Kite Explorations

By Tracy L. Coskie and M. Michelle Hornof

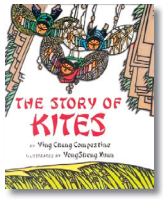
Children are delighted by the playful activity of making and flying kites, and this month's trade book article encourages teachers to harness this excitement and connect it to investigations relating to wind, technology, and the design of experiments.

This Month's Trade Books

Catch the Wind
By Gail Gibbons.
Little, Brown. 1989.
ISBN 0-316-30996-6.
Grades K–4

Synopsis

Two children eagerly enter a kite shop with hard-earned savings to buy two kites. The shop owner identifies several types of kites, briefly describes how different models work, and names the parts of kites. After the children make their purchase, they take their kites directly to a nearby kite festival. The book ends with instructions on how to make a simple flat kite.



The Story of Kites
By Ying Chang Compestine.
Holiday House. 2003.
ISBN 0-8234-1715-8.
Grades K–4

Synopsis

During harvest time, the Kang brothers scare birds out of the family rice field by banging pots and blowing whistles. When a gust of wind blows the boys' belongings into the sky, they get an idea to make their job easier—what if the wind could fly objects that scare the birds? The boys decide to fly their straw hats, chopsticks, and even their math homework. Their initial attempts fail comically, but their designs gradually become more successful until finally, the whole village is impressed by their clever ideas.

Curricular Connections

Kite making and kite flying offer a realm of possibilities for investigation. In *Catch the Wind*, students learn that the shapes and parts of kites affect how they are flown and how well they fly. Just as the Kang brothers discovered in *The Story of Kites*, designing and building kites offer a fun introduction to the effects of changing a single variable. *What are the effects of creating a longer tail? Using a different shape? Flying on a windier day?* Charting the results of their variables extends a unit with kites to an investigation with data analysis and real connections to mathematics.

Air can be a tricky subject for younger students. The concepts of air and wind can be made more visible and concrete by studying the way kites respond to wind.

After reading *Catch the Wind* or *The Story of Kites*, students will be eager to talk about their own kite-flying experiences. You can use this opportunity to begin asking questions. *Can you fly a kite if there is no wind? Do some kites fly better than others?* Soon you will have a list of wonderings and a class of students ready for investigation. Be sure to teach students safety rules before flying kites (See Figure 1).

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For Grades K–3: Go Fly a Kite

Purpose:

For children to begin to understand wind as air in motion.

Materials:

- Lightweight plastic (grocery bags work, but you can experiment with other lightweight materials, such as thin wrapping paper): 20 × 35 cm pieces for the kites and two 2 × 6 cm long pieces each for the tails;
- Two 18 cm plastic drinking straws;
- 1 m of crochet thread for the "bridle," plus extra thread for the flying line;
- Cellophane tape;
- Scissors; and
- A hole-punch.

Procedure:

1. Ask students to recall what the young children in *Catch the Wind* did. *Why do they think that there are so many different kinds and shapes of kites?* Pose the question and have students make predictions: *What do they think affects the way a kite flies?* While brainstorming, students can revisit the book for ideas.
2. Explain to the students that they are going to build and test one specific type of kite—a sled kite. *Kite Directions* (adapted from Greger 1984): Draw the pattern (Figure 2) onto graph paper and cut it out. Trace the pattern onto a piece of plastic folded in half. Cut out the sides (except along the folded side) and open it up. Tape the straws to the creases to create two spines. Tape each corner to reinforce the plastic, and punch a small hole at each pointed end. Tie a small loop of thread through each hole. Tie 100 cm of the crochet thread to the corner loops to create the bridle. At the end of the bridle, tie another loop for the flying line. Tape the tails onto the shorter side.
3. While (and after) students build their kites, discuss how air affects kites and record students' ideas about wind speed, direction, etc.
4. Students can then test their kites indoors by pulling or using a fan or blow-dryer. Discuss what students noticed about how their kites "used" air. Record any new ideas.

To extend this lesson, choose a day when the wind is blowing. Introduce students to wind vanes and anemometers (see Internet Resources). Ask students to share their ideas about how the wind vane and anemometer could be useful to them in flying their kite outside. Review safety rules (Figure 1) before flying kites outdoors.

Check the wind direction and speed and then ask students to predict what will happen with their kites. *What direction will they fly? How hard will the kite pull?* Have students predict what would happen if the wind vane and anemometer gave a different reading. *What would happen if the vane and/or the anemometer were giving changing readings?* Although students will likely recognize that faster wind speeds will help them fly their kites, they may at first confuse whether to run in the same direction the wind vane is pointing or run in the opposite direction. Children this age should realize that changes in wind speed and direction will affect how their kites fly.

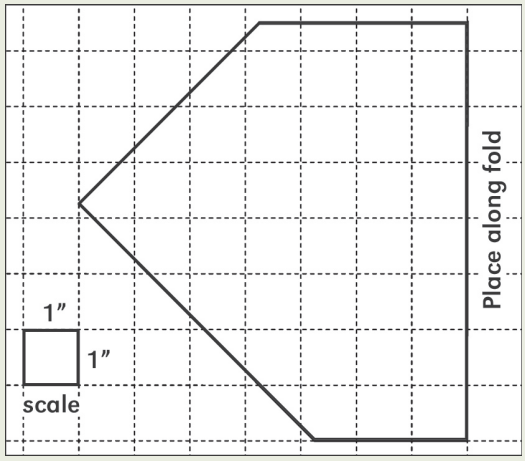
Figure 1.

Kite safety.

- Keep your line dry and never fly in wet or stormy weather.
- Never fly a kite near power lines, transmission towers, or antennas.
- Never fly a kite with anything metallic in the construction or line.
- Fly kites away from busy streets or steep slopes.
- Watch out for people and trees.

Figure 2.

Mini sled kite pattern.



For Grades 4–6: Variation on a Tail

Purpose:

To incorporate information from scientific instruments into an investigation of how different variables affect how a kite flies.

Materials:

Same materials as for the K–3 activity, plus additional plastic or paper for the tails

Procedure:

1. Ask the students to describe what the brothers in the story were doing when they were testing different objects. This connection to the book can lead into the following question: *Have you ever been presented with a problem where you changed a variable to see what the outcome was?* You may need to introduce or refresh the idea of what a *variable* is.
2. Allow students to construct a sled kite as described previously. Be sure that students accurately measure and carefully attach the tails in a specific location evenly spaced from the edges of the kite.
3. Have students fly their kites using a box fan to control the variable of wind. Then introduce the idea of changing the tails—a simple way to see immediate effects. Ask students to describe how the tails of the kite could be manipulated to see what the effect is and record the students' answers. Have students brainstorm what other factors need to be considered (e.g., measurement, observation, recording notes, and so on).
4. Next, ask students to make a change to the tails, such as adding a small nonmetallic weight to the ends of each. (Other ways to change the tails include making them shorter and longer, tying 4–5 ribbons in regular intervals along the length, or attaching them closer together or farther apart.) Students then fly the kite using the same box fan on the same setting and describe any changes in how the kite behaves. A data table will enable students to track each kite flight (flight number), changes to the tail, reason for change, and description of the kite's behavior (available online; see NSTA Connection).

Extend the investigation by showing students two kites; for example, two "mini-sleds" like those described above, but one made of wrapping paper and one made of grocery bag plastic. *Which will fly better? Why? Under what conditions? What does the tail do? What if we took it off altogether?* You could also show students another simple type of kite, such as a Vietnamese kite or snake kite. Ask them to predict how they might fly. Have student groups get together to design experiments. Consider having students use the Beaufort scale to indicate wind velocity (see NSTA Connection). Encourage students to plan their data collection ahead of time. *How will they manipulate or measure the variables? How will they determine results? Can they meet the challenge of designing kites that will accomplish a job, such as pulling an object?*

Providing students with various materials and other resources may promote independent investigations and draw in students whose interests lie in technology, history, and the arts. Whether it is designing and trying to fly a kite or manipulating variables to see how they affect a kite, capitalize on your students' interest in these dancing wonders.

Connecting to the Standards

This article relates to the following *National Science Education Standards* (NRC 1996):

Content Standards

Standard A: Science as Inquiry

- Abilities necessary to do scientific inquiry (K–8)

Standard B: Physical Science

- Properties of objects and materials (K–4)

Resources

Greger, M. 1984. *Kites for everyone*. Richland, WA: Author.

National Research Council (NRC). 1996. *National science education standards*. Washington, DC: National Academy Press.

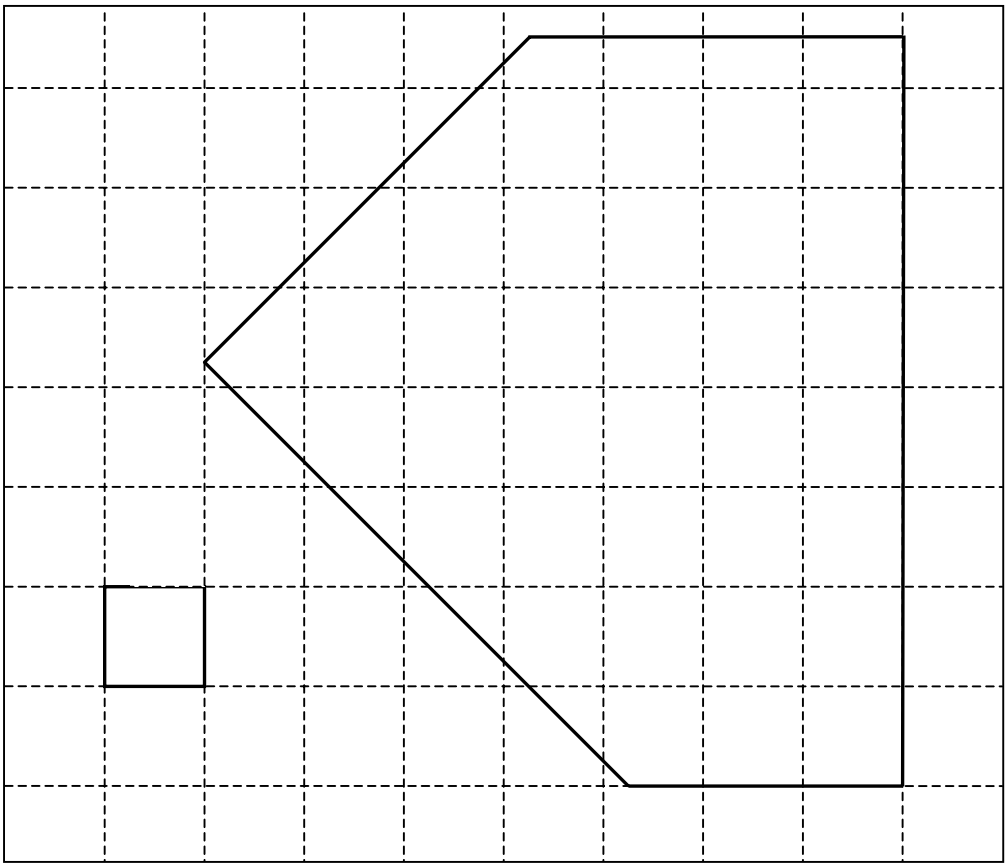
Internet

Wind Vane and Anemometer
http://wow.osu.edu/experiments/weather/windvane.html

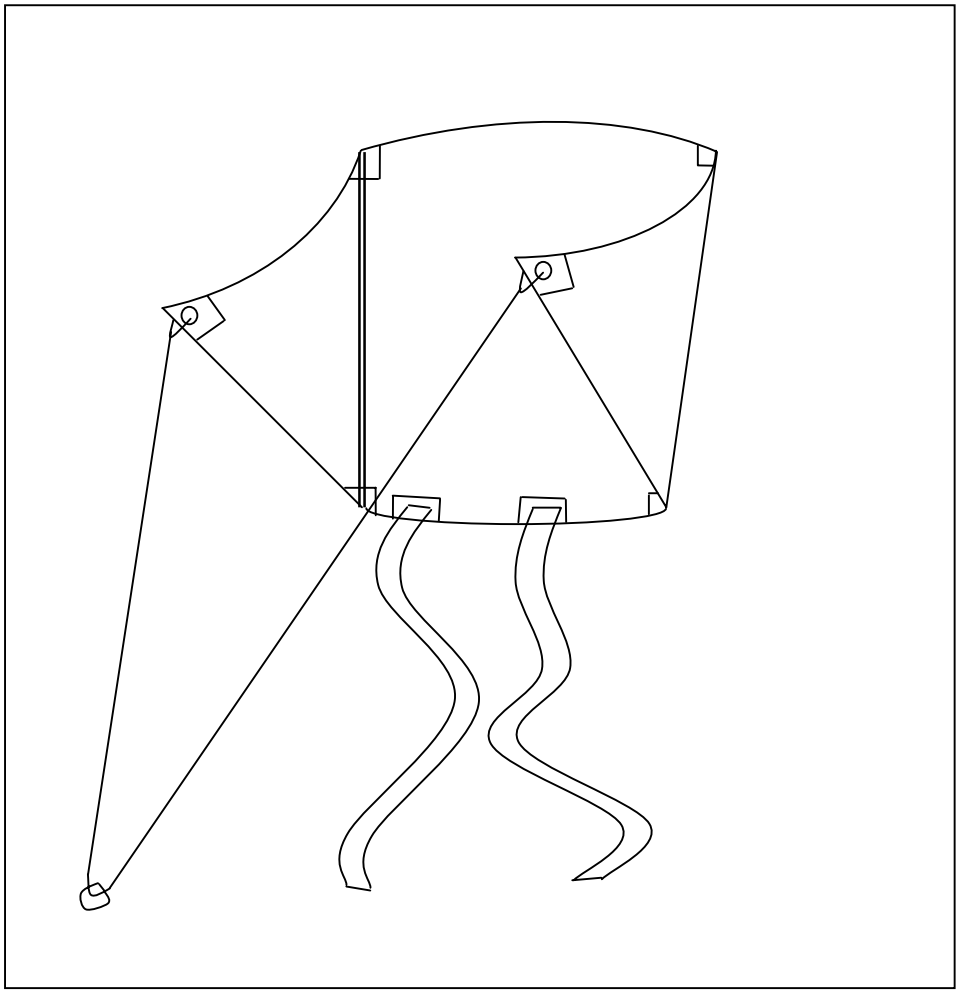
NSTA Connection

A larger version of the mini sled kite pattern, a blank flight data table, and a Beaufort wind scale are available online by clicking on this article at *www.nsta.org/elementaryschool#journal.*

Mini Sled Kite Pattern



A mini sled kite.



Flight Data Table

Flight #	Change to tail	Reason for change	Results

Beaufort Wind Scale

The wind scale designed for sailors by Rear Admiral Sir Francis Beaufort in 1805 ranges from 0 at dead calm to 12 at hurricane force. Numbers 1-6 describe kite-flying winds and can be described as below:

1	drifting smoke, small ripples on water	1-3 mph
2	rustling leaves, wavelets form	4-7 mph
3	dancing leaves, wave crests break	7-10 mph
4	tree branches tossing, waves extend	11-16 mph
5	trees swaying, kite strings will break	17-21 mph
6	large branches moving, flying risky	22-27 mph