AEROPLANES
FLYING TO WORLD CUP 2010

Equipment:

Activities 1 and 2: Thin paper (ordinary printer or copybook paper)
Activity 3: Thin paper (ordinary A4 printer or copybook), books.
Activity 4: Saucer, light counters (the sort used for tiddly-winks)
Activity 5. Two polystyrene beakers
Paper aeroplane follow-up activity: Paper, long measuring tape

Suggested Class Level:

First class upwards

Preparation:

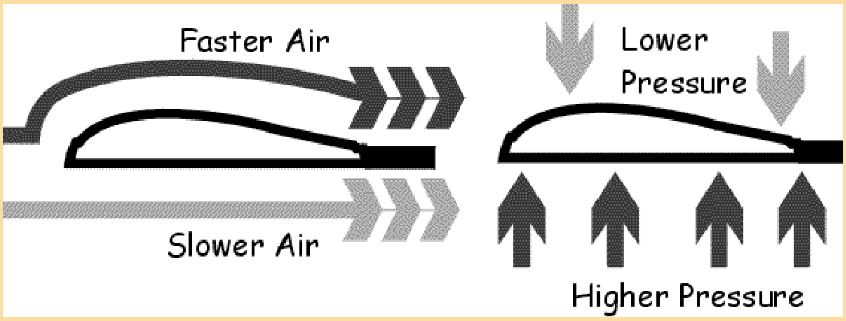
Activity 1: None

If using A4-sized paper cut it in half width-ways for Activities 1 & 2

Background information:

The space around us is not empty but is filled with air, which pushes on everything around us. This is called air pressure. *(See Discover Primary Science activity "Air Pressure").*
Moving air has lower pressure than still air, and the faster the air is moving the lower its pressure.
This is called **Bernoulli's Principle,** after a Swiss scientist called Bernouilli who discovered this in 1738. He would have been amazed to think that his idea would be used 200 years later to lift aeroplanes into the sky!.

This is the basis of how aeroplanes stay in the air: Air flows faster over the curved top of the wings than under the flatter bottom.



The slower air underneath has greater pressure which pushes upwards on the plane, and stops it being pulled down by gravity. *(i.e. the force pushing up is greater than the force pushing down).*

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Trigger questions:

What happens to something when you let it go out of your hand?
Why do most things fall? *(Gravity)*
Why do some things *(like a helium balloon)* float upwards? *(Helium is lighter than air).*
Do only light things stay up in the air? *(No, heavy aeroplanes can).*
What would happen to a plane if all its engine failed? *(It would crash).*
So does it have to keep moving in order to stay up? *(Yes)*
But a helicopter can stay still; how does it manage that? *(The rotor blades on top keep moving).*
(See the Discover Primary Science activity "Paper Helicopters")

Content Strand:

SCIENCE: Forces

MATHS: Number: Operations – add, divide, decimals, %

Measures: Time, money

Algebra: Equations

Shape and Space: 2-D, 3-D shapes

Data: Represent and interpret data

Skills:

Predicting, experimenting, measuring, observing

Cross - curricular links:

Maths

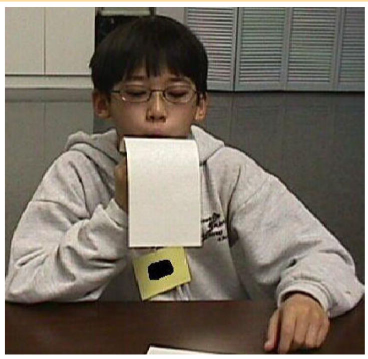
Geography

History

Art

Science Activities:

For each of these activities the children should first predict what they think will happen, and then go on to do the activity. They should then compare their prediction with what actually happened.



1. Hold a piece of thin paper under your chin and blow over the top of it. What happens?
(The paper rises up)

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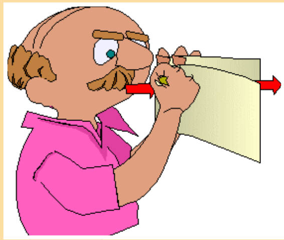
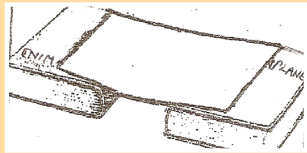
Science Activities continued:

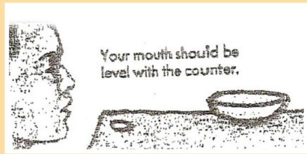
2. Hold a piece of paper against each cheek and blow between them. What happens? *(The papers move towards each other)*



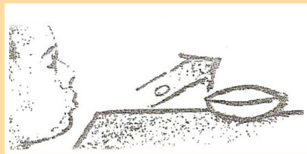
3. Place two books about 10 cm apart on a table and lay a sheet of paper over them. Try to get the paper to float away by blowing underneath it. *(The paper will probably droop in the middle).*



4. Place a light plastic counter about 1 cm from the edge of the table, and a saucer a little way beyond it. Using what you learned in the first 3 activities can you get the counter into the saucer without touching either? *(Blow hard across the top of the counter, keeping your mouth level with the counter).*



5. Take two empty polystyrene beakers and put one loosely inside the other. Hold them close to your mouth and blow across the top of the beakers. What happens?
(The top beaker jumps out because the moving air over the beaker has lower pressure than the still air in the bottom beaker, so the top beaker is pushed up and out).



Maths Activity:

A. The children could make paper aeroplanes (many different designs available on the Internet or elsewhere - see below for websites). They could also design their own plane.

They can estimate, and then measure, the distances the paper planes travel; they can then take an average distance for their plane.
They should practice different launching actions; and then discuss which design and which launching action propels the plane the furthest.
(They will find that pointed 'noses' on the planes will help them fly better, as it cuts down the resistance of the air (or 'drag') – like low racing cars or bikes).

B. The finals of the World Cup 2010 are due to be played in South Africa, which is about 9,500 kms from Ireland. Some people from Ireland will probably go there by plane.

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Questions:

1. If a Boeing jet uses about 16 litres of fuel for every kilometre it travels, how many litres of fuel will it use on the journey to South Africa?

2. If the price of jet fuel was €0.60 *(i.e. 60 cents)* per litre and increased by 10%, what is the new price per litre?

3. If a jet can carry 500 passengers and 4,000 people want to travel, how many jets will be needed?

4. If the Boeing cruises at about 900 kilometres per hour, how long will it take to get to South Africa? *(Estimate, then calculate).*

5. The money in South Africa is called 'Rand' and there are about 12 Rand to €1. If you saw a football jersey in a shop in Johannesburg for 360 Rands how much would that be in Euro?

6. Do not miss the match! South Africa is one hour ahead of Ireland in time. If the match you want to see is at 5.45 p.m. in South Africa, what time should you turn on your TV here?

7. If a team plays 6 matches and wins 3, loses 2 and draws 1, what % of their matches do they lose? Can you make a pie chart of these results?

Pick your favourite team and try to work out what % of its matches it has won.

8. There are 4 teams in each group. How many matches does each team play in their group? How many matches are played altogether in each group?

Safety:

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CLASSROOM ACTIVITY PACK

Follow-up activity: (Art, Maths)

Draw a football that looks realistic (i.e. 3-D and not flat!).
This summary is taken from the following website: www.creative-science.org.uk/drawfootball.html

Scientists and artists need to ***observe*** clearly in order to progress. In that sense They have a lot in common. Leonardo da Vinci is a very well-known example of an artist who was also a scientist. He is famous for his work on helicopters as well as his paintings.

1. Try to draw a football, either by looking at one in front of you, or from memory. Try to make it look round, and not flat!

2 .Now look at the ball. It may look complicated at first, but try to find if there is a ***pattern***. What ***shapes*** are there? And how are they connected? Remembering patterns can be difficult, but if we can find a ***symmetry*** then it makes it easier. You will find:
12 pentagons (five-sided patches) *and* 20 hexagons (six-sided patches).

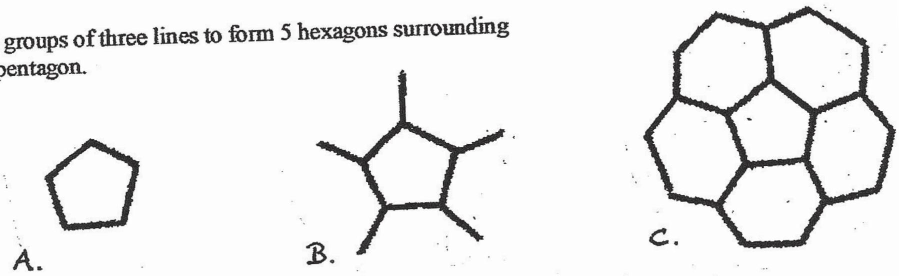
Groups of ***all*** hexagons can only be flat, just like a tiled floor. When you add a pentagon the shape curves a little; when 12 pentagons are added the ball closes up completely.

In **drawing the football**, the hexagons lie side by side but no pentagons touch each other:

A. First draw a regular pentagon. (What angles do they have?).

B. Add lines away from each corner of the pentagon.

C. Add groups of three lines to form 5 hexagons surrounding the pentagon.



D. Add more groups of three lines to make up 5 more pentagons –smaller ones ; they are distorted because they are curving away). (We now have 6 pentagons – half the total number on the ball; you do not need to draw any more as you cannot see though the ball).

E. Add curved lines (or groups of three lines if you like) to form the final (very distorted) hexagons on the outer edge of the ball.

F. Shade in the pentagons to make it more like a football.