**Lesson 5**

**Laws and Forces**

Read: FTGU pages 21-39

1. Newton’s Laws of Motion
   1. First Law
      1. An object either is at rest or moves at a constant velocity, unless acted upon by an unbalanced external force
   2. Second Law
      1. The acceleration of an object is directly proportional to the net force acting upon it, and inversely proportional to its mass
         1. F=*m*a
   3. Third Law
      1. Each action has an equal and opposite reaction
      2. Explain the rocket example
2. Four Forces
   1. Lift
      1. Acts upwards, 90 degrees relative to the chord line from the centre of pressure
   2. Drag
      1. Acts backwards parallel to the relative airflow
   3. Thrust
      1. Acts forwards parallel to the longitudinal axis
   4. Weight
      1. Acts straight downwards relative to the earth from the centre of gravity
3. Equilibrium
   1. A state of uniform motion (straight and level flight at a constant airspeed)
   2. Occurs when all components of all four forces balance each other
4. Aerodynamic Couples
   1. Parallel forces that do not pass through the same point
      1. This produces a turning moment
   2. A moment is a force at a distance
   3. Lift and Weight are a couple
      1. Lift > Weight 🡪 climb
      2. Lift < Weight 🡪 descent
   4. Thrust and Drag are a couple
      1. Thrust > Drag 🡪 increasing airspeed
      2. Thrust < Drag 🡪 decreasing airspeed