

## LESSON NAME

Thermal Glider

## DESCRIPTION OF ACTIVITY

Amazing aeronautical exploration where the students will get to build and trim a glider for freeflight. It looks really beautiful when it slowly glides through the air. It can also be modified to a walkalong glider. This is an experience and depending on previous knowledge and skill the students will have more time to explore more advanced experiments.

To find an example of the glider, click [HERE](#)

## LEARNING GOALS

Key learning experiences are centred around strong and lightweight constructions, balance, aerodynamics, lift, control, wingshape and trial and error testing.

## PRE-REQUISITE KNOWLEDGE/SKILL

It's good if the students have previous knowledge of connecting Strawbees so it's easier to achieve high precision connections and measurements.

## MATERIALS NEEDED

16 Strawbees (11 doubles, 5 singles), 15 straws, a thin plasticbag, gluestick and scissors.


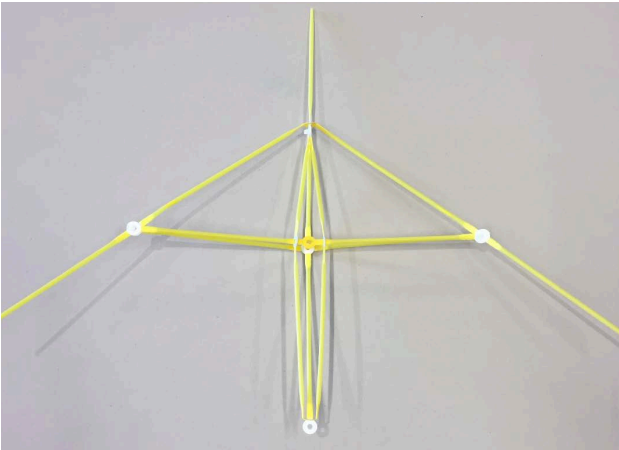
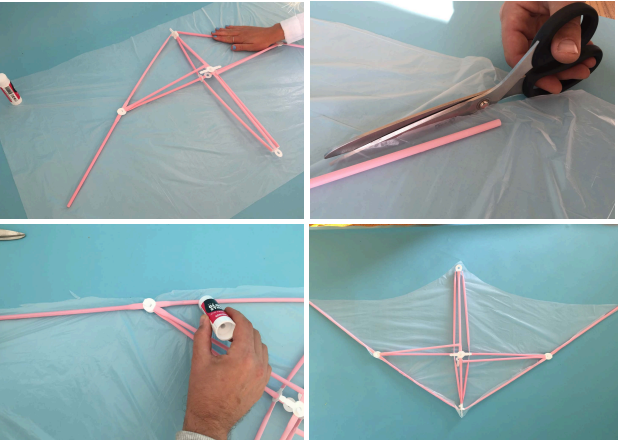
## CLASS DURATION

DURATION	ACTIVITY	TIPS
10 min	Introduction	Make it amazing!
20 min	Airframe construction	
10 min	Cover the wings	
20 min	Trim for flight	

## ADDITIONAL CHALLENGE

- Have competitions seeing who can keep the plane in the air for the longest time, which plane can travel the longest distance, or has the most precision landing within targets.
- Learning walkalong gliding with a large surface of cardboard and hanggliding the airplane on the wave of air generated from walking forward.

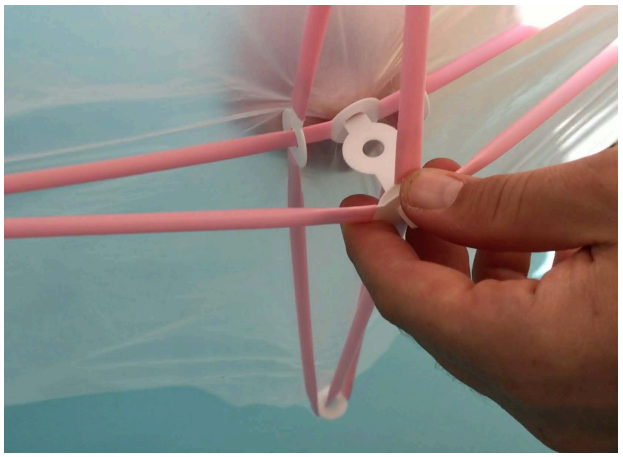
## STEP - BY - STEP INSTRUCTIONS

IMAGES	NOTES
	<p><b>1. INTRODUCTION (10 min)</b> Talk about aviation, if you have a thematic day on flight maybe start out with building paper airplanes.</p> <p>Talk about aviation history and the Wright brothers (and if you have built the tetrahedral kite you can tie into this lesson too). Talk about gliders and how they can soar through the air.</p> <p>The glider we are going to build is very similar to a hangglider and is a delta wing construction (google hang gliders). Prepare by having built one yourself first.</p>
	<p><b>2. AIRFRAME CONSTRUCTION (20 min)</b> We need to build a rigid structure to allow airflow over the wings without them folding. Let the students sit alone or in groups and build according to the schematic, when they are finished check that they correspond with your prebuilt version. Lengths and angles are very important.</p> <p>Talk about the importance of symmetry, and help the students achieve this. Let them fix any problems, just show them where they are and give hints on how to solve them.</p> <p>Words: Deltawing, Airframe, Symmetry</p> <p>The airframe schematic is found under additional resources.</p>
	<p><b>3. COVER THE WINGS (10 min)</b> Steps in short: 1. Cut the bottom of a plastic bag and open one side. 2. Lay it out on a flat surface. 3. Put gluestick on the top side of the airframe. 4. Press it down onto the plastic bag. 5. Cut of the surplus, leave approximately 1 cm. 6. Glue the underside of the outer parts of the airframe and fold the surplus over.</p> <p>Hint: Disconnect the center double Strawbee so the wings can be put flat against the surface. Reconnect when finished.</p> <p>More pictures can be found under additional resources.</p>



Note:  
Feel free to include links to videos too!

## STEP - BY - STEP INSTRUCTIONS

IMAGES	NOTES
	<p><b>4. TRIM FOR FLIGHT (20 min)</b></p> <p>Now let's fly. Check out the videos for hints on how to trim an airplane. It can fly in many configurations, so explore different solutions together. Center of Gravity is important. V-Shape of wing is important. Back part of the wing and how much upwards lift it generates is important.</p> <p>To get it to glide well the plane should be able to pull itself out of a dive without stalling. Show a front heavy plane and a tail heavy plane and how the V-shape affects how it flies. A tailheavy plane with a lesser V-shape is very unstable, and a tailheavy with a good V-shape will stall over and over again.</p> <p>To find examples of how to trim your glider, click <a href="#">HERE</a></p>



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Feel free to include links to videos too!