CRANE COUNTRY DAY SCHOOL

Educating Kindergarten Through Eighth Grade Students Since 1928

DESIGNING & FLYING KITES

Project Objectives:

We spent the last quarter of our Third Grade Engineering semester studying aeronautical engineering. We discussed the differences between aerospace and aeronautical engineering and where the two combine. We discussed the forces behind flight and built and tested standard kite designs. From our experiences, we then designed our own kite and took it for a test flight.

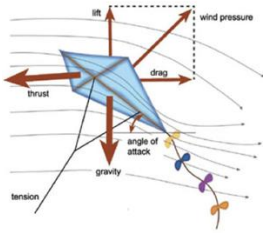
Step 1 - Understanding the forces of flight
Step 2 - Create 3 basic kite designs
Step 3 - Test and analyze how different kites fly
Step 4 - Design, create, and fly your own kite
Step 5 - Design and create a kite winder

Tools and Materials: Transparent Paper, Recycled Bamboo Shafts from Window Shades, Light Crochet Thread
Estimated Cost per Kite: TBD

Grade Range: Grades 3-5 **Tools:** Woodworking Tools **Collaboration:** Science

Step 1 - Understanding the forces of flight

We discussed the forces of flight and reviewed measuring angles. We discussed how to identify and alter the angle of attack of a kite and how to adjust it to wind speed. We analyzed the anatomy of a kite and identified the sail, spars, stabilizers, and bridle. We also identified the five most important criteria for a functional kite. NASA has an amazing kite tutorial and flight simulator at the following website: https://www.grc.nasa.gov/www/k-12/airplane/kite1.html



Step 2 - Create 3 basic kite designs

We discussed bilateral symmetry and studied images of things that glide in nature; birds, butterflies, squirrels, and seeds. Students then created three basic single point kites: the "bow," "hex," and "bug" kites. They created these kites bilaterally, folding the paper and tracing a kite template along the fold. We used transparent paper so they could see the lines. The kites were then cut out and fitted with "spars." We used recycled bamboo shafts from window shades. We studied different types and placements for stabilizers.

Step 3 - Test and analyze how different kites fly

We headed down to the fields to test out our basic kites. We brought a worksheet to document variables in kite design, construction, and bridal calibration. We tested length of tail stabilizer, length and placement of side stabilizers, and placement of the cross spar and single point bridle. Students then took their worksheets back to class where we discussed what worked and which kites flew best and why. We then began designing our own kites.

Step 4 - Design, create, and fly your own kite

Students created five sketches and then analyzed the five criteria for a good kite; a design that maximizes sail surface, minimal weight (the less spar the better,) spar strength, right intersection of cross spar along the spine for single point bridle, stabilizer placement, and length. They then created a scale template and placed it along the fold of transparent colored kite paper. Stabilizers were added and they were ready to fly.

Step 5 - Design and create a kite winder

Students were exposed to different kite winder designs and asked to find important parts of a kite winder: guards to hold the string, a handle, a hole to secure the string, and a notch to keep the kite at a certain length. Again they used a folded piece of paper to create a template that was then scanned and cut on a laser cutter. They hand sawed the notch and then wound 100 feet of string (we used light crochet thread) around the winder.

For more information about this project you are welcome to contact Crane Country Day Schools Design and Engineering Teaching Team, DesignAndEngeeringTeam@CraneSchool.org.

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