

Flying Cups

Name: _____

Date: _____

Lesson Focus

This lesson focuses on Newton's laws and Bernoulli's principle. It also touches on the four forces of flight (thrust, drag, lift, and gravity) and how changes in design can affect performance.

Keywords

Magnus effect:

Thrust:

Drag:

Lift:

Gravity:

Bernoulli's principle:

Newton's laws of motion:

[Magnus effect video](#)

Materials for Each Group

1. Two cups (plastic or foam are best, but paper will work); try to provide different cups to test
2. Tape
3. About 10 rubber bands

Pre-Lab Questions: Please use complete sentences with correct punctuation.

1. What are Newton's three laws of motion?

2. Read over the lab. Which law do you think applies and why?

3. How do you think Bernoulli's principle will affect aircraft?

Procedure

Building

1. Attach two cups of the same size bottom to bottom.
2. Tape them together.
3. Make a chain out of rubber bands.
4. Wrap the chain around the middle of the cups at the taped area.



Flying

1. Hold tension on the rubber band
2. Position the rubber band so that it comes out from the bottom of the cups
3. Release the tension and let the cups fly

After flying the cups to get the hang of it, record your best distance. Discuss some modifications you might make to the design. See if you can increase the flying distance. Or, if possible, get another size of cups to compare distance traveled.

How will you modify your design? Draw your modifications here:

Hypothesis: Circle your choice. By (increasing/decreasing) the diameter of the cup, the distance flown by the cups will (increase/decrease), because

Create a data table to keep track of your trials.

Data

Example: Changing the diameter of the cups

Trial	Diameter of rim, cm	Distance flown, cm
1	7 cm	
2	7 cm	
3	7 cm	
4	10 cm	
5	10 cm	
6	10 cm	
7	10 cm	

Present your conclusion to your peers.

My hypothesis was supported/not supported. The data showed that _____

_____. If this experiment were repeated, I would try _____

_____.

Analysis Questions

1. How does Bernoulli's principle figure into this lab?
2. Did one cup size work better than another?
3. The Magnus effect is when something spins perpendicular to movement, like in this lab. Airplanes and large ships have been created using the principles in this lab. How would you create an airplane around the Magnus effect? Draw it out.