch.
3. Sequence to start a climb - Power, Attitude, Trim.
4. Wings level with aileron, track straight ahead with rudder. ASI, ALT, HI, Ball.
5. Anticipate and correct for left-turning tendencies. - No side-to-side motion.

Questions for the Student

1. What is the sequence for establishing a climb?
2. At full throttle, how can the climb airspeed be adjusted?
3. What is the definition of V_X and V_Y?

Common Errors

- Failure to adequately clear the area
- Failure to adequately anticipate the level-off
- Failure to coordinate the flight controls
- Failure to use visual cues and instrument indication in combination to achieve straight and level flight.
- Failure to scan for traffic.

Completion Standards

At the end of this lesson, the student should understand the basic concepts of normal climbs. The student should be able to perform this maneuver with the assistance of a flight instructor.

There are no required Airman Certification Standards (ACS) identified normal climbs. A proficient student pilot should be able to maintain airspeed +/- 10 knots and maintain a heading of +/- 10 degrees.

Coordinated flight should be maintained. The pilot should also understand how to properly trim the airplane for a constant airspeed climb.

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Objective:

To maintain a descent at a constant airspeed and constant direction to either an altitude or to a point on the ground while keeping the airplane coordinated.

Motivation:

Every flight will have a descent. As one of the four fundamentals of flying, mastering this skill is part of a pilot's basic skills for controlling an airplane.

Presentation: Time 15 Minutes

1. Constant airspeed or constant rate - Using the flight instruments ASI, VSI, ALT.
2. Reduction in power causes the airplane to keep the same trimmed airspeed, downwash is reduced, and a descent is started.
3. Relationship of the horizon to the cowling while descending.
4. The Point on the ground that isn't moving (where the airplane is going) and how to change it with flaps, slipping, and power.
5. Sequence to start a descent: Power, Attitude, Trim - Pitch for airspeed, power for rate of descent. Maintain no side-to-side motion with rudder.
6. Describe descending to a point on the ground (aiming) vs descending to an altitude.

Questions for the Student

1. How can a pilot determine where the airplane is aimed during a descent?
2. How can the pilot adjust airspeed during a descent?
3. What is the sequence to establish a descent?

Common Errors

- Failure to adequately clear the area.
- Inadequate back-elevator control during glide entry, resulting in too steep a glide.
- Failure to slow the airplane to the desired airspeed prior to lowering pitch attitude.
- Attempting to establish/maintain a descent solely by reference to flight instruments.
- Inability to sense changes in airspeed through sound and feel.
- Inability to stabilize the descent. (chasing the airspeed indicator)
- Skidding or slipping during descending turns due to inadequate appreciation of the different rudder pressure requirements with and without power.

Completion Standards

At the end of this lesson, the student should understand the basic concepts of normal descents. The student should be able to perform this maneuver with the assistance of a flight instructor. There are no required Airman Certification Standards (ACS) identified for normal descents. A proficient student pilot should be able to maintain airspeed at +/- 10 KIAS and maintain a heading of +/- 10 degrees. The pilot should be able to descend to a point on the ground using an appropriate combination of throttle and flaps. Coordinated flight should be maintained. The pilot should also understand how to properly trim the airplane for a constant airspeed descent.

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Objective

To make a level turn at bank angles between 20 – 45 degrees while maintaining constant altitude, airspeed, and coordination.

Motivation

Mastering this skill is part of a pilot's basic skills to control the airplane.

Presentation

1. Aerodynamics of turning - VCL vs HCL, Load Factor, Need for additional lift.
2. Aileron controls bank angle. Relationship of the horizon to the cowling.
3. Elevator controls altitude - Needed to restore VCL. Measured with the ALT.
4. Throttle controls airspeed - Added elevator slows speed due to induced drag.
5. Rudder for coordination - Explain adverse yaw and rudder use in the turn.
6. If Yaw starts before bank established - SKID, Yaw opposite the turn - SLIP.
7. The pilot's outside view will be different between a right turn and a left turn.

Key Points:

- Adverse yaw will be present during roll in and roll out. Stop it with rudder.
- Use Elevator to control altitude and power to control airspeed.
- The site picture from a left and right turn is different.

Questions for the Student:

1. How can a pilot compensate for adverse yaw?
2. Why is increased elevator back-pressure necessary to maintain altitude during a turn?
3. What is the primary flight control that controls the bank angle?

Common Errors

- Failure to adequately clear the area before beginning the turn.
- Attempting to execute the turn solely by instrument reference.
- Attempting to lean, in relation to the turn, while turning, rather than sitting upright.
- Insufficient feel for the airplane as evidenced by the inability to detect slips/skids without reference to flight instruments.
- Fixating on the nose reference while excluding wingtip references.
- Holding un necessary rudder in the turn.
- Gaining proficiency in turns in only one direction. (usually the left)
- Failure to coordinate the use of throttle with other controls.
- Altitude gain/loss during the turn.

Completion Standards

At the end of this lesson, the student should understand the basic concepts of medium bank turns. The student should be able to perform this maneuver with the assistance of a flight instructor. There are no required Airman Certification Standards identified for medium bank turns. A proficient student pilot should be able to maintain altitude at +/- 100 feet, bank angle +/- 5 degrees, and roll out on the desired heading within +/- 10 degrees. Coordinated flight should be maintained throughout.

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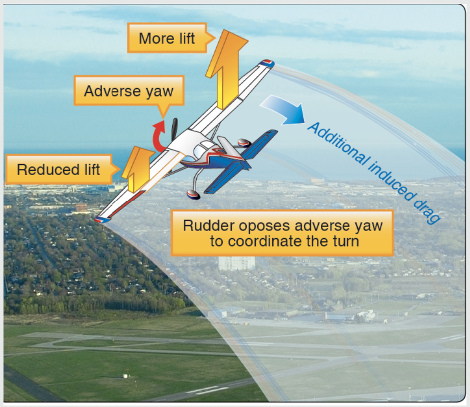
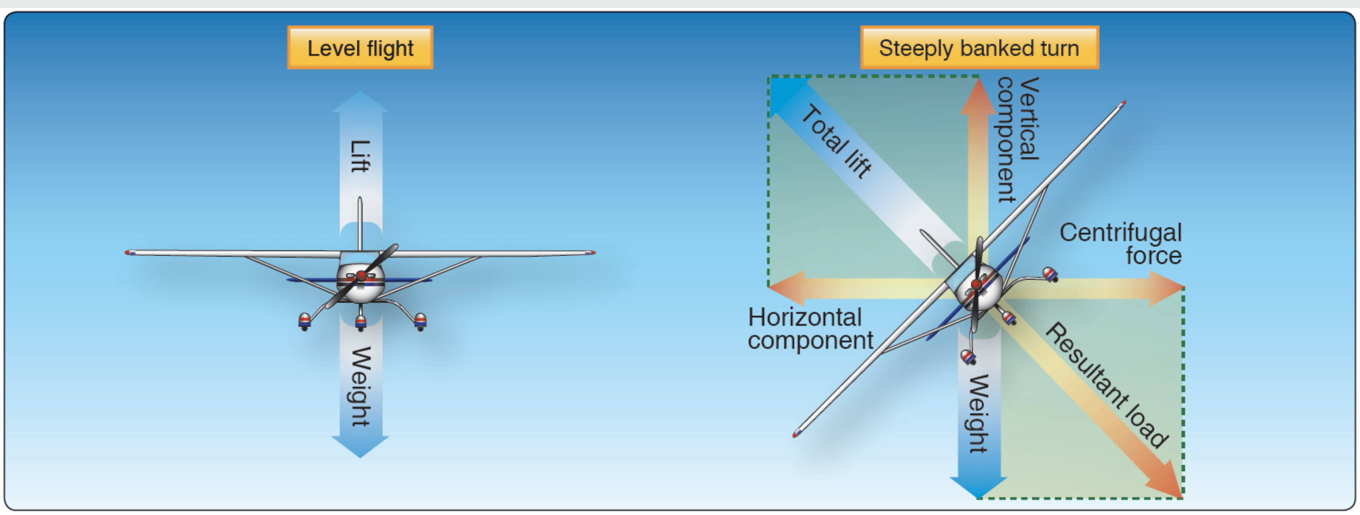
Lesson Additional Images





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Objective

To perform a 360-degree level turn using between 45 - 50 degrees bank while maintaining altitude, airspeed, and coordination.

Motivation

Develops smoothness, coordination, orientation, division of attention, and control techniques to control the increase in load factor and stall speed. This maneuver can be used to avoid an encounter with clouds, terrain, or other aircraft.

Presentation: 20 Minutes

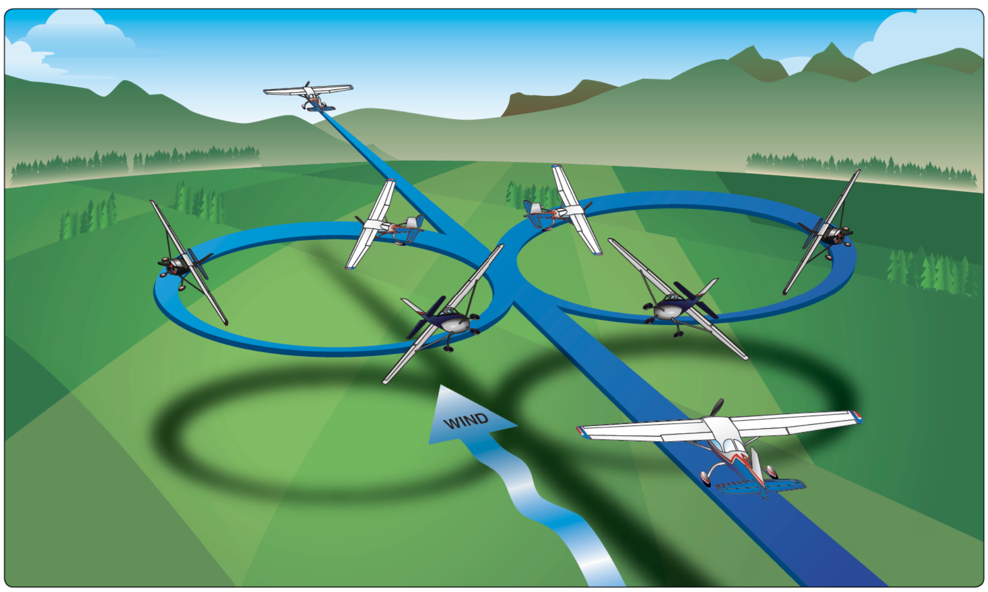
1. Aerodynamics review of turning flight including increases in load factor and stall speed and accelerated stalls.
2. How load factor increases with bank angle - Note how after bank angles of greater than 45 degrees load factor increases substantially with even small increases in bank angle.
3. Determining maneuvering speed, including changes in weight.
4. Identification of reference points and heading.
5. Adverse yaw and how to use rudder to stop it.
6. Use of horizon to determine bank and the different sight pictures in left / right turns.
7. Maintaining altitude with elevator and airspeed with power.
8. Use of trim in a turn.
9. Overbanking tendency.
10. Left turning tendencies and the use of rudder in the turn.
11. Anticipating rolling out. (1/2 bank angle in degrees)

Key Points:

- Load factor and stall speed increase quickly over banks angles of 50 degrees.
- Adverse yaw happens anytime the ailerons are deflected.
- Elevator controls altitude and power controls airspeed.
- During the turn right rudder will be needed to stop the left-turning tendencies.

Risk Management - Teach how to identify, assess and mitigate risks enocmpassing the following:

1. Failure to divide the attention between airplane control and orientation.
2. Task management.
3. Energy management.
4. Accelerated stalls.
5. Spins.
6. Failure to maintain situational awareness.
7. Collision avoidance, scanning, and obstacle avoidance.
8. Failure to maintain coordinated flight.



Questions for the Student:

1. What elevator, aileron and rudder control inputs will be necessary to maintain altitude during a steep turn?
2. What is the minimum bank angle required for a steep turn for a commercial pilot? Private pilot?
3. When should the rollout begin to be wings level at the 360-degree point of the maneuver?
4. What kinds of elevator control pressures will be required when entering, and maintaining the steep turn?
5. What visual references should the pilot use during the turns to maintain altitude?

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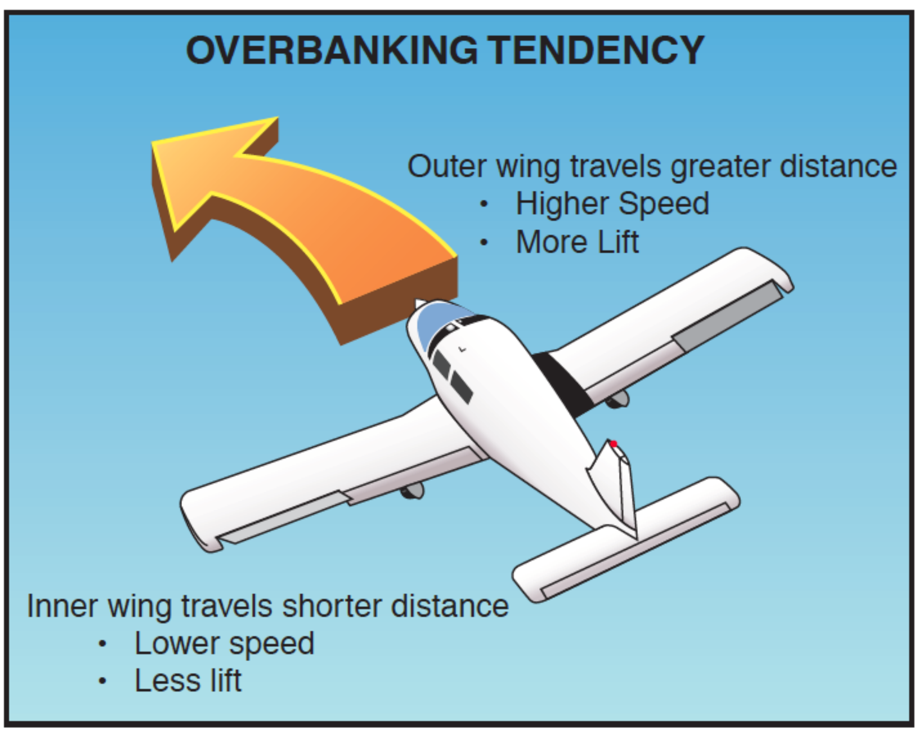
Common Errors

- Failure to adequately clear area.
- Excessive pitch changes during entry or recovery.
- Attempts to start recovery prematurely.
- Failure to stop the turn on a precise heading.
- Excessive rudder during recovery, resulting in skidding.
- Inadequate power management.
- Inadequate airspeed control.
- Poor coordination.
- Gaining altitude in right turns and losing altitude in left turns.
- Failure to maintain a constant bank angle.
- Disorientation.
- Attempting to perform the maneuver by instrument reference rather than visual reference.
- Failure to scan for other traffic during the maneuver.

Steep Turns - Overbanking Tendency



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Completion Standards

1. Establish the manufacturer's recommended airspeed or if one is not stated, a safe airspeed not to exceed V_A.
2. Roll into a coordinated 360° steep turn with a 45° bank.
3. Perform the Task in the opposite direction, as specified by the evaluator.
4. Maintain the entry altitude ±100 feet, airspeed ±10 knots, bank ±5°; and roll out on the entry heading, ±10° or as recommended by aircraft manufacturer to a safe maneuvering altitude.

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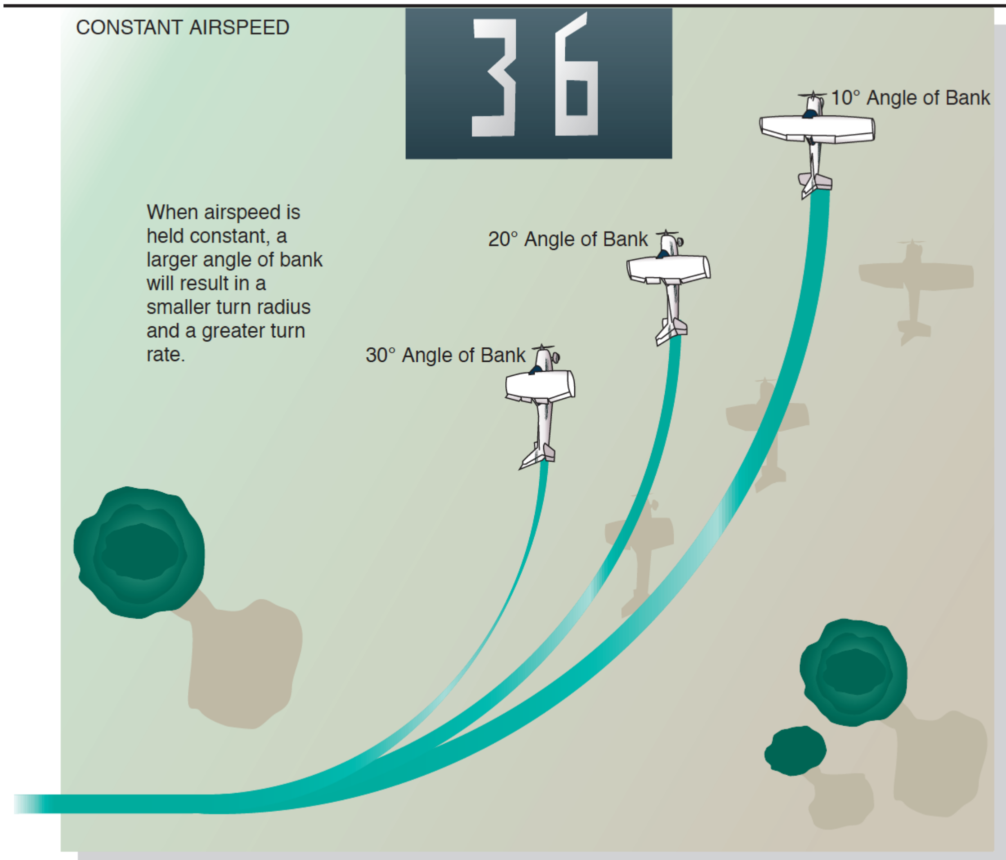
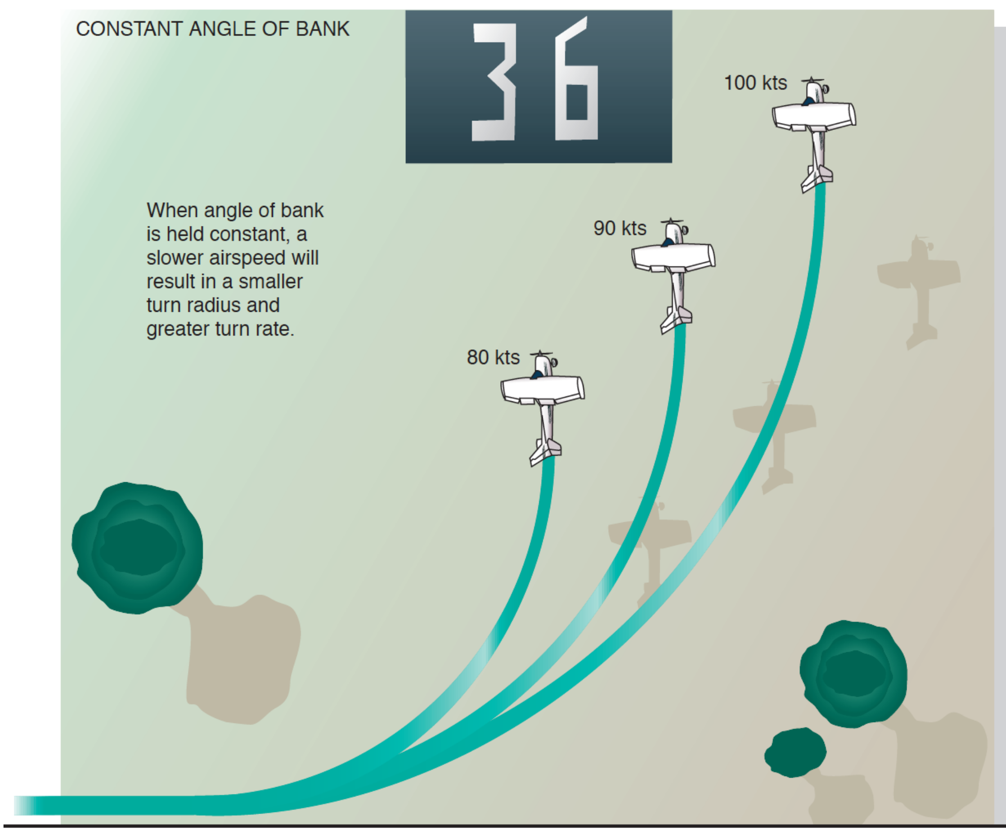




Objective

To maintain coordinated airplane control at speeds other than cruise speed while using different drag devices while straight and level, turning, climbing, or descending.

Motivation

Develops control at slow speeds that will be used for landing.

Presentation: 30 Minutes

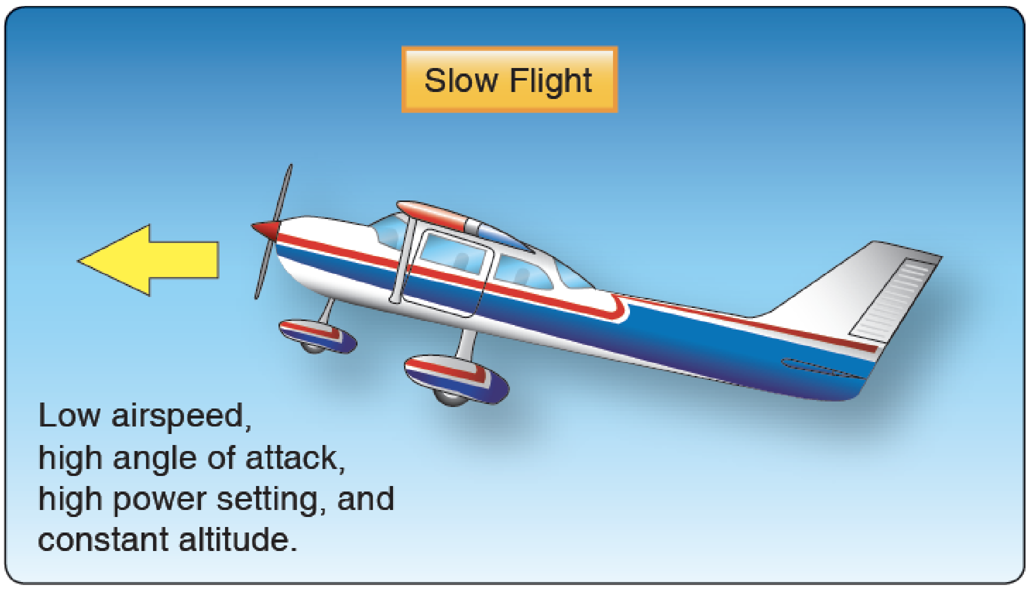
1. How this maneuver applies to different phases of flight. (Takeoff/Landing)
2. Review aerodynamics, Lift/drag. (induced and parasite)
3. Why the AOA increases when airspeed decreases. (Lift equation/drag vs speed charts)
4. Show power available vs power required charts - at high and at low speeds the power required is high. (Climb not possible)
5. Therefore: At very low speeds - PITCH FOR AIRSPEED AND THROTTLE FOR ALTITUDE.
6. As speed is reduced, the AOA must increase - Induced drag increases so power must also be increased.
7. This causes high torque, P-factor, and slip stream causing the airplane to yaw left.
8. Prevent yaw with rudder.
9. At slow speeds controls are not as effective, stall warning horn 5-10 kts above stall.
10. Recognize the stall horn and take corrective action if activated.

Key Points:

- Throttle controls altitude at low speeds.
- Pitch controls airspeed at low speeds. Pitching for altitude only increases drag.
- Rudder must be applied to keep the airplane from yawing - maintain fixed heading.
- Flight controls will be less responsive and less effective at slower airspeeds.
- Turns should be shallow. Climbs may not be possible.

Risk Management - Teach how to identify, assess and mitigate risks enocmpassing the following:

1. Proper understanding of Angle of Attack.
2. Collision avoidance and scanning for traffic while at high nose attitudes.
3. Failure to avoid a stall or react appropriately to a stall warning.
4. Failure to remain coordinated.



Questions for the Student:

1. Why is additional right rudder pressure necessary during slow airspeed/increased throttle conditions?
2. What control input should be used to change airspeed when flying slow?
3. How does the pilot control altitude during slow flight?
4. Why is additional power required as the airspeed slows?

Common Errors

- Failure to adequately clear the area.
- Inadequate elevator back-pressure as power is reduced, resulting in a loss of altitude.
- Excessive elevator back-pressure as power is reduced resulting in a climb, followed by a rapid reduction in airspeed and mushing of the flight controls.
- Inadequate compensation for adverse yaw during turns.
- Fixation on the airspeed indicator.
- Failure to anticipate changes in lift as flaps are extended or retracted.
- Inadequate power management.
- Inability to adequately divide attention between airplane controls and orientation.

Completion Standards

1. Select an entry altitude that will allow the Task to be completed no lower than 1,500 feet AGL.
2. Establish and maintain an airspeed at which any increase in angle of attack, increase in load factor, or reduction in power would result in a stall warning (e.g., aircraft buffet, stall horn, etc.).
3. Accomplish coordinated straight-and-level flight, turns, climbs, and descents with flap configurations specified by the evaluator without activating a stall warning. (e.g., aircraft buffet, stall horn, etc.)
4. Divide attention between airplane control, traffic avoidance, and orientation.
5. Maintain the specified altitude, ±100 feet; specified heading, ±10°; airspeed +10/-10 knots; and specified angle of bank, ±10° or as recommended by the aircraft manufacturer to a safe maneuvering altitude.

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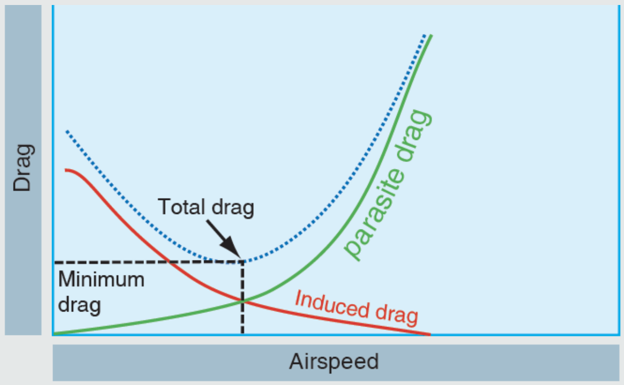
Lesson Additional Images



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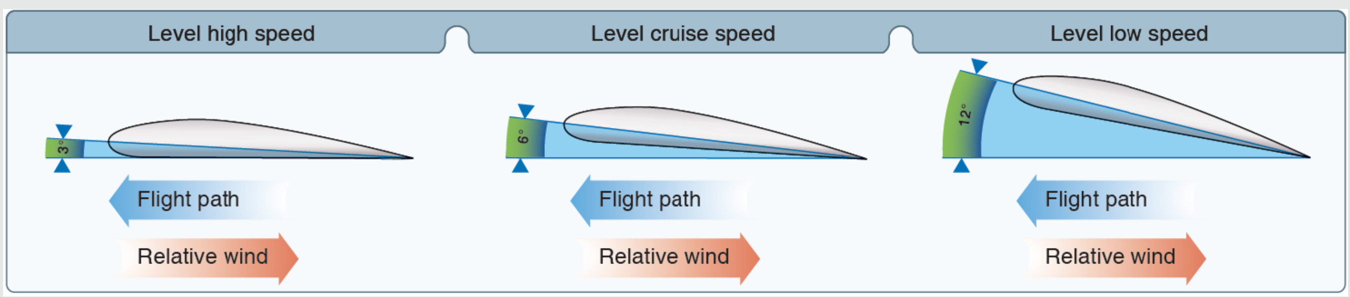

Objective

Develop recognition of an impending stall or stalled condition in the landing configuration and prevent a stall or unstall the airplane after a stall occurs.

Motivation

Recognizing, avoiding, recovery from stalls avoids stall/spin accidents.

Presentation: 15 Minutes

1. Stall aerodynamics - Critical AOA, not speed-dependent, flight path vs relative wind, how load factor and weight affect stall speed.
2. AOA vs lift - Can generate lift at low speeds but not more than the critical angle.
3. Airplane in the landing configuration, full flaps on approach speed, descending.
4. Inducing the stall - Power idle (like the flare) and raise the nose to landing attitude.
5. Importance of coordination - Avoid a stall with yaw. (Describe spin basics)
6. Approach to stall indications. Loss of control effectiveness, stall warning horn, buffeting.
7. Full stall indication - Uncommanded nose-down attitude due to loss of lift possible wing drop.
8. Stall recovery procedure. Reduce AOA with elevator until the stall symptoms are gone, use full power to minimize altitude loss and rudder to stop yaw.
9. If a wing drops, prevent it from dropping further with rudder. Unstall the wing with elevator, then level with wing with aileron. Do NOT level the wings with rudder (Possible spin - Stall with Yaw.)

Key Points:

- The airplane will be in the landing configuration, on approach speed, descending.
- Stall recovery can always be made by reducing the AOA with elevator.
- Power is only necessary to minimize altitude loss.

Risk Management - Teach how to identify, assess and mitigate risks enocmpassing the following:

1. Aerodynamic factors AOA to airspeed, Load factor, weight, configuration.
2. The range and limitations of stall warning indicators.
3. Actions for maximum performance and the consequences of failing to do so.
4. Collision avoidance, scanning, and obstacle avoidance.
5. Failure to follow the stall recovery procedure.
6. Failure to maintain coordinated flight during the maneuver.
7. Secondary stalls and inadvertent stalls or spins

Questions for the Student

1. How will the controls feel during the initial symptoms of a stall?
2. How is the angle of attack related to a stall?
3. What would happen if the flaps were raised too quickly during stall recovery?
4. To unstall the wing, what must the pilot do?

Common Errors

- Failure to clear the area.
- Inability to recognize an approaching stall condition through feel for the airplane.
- Premature recovery.
- Over-reliance on the airspeed indicator while excluding other cues.
- Inadequate scanning resulting in wing-low condition during entry.
- Excessive elevator back pressure, resulting in an exaggerated nose-up attitude during entry.
- Inadequate rudder control.
- Inadvertent secondary stall during recovery.
- Failure to maintain a constant bank angle during turning stalls.
- Excessive forward elevator pressure during recovery, resulting in negative load on the wings and potential secondary stall.
- Excessive airspeed build-up during recovery.
- Failure to take timely action to prevent a full stall during the conduct on imminent stalls.

Completion Standards

1. Select an entry altitude that will allow the Task to be completed no lower than 1,500 feet AGL.
2. Establish and maintain an airspeed at which any increase in angle of attack, increase in load factor, or reduction in power would result in a stall warning (e.g., aircraft buffet, stall horn, etc.).
3. Accomplish coordinated straight-and-level flight, turns, climbs, and descents with flap configurations specified by the evaluator without activating a stall warning. (e.g., aircraft buffet, stall horn, etc.)
4. Divide attention between airplane control, traffic avoidance, and orientation.
5. Maintain the specified altitude, ±100 feet; specified heading, ±10°; airspeed +10/-10 knots; and specified angle of bank, ±10° or as recommended by the aircraft manufacturer to a safe maneuvering altitude.

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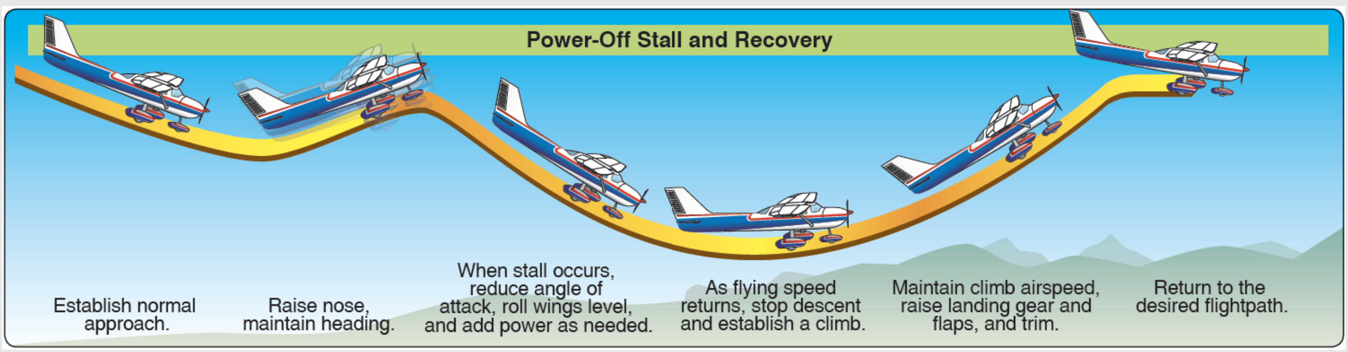
Lesson Additional Images

Stall Recovery Template	
1. Wing leveler or autopilot	1. Disconnect
2. a) Pitch nose-down b) Trim nose-down pitch	2. a) Apply until impending stall indications are eliminated b) As needed
3. Bank	3. Wings Level
4. Thrust/Power	4. As needed
5. Speed brakes/spoilers	5. Retract
6. Return to the desired flight path	



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Objective

To develop recognition of an impending stall or stalled condition in the take-off configuration and prevent a stall from occurring or unstall the airplane if stalled.

Motivation

Recognizing, preventing, and recovering from a power-on stall prevents takeoff and departure stalls.

Presentation: 15 Minutes

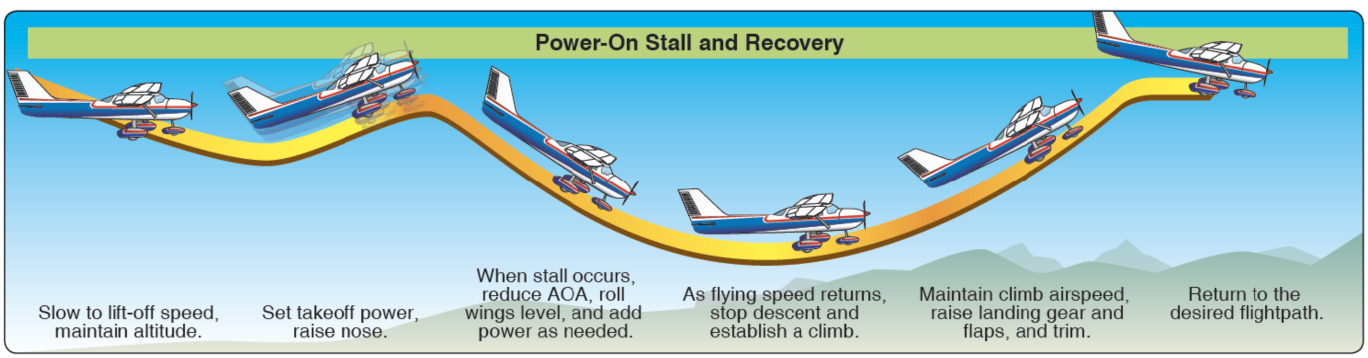
1. Stall aerodynamics - Critical AOA, not speed-dependent, Flight path vs. the relative wind. How load factor and weight affect the stalling speed.
2. AOA vs lift - Can generate lift at low speeds but not more than the critical angle.
3. The airplane is in the takeoff configuration, no flaps and the speed at V_r.
4. Inducing the stall - Raise the nose to an attitude that will induce the stall and add full power.
5. Importance of coordination - Avoid a stall with Yaw. (Describe spin basics)
6. Approach to stall indications. Loss of control effectiveness, stall warning horn, buffeting.
7. Full stall indications - Uncommanded nose-down attitude due to loss of lift possible wing drop.
8. Stall recovery procedure. Reduce AOA with elevator until the stall symptoms are gone, use full power to minimize altitude loss and rudder to stop yaw.
9. If a wing drops, prevent it from dropping further with rudder. Unstall the wing with elevator, then level with wings with aileron. Do NOT level the wings with rudder (Possible spin - Stall with Yaw.)

Key Points:

- The airplane will be in the takeoff configuration at a higher-than-normal attitude. The speed will be V_r.
- To unstall an airplane the only thing necessary to do is to reduce the AOA with the elevator.
- If full power is not used, ensure you use full power to minimize altitude loss.
- A wing drop during the power-on stall is more likely due to the enhanced left-turning tendencies.

Risk Management - Teach how to identify, assess and mitigate risks encompassing the following:

1. Aerodynamic factors (angle of attack (AOA), airspeed, load factor, aircraft configuration, aircraft weight, and aircraft attitude.)
2. The range and limitations of stall warning indicators.
3. The effect of environmental elements on aircraft performance.
4. Required actions for aircraft maximum performance and the consequences of failing to do so.
5. Accelerated stalls.
6. Collision avoidance, scanning, obstacle, and wire strike avoidance.
7. Failure to follow the stall recovery procedure.
8. Failure to maintain coordinated flight during the maneuver.
9. Secondary stalls.
10. Inadvertent stall or spin.



Questions for the Student

1. What are the symptoms of an impending and a full stall?
2. How does a pilot recover from a stall?
3. How does the pitch attitude differ between a power-on stall and a power-off stall?
4. Why is it important to maintain coordination during a stall?

Common Errors

- Failure to clear the area.
- Inability to recognize an approaching stalled condition by the feel of the airplane.
- Premature recovery.
- Over-reliance on the airspeed indicator while excluding other cues.
- Inadequate scanning resulting in wing-low or un-coordinated condition during entry.
- Excessive elevator backpressure resulting in an exaggerated nose-up attitude during entry.
- Inadequate rudder control.
- Inadvertent secondary stall during recovery.
- Failure to maintain a constant bank angle during turning stalls.
- Excessive forward elevator pressure during recovery, resulting in negative load on the wings and potential secondary stall.
- Excessive airspeed build-up during recovery.
- Failure to take timely action to prevent a full stall while conducting imminent stalls.

Completion Standards

1. Select an entry altitude that will allow the Task to be completed no lower than 1,500 feet AGL.
2. Establish the takeoff, departure, or cruise configuration as specified by the evaluator.
3. Set power (as assigned by the evaluator) to no less than 65 percent available power.
4. Transition smoothly from the takeoff or departure attitude to the pitch attitude that will induce a stall.
5. Maintain a specified heading, ±10°, if in straight flight, and maintain a specified angle of bank not to exceed 20°, ±10°, if in turning flight, while inducing the stall or as recommended by the aircraft manufacturer to a safe maneuvering altitude.
6. Recognize and recover promptly after a fully developed stall occurs.
7. Execute a stall recovery in accordance with the procedures set forth in the AFM/POH.
8. Accelerate to V_X or V_Y speed before the final flap retraction; return to the altitude, heading, and airspeed specified by the evaluator.

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Objective

To transition the airplane from maneuvering on the ground to achieving flight.

Motivation

A safe transition from the ground to air is required on every flight.

Presentation: 15 Minutes

1. Takeoff distance using POH, current weather. Xwind component. Safety briefing.
2. Takeoff power and static RPM requirement (from limitations section of POH).
3. Position flight controls for wind. Clear the area, taxi on the runway and ensure the nose wheel is straight.
4. Apply full power in 3 to 5 seconds to avoid swerving and engine hesitation.
5. Compensate for torque, P-factor and slipstream - controls get firmer with speed.
6. Elevator becomes firmer - Rotate at V_r.
7. Set initial climb about 10 deg, tires will unstick, and the airplane will accelerate.
8. Pick a point well ahead to track to, wings level with aileron, stop yaw with rudder.

Key Points:

- Compensate for torque and P-factor. Keep one hand on the throttle.
- Rotate at the appropriate speed.- controls firm - set attitude.
- Climb at the appropriate speed by adjusting the pitch attitude and trim.

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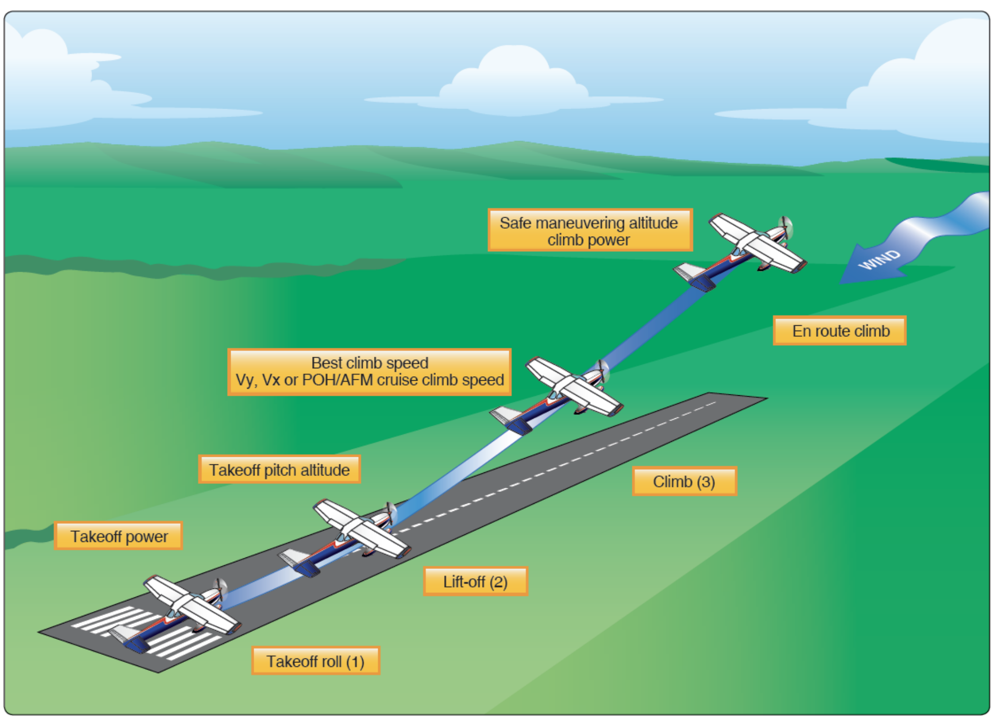
Risk Management - Teach how to identify, assess and mitigate risks enocmpassing the following:

1. Selection of runway based on wind, pilot capability, and aircraft limitations.
2. The demonstrated crosswind component for the aircraft.
3. Wind shear.
4. Tailwind.
5. Wake turbulence.
6. Go/no-go decision-making.
7. Task management.
8. Low altitude maneuvering.
9. Wire strikes.
10. Obstacles on the departure path.
11. A rejected takeoff and predetermining takeoff abort criteria.
12. Handling engine failure during takeoff and climb.
13. Criticality of takeoff distance available.
14. Plans for engine failure after takeoff.



Questions for the Student:

1. When full power is applied on the take-off roll, how do you expect the airplane to react?
2. How would you mitigate the reaction to adding full power on the take-off roll?
3. What is meant by the term “rotation speed”?
4. Why should power be added smoothly to full throttle?

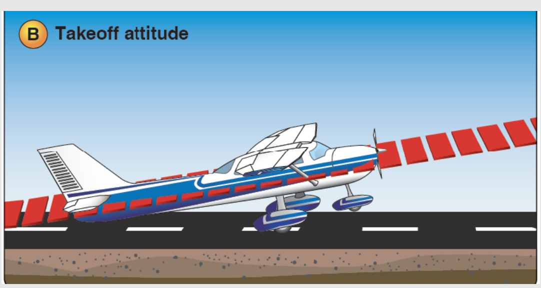
Common Errors

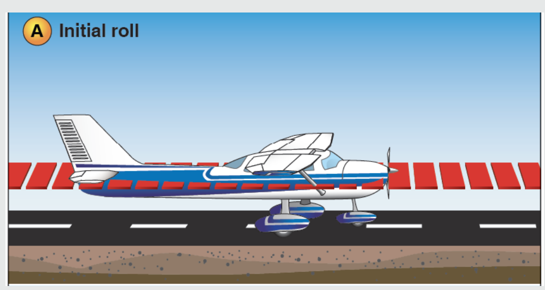
- Failure to adequately clear the area prior to taxiing into position on the runway.
- Abrupt use of throttle.
- Failure to check engine instruments for signs of malfunction after applying take- off power.
- Failure to anticipate the aircraft’s left-turning tendency on initial acceleration.
- Overcorrecting for the aircraft’s left-turning tendency.
- Relying solely on the airspeed indicator rather than developed feel for indications of speed and airplane controllability during acceleration and lift-off.
- Failure to attain the proper lift-off attitude.
- Inadequate compensation for torque and P factor during initial climb, resulting in a sideslip.
- Over-control of elevator during initial climb-out.
- Limiting scan areas directly ahead of the airplane (pitch attitude and direction) resulting in allowing a wing to drop (usually the left) immediately after take-off.
- Failure to attain/maintain an adequate climb-out speed.
- Failure to employ the principles of attitude flying during climb-out, resulting in “chasing” the airspeed indicator.

Completion Standards

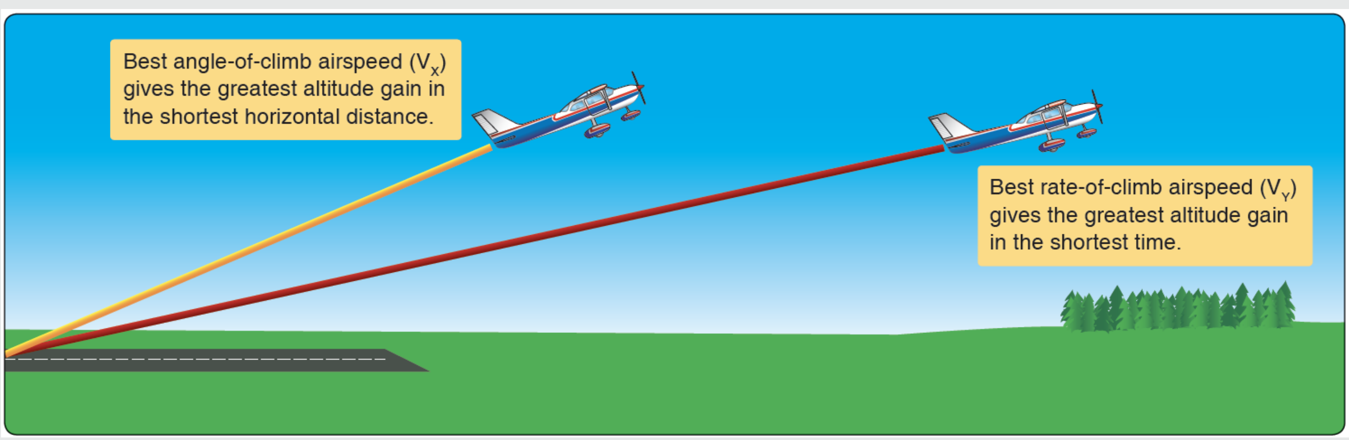
Demonstrate and Say

1. Verify ATC clearance and no aircraft are on final before crossing the hold line.
2. Verify aircraft is about to enter the assigned/correct runway.
3. Ascertain wind direction with or without visible wind direction indicators.
4. Determine if the crosswind component is beyond the pilot's ability or aircraft manufacturer's maximum demonstrated value.
5. Position the flight controls for the existing wind conditions.
6. Clear the area; taxi into the takeoff position and align the airplane on the runway centerline/ takeoff path.
7. Confirm takeoff power, and proper engine and flight instrument indications prior to rotation.
8. Rotate and lift-off at the recommended airspeed and accelerate to V_Y (or other speed as appropriate for aircraft).





Lesson Additional Images



Objective

To maintain a fixed distance from a rectangular course by compensating for wind drift.

Motivation

These are the basic techniques to stop drift in the traffic pattern.

Presentation: 15 Minutes

1. Determining wind direction and velocity - Dust, smoke, water, crops, wind circle.
2. The effects of wind on ground track and relation to a ground reference point.
3. Selection of features on the ground for the rectangular course, Adequate dimensions, (approx. 1nm legs), boundaries etc. Fly 1/4 to 1/2 mile from the boundaries and preselect emergency landing locations.
4. Entry/exit location, altitude (600-1000ft. AGL), and airspeed requirements of the maneuver. (Below V_a and slow enough to see wind drift)
5. The effects of bank angle and ground speed on rate and radius of turn. Relate this to each turn and straight and level segment in the maneuver. (Demonstrate with a model airplane)
6. The relationship of rectangular course to the airport traffic pattern.

Key Points:

- Determine the location and strength of the wind.
- Anticipate the crab or steepness of bank needed.
- Keep the airplane approximately 1/2 mile from the boundary of the course.

Risk Management - Teach how to identify, assess and mitigate risks enocmpassing the following:

1. Collision avoidance, scanning, and obstacles.
2. Low altitude maneuvering.
3. Task management.
4. Failure to maintain aircraft control.
5. Failure to select a suitable emergency landing area.

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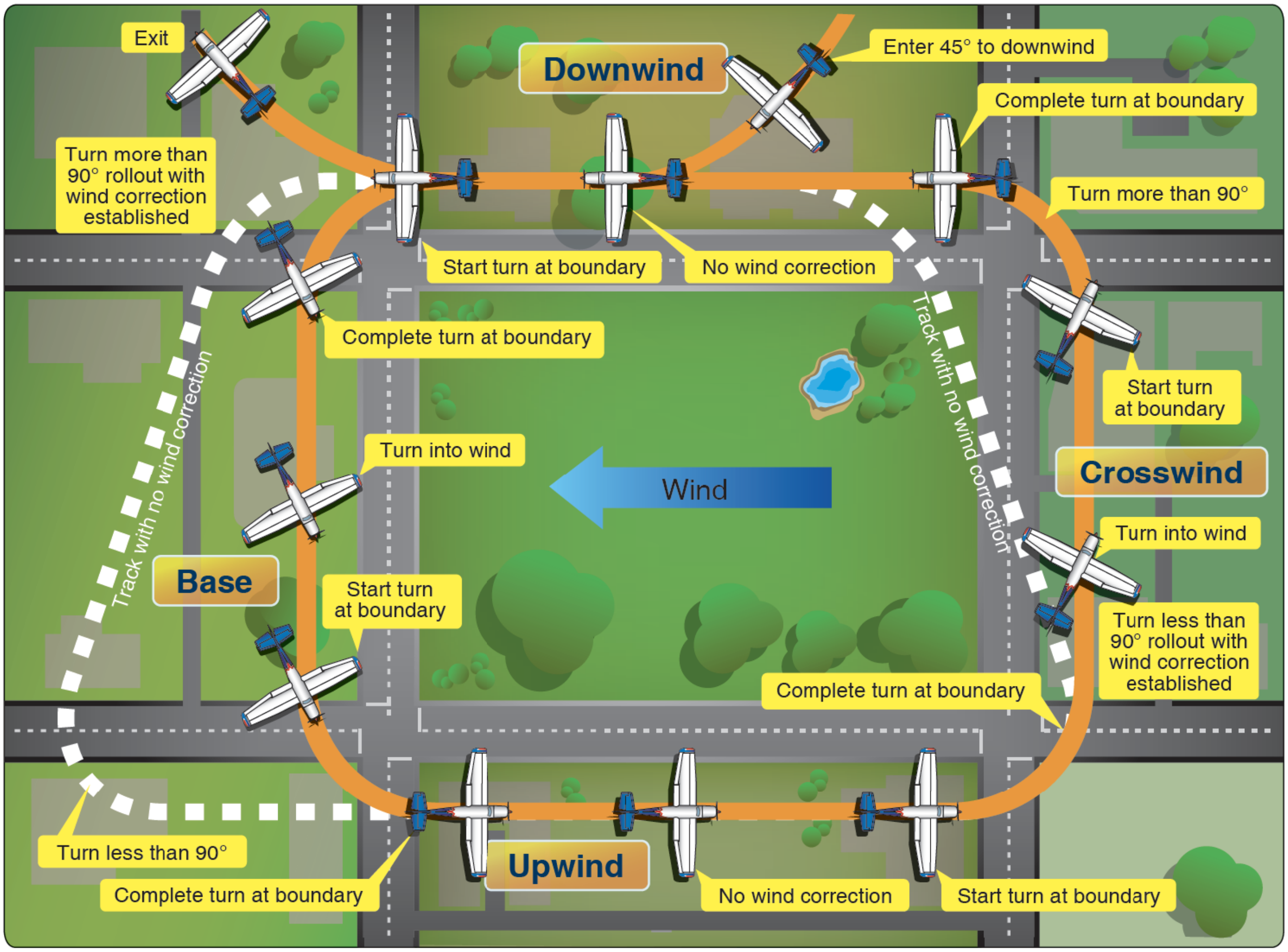

Questions for the Student:

1. In which turns will the greatest bank angle be required? Why?
2. On what legs will a crab be required to maintain ground track?
3. On the identified legs, which way will the airplane be crabbed?
4. What should the steepness of the bank be at each of the four corners?
5. How is the maneuver entered relative to the rectangular course legs?

Common Errors

- Failure to adequately clear area.
- Failure to establish proper altitude prior to entry.
- Failure to establish proper wind correction angle, resulting in drift.
- Gaining or losing altitude.
- Poor coordination. Slipping or skidding in turns.
- Abrupt control usage.
- Inability to divide attention between airplane control and maintaining ground track.
- Inadequate visual look out for other aircraft.

Completion Standards

1. Determine the area is clear of terrain, obstacles, and other aircraft, and the aircraft will remain in the appropriate airspace.
2. Select a suitable ground reference.
3. Identify a suitable emergency landing area.
4. Plan the maneuver:
    - Rectangular course: enter a left or right pattern, 600 to 1,000 feet above ground level (AGL) at an appropriate distance from the selected reference area, 45° to the downwind leg.
5. Apply adequate wind drift correction during straight and turning flight to maintain a constant ground track if around a rectangular reference area or to track a constant radius turn on each side of the selected reference line or a selected point.
6. Divide attention between airplane control, traffic avoidance and the ground track while maintaining coordinated flight.
7. Maintain altitude ±100 feet; maintain airspeed ±10 knots or as recommended by aircraft manufacturer to a safe maneuvering altitude.

Objective

To perform two opposite direction level 180 degree turns of equal radius across a road, with the wings becoming level when crossing the road.

Motivation

This maneuver provides a greater understanding of wind correction during non-straight and level conditions.

Presentation: 15 Minutes

1. Determine the wind direction and velocity - Dust, smoke, water, crops, wind circle.
2. Selection of a road perpendicular to the wind of adequate length. (Long enough to do at least two 180 degree turns). Preselect emergency landing locations.
3. Define two half circles on each side of the road. Enter downwind first turn to the left (Steepest bank). The radius should be enough to allow the plane to be level just as it passes over the road.
4. Entry/exit location, altitude (600- 1000 ft. AGL), and airspeed requirements of the maneuver. (Below Va and slow enough to see wind drift)
5. Show effects of bank angle and ground speed on rate and radius of turn. Relate this to each turn and straight and level segment in the maneuver. Wings should just become level as the road is crossed. (Demonstrate with model airplane)
6. Where to exit the maneuver. (after at least two turns have been made)

Key Points:

- The higher the ground speed, the greater the bank angle needed.
- Bank angle is used to produce the necessary wind-drift correction.
- Bank angle and roll rates will always be changing.

Risk Management - Teach how to identify, assess and mitigate risks enocmpassing the following:

1. Collision avoidance, scanning, and obstacles.
2. Low altitude maneuvering.
3. Task management.
4. Failure to maintain aircraft control.
5. Failure to select a suitable emergency landing area.

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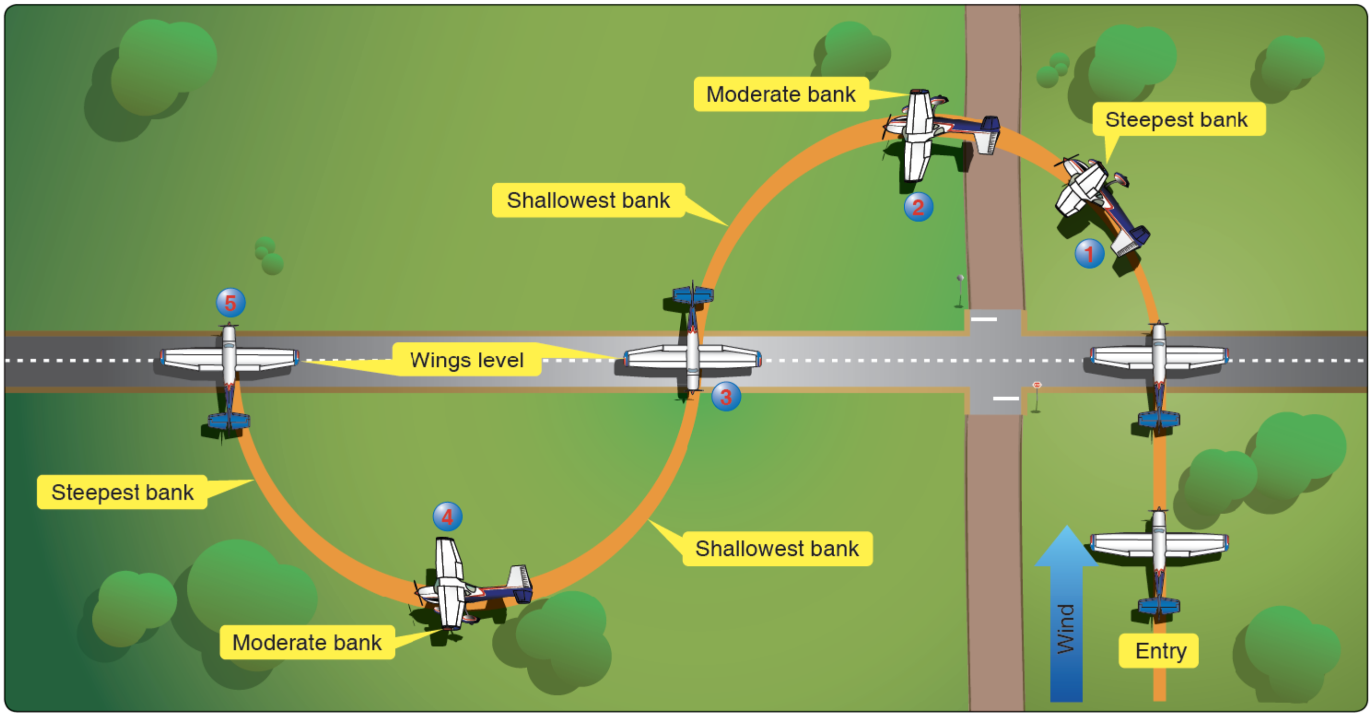

Questions for the Student:

1. How long should the airplane be straight and level when reaching the road?
2. Is the required bank angle high or low when the ground speed is high?
3. In the diagram above, in which positions will the wind correction angle be greatest?
4. At what points during the maneuver will the bank angle and roll rates be highest?

Common Errors

- Failure to adequately clear the area.
- Poor coordination.
- Gaining or losing altitude.
- Inability to visualize the half-circle ground tracks.
- Poor timing in beginning and recovering from turns.
- Faulty correction for drift.
- Inadequate visual lookout for other aircraft.

Completion Standards

1. Determine the area is clear of terrain, obstacles, and other aircraft, and the aircraft, will remain in the appropriate airspace.
2. Select a suitable ground reference.
3. Identify a suitable emergency landing area.
4. Plan the maneuver.
5. Enter perpendicular to the selected reference line, 600 to 1,000 feet AGL at an appropriate distance from the selected reference area.
6. Apply adequate wind drift correction during straight and turning flight to track a constant radius turn on each side of the selected reference line or a selected point.
7. Reverse the turn directly over the selected reference line.
8. Divide attention between airplane control, traffic avoidance and the ground track while maintaining coordinated flight.
9. Maintain altitude ±100 feet; maintain airspeed ±10 knots or as recommended by aircraft manufacturer to a safe maneuvering altitude.

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