MoLab Mondays!

Galactic
Hoop Rocket

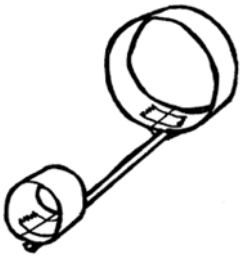
MoLab is excited to have the opportunity to stay in touch with our MoFamilies and continue to provide on-the-go, dynamic, hands-on, and inquiry-based science experiences through a mobile laboratory that promotes discovery. Our weekly activities will engage your little investigators with hands-on learning that proves anyone can think like a scientist.

For the seventh installment of MoLab Mondays!, we want to share an easy activity that is perfect for the 4th of May – Galactic Hoop Rocket! It is a fun way to explore the science of flight while creating a physics toy that is out-of-this- world!

Tools & Materials:

- Scissors
- Ruler
- 3 x 5-inch index card (or some other stiff paper)
- Clear plastic tape
- Plastic Straw (non-bendy kind)

Assemble Your Galactic Hoop Rocket



- Take the index card, or a sheet of stiff paper, and cut it into 3 equal strips. Each piece should measure 5 inches long and 1 inch wide.
- Place a piece of tape on the end of one strip. Curl the paper into a little hoop and tape the ends together.
- Put the other two strips of paper end to end so they overlap a little. Tape them together to make one long strip. Then, curl the strips into a large hoop and tape the ends together.
- Tape both of your hoops to either end of the straw by placing ends of the straws on top of a piece of tape and then folding the tape up over the sides of each hoop. It is important to make sure that both hoops are aligned.

- Now, it is LAUNCH TIME!!! Hold the Galactic Hoop Rocket in the middle of the straw, with the little hoop in front and both hoops on top of the straw. Throw it like a spear!
- Practice and have fun!!

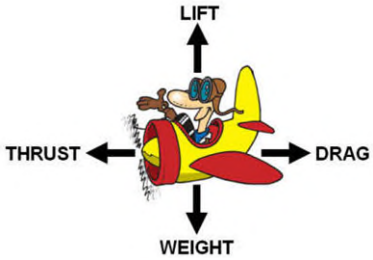
Make Observations and Ask Your Student

- How is your Galactic Hoop Rocket able to fly?
- Why is it important that the hoops are aligned?
- If you adjust the distance between the hoops, would it change how far it flew?
- Does the length of the straw affect flight?

What's Going On?

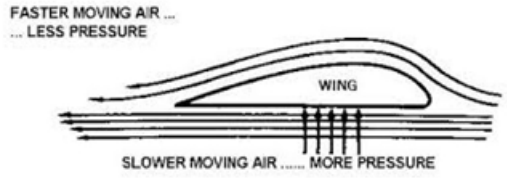
How is something so awkward looking able to fly? Your Galactic Hoop Rocket is able to fly due to the same forces that allow planes to travel through the air. The four forces of flight are lift, thrust, weight, and drag.

The curved surfaces of the hoops on top of the glider help generate **lift**. Your arm provides the **thrust**. **Weight** is the force caused by gravity. Gravity pulls the glider toward the ground. The glider maintains its upright position, even though one hoop is bigger than the other, because gravity causes lighter and heavier objects to fall at the same rate. The two hoops keep the straw balanced in the air while flying. The small hoop keeps the Galactic Hoop Rocket from turning, and the big hoop creates air resistance, or **drag**, which keeps the straw level.



Dig a Little Deeper

Bernoulli's Principle helps explain how lift can be accomplished by an aircraft because of the shape of its wings. The wings of a plane are shaped in such a way that air flows faster over the top of the wing and comparatively slower underneath. The aircraft is pushed up by the high air pressure underneath the wings through the lower air pressure. In other words, the air molecules under the wing are slower and tighter together which causes higher pressure. The air molecules above the wing are moving faster and under less pressure.



All the time, the plane is being slowed down by having to push through the air. Remember - this is called drag, and the engines must overcome it. As long as the plane continues to move forward at a fast-enough speed, the plane continues to fly – a balanced force. To increase or decrease lift, the pilot can adjust either the speed of the plane or the position of its wing flaps.

What are some examples of Bernoulli's Principle in everyday life?

- Shower curtain blows in towards you during your shower! (The air molecules in the shower are moving faster and under less pressure than the slow-moving molecules outside the shower that are under more pressure. Who wants to be under pressure? Those air molecules push and cause the curtain to move towards you. Thanks Bernoulli!)
- Things in your car blow out the window when the car is going fast.
- An open-door slams as a gust of wind blows by.
- Fireplace chimneys draw better when the wind is blowing.
- A baseball player throwing a curve-ball pitch.

Extension Activity Ideas

- Try a simple demonstration of Bernoulli's Principle: hold a piece of paper between your fingers and thumbs so that it hangs down in a curve. Now blow as hard as you can over the top of the curve. Because the fast-moving air lowers the pressure over the paper, it lifts!
- Research who Daniel Bernoulli was and learn about his other scientific discoveries.
- Brainstorm how would Bernoulli's Principle apply to the Millennium Falcon as it travels through the galaxy. What would be different about the four forces of flight?

Happy Experimenting from MoLab, Inc…
and May the Fourth be with you!