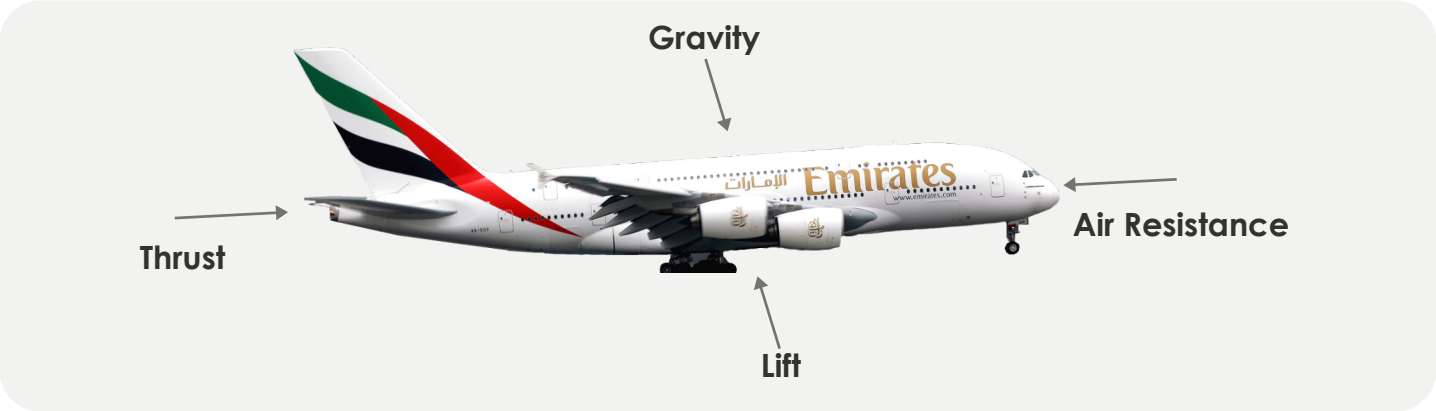
THE SCIENCE BEHIND FLIGHT

The Airbus A380 is the largest passenger aircraft in the world. As you can see below, it has two rows of cabin windows. That's because it is a double-decker plane and across its two floors it can fit more than 500 passengers and on some plane configurations more than 800! How do we get such a large object over 40,000 feet into the sky? Let's find out by focussing on three different parts of the aircraft.

Nose Cone

The nose cone of an aircraft is important for several different reasons. It is the location of the cockpit, where the pilots sit and control the aircraft. It is also the location of the radar and navigation equipment. Finally, have a look at the pointed, streamline shape of the nose. This shape allows it to cut through air resistance, the force working against the aircraft and trying to slow it down. Objects that can cut through air resistance easily like this can be described as aerodynamic.

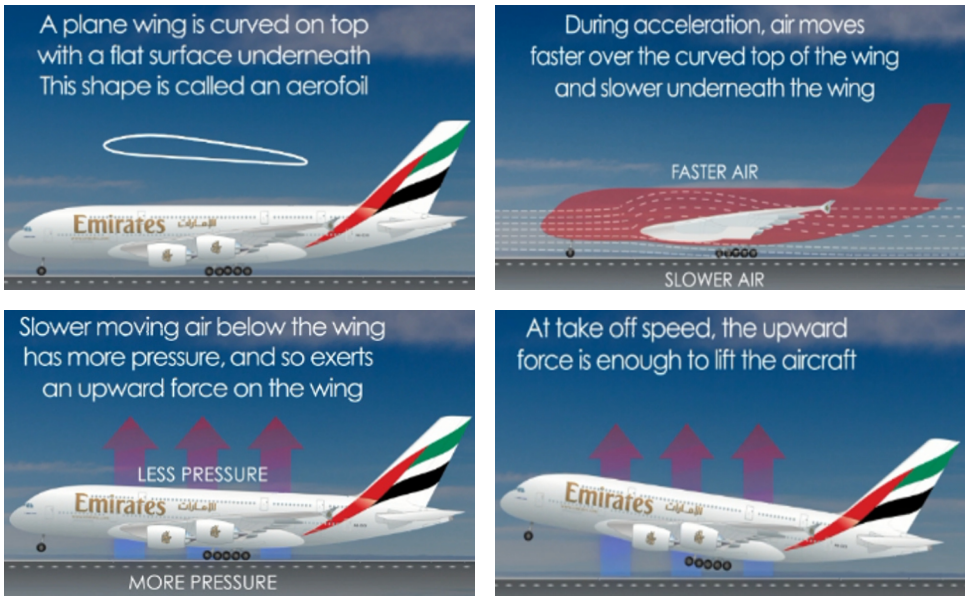


Air resistance is one of four forces acting on an aircraft. The weight of the aircraft allows gravity to stop it spiralling off into space! Let's focus on the aircraft's wings to understand lift.

KS2 & KS3

THE SCIENCE BEHIND FLIGHT

Wings and the Bernoulli's Principle

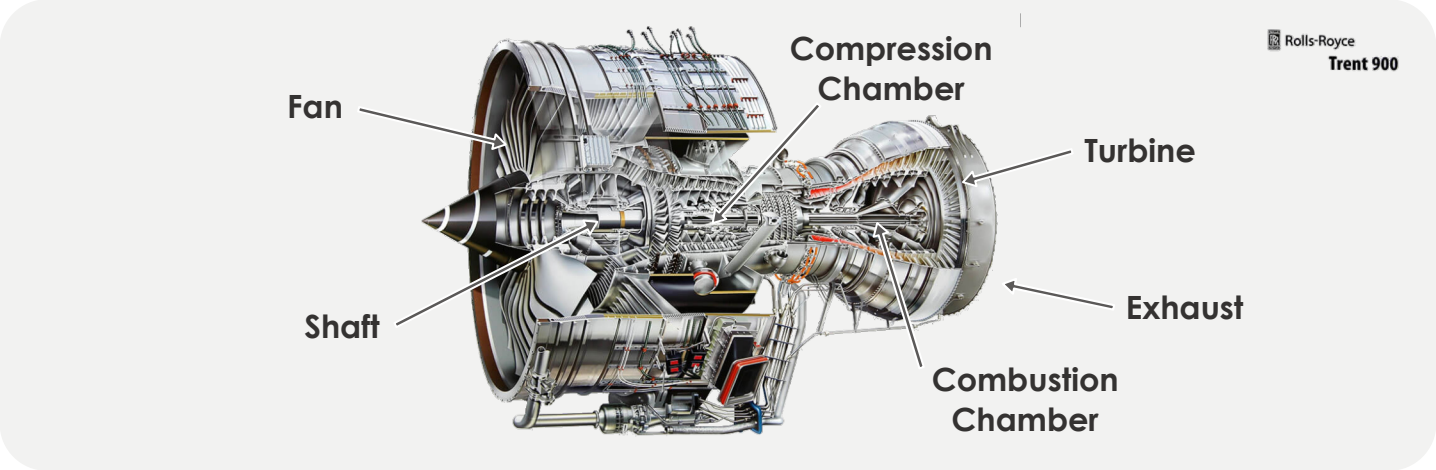


The process of lift and flight would not be possible without Bernoulli's Principle.

Bernoulli's Principle

The faster the speed of the air, the lower its pressure

Jet Engines and Newton's Law



Lift and flying would also not be possible without thrust; the force generated in the engines that accelerates and pushes the aircraft forward. There are four stages in generating thrust in a jet engine.

Suck: The fan spins up to 50 times per second to suck in roughly 1.6 tonnes of air per second.

Squeeze: The air is compressed in the compression chamber, to produce heat and pressure within it.

Bang: The air is combined with jet fuel (kerosene) and, using an electrical spark, is ignited in the combustion chamber. Once ignited, it can reach up to 2000°C (half the temperature of the Sun!)

Blow: The intense heat and pressure means that the air is now able to blast through the exhaust. When it blasts out of the back of the engine, it *thrusts* the aircraft in the opposite direction at the same speed. This process reflects Newton's Third Law.

Newton's Third Law

For every action, there is an equal and opposite reaction

KS2 & KS3