

Hoop Glider

Ready, set, glide! How far can you make your hoop glider straw soar? Discover how aeronautical engineers use forces of flight to design and build airplanes and spacecrafts.

TEKS:

SCI 1.8 D: The student is expected to demonstrate that air is all around us and observe that wind is moving air.

SCI 3.6 C: The student is expected to observe forces such as magnetism and gravity acting on objects.

SCI 4.6 D: The student is expected to design a descriptive investigation to explore the effect of force on an object such as a push or a pull, gravity, friction, or magnetism.

SCI 5.6 D: The student is expected to design a simple experimental investigation that tests the effects of force on an object.

Materials:

- Index card or stiff paper (3 x 5 inches)
- Ruler
- Scissors
- Straw
- Tape

How To:

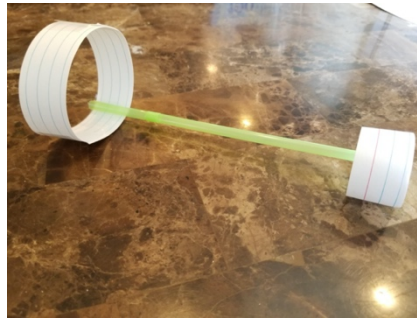
1. Cut the index card into three pieces, each piece measuring 1 x 5 inches.
2. Tape two of the pieces of paper together at each end to make a hoop. Make sure that the paper overlaps about half an inch at each end, and add tape to both the inside and outside of the hoop to make it extra sturdy.
3. Use the third piece of paper to make a smaller hoop, overlapping its edges as well.
4. Tape one of the paper hoops at one end of the straw and the other hoop at the opposite end of the straw, making sure the straw is taped on the inside of the hoops.
5. Your hoop glider is complete! To test it, hold the straw in the middle with both hoops on top and the smaller hoop in front. Throw it just like you would throw a dart or paper airplane (slightly angled upwards).

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6. Try changing the sizes of the hoops or the straw to see how this affects the flight of your hoop glider!



STEM Explanation:

With practice, you can probably make your hoop glider fly even farther than paper airplanes! But what makes the straw and index card hoop glider able to fly so well? The answer is found when you look at all of the forces acting on it! A force is simply a push or a pull, and our hoop glider has four forces influencing its flight: gravity, lift, thrust, and drag.

Gravity: Gravity is the force that *pulls* objects down to the ground and stops your hoop glider from flying. The more weight an object has, or the heavier it is, the greater the force of gravity pulling it down to the ground! The hoop glider we made was designed with very light materials in order to reduce the force of gravity.

Lift: Lift is the force that *pushes* your hoop glider to rise and remain in the air, and lift acts in the opposite direction of gravity. When you throw your hoop glider, the air flows around your hoops and pushes them up into the air. This creates lift and allows your glider to fly! In order for your hoop glider to fly through the air, the force of lift must be greater than the force of gravity.

Thrust: Thrust is the force that *pushes* your hoop glider forward and keeps it flying in the air. You provide your hoop glider with thrust when you first throw it—the force comes from your arm! The glider begins to lose this force of thrust the longer it flies through the air.

Drag: The last force your hoop glider experiences is called drag. Drag is a force caused by the air *pushing* against the surface of your glider, opposing its motion. Luckily, your glider has a shape that reduces the drag your aircraft experiences!

Career Connection:

Aeronautical engineers apply technological and mathematical principles to research, design, develop, and test the performance of civilian and military aircraft. They work with airplanes, weapons, satellites, and space vehicles to improve the safety, fuel efficiency, speed, and environmental impact of air travel.

Resources:

<https://sciencebob.com/the-incredible-hoop-glider/>

<https://ivyleaguekids.org/stem-at-home-hoop-gliders-craft>

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