

Aerodynamics

The Science Bit

- Aerodynamics is **the way objects move through air**.
- Anything that moves through air is affected by aerodynamics, from a rocket blasting off, to a kite flying. Since they are surrounded by air, even bicycles are affected by aerodynamics
- There are three basic forces to be considered in aerodynamics: **thrust, drag** and **lift**.
- **Thrust**- a force that pushes or pulls an object forward in space.
- **Drag** – a force which opposes thrust.
- **Lift** is generally explained by three theories: Bernoulli's principle, the Coanda effect, and Newton's third law of motion and is an upward lift force.
- The forces that allow a paper plane to fly are the same ones that apply to real airplanes. While the plane is flying forward, air moving over and under the wings is providing an upward lift force on the plane. At the same time, air pushing back against the plane is slowing it down, creating a drag force.
- When considering the flight of a paper glider there are a range of factors that determine how far and high your paper airplane will go:
 - its construction material (type of paper),
 - angle of lift off (how you push it off).
 - even the atmospheric conditions (the weather).

Experiment with these different aspects of flying a paper airplane, and most importantly, have fun!

Ideas to take it further

Having all just made the same plane can you see any things you could change?

What effect do you think your change might have?

Have another go at making a glider but this time change one thing and see what happens. Did it have the effect you expected?

Fun Glider Facts and Information

- While it is believed the Ancient Chinese were responsible for the creation of paper gliders, the first officially recorded paper airplane didn't occur until 1909.
- In December 2010 a paper aeroplane thrown by Takuo Toda in Hiroshima, Japan, stayed in the air for 29.2 seconds – a world record.
- The furthest distance a paper aeroplane has been thrown is currently 69m by Joe Ayoob in the US.
- On 24 June 2015 David Green achieved the highest altitude paper plane launch recording an altitude of 35m.
- The largest paper aircraft was made in 2013 in Germany. It was launched in an aircraft hangar and flew just over 18 meters. It was made from paper and took 14 people 1,200 hours to build it. The plane had a wing span of 18 meters.