Elements of a Take Off

Pre Take Off:
Communications: Announce on CTAF or contact Tower for permission to take off. Ex: "Paine Tower, Cessna November 49158 ready for take off at 16 Left, departing southbound VFR"

Final Check:
1. Fuel on (fullest tank)
2. Primer: in and locked
3. Master: on
4. Alternator: on
5. carb heat: cold
6. propeller: maximum RPM
7. mixture: rich
8. oil pressure and oil temperature: in the green arc
9. trim: set for take off
10. flaps: set for take off

Flight Elements of a Take off:

Nose-Left Tendency for *four* reasons:
1. Engine torque: engine rotates clockwise (from pilot's view)
2. spiraling slipstream hitting the left side of the vertical tail pushing the nose right.
3. Gyroscopic Precession (tail draggers) As the nose is raised, the gyroscope effect of the spinning propeller is to push the nose left
4. P Factor during climb out: The descending propeller blade (right side) has higher angle of attack than ascending blade (left side). Therefore, there is more thrust coming from the right side of the propeller.

Ground Effect:
Aircraft is in ground effect when within ½ wingspan height above the runway
While in ground effect, drag is reduced, the aircraft can fly at lower airspeeds than out of ground effect
When leaving ground effect, there is a nose-up pitch tendency, an increase in drag and a loss of lift
Therefore: *It is extremely important to have sufficient climb airspeed when leaving ground effect or the aircraft may stall and mush back onto the runway (or worse!)*

Climb Out:
Fly at Vx (best angle of climb) until clearing obstacles
Fly at Vy (best rate of climb) for the initial climb phase (at least until 500 ft)
Track runway centerline until reaching 500' AGL
Right Rudder will be required to counteract P-factor during climb
Turn to the crosswind pattern leg after reaching 500'

Elements of Slow Flight and Stalls

The pilot must be familiar with the handling qualities of the aircraft over the full airspeed operating envelope. At cruise airspeed, the controls are stiff and precise, and rudder usage requirements are minimal. As speed decreases, the controls start to feel "mushy", adverse yaw becomes much more apparent, and the usage of rudder is much more necessary. Since the landing approach and landing flare are conducted in a slow-flight regime, it is important for the pilot to recognize the differences in handling qualities at these speeds, and in particular, the recognition of stall onset and the potential stall-spin dangers which arise when trying to "raise the low wing" with ailerons as would be done (safely) at higher airspeeds.

Entering Slow Flight:

From Cruise:

1. retard the throttle to about 1/3 power
2. Increase elevator back pressure to maintain level flight, airspeed will decrease
3. Use trim to relieve back pressure
4. As the airspeed approaches the low end of the white-arc, increase throttle as necessary to maintain altitude
5. Apply right rudder as necessary to maintain heading, apply rudder trim if available
6. As we have seen before, but now very much apparent: *pitch controls airspeed, and power controls altitude*

Turns in Slow Flight

Considerable right rudder will be needed to maintain heading, and even more will be needed for a right turn. Conversely, a left turn might *still* require right rudder even though the turn is "coordinated". Items to notice: attempting to roll out of a turn on a point by using ailerons will usually result in over-shooting the point. However, usage of opposite rudder to "lift the low wing" will produce a more effective response. This is because an aileron applied to lift the low wing, will produce so much adverse yaw and extra drag on the low wing that the lift is less effective. Taken to an extreme, the aileron will stall the low wing leading to a stall-spin situation. Use of "high rudder" prevents this problem.

Recovery from Slow flight

1. Pitch controls airspeed: lower the nose *gradually* and allow airspeed to increase
2. Power controls altitude: maintain altitude during the transition with power
3. At the end, you should be back to level flight with cruise power and airspeed when

Stall Recognition and Recovery

A stall occurs when the air flow over the top of the wing separates forward of the trailing edge. The separation bubble provides an area of high drag and atmospheric pressure, which means a loss of lift and an increase in drag. The *only* factor which determines when a wing stall is *angle of attack.* An airplane can be stalled flying straight down, or not-stalled flying straight up. *The stall is completely independent of aircraft attitude.* **The only way to break the stall is to reduce the angle of attack of the wing in order to regain smooth airflow.** Even if the aircraft is already pointed straight down!

Stall Practice:

Stalls should be practiced at a safe height above the terrain; a minimum of 2000 ft

AGL is recommended.

1. Enter slow flight as described in the previous section
2. After level slow flight has been established, reduce the power slightly while trying to maintain altitude with additional back pressure
3. Try to feel the slight pre-stall "buffet" that will be produced as the wing starts to stall at the wing root.
4. **Power off stalls:**
   a) Reduce power to idle
   b) increase back pressure, *using the rudder* to maintain a wings-level attitude
   c) as the stall breaks and the nose drops, release back pressure and smoothly apply full power. Smoothly pull out of the descent, being careful to avoid a second stall during the pull-up maneuver
5. **Power On Stalls:**
   a) As the airspeed reaches the bottom of the white arc, apply full power
   b) increase back pressure to keep airspeed from increasing, the nose will rise significantly
   c) use *rudder* to maintain wings level
   d) continue applying back pressure, feel the stall buffet and apply rudder to hold wings level as the stall occurs
   e) release back pressure to break the stall, allow airspeed to increase and gradually re-apply back pressure to pull out of the descent
   f) be careful to avoid a secondary stall during the pull-out

Radio Communications

Two way radio communications are an important part of flight safety and are required for flying into or even near any airport with an operating control tower. There are quite a few different parties you could be talking to on the radio, however, the basic exchange will always take the following format:

1. **Who you are talking to**. For an uncontrolled airport, this is the name of the airport. When calling a control tower, it's the name of the airport and the position you're calling.
2. **Who you are:** Your aircraft type and N-number (ex: Cessna November 49158)
3. **Where you are:** When on the ground, position on the airport (ex: taxiway foxtrot 2), when in the air, approximate location and altitude (ex: over Vashon island at 2000 ft)
4. **What you are doing:** just that, example "taxiing to the active runway"

Note: for uncontrolled fields only, repeat (1) at the end of the message. For example:
"Vashon traffic, Cessna November 49158 is departing runway zero-seven, Vashon".

Note 2: After the initial radio contact the call sign is usually abbreviated to the last 3 digits of the N number, for these examples it becomes "Cessna 158"

Examples, uncontrolled airport:
Entering the traffic pattern:
"Harvey traffic, Cessna 158 on a 45 for right downwind 32 Harvey"
On approach for touch and go:
"Harvey traffic Cessna 158 on final for 32 touch and go Harvey"

Examples, Controlled airport:
1) Listen to the ATIS, note the version number, call it "Alpha"

2) Call ground control with the usual bits of information including that you have atis:
You: "Paine ground this is Cessna 49158 at Crown with Alpha, taxi to the active for VFR departure Eastbound"
Paine Ground: Cessna 158 taxi to 16 Left

3) Taxi to 16 Left, after run-up call tower
You: "Paine Tower, Cessna 158 ready for take off 16 Left, Eastbound VFR"
Paine Tower: "Cessna 158 cleared for take off 16 Left, eastbound departure approved"

Upon returning to the field, the contacts are reversed. You must contact tower at least 5 miles from a class Delta airspace, initial contact should be at around 10 miles:
1) get the ATIS again, this time it's Bravo

2) Call Tower:
You: "Paine Tower, Cessna November 49158 10 east of Paine with Bravo inbound for landing"
Paine: "Cessna 158 enter a left base for 16 Left, report I-5"
You: "Cessna 158, left base for 16 Left, will report I-5"

<later>
You: "Paine Tower, Cessna 158 is at I-5"
Tower: "Cessna 158 number two following an archer on final, cleared to land 16 Left"
You: "Cessna 158 cleared to land number 2 16 Left"

<after landing>

Tower: "Cessna 158 contact ground .8, good day"
You: "Cessna 158, ground .8"

<switch to ground frequency>
You: "Paine ground, Cessna 158 at golf 3, taxi to Crown Aviation"
Ground: "Cessna 158 taxi to Crown"

Establishing 2-Way Radio Contact

Class A, B, C and D airspace require 2-way radio contact to be established prior to entering the airspace. *Two Way radio contact is established when, and **only** when the party you have called responds with your aircraft call sign.*

Examples of Established 2-way radio contact:
You: Paine tower, Cessna November 49158 over Langley at 2500, inbound with Alpha

Two way radio contact **IS** established in the following replies by tower:
Paine: "Cessna 49158 report right base for 16 Right"
Paine: "Cessna 49158 report the shoreline"
Paine: "Cessna 158, Standby"

In the last call, even though the request was to "stand by", the tower did respond with your call sign and therefore 2-way radio has been established and you may enter the class D airspace.

In the following examples, 2 way radio is **NOT** established:
Paine: "Cessna calling Paine, say again?"
Paine: "Cessna over Langley, standby."

Because there was no call sign, radio contact has not been established.

There are a number of other rules regarding what radio contact is required for each type of airspace. These are covered under "airspace"