CAMBRIDGE SCIENCE CENTRE

OpenUpScience

Issue 7

Welcome to OpenUpScience, the weekly magazine from Cambridge Science Centre. In this issue, we are taking off to find out about the forces involved with flight and how planes stay in the air. Of course, we also have lots of games and activities for you to try.

Flight has always fascinated humans. Over 2400 years ago the Chinese were using flying kites in celebrations. The earliest human attempts to fly were based on copying birds – using wooden wings, covered with feathers. These experiments did not go well!

Leonardo da Vinci made the first scientific studies of flight in the 1480's. He had over 100 drawings of his ideas, but his flying machine, the Ornithopter, was never made.

It seems that getting up, up and away is just not that easy…

Spark, Ignite, Fuel, Illuminate

First powered flight

(Answers on back page.)

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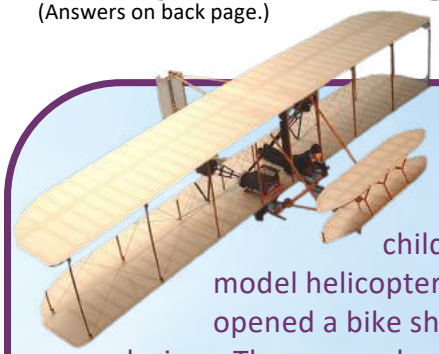


Wilbur and Orville Wright were American inventors. Their love of the science of air flight started as children when their father gave them a model helicopter. Later in their lives, Wilbur and Orville opened a bike shop, fixing bicycles and selling their own designs. They were always working on different mechanical projects. They decided to try to figure out how to design wings for flight. Soon the brothers had gathered the data they needed to build a successful flying machine. They wanted the flying machine to power itself, so Wilbur and Orville also had to design and build their own engine. On the 17th of December 1903, the Wright brothers achieved the first flight in a controllable, powered, heavier-than-air machine. Their machine was called 'The Flyer'. The first flight, by Orville, lasted 12sec and covered 36m. The best flight, by Wilbur, lasted 59sec and flew him 255.6m, what an achievement!

1. What were the Wright brothers first names?
   - A. Orville and Albert
   - B. Wilbur and Orville
   - C. William and Oscar
   - D. Orville and Wilbert

2. What toy started their interest in flight?
   - A. Aeroplane
   - B. Scooter
   - C. Helicopter
   - D. Kite

3. How long did the Wright brothers' longest flight last?
   - A. 29 sec
   - B. 39 sec
   - C. 49 sec
   - D. 59 sec

4. The Wright brothers' first powered flying machine was called…?
   - A. The Flyer
   - B. The Jet
   - C. The Wing Machine
   - D. The Biplane

Flying forces

The four forces of flight help an object to move through the air

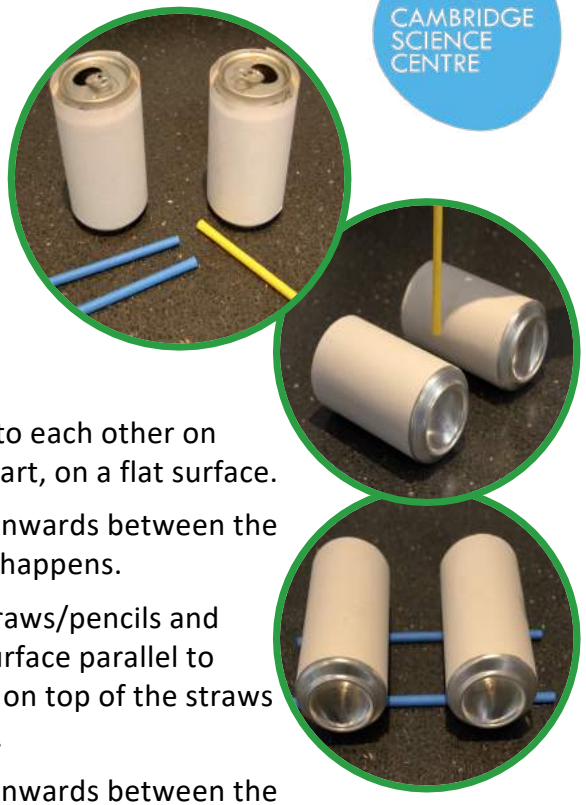
Match the description to the force

The push that lets something move up. For a plane this comes from its wings.	Drag
The force that slows something down. Can be reduced by the smooth shape of the plane.	Thrust
Due to force of gravity. This controls how strong the upward push needs to be.	Lift
The push that moves something forwards. A plane's engines provide this force.	Weight

Bernoulli's Principle

What you'll need

- Two empty cans (of the same size).
- Three straws, or one straw and two pencils.



What to do

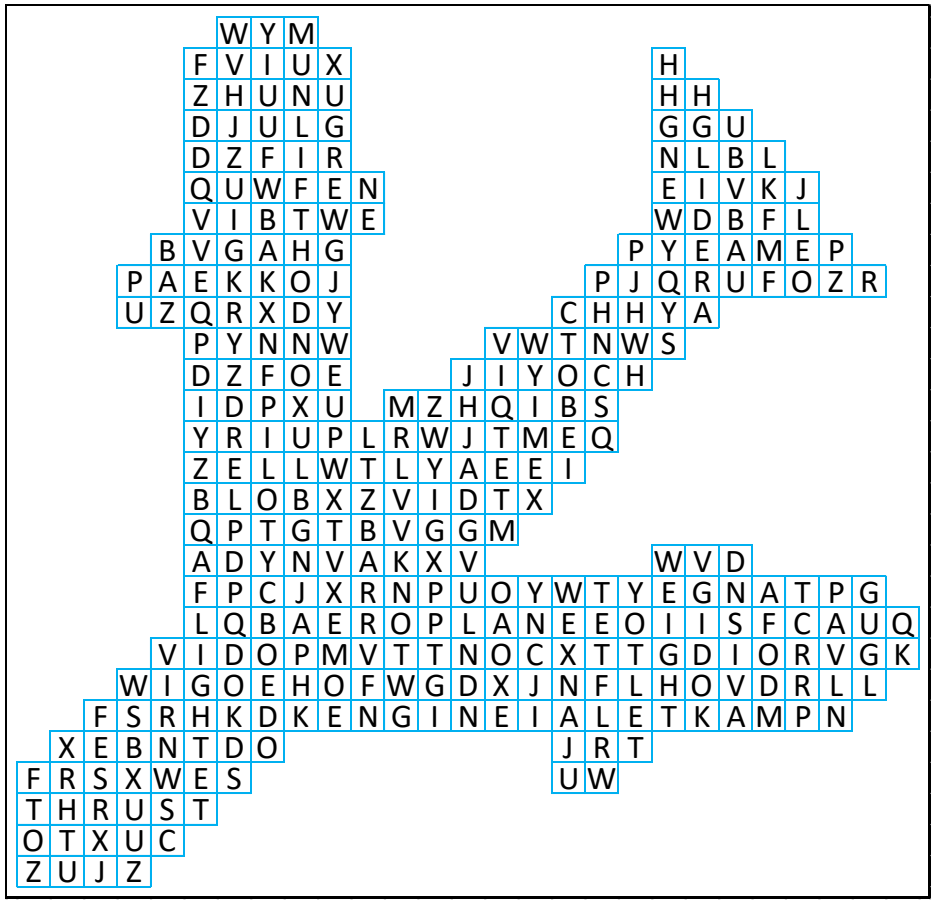
1. Place the two cans next to each other on their sides about 2cm apart, on a flat surface.
2. Use a straw to blow downwards between the two cans. Observe what happens.
3. Now take two of your straws/pencils and place them on the flat surface parallel to each other. Put the cans on top of the straws again roughly 2cm apart.
4. Use a straw to blow downwards between the two cans. Observe what happens.

What's happening?

Bernoulli's' principle: a fluid moving fast, creates low pressure and a fluid moving slowly creates a higher pressure. Air also behaves like a fluid. Blowing between the cans on the straws reduces the air pressure between the cans. High pressure moves towards low pressure and this forces the cans together. The same happens with wings of a bird or a plane. Air moving over the top of their wings moves faster, creating low pressure. High pressure from under the wing results in an upward force known as lift which moves the bird or plane upwards.

Flight Mysteries

Can you find the flight words hidden below?



AVIATION	**DRAG**	**THRUST**
WEIGHT	**AEROPLANE**	**GLIDER**
FLIGHT	**BERNOULLI**	**ENGINE**
LIFT	**WING**	**PILOT**

Unexpected flyers

Challenge your ideas of what a paper aeroplane should look like with this hoop glider.

What you'll need

- Thin card
- Pencil
- Ruler
- Scissors
- Straw
- Tape

The curved surface of the hoops provide lift, the big hoop creates drag and the smaller hoop at the front gives stability to the design. The weight of the glider is pretty small, so that just leaves you to provide the forward thrust as you launch your plane into the air.

What to do

1. Gather your equipment.
2. Measure three 2.5cm strips along the short edge of your card, mark with a pencil and cut along the lines so that you have three long narrow strips of card.
3. Mark a line on two of the strips, in the centre and parallel with the short ends (this is a bit fiddly, but will ensure that the two hoops line up properly, so it's worth making the effort)
4. Separate the two card strips to leave a 5 - 10cm gap. Stick the straw across the strips following the line of the marks you made.
5. Take one of the strips and make it into a hoop, fixing with tape, and then take the third strip and join it onto the end of the flat strip with tape, making one long strip.
6. Make the long strip into a hoop, fix with tape, and you're done!
7. Have fun flying your hoop glider.

Flying fun facts

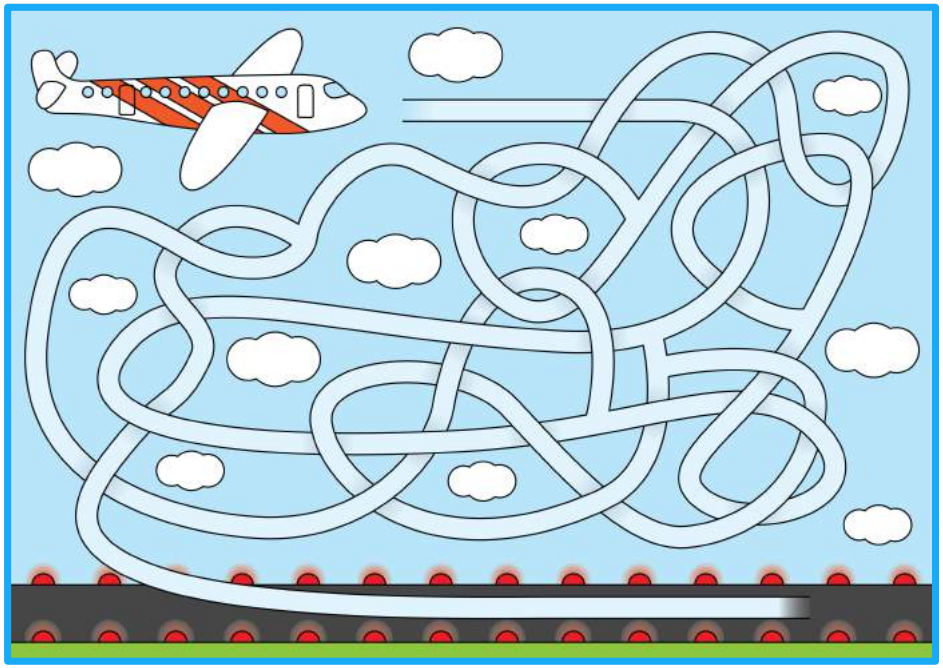
The largest paper aeroplane ever made had a wing span of 18.21 metres and flew a distance of 18 metres

The longest distance for a paper aeroplane to be thrown is 69.14 metres

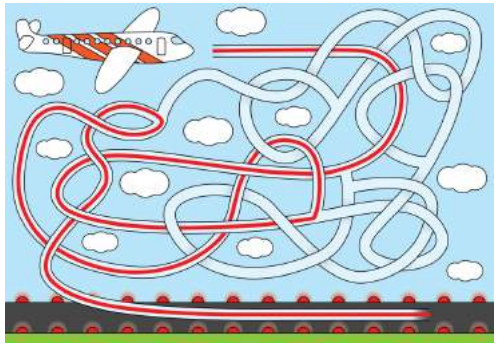
This Week's Challenge

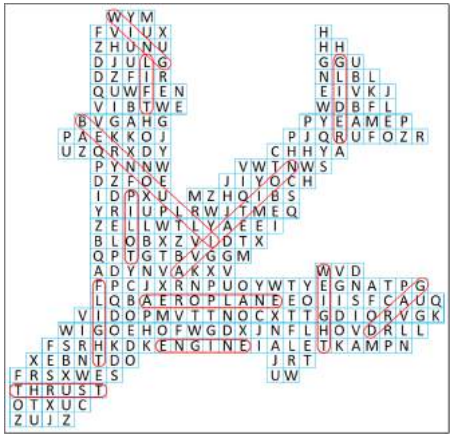
Make and fly a paper aeroplane

Any shape, any size, any paper – experiment and measure the distance of your longest flight. Send your videos or photos to: OpenUpScience@cambridgesciencecentre.org



Puzzle Solutions





Next Issue: Codes and Coding

Explore cracking codes and computer coding

Send us your work! OpenUpScience@cambridgesciencecentre.org

Send us your questions! Look out for the answers on: Science@6 - YouTube, Monday, 6pm

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Quiz Answers: Q1 – B, Q2 – C, Q3 – D, Q4 – A