SCIENCE ★ TECHNOLOGY ★ ENGINEERING ★ MATH

PRESENTED BY: girlstart

Paper Kites

Create a paper kite that uses backyard wind power to fly! Read about the history of kites and explore the forces of lift, gravity, drag, and thrust as you make your kite soar.

TEKS:

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 effects of force on an object.

Materials:

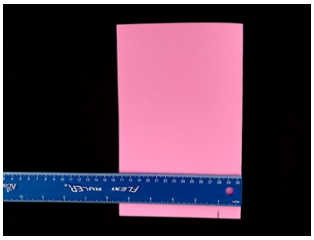
- Cotton string (5-10 feet)
- Hole punch
- Pen or pencil
- 8.5 x 11-inch piece of paper
- Plastic ribbon (6 feet) or plain ribbon (2 feet)
- Ruler
- Straw
- Tape

How To:

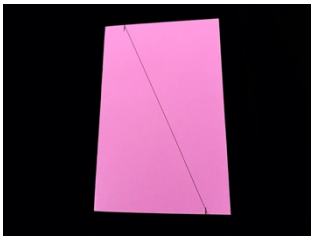
1. Fold a sheet of paper in half hamburger style (short ways) and place this folded piece of paper down so the folded edge is facing left.

2. Use a pen or pencil to make a mark on the top of the folded paper about one inch to the right of the folded edge.

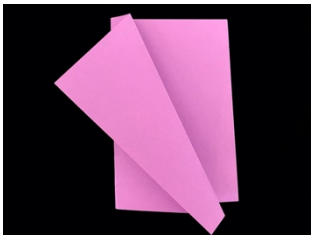
3. Use a pen or pencil to make a mark on the bottom of the folded paper about one inch to the left of the non-folded edge.



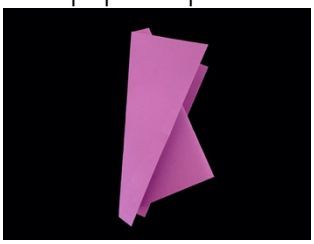
4. Draw a line that connects these two marks.



5. Fold the paper along the line that you just drew. Make sure to only fold a single layer.



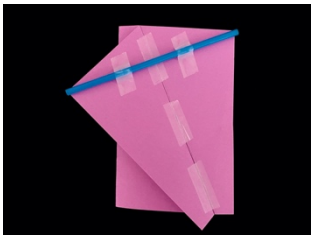
6. Now, flip the paper over and fold the other side down to match the side that you just folded. At this point, your paper should look a bit like a paper airplane!



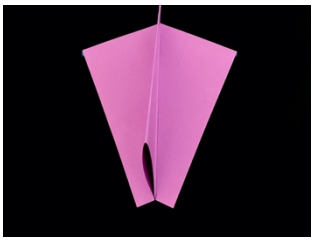
7. Flip the paper back over so that it looks the same as it did after you completed step 5.

8. Tape along the middle seam.

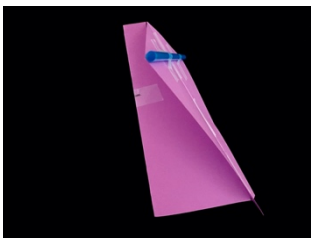
9. Lay a straw across the kite as shown in the photo below and tape it into place.



10. Flip your kite over so the straw is facing down. The flap sticking up is the spine of your kite.

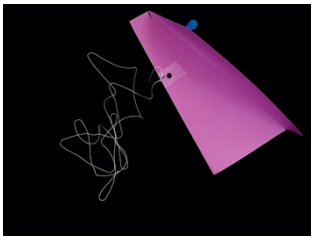


11. Mark a spot on the spine about a third of the way down and place a piece of tape over this mark to reinforce it.

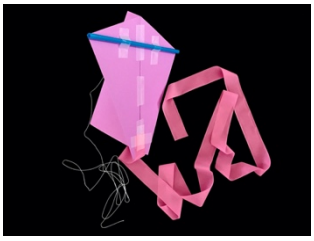


12. Use a hole punch to make a hole on this piece of tape.

13. Tie one end of the cotton string through this hole.



14. Tape a piece of ribbon to the back of your kite. If you are using very light, plastic ribbon, it can be as long as six feet. If you are using a heavier ribbon, one or two feet will be enough.



15. Now your kite is ready to fly! Take it outside, toss your kite in the air (while holding on to the cotton string), and see if it soars.
16. If it is not very windy outside, you may need to let out some string and then run with the kite trailing behind you to get it to fly.

STEM Explanation:

Kites were invented over 2000 years ago in China, and the invention spread quickly around the world. The earliest kites were made from bamboo and silk, and they were used as fun toys as well as communication, measurement, weather observations, and even transporting people!

Did you know that a kite is considered a special type of aircraft? An aircraft is simply a "machine capable of flight." But how is something that you make out of paper, string, and a straw able to fly? Think about this…

What happens if you try to fly your kite indoors? Probably not much! This is because, in order for a kite to fly, it needs a force to act on it. A force is simply a push or a pull, and anything that flies has "four forces of flight" acting on it: lift, drag, gravity, and thrust.

Lift: Lift is the force that makes your kite rise into the air. When wind blows on your kite, some of the wind hits the kite, some goes above the kite, and some goes below the kite. The wind that goes below the kite causes the kite to lift off of the ground! If you try to fly a kite inside, or on a day with no wind, there is no force to provide lift. Here's a tip, though: if you run with your kite, you can "create lift" and make the kite fly!

Gravity: Gravity is the force that pulls everything towards the earth—including your kite—and acts in the opposite direction of the force of lift. The heavier an object is, the greater the force of gravity acting on it. This is why kites are made from lightweight materials. In order for a kite to fly in the air, the force of lift must be greater than the force of gravity!

Drag: Once a kite has been lifted into the air, the force of drag helps keep it steady. Drag is the force of resistance caused by wind pushing on the surface of the kite. It helps make sure the force of lift doesn't cause the kite to fly all the way over your head and to the other side of the yard! The ribbon tail that you added to the back of your kite helps to increase drag and keep the kite balanced in the sky.

Thrust: The final force acting on your kite is thrust. Thrust is the force that pushes your kite in a forward direction and keeps it flying in the air! If you tried to fly a kite without a string, it would probably either fly far away or plummet to the ground. The string that you hold on to creates the force of thrust and helps all four flying forces: thrust, drag, gravity, and lift, work together to make your kite soar!

Career Connection:

Aerospace engineers design and build spacecrafts, missiles, airplanes, satellites, and more! They create and test all types of flying machines, ensuring these vehicles are safe and effective for space exploration, transportation, communication, and defense.

Resources:

https://www.batchelors.net/kites-in-the-classroom/9-kites-a-guide-for-students.html
https://www.instructables.com/id/Easy-Paper-Kite-for-Kids/
http://blog.learningresources.com/kites/#:~:text=Thrust%20is%20created%20either%20by,to%20the%20force%20of%20drag.
https://www.computersmiths.com/chineseinvention/kite.htm
https://china.mrdonn.org/kites.html