

Hang Gliders

Prepare for lift off! Engineer a hang glider and watch it soar in the air as you complete your own set of aerodynamic challenges!

TEKS:

SCI 3.6 C: The student is expected to demonstrate and observe how position and motion can be changed by pushing and pulling objects to show work being done such as swings, balls, pulleys, and wagons.

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 effect of force on an object.

Materials:

- Clear tape
- Hot glue gun and hot glue sticks
- 12 x 12-inch piece of plastic disposable table cloth
- Scissors
- Sharpie
- Small figure
- 5 straws (biodegradable)
- 2-4 twist ties

How To:

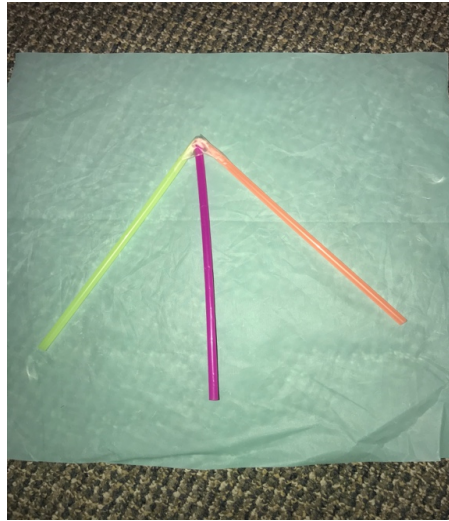
1. Start by making the hang glider frame by connecting the ends of two straws together. Pinch and push the end of one straw into one end of the other straw, and secure the joint with tape. Bend the straws where the tape connects them so they are at a 90-degree angle.

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2. Take another straw and cut one end to a point. Place this pointed end halfway between the 90-degree angle formed by the other two straws. Hot glue where all three straws connect. To ensure the straws stay connected, place a piece of clear tape around the joint. **Safety: An adult should assist when using hot glue.**



3. Create a brace to secure the structure by placing another straw across the three straws, perpendicular to and halfway down the length of the center straw.
4. Cut the ends of the brace straw at an angle, so that they fit against the outer straws.
5. Cut a notch in the center straw large enough for the brace straw to fit. Place the brace straw in the notch and tape the ends of the brace to the outer straws.
6. Place the frame on the piece of table cloth and use a Sharpie to draw an outline for the wing. Trace the lines bordering the outer straws about a quarter inch away from the straws. Connect the ends of the straws to complete the wing outline.



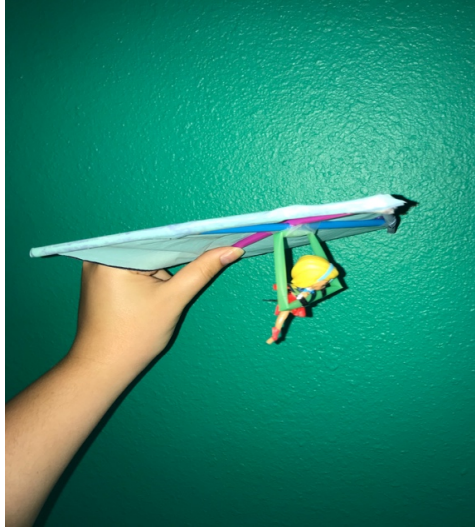
7. Cut out the wing along the lines. Use hot glue to attach the frame to the wing by applying glue to each straw and pressing it against the wing, wrapping the excess wing around the outer straws.

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8. To create a bar for your small figure to hold on to, bend a straw into a four-sided shape with one side shorter than the opposite side (like a trapezoid). Fold one end of the straw and push it inside the other end of the straw to create a closed shape. Place tape around this joint to hold it in place.
9. Place hot glue on the short side of the trapezoid and press it against the bracing straw. Tape over this to secure it in place. **Safety: An adult should assist when using hot glue.**
10. Now it's time to test your hang glider. Use twist ties to secure your figure onto the bar of the hang glider, throw your glider, and watch it soar!



11. Give yourself some challenges, such as throwing your glider through a hula hoop or having the glider land on a target!

STEM Explanation:

Ever wondered how people can seamlessly soar in the air on hang gliders? Pilots of hang gliders utilize aerodynamics to keep the glider upright and flying. To start moving, pilots run down a high up slope (like a hill or mountain) at a speed of around 20 mph to take off. Gravity pulls the glider toward the ground while the weight of the glider and pilot causes thrust that keeps the wing moving in the air. The wing shape creates a low-pressure area above the wing and a high-pressure area below the wing, which forces the hang glider up into the low pressure area, creating lift, the force that keeps the glider aloft. Another force acting on the glider is drag, which is a frictional force that slows the glider down. Drag is created as the glider and pilot collide with air molecules as they move.

Career Connection:

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

Resource:

<http://adventure.howstuffworks.com/hang-gliding.htm>

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