PRAIRIE STEM

30 minutes

Virtual STEAM

Science and Engineering

Floating Ping Pong Ball

Objective: Exploration of Bernoulli's Principle by demonstrating how lift occurs with both high and low air pressure

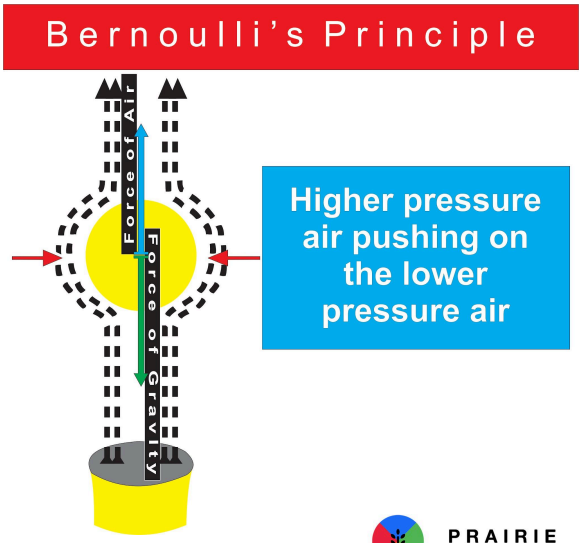
Indicators:

Science: SC.8.1.1.F Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

Engineering: STEL-2Q. Predict the outcomes of a future product or system at the beginning of the design process. Careful designers should consider possible outcomes of a technological product before the product is completed. This is a habit of mind that students should continually expand through design, problem-solving, ideation, and systems thinking.

Materials:

- 1 - Construction Paper
- 1 - Sheet of Paper
- 1 - Aluminum Foil Sheet
- 5 - Address Labels (Tape)
- 1 - Skewer
- 1 - Covered Straw
- 1 - Cotton Ball
- 1 - Mini Pie Tin
- 1 - Ping Pong Ball



Vocabulary:

- Bernoulli's Principle
- Lift
- High Air Pressure (Fast)
- Low Air Pressure (Slow)
- Force

Instructions:

1. Watch the following video for background information: Bernoulli's Principle https://www.youtube.com/watch?v=PPweiE97568

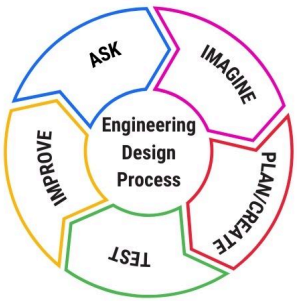
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2. **ASK:** Engineers solve problems. Here is your problem to solve: Thinking of Bernoulli's Principle of Physics, can you think like an engineer and design a device that can demonstrate this principle of flight with high and low air pressure?. What other objects can you make **lift** besides a ping pong ball and how?
3. **IMAGINE/DESIGN:** Take out your straw and ping pong ball. First test out ways to float your ping pong ball by blowing through the straw. Think about some different designs that will lift at least three different objects. How will it allow the objects to lift and spin when a force of high and low air pressure collides with the force of gravity, therefore, demonstrating Bernoulli's Principle?
4. Using the sheet of paper provided, explore three different solutions for your problem. Make sketches, measurements, notes, whatever will help you. Think like an Engineer. Think of this paper as your Engineering Notebook.
5. Choose the design that you feel will solve your problem and begin innovating.
6. **CREATE**: As you fabricate your design, be thinking about some possible outcomes. You can make changes now if you foresee problems. Record each new change or adjustment on your paper (Engineering Notebook) to refer back to.
7. Test your device.
8. **IMPROVE:** Make adjustments and retest your device.



Lesson Extensions:

- Using your device, what are some other things you can make levitate or float at different angles. What is the greatest degree of an angle that still allows the object to levitate?

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- Do all items that levitate with your device actually spin?
- Do some shapes work better than others? What makes them more or less aerodynamic?
- Does an item's weight make a difference?

Video Extension:

Bernoulli's Principle
https://www.youtube.com/watch?v=3b9xCC_vaZQ

Book Extension:

The Cartoon Guide to Physics by Larry Gonick
https://www.amazon.com/Cartoon-Guide-Physics/dp/0062731009/ref=sr_1_26?dchild=1&keywords=8th+grade+book%2C+physics&qid=1609966357&sr=8-26

Ignite our Future Connection:

- **Peaceful Problem Solving-** Bernoulli's Principle explains the basis of flight and allows us to travel the world. It allows us to continue to innovate and solve problems.