Student Name			
School:			
Activity Title:	How do wings work		
Topic/Area Covered:	**Basic aerodynamic theory (Bernoulli's principle with only static and dynamic pressure terms, incompressibility of fluid, therefore how lift happens in wings)**		
No of pupils	**Est ~ 30**	**Duration of Session**	50 minutes

Activity Summary: (100 words max)	We will start off by explaining the theory behind how a wing generates lift in the most basic terms possible (using demonstrations and practical activities along the way) before then allowing the students to put that theory into practice by building a model wing themselves. The hope is to introduce them to the more innovative side of engineering of taking the facts and laws of our existence and exploiting them to achieve something (in this case using a wing taking advantage of Bernoulli's principle and air's tendency to not compress until supersonic speeds to fly).

Activity Aims:

Learning Outcome

"To understand how wings generate lift"

Objectives

- ***1 – State what happens when something that cannot be compressed flows through a smaller and smaller space***
- ***2 – Give an example that shows what happens when there is a difference in pressure across a material/body/surface***
- ***3 – State what happens to the static pressure of a fluid as it enters a smaller and smaller space***
- ***4 – Explain how a wing generates lift from the knowledge gained in objectives 1 through 3***

However, by doing this our hope at the end is to allow the pupils to appreciate the more inventive aspect of engineering that is taking fundamental laws of the world around us and exploiting them for our own purposes, in this case we hope to show that to them by taking them through the motions explaining how a wing generates lift.

Resources/Materials Required

Qty	Resource/Materials
10	*Syringes*
X	*Plastic bottles*
30	*Sheets of paper*
X	*Straws*
X	*Cardboard sheets*
X	*Scissors**
X	*Tape**
X	*Prit Sticks**
1	*Bundle of string*
1	*Hairdryer*

Either unsure of where to source yet (may have a desk fan at home that will do) or are hoping the school could provide for the activity (mainly the small craft things that the kids should have, scissors, tape, prit sticks, however may need to ask if the tort stands can be borrowed from their science department)

Lesson Plan

Time	Activity	Resources Needed	Notes
2 Minutes	**Demonstration of fluids relative incompressibility**	**Syringes filled with water and exit taped**	**In this demonstration/activity we will show the pupils that by trying to compress a syringe full of water that it is quite infeasible**
2 Minutes	**Demonstration of what happens when there are STATIC pressure differentials**	**Plastic Water Bottles**	**In this demonstration/activity we will show the pupils how when there is a pressure difference the fluid (air in this case) will apply a force from the higher pressure towards the lower pressure**
2 Minutes	**Demonstration of Bernoulli's principle**	**Sheets of paper**	**In this demonstration/activity we will hopefully allow the students to validate Bernoulli's principle for themselves by showing that when blowing over a piece of paper, increasing dynamic pressure and**

			decreasing stating pressure causes the paper to rise.
15 Minutes	**Wing building**	**String** **Straws** **Paper** **Scissors** **Tape** **Cardboard** **Hairdryer** **Prit Sticks**	**In this activity we will allow the pupils in groups to build a model wing using card and paper and then we will test their wings using vertical string that the wing will hopefully climb, see video below…** https://youtu.be/Ql6vtJV09SM?feature=shared

Power point presentation - How do wings work presentation.pptx (Still subject to small changes but no major structural ones)