**Lesson 6**

**Loads and Load Factors**

Read: FTGU pages 17-18, 34-35

1. Definitions
   1. Weight
      1. The downward force due to gravity that acts to oppose lift
      2. Acts through the centre of gravity
   2. Loading
      1. Gross weight of the aircraft divided by the area of the lifting surfaces
   3. Dead load
      1. The load put on the aircraft when it is sitting on the ground. Weight due to gravity
   4. Live load
      1. The actual load on the aircraft at a given moment of flight
      2. Additional loads are added in flight due to acceleration or change in direction
   5. Load factor
      1. Ratio of live load (actual load on the wings) to dead load (weight due to gravity on the ground)
      2. In straight and level flight, the load factor is 1
2. Load Factor changes
   1. The load factor is increased any time the aircraft is not in straight and level flight
   2. This can be due to a number of factors, including:
      1. Manoeuvres
      2. Wind gusts
      3. Turbulence
   3. Aircraft have structural limitations
      1. Permanent damage can occur if the limitations are exceeded
   4. Increasing the load factor means more lift is required to keep the aircraft airborne, increasing the stall speed
      1. More on stalls in 6.07
3. Load Factor in Turns
   1. The load factor in a turn increases exponentially with the angle of bank, and the amount of lift required to maintain flight in a turn increases as well
   2. In a coordinated turn at 60 degrees of bank, the aircraft experiences twice the force of gravity and the load factor is 2 or 2G
4. Forces in a turn
   1. Lift is divided into vertical and horizontal components
      1. Vertical component opposes weight
      2. Horizontal component causes the airplane to turn
         1. Known as centripetal force
         2. This change in direction creates an inertial effect known as centrifugal force
            1. The force you feel going around a corner in a vehicle

Confirmation:

1. Load factor =
   1. Live Load over Dead Load
2. What is the difference between live load and dead load
   1. Live load is the actual load during a moment of flight due to the weight of the airplane and forces experienced due to acceleration from gusts, turbulence, and maneuvers
   2. Dead load is the actual weight of the airplane due to gravity if it were parked on the ground including passengers, crew, actual fuel quantity, and cargo
3. Label where the centripetal and centrifugal forces are:
   1. In: centripetal Out: Centrifugal
4. If this aircraft is doing a 60 degree of bank turn, how many Gs is it experiencing?
   1. 2
5. When does an aircraft experience a 1G force?
   1. Straight and level flight, or on the ground