

# Private Pilot Flight Instruction Lesson Plan

## Short and Soft Field Takeoffs and Landings

Student: \_\_\_\_\_ Date: \_\_\_\_\_

### Objectives:

Upon completion of this lesson, the student will:

- Be able to safely perform short and soft field takeoffs and maximum performance climbs.
- Be able to safely perform short and soft field approaches and landings.

Note: The student should have some experience with normal takeoffs and landings prior to attempting short and soft field operations.

### Elements:

- Takeoffs and Landings from (simulated) short soft runways.
- Maximum performance climbs ( $V_x$ ) over obstacles on takeoff.
- Maximum performance approaches.

### Schedule:

• Pre-lesson briefing	00:10
• Preflight	00:10
• Practice short and soft field takeoffs and landings	00:50
• Post-flight procedures	00:10
• Post-lesson debriefing	00:10
Total:	01:30

### Equipment:

- POH and/or appropriate checklists for aircraft to be flown.
- Chalkboard and or model for demonstration of techniques.

### Instructor Actions:

1. Pre-lesson briefing
  - Present objective for the lesson.
  - Describe what will take place during the lesson.
  - Describe reasons for learning short and soft field techniques.
  - Discuss procedures for short field takeoffs (see Student Actions - 3)
  - Discuss procedures for short field landings (see Student Actions - 4)
  - Discuss procedures for soft field takeoffs (see Student Actions - 5)
  - Discuss procedures for soft field landings (see Student Actions - 6)
  - Review slipping and crabbing approaches if there is a crosswind.
2. Preflight

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3. Short Field Takeoff Procedures
  - Demonstrate the procedure.
  - Coach student on proper use of flight controls while taxiing and during takeoff roll.
  - Have student use all available runway for takeoff.
  - Coach student on appropriate flap setting for short field takeoff as specified in the POH for the aircraft being used.
  - Ensure student checks engine gauges after smoothly applying power (oil pressure, temperature and RPM) while holding airplane with brakes.
  - Ensure student re-checks engine gauges and airspeed while beginning roll.
  - Coach student on holding the centerline during takeoff roll and to rotate at the appropriate airspeed.
  - Coach student on climbing at  $V_X$  until reaching an altitude of 100 feet and then transitioning to a  $V_Y$  climb and holding runway heading or complying with applicable noise abatement procedures.
  - Coach student through the post departure checklist for the aircraft (gear up, flaps up, fuel pump, prop setting, etc.).
4. Short Field Landing Procedure
  - Demonstrate the procedure.
  - Coach student on the use of flaps during the approach.
  - Coach student on use of maximum performance approach airspeed.
  - Coach student on use of slip or crab on final, and transition from crab to slip just before touchdown.
  - Coach student on proper flare technique and visual references during the flare. Note flare will be quicker than normal due to low airspeed.
  - Coach student on use of flaps and braking immediately after touchdown to reduce roll out as prescribed in the POH for the aircraft being used.
  - Coach student on proper use of flight controls after landing.
5. Soft Field Takeoff Procedure
  - Demonstrate the procedure.
  - Coach student on proper use of flight controls while taxiing and during takeoff roll.
  - Have student keep the airplane moving while holding weight off of the nose wheel.
  - Coach student on appropriate flap setting for soft field takeoff as specified in the POH for the aircraft being used.
  - Ensure student checks engine gauges after smoothly applying power (oil pressure, temperature and RPM) while and airspeed while beginning the takeoff roll.
  - Coach student on technique of holding the nose high until the aircraft lifts off into ground effect, then have student fly in ground effect until reaching the appropriate climb speed ( $V_X$  or  $V_Y$ ).
  - Coach student through the post departure checklist for the aircraft (gear up, flaps up, fuel pump, prop setting, etc.).
6. Soft Field Landing Procedure
  - Demonstrate the procedure.
  - Coach student on the use of flaps during the approach.
  - Coach student on use of the appropriate approach airspeed as recommended by the POH.
  - Coach student on use of slip or crab on final, and transition from crab to slip just before touchdown.
  - Coach student on proper flare technique and visual references during the flare
  - Coach student on use of flight controls to keep weight off the nose wheel through the roll-out and taxiing.

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7. Post-flight Procedures
8. Post-lesson debriefing
  - Summarize what was learned and critique students performance of maneuvers with constructive suggestions to improve technique.
  - Ask questions to evaluate the student's understanding of what was learned.
  - Answer student questions
  - Explain what will be covered in the next lesson and assign reading material.

### Student Actions:

1. Pre-lesson briefing
  - Ask questions concerning previous lessons and/or this one.
2. Preflight
  - Perform pre-flight and pre-takeoff procedures using appropriate checklists
3. Short Field Takeoff Procedures
  - Uses flight controls appropriately for existing wind conditions while taxiing and during takeoff roll.
  - Uses all available runway for takeoff; Aligns nosewheel with runway prior to stopping.
  - Uses the appropriate flap setting for short field takeoff as specified in the POH for the aircraft being used.
  - Checks engine gauges after smoothly applying power (oil pressure, temperature and RPM) while holding airplane with brakes.
  - Re-checks engine gauges and airspeed while beginning roll.
  - Holds the centerline during takeoff roll and to rotates at the appropriate airspeed.
  - Climbs at  $V_x$  until reaching an altitude of 100 feet and then transitions to a  $V_y$  climb while holding runway heading or complying with applicable noise abatement procedures.
  - Performs the post departure checklist for the aircraft (gear up, flaps up, fuel pump, prop setting, etc.).
4. Short Field Landing Procedure
  - Extends downwind slightly to preclude the possibility of being too high on final.
  - Uses the appropriate flaps settings during the approach.
  - Stabilizes the final approach at maximum performance approach airspeed.
  - Uses of slip or crab on final, and transition from crab to slip just before touchdown if crosswind conditions exist.
  - Performs round-out and flare (flare will be more abrupt due to low airspeed).
  - Raises flaps and applies brakes immediately after touchdown to reduce roll-out as prescribed in the POH for the aircraft being used.(First couple of times forget about the flaps).
  - Demonstrates proper use of flight controls after landing.

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5. Soft Field Takeoff Procedure
  - Demonstrates proper use of flight controls while taxiing and during takeoff roll.
  - Keeps the airplane moving while holding weight off of the nose wheel.
  - Uses the appropriate flap setting for soft field takeoff as specified in the POH for the aircraft being used.
  - Checks engine gauges after smoothly applying power (oil pressure, temperature and RPM) and airspeed while beginning roll.
  - Holds the nose on the horizon (or other suitable reference) until the aircraft lifts off into ground effect, then flies in ground effect until reaching the appropriate climb speed ( $V_X$  or  $V_Y$ ); Note, most airplanes require a firm push on the yoke to remain in ground effect.
  - Uses appropriate rudder inputs to maintain alignment with the centerline during the takeoff run.
  - Performs the post departure checklist for the aircraft (gear up, flaps up, fuel pump, prop setting, etc.).
6. Soft Field Landing Procedure
  - Demonstrates appropriate use of flaps during the approach.
  - Stabilizes the airplane at the appropriate approach airspeed as recommended by the POH.
  - Uses a slip or crab on final, and transition from crab to slip just before touchdown if crosswind conditions exist.
  - Performs round-out and flare.
  - Applies a little power at touchdown (pull throttle to idle then add just enough to hear the change in engine RPM).
  - Holds weight off the nose wheel after touchdown and keeps plane moving.
  - Demonstrates proper use of flight controls after landing.
7. Post-flight procedures
  - Perform post-flight procedures using appropriate checklists.
8. Post-flight debriefing.
  - Ask questions about the lesson.

### Completion Standards:

This lesson will be completed when the student is able to:

- Perform safe short and soft field takeoffs and landings.
- Is able to touchdown within 200 feet of a specified point (Private pilot standard), or within 100 feet of a specified point (Commercial standard).
- Establish and maintain climb and approach speeds  $+10 / - 5$  Knots (Private pilot standard) or  $+/- 5$  Knots (Commercial standard).

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### Common Errors:

- Short Field takeoffs
  - Not using all available runway.
  - Fails to align nosewheel with the runway.
  - Abrupt power application.
  - Trying to pull the airplane off too soon
  - Picking up excessive airspeed after takeoff; not initiating climb at  $V_x$ .
- Short Field Landings
  - Failure to maintain maximum performance approach speed on final.
  - Unstable approach.
  - Landing too fast.
  - Doesn't pull back hard enough in the flare.
  - Poor braking technique.
- Soft Field Takeoff
  - Allowing airplane to stop
  - Forgetting to set flaps
  - Not holding yoke full back at the start of the takeoff roll
  - Keeping the yoke full back as the airplane accelerates, thus delaying liftoff and possibly dragging the tail.
  - Fails to push the yoke forward hard enough to stay in ground-effect after liftoff.
  - Poor directional control due to looking over the raised nose and left turning tendency
  - Stalling on liftoff allowing the plane to drop back onto the runway
  - Forgetting to retract flaps once a safe altitude and positive rate of climb is established.
- Soft Field Landing
  - Unstable approach.
  - Flaring too high and dropping in
  - Failure to hold the nosewheel off during touchdown and rollout.
  - Poor power control during touchdown and rollout.
  - Poor directional control due to looking over the raised nose

### References:

- POH/AFM for airplane used.
- Airplane Flying Handbook (FAA-H-8083-3A); Pages 5-8 – 5-10, 8-17 – 8-20
- PRIVATE PILOT – ASEL PTS Areas of Operation II, III, IV – Tasks C, D, E, F
- COMMERCIAL PILOT – ASEL PTS Areas of Operation II, III, IV – Tasks C, D, E, F

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**Possible Review Questions:**

When performing a short-field takeoff, we use \_\_\_\_\_ runway.

What is  $V_x$ ? What is  $V_x$  for the airplane (being used)?

When performing a short-field takeoff, we initially climb at  $V_x$ . After clearing any obstacles, we then transition to a climb at \_\_\_\_\_.

What is  $V_y$  for the airplane (being used)?

When performing a soft-field takeoff, it is important to keep \_\_\_\_\_ during the entire taxi and takeoff roll.

When performing a soft-field takeoff or landing it is important to keep the \_\_\_\_\_ off the nose-wheel.