

# AVIATION

Aviation is the design, development, production, operation, and use of aircraft. Aviation started off fairly simple with things like kites and gliders. Today we have aircrafts like airships, helicopters, commercial planes and even supersonic flight.

Aeroplanes fly because they are able to generate a large amount of force called lift, this allows the plane to move upwards. Lift is generated by the aeroplane moving forward through the air, this motion occurs due to the thrust of the engine.



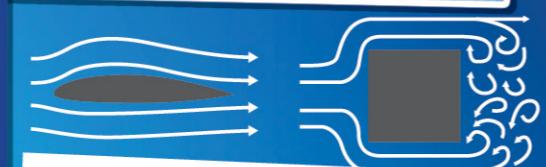
The faster moving air above the wing creates less pressure pushing down than there is pushing up.

Newton's Third Law of Motion state that "For every action there is an equal and opposite reaction."

## LIFT

Although lift is most commonly linked with the wing of a fixed-wing aircraft, it can also be created by propellers, kites, helicopter rotors and rudders and sails on sailing boats. Lift can be in any direction, like when the spoiler of a racing car pushes it down towards the ground.

Lift is generated by two forces acting on the wing, the first is the 'Bernoulli Effect', where the shape of a wing causes the air that flows above the wing to move faster than the air that flows below it. The faster moving air flow creates a low pressure zone above the wing and a high pressure zone below, pushing the plane upwards. The second effect is 'Newton's Third Law of Motion', as the air curves to move around the top of the wing, it pushes down on the rear of the wing, making the front of the wing lift.



The less drag that an aircraft has, the less thrust that it requires to take off.

**THERE ARE TWO BASIC TYPES OF AEROPLANES  
PROPELLER DRIVEN PLANES AND JET PLANES.**

## THRUST

Thrust, whether caused by a propeller or a jet engine, is the aerodynamic force that pushes or pulls the aeroplane forward through the air. The opposite aerodynamic force is drag, or the friction that can restrict the motion of an object moving through the air.

When the thrust produced by the engines of an aircraft is greater than the force of the drag, the aircraft will move forward. When the forward motion reaches a high enough force this will then produce a force of lift that is greater than the weight of the aircraft allowing it to move upwards. Drag is the force produced by the resistance of the air to the forward motion of the aircraft. Swing your arm rapidly side-to-side and you should feel a resistance against your arm.

## HOW AIRCRAFTS FLY

A fixed-wing aircraft can generate thrust in several ways including by the spinning blades of a propeller, or a rotating fan pushing air out from the back of a jet engine, or by ejecting hot gases from a rocket engine. Reverse thrust can be created to help when braking after landing by reversing the propeller blades, or using a thrust reverser on a jet engine.

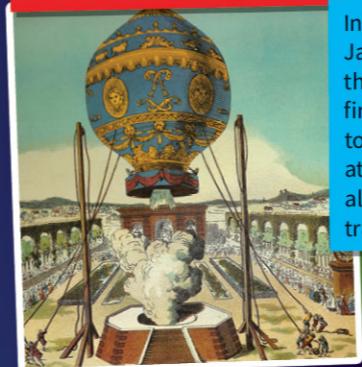
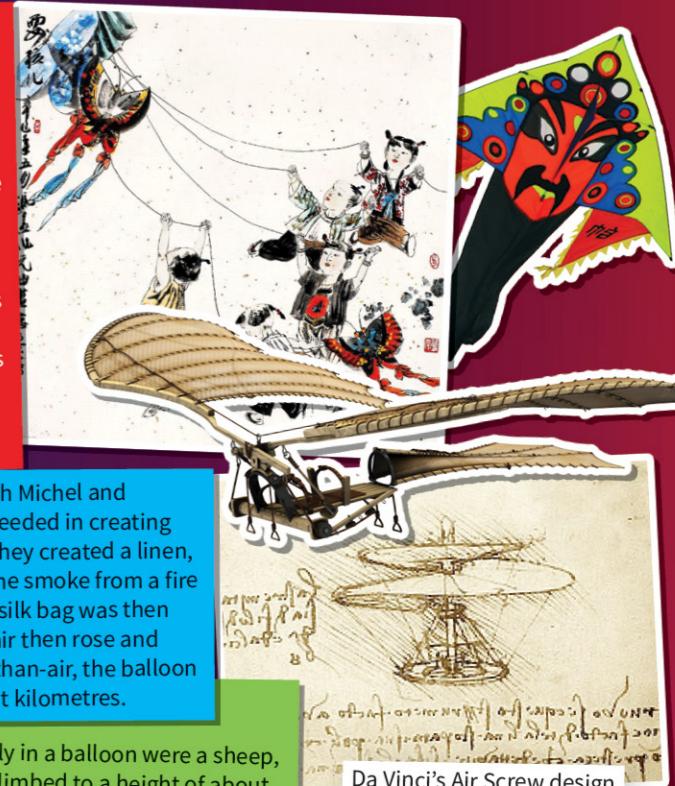
**Propeller Driven Planes** Propeller driven aeroplanes use a propeller that is turned by some type of engine. Propellers are shaped just like the wings, and also generate lift, except that the lift is used in a forward motion instead of a up motion, this is called thrust. Each propeller is made up of two or more blades. The first aircraft propellers were made of wood, but now most propellers are made of metal.



**Jet Planes** Jet planes do not have propellers. Instead, they have jet engines that move the aeroplane forward. You can think of a jet engine as a cylinder in which a liquid fuel is burned at high pressure with air from a compressor. The resulting heat forces the gases out of the back of the cylinder at high speed. Force is applied in the forward direction, moving the plane forward.

# HISTORY OF AVIATION

Humans fascination with flight dates back as far as 400 B.C., where the first kites were invented by the Chinese. Kites were used by the Chinese in religious ceremonies and for celebrations. Kites have been important to the invention of flight as they were the starting point to balloons and gliders. For many centuries, humans have tried to fly just like birds do. They would make wings out of feathers or light weight wood and would attach them to their arms to test their ability to fly. In 1485 Leonardo da Vinci drew up plans for the air screw and parachute. It is also said that Leonardo had visions and drew diagrams of a helicopter, glider and ornithopter.



In 1783 two French brothers Joseph Michel and Jacques Etienne Montgolfier, succeeded in creating the first real device to "fly" when they created a linen, fire powered balloon. They used the smoke from a fire to blow hot air into a silk bag, the silk bag was then attached to a basket and the hot air then rose and allowed the balloon to be lighter-than-air, the balloon travelled in the air for around eight kilometres.

In 1783, the first passengers to fly in a balloon were a sheep, rooster and duck. The aircraft climbed to a height of about 180 metres in the air and travelled more than 1.6 kilometres.

Da Vinci's Air Screw design

## MYTHS AND LEGENDS OF FLIGHT

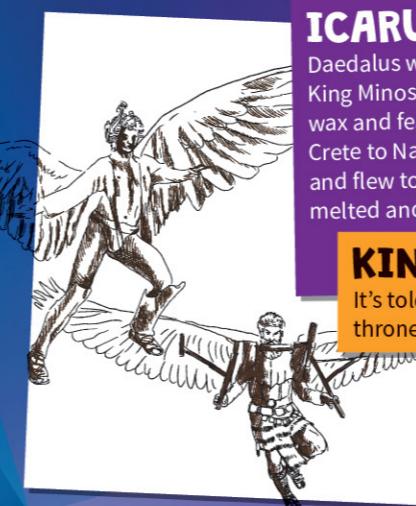
### PEGASUS

A man named Bellerophon the Valiant, who was the son of the King of Corinth, is believed to have captured Pegasus, a winged horse. Pegasus took him to a battle with the triple headed monster, Chimera.



### ALEXANDER THE GREAT

Alexander the Great is believed to have harnessed four Griffins (mythical winged animals) to a basket and had them fly around his empire.



### ICARUS AND DAEDALUS

Daedalus was an engineer who was imprisoned by King Minos. With his son, Icarus, he made wings of wax and feathers. It's told that Daedalus flew from Crete to Naples, but Icarus, tried to fly too high and flew too close to the sun. The wings of wax melted and Icarus fell to his death in the ocean.



### KING KAJ KAOOS OF PERSIA

It's told that King Kaj Kaoos attached eagles to his throne and had them fly around his kingdom.



The record for the longest paper plane flight was set by a Japanese man called Takuo Toda. The flight lasted for 27.9 seconds.

Many of Leonardo da Vinci's designs have since been built and tested in recent years, some designs have been successful, whilst others have failed.