**Title** Lesson 2: Forces Involved in Flight

**Project title** If You Build It, Will It Fly??????

**Grade Band Team:** Grades 6-8 ,Team C

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**Key Terms:**

Science terms

Aerodynamics, airfoil, center of gravity, drag, gravity, lift, thrust, high pressure, low pressure, rudder, wing, mass, weight, force, friction, Bernoulli’s principle, and Newton’s laws

 of motion.

**Learning Objectives:**

Student will be able to…

1. Illustrate Bernoulli’s Principle in relation to an airplane flying.
2. Differentiate between the 4 forces acting on flight.
3. Summarize Newton’s 3 Laws of motion.

**Wisconsin** **Model Academic Standards in Science**

*POSITION AND MOTION OF OBJECTS*

D.8.5 While conducting investigations, explain the motion of objects by describing the forces acting on them

**Wisconsin Model Academic Standards in Information and Technology Literacy**

* A.8.2 Explain the need for and application of knowledge and skills from other disciplines when engaging in technological activities.

**Career Cluster Pathways in Manufacturing**

* Manufacturing production process development

**Materials**

Bernoulli’s Principal: Hair dryer, ping pong ball, 12X18 piece of construction paper

4 forces of flight: Notebook

Newton’s laws:

**Procedure**

1. Explain Bernoulli’s Principle using the diagram on: <http://www.dynamicscience.com.au/tester/solutions/flight/Demonstration%20of%20Bernoulli%27s%20law%20balancing%20ball.htm>
2. Demonstrate the example used on the webpage with the hair dryer and ping pong ball.
3. Show two more examples from: <http://www.dynamicscience.com.au/tester/solutions/flight/bernoullis%20project.htm>

Demonstrate the 2 other examples of Bernoulli’s and illustrate one of them using arrows as to what is happening with airflow.

1. Introduce the 4 forces of flight: <http://www.faa.gov/education/educator_resources/educators_corner/grades_7_8/four_forces_of_flight/>
2. Have the students take notes and do the activities to help them understand the difference between the different forces.
3. Introduce Newton’s 3 Laws of Gravity. Have them write them in their notebook and they should brainstorm examples that support each law.

**Assessment**

 **Pre-assessment:** Students will be given the summative assessment as a pre-test to find out what their prior knowledge is of forces of flight.

 **Formative Assessment:**  Notes in their notebook, participation in activities

 **Summative Assessment:**  Students will draw a diagram using arrows of what is happening with the air around an airplane to explain Bernoulli’s Principle. They will also be able to match the correct definition to each of the 4 forces acting on a plane. They will also write a quality paragraph that summarizes Newton’s 3 laws of motion.

**REACT Model of Contextual Teaching**

 **Relating**: How many kids have flown in an airplane? Watched a bird fly? Wish they could fly?

 **Experiencing:** Students will see video of a plane flying, participate in doing an activity of Bernoulli’s Principle, and at the end of the unit, will fly their glider that they made.

 **Applying:** Students will use the information in designing their own glider.

 **Cooperating:** Students will be flying their constructed planes together, share successes and/or failures, and conclusions for what could have made the plane better.

 **Transferring:** The concepts of force transfer to discussions about students riding a bicycle or skateboard. Newton’s laws of motion transfer to discussions and observations in sports as to what is happening when a ball is kicked or thrown.