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GREGORY GRAMBO

**FLYING HIGH
WITH KITES**

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Flying High with Kites

by Gregory Grambo

ON A WINDY DAY it's wonderful to take a kite outside and fly it. For more than two thousand years people have been flying kites. Today kites are used for scientific research and have also paved the way for the modern airplane. They have had many uses, from the religious and social, to the scientific. Kites have their origin in China. The Chinese military used them to frighten off troops during the Dynasty more than a 1500 years ago.

"Stalled aircraft" or low angle kite

Kites fall into two main groupings based on the way in which they fly. High angle kites are tipped very steeply, while low angle kites have a slight tip off of the horizontal. Wind hitting the lower surface of the "stalled aircraft," or high angle, kite pushes the kite backwards. The flying line prevents it from moving backwards. Planes flying like this type of kite would stall and fall to the earth. The top surface of a low angle kite is curved upward. This means the air must flow farther over the top of the kite than it does under the kite. The air pressure is lower above the kite, causing it to rise (Bernoulli's Principle).

Materials

Kites can be made from a variety of materials: newspaper, cloth, plastic, paper bags, sticks and string. Kites also must be made large enough to support the weight of the materials used to build the kite. Encourage your students to experiment with kite sizes and shapes. This will help them add a new dimension to their scientific discovery. Most kites need a tail to help them fly. Just as a plane needs a rudder and rear stabilizers to keep the plane from flipping over or tossing sideways, the kite's tail helps to give stability to the kite. Your students should also experiment with kite tail length. Later, question your students as to how the length of the tail will effect flight for the kite. Here are a few types of kites you may wish to have your students build and fly.

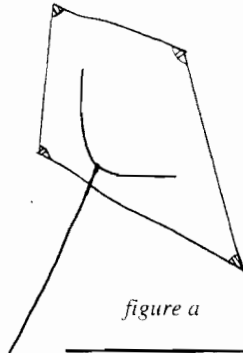
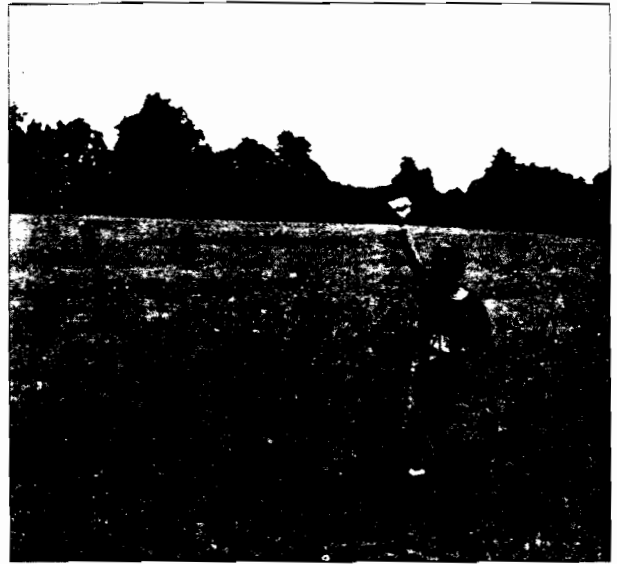


figure a



Diamond Kite

- Begin with two thin sticks or 1/4 inch dowels, 36" long and 48" long. (One stick should be 3/4 the length of the other.)
- Place the shorter stick (called the spar) horizontally across the vertical stick (called the spine) to form a cross. Make sure that you center your spar so that both sides of the cross are equal in width.
- Use wire or string to lash the two sticks together. Make sure the sticks are at right angles to each other. (figure b)
- Cut grooves into the end of each stick. Moving from groove to groove, run a string tightly around the outermost edges of the sticks. You now have a diamond kite frame. (figure c)
- Lay this frame on top of the covering material. Cut around your kite frame leaving a one-inch margin. (figure d)
- Fold and glue or tape the edges of the covering material over the strings on the frame.
- You are now ready to attach a tail and flying bridle on to your kite. Put two holes through the front covering of your kite; one on the spine four inches above the spar, and one on the spine five to six inches below the spar. Bring a piece of the bridle through the top hole and tie it to the spine. Bring this string through the second hole and again secure it to the spine.
- Attach your flight line to the center of this string. (figure a)

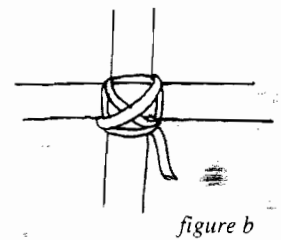


figure b

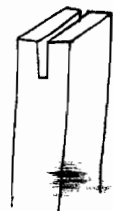


figure c

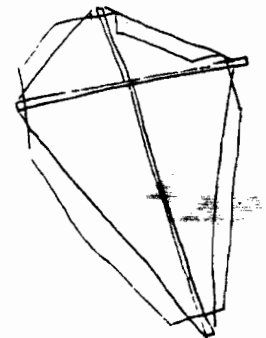
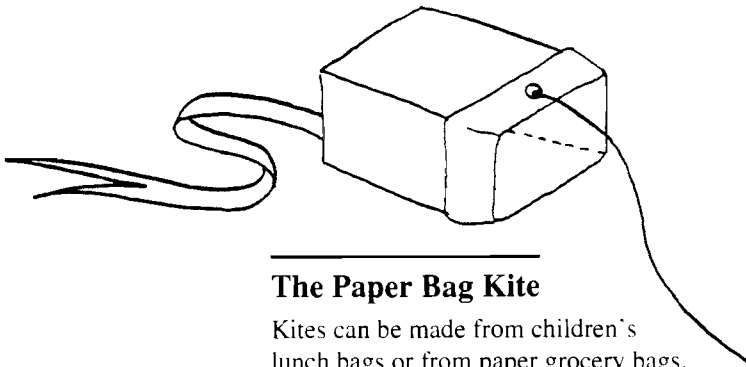


figure d

- Now attach a long tail (crepe paper streamer or strips of fabric work well as tail material) to the bottom of your kite. You are now ready to fly your kite. You may have to add more tail length if the kite tries to spin or twist.



The Paper Bag Kite

Kites can be made from children's lunch bags or from paper grocery bags. Start by cutting the bottom out of the bag. Fold one inch of the bag back to double the thickness around the top edge of the bag. Punch a hole through this double layer of paper bag, and attach your flying line through the hole. You need to attach a crepe paper tail to the other end of the bag to stabilize the kite during flying time. You can now decorate your kite with paint, crayons or craypas. Ancient Japanese peoples would make large carp (a type of fish) designs on kites in this manner using colored streamers as tails. Other designs would include dragon faces and animal designs.

Experimenting

Have your students experiment with different arrangements of kite sticks to yield kites of varying geometric shapes. With two sticks you can make a flat kite, diamond kite and a bow kite. An additional stick allows you to make kites with a hexagon shape. Covering can be made from large flat sheets of newspaper or gift wrap. You can even recycle the plastic you get from the dry cleaners as a covering for your kite.

The unlimited possibilities will also allow you great variation in the types of decoration you can make on your kite. Decoration should be light and should not off-balance the kite. For example, thick paint will eventually crack the covering and may make a kite too heavy to fly. Sharp contrasts work well, so that images stand out at a distance.

Games

Kite games add to the fun of building a flying kite. You may even want to have a kite festival in the school yard. A contest can be created by giving each child a fixed flying line of 150 yards. Observe who can get their kite off the ground and use up the flying line the fastest. You can also have contests to see which kites fly highest, which stay aloft longest, or which have the longest or shortest tails. Award certificates can be given out for winners in various categories, including best kite design. ☺

GREGORY GRAMBO is a sixth grade science educator at Louis Armstrong Middle School in New York City. His experiments have been published in periodicals in the U.S. and Australia. He currently writes a "How and Why" column that appears in seven New York City newspapers.

Flying Kites

Never fly your kite in a storm.
Choose a spot free of power lines, telephone wires and trees. [Just ask Charlie Brown.]

More on Kites:

Making and Flying Kites,
by Wolfgang Schimmelpfennig.
One-hour Kites, by Jim Rolands.



Charles tapes a tail onto his kite.