

Why do planes stay up?

Sources:

Edexcel Physics for AS by Mike Benn and Graham George page 53.

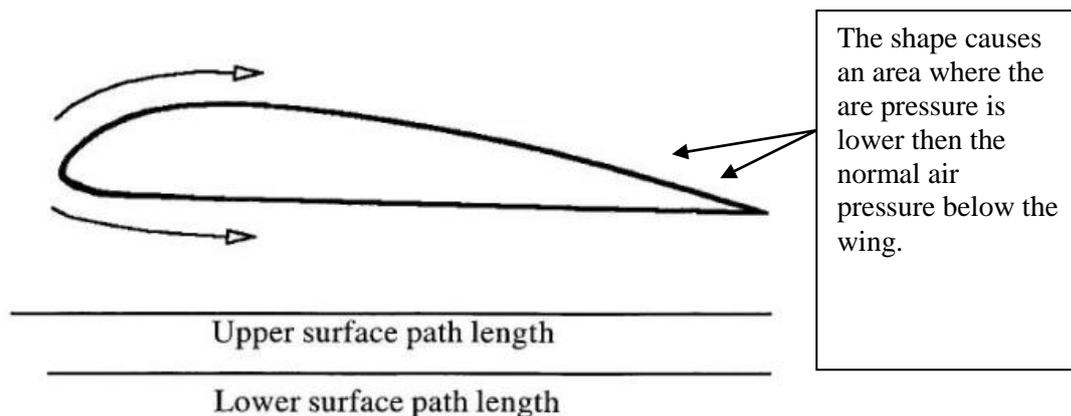
<http://science.howstuffworks.com/transport/flight/modern/airplanes.htm> Saturday 31st of August.

There are several key aspects why planes can achieve flight and remain airborne, this all is due to the basic physics principals of fluid dynamics. As both gasses and liquids act in similar ways, as fluids.

When a plane is in flight there is 4 forces acting on the vessel, in two pairs of two's. these pairs are know as Newton pairs biased on the third law of motion. These pairs are; Thrust & drag, and lift & weight. Under the correct conditions these forces can give the vessel the ability of flight.

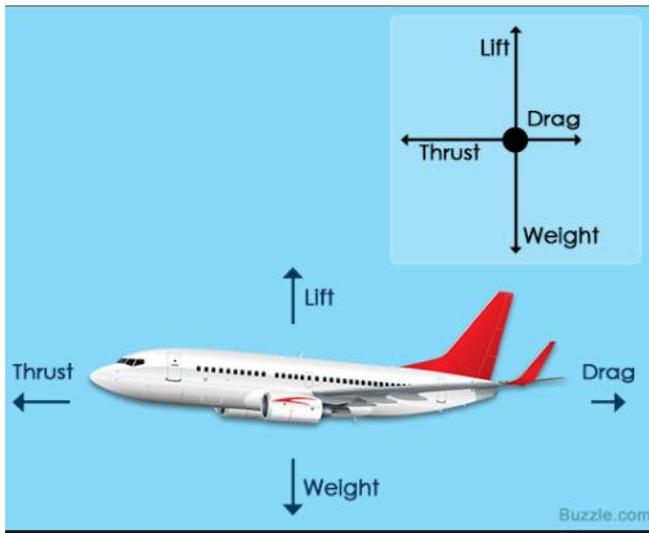
Thrust: This is where the velocity of the plain comes from. weather it is from a propeller pulling the plain or a jet pushing it. This will propel the plane through the air, as it does so the plane will have the other force of drag acting uppon it from the air around it. At high velocity the laminar air infront of the plain will be acting against the plane and the turbulent flow or 'Eddie currents' will be creating a vacuumed behind the plane slowing it down. the plane is therefore airodimaicly shaped to utilise these forces. When the plane is travelling at a constant velocity the thrust and drag will be at equilibrium.

The aerofoil (the wings) on a plane is shaped to channel the air above and below the wing. As the air travelling along the top has further to travel then along the bottom, the air has to travel faster. Because the air is travelling faster the pressure drops. This is known as the Bernoulli's principle.



Free body diagram:

Free body diagrams come from Newton's third law of motion that a body at rest or travelling at a constant velocity will remain at a constant velocity so long as there is no resultant force acting on the body.

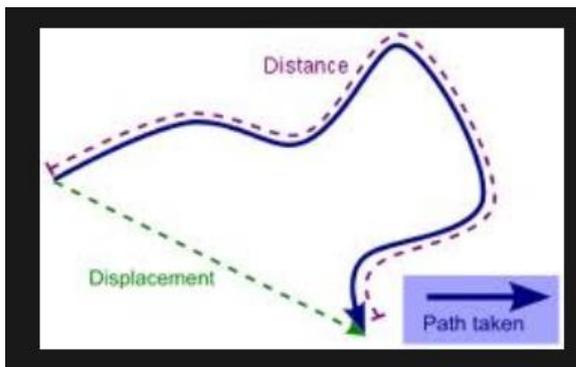


To the left is a free body diagram of a plane in flight. Showing to four forces acting upon it an pairs of Newton third laws.

As much as this helps to 'pull' the plane up (upthrust or lift) this isnt all that helps the plane fly. This is shown by a plane abblity to fly ppuside down. If this was all that helped a plane to fly and keep height then if a plane went up-side-down then it would be 'sucked' down towards earth.

There is many outside factors that would effect weather a plane could fly such as the density and the pressure of the fluid the plane would be flying through.

Scalar and vector quantities:



It can be important to remember that there is a difference between distance and displacement as both of these mean different things. These fall under different category's known as 'Scalar' and 'Vector' quantities.

Scalar quantities have only the magnitude, so this would be the displacement, where the vector quantities is the distance as it shows

both magnitude and the direction. This is important as more fuel is needed to complete a journey. The ability to fly has changed how we see and interact with the world, we can travel great distances in short amounts of time.

The risk of fight is that something could go wrong. If a aerofoil get damaged or an engine stops working then a plane could fall out of control possibly killing all of its passengers and any they is involved with the, as an example the 9 11 deserter with the twin towers.