SCIENCE BEHIND THE CONCEPTS

TORPEDO BAY
NAVY MUSEUM

The Science of Helicopters

Helicopters use rotating wings called rotor blades to fly.

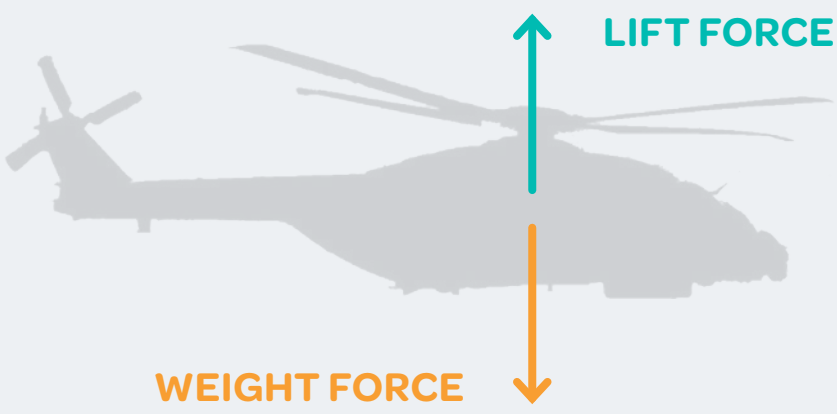
When a helicopter is hovering in mid-air, the **weight force** of the helicopter, caused by **gravity**, is pulling the helicopter down. The engine powers the rotor blades which makes them move.

The blades are curved on top so the air rushing over the top of them creates something called **lift force**. The upwards force caused by the lift must be the same as the downwards weight force for the helicopter to remain hovering.

Balanced forces lead to an object remaining stationary (staying still).

FORCE DIAGRAM

A hovering helicopter



SCIENCE BEHIND THE CONCEPTS

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The Science of Paper Helicopters

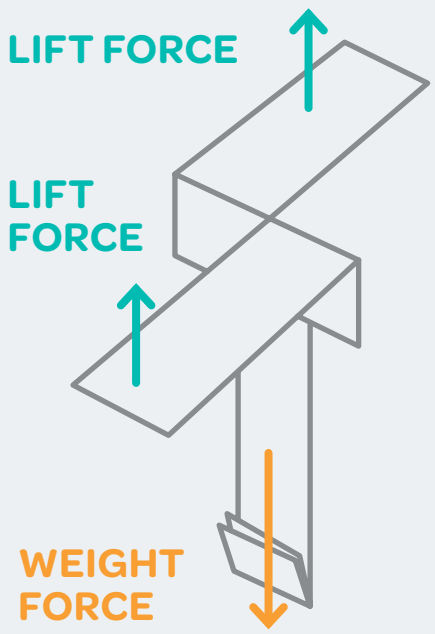
The physics of paper helicopters is slightly different to real helicopters.

The paper helicopter has a downward **weight force** acting on it pulling it down to the ground. As it falls the air pushes the blades upwards so that they are not horizontal. The **lift force** of the air pushes on each of the blades equally, but in opposite directions. This results in them spinning.

The helicopter falls downwards due to **unbalanced forces**. The weight force of the helicopters is greater than the **lift force** of air.

FORCE DIAGRAM

Paper helicopter



To explore the concept of lift, take a piece of paper. Hold it just below your mouth so that it is curving down from your bottom lip. Now blow across the top of the paper. ***What do you notice?***

Blowing creates a fast moving stream of air, this lowers the pressure on top of the paper and the higher pressure under the paper lifts the paper up.

This is what the shape of the curved helicopter rotor blade does too.