Lesson Title	Four Forces of Flight
Length of Lesson	50 minutes
Created By	Emily Burtnett
Subject	SL Math (IB)
Grade Level	11^{th}-12^{th}
State Standards	Physical Science 5a, c, d, e
DOK Level	2
DOK Application	Investigate matter in motion. Show how motion involves a frame of reference. Define the fundamental forces of nature. Explain the basic principles found in Newton's Three Laws of Motion. Determine net forces and resulting motion of objects.
National Standards	Analyze characteristics and properties of two- and three- dimensional geometric shapes and develop mathematical arguments about geometric relationships. Analyze properties and determine attributes of two- and three-dimensional objects. Establish the validity of geometric conjectures using deduction, prove theorems, and critique arguments made by others.
Graduate Research Element	Aerodynamics, fundamental forces of flight

Student Learning Goal:
Students will be introduced to the four fundamental forces of flight and learn why/how an airplane flies. Students will participate in simple activities to understand lift, drag and Newton's laws.

Materials Needed (supplies, hand-outs, resources):
PowerPoint presentation, cardboard, fan

Lesson Performance Task/Assessment:
Students will follow along with presentation discovering the forces and principals of flight. There will be activities throughout the presentation which allow students to understand the principals and actually experience them.

Lesson Relevance to Performance Task and Students:
Students will have a better understanding of how and why planes fly. These principals can be applied to other parts of their daily lives such as automobiles or anything that involves forces (Newton's laws).

Anticipatory Set/Capture Interest:

Video of airplanes flying, taking off, landing and asking them why they think a plane can fly.

Guided Practice:
The presentation explains the principals. The instructor will teach the principals and give students the opportunity to ask questions. The instructor will lead various activities to demonstrate the students and give them the opportunity to participate.

Independent Practice:
Students will participate in demonstrations and be asked to explore the principals and participate in discussions.

Remediation and/or Enrichment:
The presentation portion of the lesson can be accelerated and students can be asked to do basic aerodynamic calculations based on forces.

For remediation, the lesson can be broken down into portions, allowing more attention on each force/principal. Individual IEPs will be supported.

Check(s) for Understanding:
Can students identify which force is acting on an aircraft in order to keep it in flight? Students should be able to discuss the forces and how they work together.

Closure:
The concepts will be reinforced and summarized with a classroom discussion.

Possible Alternate Subject Integrations:
Physics, aerodynamics, history (of flight)

Teacher Notes:
This is a lecture lesson, do not forget to do all the demonstrations, show videos and any activities that are needed to keep students' attention. It is a very interesting and fascinating subject, but students can lose interest if it is not presented well.