Lesson 2

Flight Controls

1. Axes of an Airplane
   1. Centre of Gravity
      1. The point through which all weight of the aircraft can be described as acting through
      2. The balancing point of the aircraft, which it pivots around
      3. All axes of the aircraft intersect at the centre of gravity
   2. Vertical (Normal) Axis
      1. Passes vertically through the centre of gravity relative to the aircraft
   3. Longitudinal Axis
      1. Passes lengthwise through the centre of gravity nose to tail
   4. Lateral Axis
      1. Passes sideways through the centre of gravity wing tip to wing tip
2. Movements
   1. Roll
      1. Movement of the lateral axis around the longitudinal axis
   2. Pitch
      1. Movement of the longitudinal axis around the lateral axis
   3. Yaw
      1. Movement around the vertical (normal) axis.
3. Function of the Controls
   1. Ailerons
      1. Deflect airflow over the wings to produce roll
      2. Move in opposite directions
         1. the aircraft will roll towards the up going aileron
      3. Controlled using the control column
         1. control column left, left aileron up, right aileron down, left roll
   2. Elevator
      1. Deflects airflow over the horizontal stabilizer to produce pitch
      2. Both halves, if separated, move together
         1. the aircrafts nose will move in the same direction as the elevator
      3. Controlled using the control column
         1. control column back, elevator up, nose up
      4. Stabilators
         1. The entire horizontal stabilizer acts as the elevator
   3. Rudder
      1. Deflects airflow over the vertical stabilizer to produce yaw
      2. Moves as one body
         1. the aircrafts nose will move in the same direction as the rudder
      3. Controlled using the rudder pedals
         1. rudder pedals left, rudder left, nose left
4. Flutter
   1. Rolling or weaving motion arising from deflection of a part of the airplane structure that causes the air forces on it to change in synchronism with its natural period of vibration
   2. Control surfaces must be balanced properly to prevent flutter!
5. Balancing Controls
   1. Helps pilots move them and creates stability of the control surface when neutral
   2. Examples include
      1. Hinge balance
      2. Rudder horn
      3. Aileron hinge axes
      4. Adding mass
      5. Checking static balance after repainting