



Kites in the Classroom



Guidebook

Our easy to use, hands-on Kite Kits inspire and engage anyone who uses them. In the deceptively simple activity of decorating, assembling and flying their own Kite, participants of all ages and abilities will achieve a rich array of learning outcomes. We have seen countless times how Kiting opens the mind to the greater world of scientific discovery, encourages the social dimensions of learning, and ties educational discovery with an unforgettable experience of the natural world.

- K to 12
- Out of School
- Camps & Youth Organizations
- Events & Festivals
- Fundraisers

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We founded Kites in the Classroom because we wanted to bring the joy of kiting to the world through our easy-to-use Kite Kits, and provide a fun, hands-on activity, accessible to all ages and abilities, wherever you are.

Kites are so much more than a pleasant way to spend a windy afternoon with children. The experience of decorating, building and flying a kite provides so many natural opportunities for learning.

This Guidebook is designed to help you plan a Kiting Activity for your group - whether it's K to 12, Out of School Care, Camp & Youth Organizations, Festivals & Events, or Fundraising. We also have supplemental Guidebooks to for specific goals like introducing STEM, and Special Events & Fundraising.

We start with suggestions for preparation and organization - whether you plan a short Kite Activity, a Kite Day, or an entire Kite Unit, it's up to you! The Guidebook has everything you need, including handouts you are free to photocopy and distribute to all your participants (please include our copyright).

We encourage you to visit our website and subscribe to our mailing list to receive special offers, new activities, lesson plans, guidebooks and more, to support you in the integration of Kites in your Classroom, or wherever you work with young people.

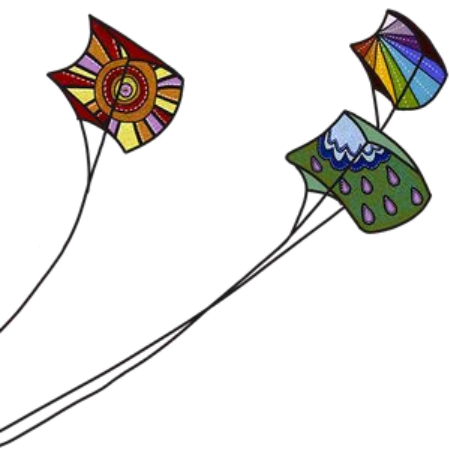
We would love to hear your stories of adventure and learning through the social media channel of your choice, using the hashtag #kitesintheclassroom or directly on our social media handles below.

We are always happy to hear your ideas on how we can improve our offering in any way.

We wish you every success with your kites, and welcome you to the rich tradition of kiting.

Gentle Breezes,

Ann Wong
Kirsten Tschofen



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Fore more than 29 years we've been bringing the joy of flight to children and adults across North America with our simple, educational Kite Kits. They have been used by 1 million children and adults in 11,000 schools and camps, and we know they work!

Our Kite Kits come with everything you need to assemble and fly a kite, are easy to decorate with felt pens/markers and wax crayons, and fly even in low winds.

Our Kite Kits are:

- An enjoyable project which educates while it entertains.
- A learning tool to provide access points for guiding inquiry, dialogue and critical thinking across the curriculum.
- A positive group building activity that can be used in a variety of contexts.



K to 12



Out of
School



Youth
Groups &
Camps



Festivals,
Events &
Fundraisers



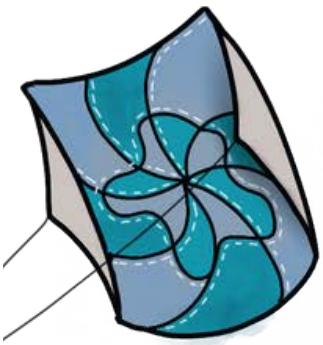


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Kites in the Classroom: Learning in Full Flight

At the simplest level Kiting provides a fun, hands-on activity accessible to people of all ages and abilities. We have seen how the sky is the limit for integrating Kites into any group activity from K to 12, Out of School Care, to Camps & Youth Organizations.

This list is only the the beginning of what you will learn using our Kite Kits!

1. Group Building

Participants in Kiting activities develop a group identity through shared experience and achievement; learn how to work together to solve problems; pool knowledge and skills; share responsibilities and roles; practice consideration towards others; and have fun together as they create memories that last a lifetime.

2. Hands-On Learning

Assembling and flying Kites provides opportunities to break complex tasks into steps; plan and manage time; follow directions while being creative; take risks; refine understanding through discussion and explanation; give and receive feedback on performance; challenge assumptions; and develop communication skills.

3. Problem-Based Learning

As anyone who has ever flown a kite knows, Kites provide a powerful opportunity to learn by actively engaging in real-world and immediately relevant problems, through exploration, risk-taking and problem-solving. These experiences develop skills that are transferable to all learning and the world of work, and promotes learning that is profound and durable.

4. STEAM Learning

A Kiting Activity or Unit of Inquiry is a fun and powerful opportunity to actively engage with the concepts and processes of Science, Technology, Engineering, the Arts and Mathematics and promotes student inquiry, dialogue and critical thinking.

5. Engineering Design Process

Kites provide an powerful way to introduce and extend the principles of the Engineering Design Process: creativity, collaboration & problem-solving, asking questions, making observations, analyzing data and communicating findings.

6. Connection with Nature

Kiting is an easy and fun activity for people of all ages to do outside. The feeling of flying a kite high in the air is both exhilarating and humbling. Kilters need to develop careful observation skills to notice things like changes in wind speed and direction, and adapt to keep their kite in the air. The feeling of being one with nature can't be beat.



Kites in the Classroom : Links to Learning Standards (US)

1. Adapted from Next Generation Science Standards nextgenscience.org
2. Adapted from National Council for Social Studies socialstudies.org
3. Adapted from Common Core State Standards for ELA and Literacy in History/Social Studies, Science and Technical Subjects ccssso.org
4. Adapted from National Core Arts Standards nationalartsstandards.org

Science, Engineering & Math	Social Studies & History	ELA	Art
Planning and carrying out investigations	Conducting research	Conduct short research projects that build knowledge through investigation	Communication
Analyzing and interpreting data	Using and managing information	Draw evidence from informational text to support analysis, reflection and research	Creative personal realization
Constructing explanations and design solutions	Defending opinions	Write opinion pieces on topics, supporting a point of view with reasons and information	Culture, history & connections
Engaging in argument from evidence	Problem solving and conflict resolution	Engage effectively in a range of collaborative discussions	Art as a means to well being
Obtaining, evaluating and communicating information	Communicating ideas and information	Write informative/explanatory texts to examine a topic and convey ideas and information clearly	Creating
Develop and use models	Using historical & geographical skills to bring meaning to issues and events	Report on a topic or text, tell a story, or recount an experience in an organized manner	Performing Presenting Producing
Using mathematics and computational thinking	Active inquiry and critical and creative thinking	Recall information from experiences or gather information from sources, take notes and categorize information	Responding
Asking questions and defining problems	Applying skills of metacognition	Write narratives to develop real or imagined experiences or events	Connecting artistic ideas and work with personal meaning and external content




Kites in the Classroom: Bloom's Taxonomy for Science and Technology

Blooms Level	Sample Action Verbs	Early Years	Primary	Middle
Remember	list, define, describe, recall, label, match, observe, identify, reproduce	Label and describe the parts of a kite.	List different kite shapes.	Define the four forces of flight: lift, thrust, gravity, drag.
Understand	explain, describe, interpret, paraphrase, classify, restate, summarize, express, generalize, recognize	Recognize examples of Bernoulli's Principle in real life (ie. water flowing through a garden hose, a shower curtain pushing into the shower, when a big truck drives past).	Explain how an airfoil works to keep an object in flight.	Explain the principles of flight in a kite and compare them to a bird, a plane and a submarine.
Apply	apply, choose, predict, use, illustrate, demonstrate, modify, interpret, develop	Choose an appropriate area to fly a kite and explain what safety hazards to look for.	Demonstrate different strategies to launch, fly and land a kite. Problem solve difficulties.	Modify the kite to fix problems like not flying straight or crashing (adding tails, moving the bridle center point)
Analyze	contrast, distinguish, test, differentiate, categorize, compare, analyze, research, examine, criticize, experiment, map, separate	Experiment, observe and record data on different strategies for launching, flying and landing a kite.	Compare the sled design made with different materials (silk, paper, plastic).	Test and experiment with different modifications to the kite to make it do certain things (ie turn to the right, fly more steadily).
Evaluate	evaluate, judge, predict, argue, persuade, convince, grade, recommend, rank, select	Evaluate and rank kite shapes for different criteria (ease of flight, biggest pull, best in low wind).	Recommend a kite material and design for specific users and flying conditions.	Experiment with different kite lines (cotton, nylon, weights and length) to see which one creates less drag and heat through friction.
Create	develop, create, design, construct, synthesize, compose, imagine, invent	Invent a use for a kite and describe how it would work.	Create a demonstration to show Bernoulli's Principal.	Identify a problem and use the Engineering Design Process to solve.



Kites in the Classroom : Bloom's Taxonomy Social Studies & History; the Arts

Blooms Level	Sample Action Verbs	Arts	Social Studies & History (Early Years)	Social Studies & History (Primary Years and Up)
Remember	list, define, describe, recall, label, match, observe, identify, reproduce	Observe kite designs from around the world and reproduce one on their own kite.	Listen to a story about Kiting.	Describe the kiting traditions of different countries (ie China, Korea, Indonesia, Japan)
Understand	explain, describe, interpret, paraphrase, classify, restate, summarize, express, generalize, recognize	Explain the materials used to make and decorate kites in different cultures (China, Korea, Indonesia, Japan etc)	Understand that Kites are important artefacts in many cultures and give examples.	Explain how the materials used to make kites reflects their importance in that culture.
Apply	apply, choose, predict, use, illustrate, demonstrate, modify, interpret, develop	Decorate a kite using symbols and icons of your choice.	What cultural symbols and icons inspire us when we decorate our kites today and what do they mean?	Explore how kites play roles in different societal systems: leisure, scientific discovery, modes of transportation, cultural expression, and war.
Analyze	contrast, distinguish, test, differentiate, categorize, compare, analyze, research, examine, criticize, experiment, map, separate	Research the symbolism of various animals and insects used to decorate kites (ie butterflies, dragons).	Compare & contrast kites as cultural and scientific artefacts across cultures and time.	Research why kites were invented in China and not other parts of the world.
Evaluate	evaluate, judge, predict, argue, persuade, convince, grade, recommend, rank, select	Create a list of criteria to judge kite decorations.	Find examples of kites in popular culture, and explain their use and/or symbolism.	Select an artefact or symbol that is losing it's meaning in your culture and argue why it's important to keep.
Create	develop, create, design, construct, synthesize, compose, imagine, invent	Design a kite to promote or educate about a cause or issue.	Create an instructional video for how to assemble and fly your kite.	Create a kite festival for your school to promote school spirit or a cause or issue.



Kites in the Classroom

If you want to inject some friendly competitiveness into your Kite Day, hold a kite contest. Done with humour and inclusion, a kite contest can be both fun and motivating. It works better if you have a category for every student, or bronze, silver and gold awards in each category so everyone is noted for something. Here are some pointers and a few rule ideas to make your contest go smoothly:

Every kite contest requires judges. Use two or three judges. Ask another teacher, a principal, or a parent. Arrange for prizes or ribbons and organize a display the winning kites in the class or in the school. Have the in-house newspaper interview fliers. Ask the media to your kite day. Everybody likes taking pictures of kites in flight!

The Neatest	Judge for clean surfaces, symmetry, neat knots, accurate bridle holes, a neatly wound kite line, and a neatly rolled up kite at the end of the event.
The Most Beautiful	Judge while holding the kite and while in flight. What is beautiful is very subjective, but we have found that there is often a single kite that really stands out to the whole group.
The Most Unique	Now and then we see kite designs and drawings that show out-of-the-box thinking. It's always good to note unconventional creativity.
The Most Efficient Flier	Efficiency in flight is directly related to how well the kite is assembled and how carefully the student raises the kite in the field. A carefully launched kite in a normal wind will rise almost straight above the kiter. Some side-by-side lift off contests will be a challenge for some.



Kites in the Classroom

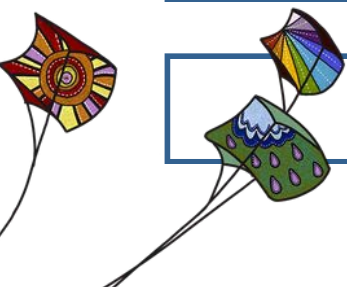
Charlie Brown Award	Charlie Brown Award Kites love to rest in trees. No, trees love kites, especially in the spring. Feeding trees is a noble endeavour!
The Steadiest Flier	Which kite seems to be anchored to the rock of Gibraltar up there? A kite that won't stay up unless the kiter is running is not a kite because it is not powered by the wind.
Altitude Sprint	Give flyers a set amount of time (say 30s to 2 min) to launch their kite and let out line. When the time is up judges decide which kite is flying the highest.
Bird Nest Award	No kite fest is possible without someone tangling the kite line into a knot. Most knots can be removed, but there are some real experts in producing unwanted knots.
Best New Rules Award	How do your students want to be judged? Reach agreement on the rules and implement their wishes. Honor the student who formulated the most fair rules.
Total Kiting Award	Initiate a contest that judges the whole process of kiting: (1) Proper choice on the field, (2) time required to fully launch the kite, (3) the kite must stay up and remain steady for at least five minutes, perhaps three (4) order the retrieval of the kite and measure the time taken to wind up the line (5) judge how well the line is wound up again - no loose ends, no knots in the line (6) contestants gather at a given place with their kites wound up neatly.

PREPARATION

Use this template to help plan your Kite Lesson, Day or Unit.

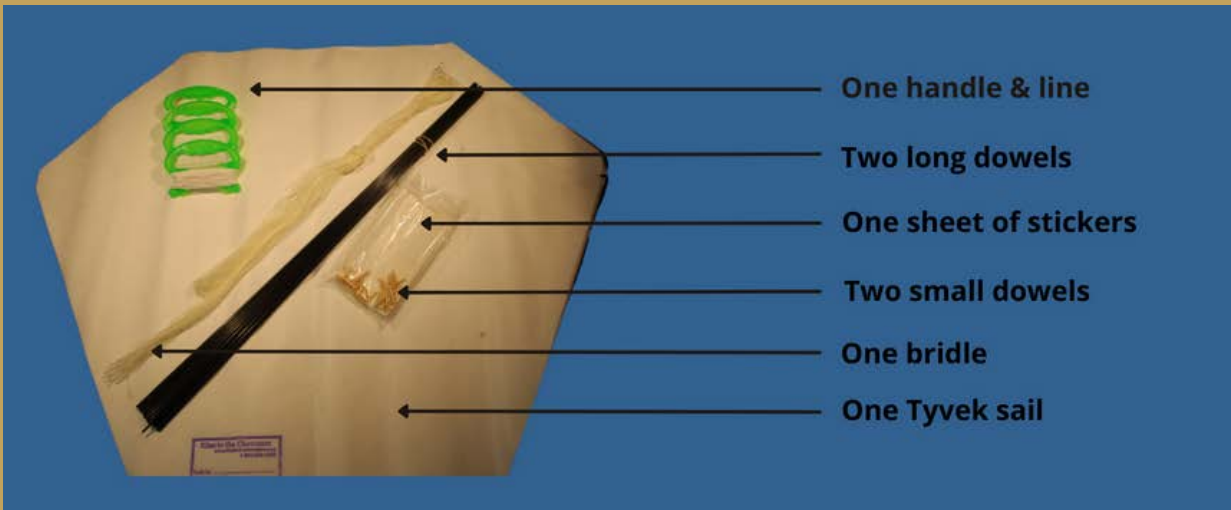
How long each activity takes depends on the the size and age of the group, and what other activities you include. When it it comes time to assemble, decorate, and fly the Kite Kits we suggest starting with a whole group introduction and then letting students work their way through the Activities/Stations at their own pace. With younger students, you will need adult or older volunteers for each station.

ACTIVITY/STATION	TIME
Introduction	
Relevant Content	
Safety & Anatomy of a Kite	15-30 min
Launch, Fly & Land; Tips	15-30 min
Station 1. Collect Materials	15-30 min
Station 2. Decorate Kite Kit	15-60 min
Station 3. Assemble Kite Kits	15-45 min
Let's Go Fly a Kite!	Have Fun!



ASSEMBLY

Visit kitesintheclassroom.com for assembly instructions.



- One handle & line
- Two long dowels
- One sheet of stickers
- Two small dowels
- One bridle
- One Tyvek sail

PREPARING FOR ASSEMBLY

- Your order will not arrive sorted into individual Kite Kits.
- We suggest laying the materials out on a table for easy collection.
- Don't pass out the small dowels until you are ready to use them.
- The bridles get easily tangled. Have a few people hand them out individually.

DECORATION

- Dark felt pens or markers with thick tips work best.
- Wax crayons, paint, and pastels can also be used after you have assembled the kite.
- Cover your worksurface.
- The designs must be large and dark enough to be seen when flying in the sky.

OTHER MATERIALS

- A sample kite, already assembled.
- Copies of instructions & handouts.
- Single hole punch (1/15 people).
- Scissors.
- A roll of hockey tape to replace stickers (optional).

ASSEMBLY

(SEE WEBSITE FOR DETAILED INSTRUCTIONS)

- STEP 1: Decorate the sail.
- STEP 2: Insert & secure the long dowels.
- STEP 3: Reinforce bridle w small dowel.
- STEP 4: Add the bridle string.
- STEP 5: Connect kite line to bridle string.
- STEP 6: Review Safety; Launch, Fly & Land and Tips for Successful Flight.

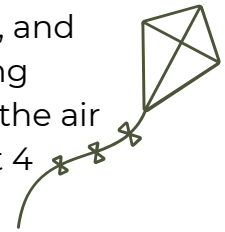


ORGANIZATIONAL HINTS



Our Kite Kits are designed to fly in very low to medium wind. Make sure to avoid rain and lightning storms. Have a backup plan in case of poor weather - in a pinch small groups can even walk their kites around a gym, in hall ways or a community center and still have fun.

Consider your location carefully and make sure you have appropriate permissions to use the space. School yards, local parks, sports fields, and beaches are all good options. Make sure your space is safe (see Kiting Safety), and that you have enough space for the number of kites in the air (remember the line is 80 feet long). Flyers should be spaced at least 4 feet apart and be reminded to stay in their "lane".



Plan how to lay out and distribute the materials. Laying everything out on tables is a good idea, but keep in mind that bridles are easily tangled, and the little dowels easily lost. Choose a big work area for kite construction. Have large covered tables set up with lots of room for every one to spread out.

Suggest decoration ideas that align with your goals for your Kite Activity - for example you can link to your curriculum, or just let the sky be the limit. Decorations must be dark and large enough to see in flight.



Groups of six to ten participants are ideal for working together and helping each other. Younger students will need help tying knots. Assign volunteers specific jobs: handing out materials, hole punching, checking knots, untanglers and flight supervisors.

Large groups will inevitably work at different paces so plan to allow your participants to move between stations at their own rate. If you have a small flying space, allow students to fly in smaller groups rather than all at once.



Having a few "problem solvers" familiar with kite assembly and kite flying works well for very large groups and saves time. Read the Troubleshooting handout carefully.

Make sure that everyone on your team has assembled and flown a Kite Kit before the event, have a sample kite ready, and order more kites than the number of participants that you can use as demonstration kites, extras for volunteers, and to replace lost kites.



SAFETY



Being safe and courteous is very important!
Make sure you follow these rules every time
you fly your kite.



Look UP into the sky for hazards like power lines, trees, buildings and nearby roads.



Look DOWN on the ground for tripping hazards like holes, glass, wire and hidden things.



Look ALL AROUND for people near you and make sure your kite line won't hurt them.



Look where you are going.



Keep a safe and respectful distance from other kites, and their kites in the sky. Fly in your "lane".



Make sure you can see your kite in the sky and it can see you.



Be aware of the weather - don't fly in rain or lightning.



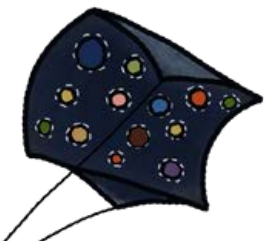
Only fly in winds that match your ability and kite design.



Use the handle to bring your kite back in. Don't touch the line - it will be very sharp.



Your kite can be replaced. You cannot. Don't take risks to rescue your kite.



Have Fun! Be Safe!





LAUNCH, FLY & LAND YOUR KITE

Assess the Wind

Start by noting the direction of the wind - feel it on your face, notice the sway of the trees, or wet your finger. Remember, our Kite Kits are designed for light wind, so don't fly on a very windy day - about 5-15 mph or 8-24 kph is great (to top of trees should be moving).



Get Ready to Launch



If it is a good kite flying day, stand so the wind is at your back and pushing into the sail of your kite. Review the Kiting Safety Rules: look up, look down and around, and make sure you have a safe space to fly.

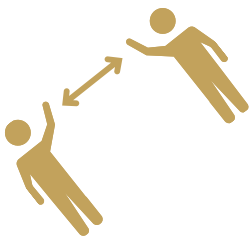
Solo Launch

Hold the handle in one hand, and the top of the kite at arms length in your other hand. When the wind catches the sail, let go of your kite and start letting the line out slowly by turning the handle (don't touch the line!).



Partner Launch

Stand with the wind at your back and your partner 3 to 6 meters (10 to 20 feet) downwind from you (so the wind is blowing from you, towards them, and catching the sail). Your partner should hold the kite up in the air, and let go when the wind catches the sail. Let the line out by turning the handle (don't touch the line!).



Landing

When you are ready to land your kite, turn the handle to wind the line while the kite is still in the air - don't grab the line! If you are struggling, and you can see where your kite will land safely, you can take a few steps forward until it lands on the ground. Then wind the line up while walking towards it. Make sure you hold your kite securely so it doesn't fly away!





TIPS FOR SUCCESSFUL FLIGHT

1

Stand in one place, and parallel to other flyers, to fly your kite. It is designed to fly in very low winds, so no running should be required. Watch where you are going if you choose to run.

2

Let the kite line out slowly, and use slow release and pull motions or quick pumping depending on the conditions.

3

Let out more line or step towards the kite in a sudden wind gust. This spills wind from the sail and will save your kite from crashing or from snapping.

4

Wind the line on the handle to land your kite. In strong wind you can walk towards your kite and it will fall to the ground (make sure there isn't anyone below the kite!).

5

Walk quickly towards the other flier (with the kite still in the air) and hold your lines close together if your kite line gets tangled with another kite. The tangle should “move down” so that you can unwrap them.



COMMON KITING PROBLEM

1

Tie the bridle ends securely over the (small) harness dowel with a double knot.

2

Fold the kite in half to find the center point of the bridle and then tie the loop. If the bridle isn't exactly centered the kite will fly left or right.

3

Keep a few feet of line on your handle at all times. The kite line is not tied to the spool, and your kite will fly away if it is unwound to the end of the line.

4

Use cotton, twisted nylon or polyester line for your kite. A fishing swivel reduces twisting of your line. Any line under tension can cut your hands.

5

Be patient when you get knots or tangles in your kite line. Tangles are a nuisance, but an inevitable part of kite flying. Find the special "Kite Line Detanglers" in your group and let them shine!

WIND SPEED & DIRECTION

A kiter needs to know wind speed and direction to have fun and fly safely.

Assessing the Wind Speed

- Before you fly your kite, it is important to know if the wind is right for it. Our kites are best in levels 1 to 3 or 5-15 mph winds.
- The Beaufort Wind Scale was developed in 1805 by Sir Francis Beaufort of the British Royal Navy to measure the wind, and is still used in weather reporting.
- Beaufort's full chart goes from 0 (Calm) to 12 (Hurricane). You should not try to fly a kite in force 6 or greater.

Beaufort Wind Scale

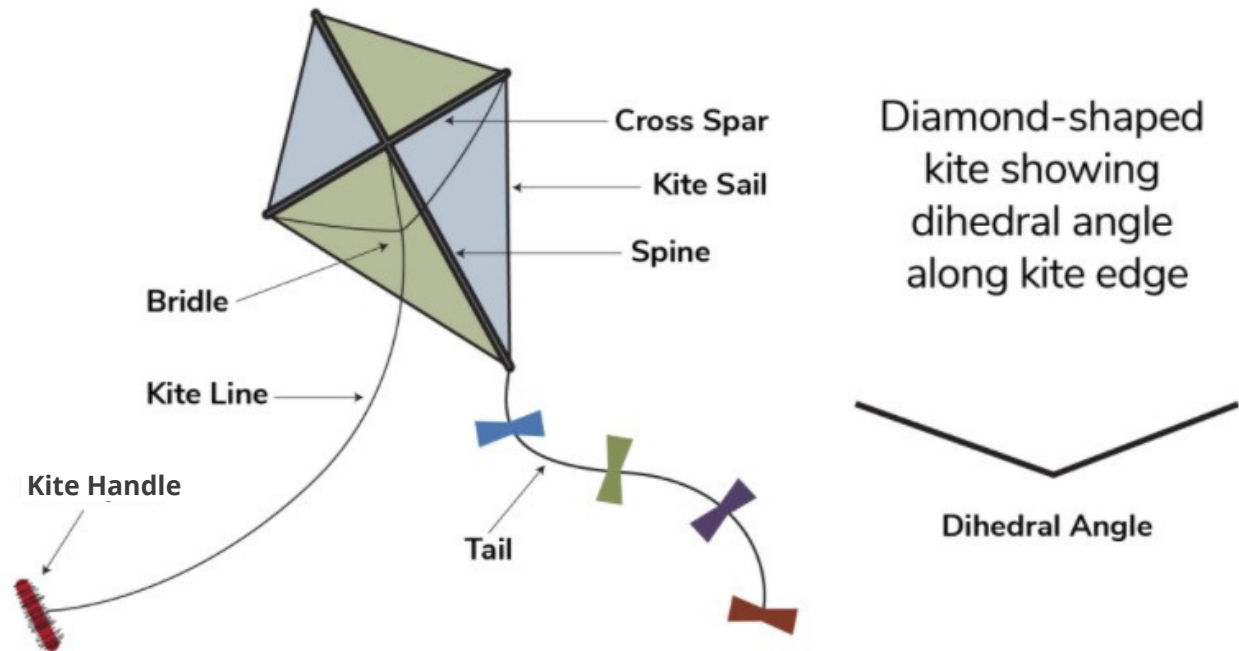
Beaufort Force Level	Beaufort Description	Visual Indication	Wind Speed (mph)	Wind Speed (kph)	Suitable Kites
0	Calm	Smoke rises	<1	<1	Nil
1	Light Air	Smoke drifts	3	5	Delta kite
2	Light Breeze	Leaves rustle	7	10	
3	Gentle Breeze	Leaves move	12	20	Diamond kite
4	Moderate Breeze	Branches move	18	30	
5	Fresh Breeze	Small trees sway	24	40	Box or Dragon Kite
6	Strong Breeze	Large branches move	30	50	
7	Near Gale	Whole trees move	38	60	<i>Do not fly!</i>

Wind Direction

Along with determining wind speed, you need to determine the wind's direction so you know where to stand and whether it will be safe to fly your kite. Fly your kite with the wind at your back. Remember the adage, "Wind in your face? You're in the wrong place!"

There are several ways to figure out which way the wind is blowing. Turn until the wind hits your face. Pay attention to your nose and ears -- they are natural wind sensors. You can also look at flags and tree tops. Wet a finger and hold it up -- the coolest side of your finger indicates the direction of the wind. Or watch the way other kites around you are flying!

PARTS OF KITE



Kite Sails

Kite sails must be light and strong. Tyvek, Mylar and Rip-stop nylon are ideal materials.

Spine

The spine must be strong, light, and straight. Maple and Birch spars are excellent. Many one line kites have fiber glass or carbon spars.

Cross Spar

The cross spar is made of the same materials and the same diameter as the spine.

Bridle

The bridle must be at least twice the length of the kite. A kite with a short bridle will not fly well, if at all. Kites use different kinds of bridling: (1) single point, (2) two-point, (3) three-point and (4) multi-point bridling.

The larger the kite the greater the need for multi-point bridling, because strong winds will bend or break kite spines and cross spars if they lack support between anchor points on the spars.

Kite Tails

Kite tails are necessary only in very strong winds or with flat kites (our Kite Kits are not flat kites so don't need kites except for decoration). Kite tails should be light. Kite tails work on friction in the air, not on weight.

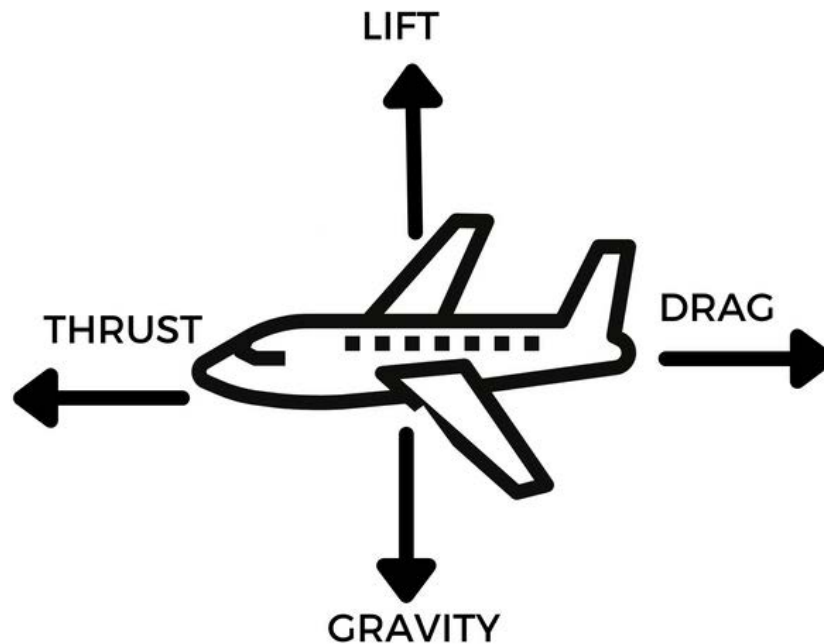
Line

Cotton and twisted nylon lines are excellent for single line kites. The thicker the line, the greater the wind resistance, which is the primary hindrance in raising the kite and releasing it to the end of a kite spool. An average kite flies well up to 150 meters/500 feet for kids. Keep tension on cotton and twisted kite lines at all times. A slack line will allow the kite line to twist*, and it will end up in knots that are difficult to untangle. Raise the kite on a tight line, and reel it home on a tight line.

* Use a fishing line swivel to fasten the kite line to the kite bridle.



PRINCIPLES OF FLIGHT

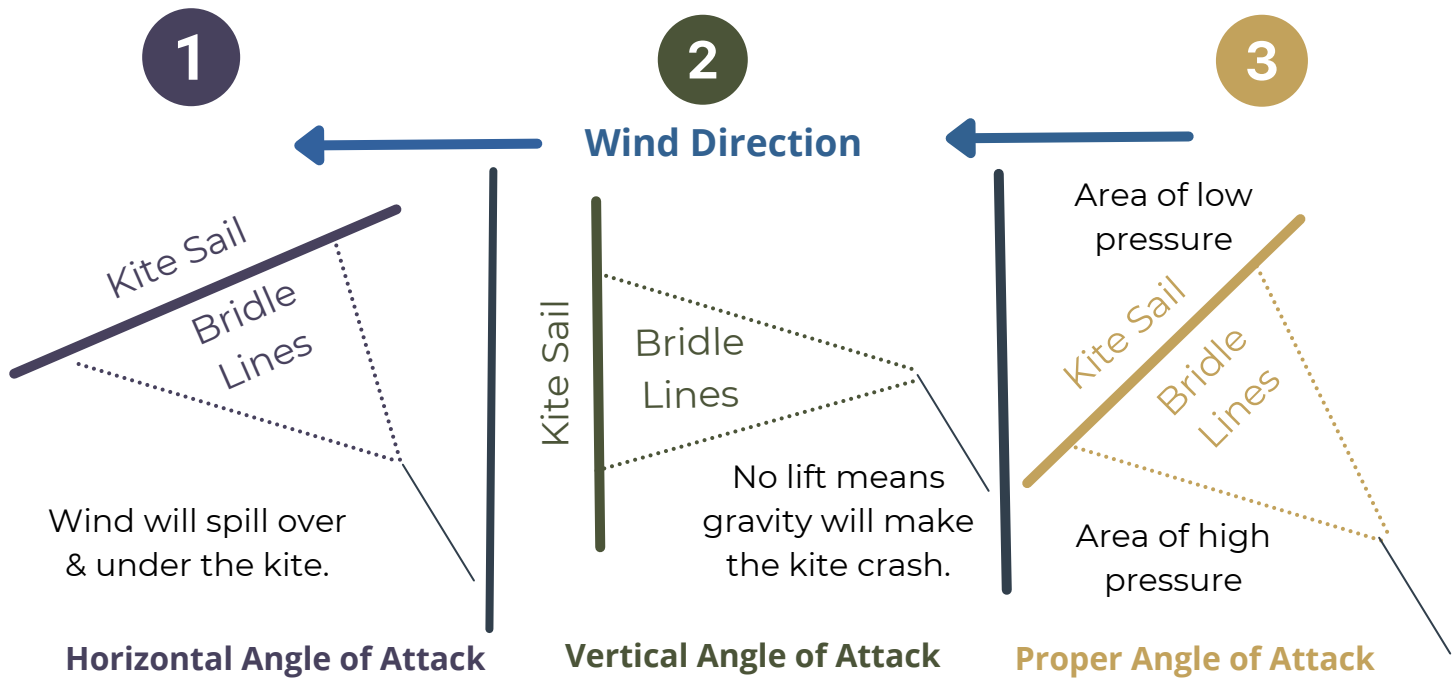


Four forces act at the same time on all objects in flight, be they kites, aircraft, sailboats, rockets, hang-gliders or parachutes.

- **Lift** is the upward force that acts against the weight of an object like a plane or kite. In an aircraft, lift is caused by the action of the air on the wings. In a kite, lift is caused by the air flowing over the sail.
- **Thrust** is the force that pulls or pushes an object forward. In an aircraft, thrust is produced by a propeller or a jet engine. In a kite, thrust is produced by the wind.
- **Drag** is the backward force that works against an object's forward thrust. It is caused by friction created when the object moves through air. In planes and kites all parts of the object cause drag.
- **Gravity** is the downward force on an object in flight. The greater the weight of the plane or kite, the greater the force gravity has upon it.

Depending on the shape of your kite it may be simply using the angle of attack or it may be using Bernoulli's Principle to achieve lift, thrust, drag and counteract gravity. We explain these two concepts next .

PRINCIPLES OF FLIGHT



Thrust and the Angle of Attack

For a long time kite sails were generally stretched as tight as possible across their frames - like you see in a traditional flat diamond kite. Such kites fly as a result of the force exerted by the wind, and the resistance of the sail, based on the angle of attack.

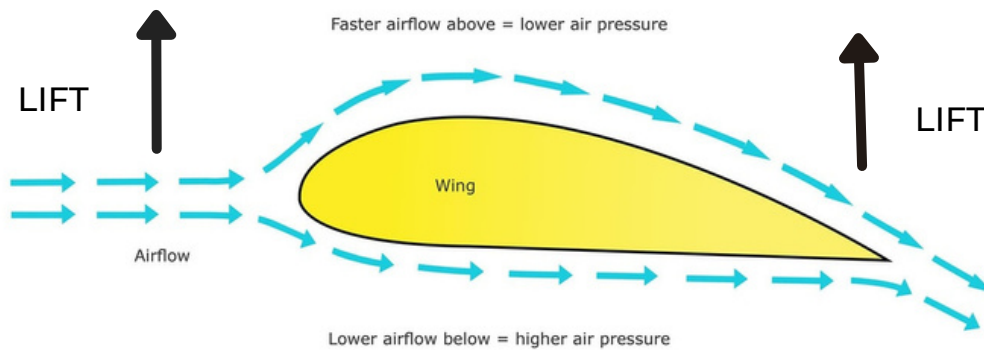
Three Angles of Attack

The angle of attack is the angle the kite makes against the horizon while it's flying, and is important to maximize **thrust**.

- **Horizontal Angle of Attack:** When a kite is aligned so that it is almost parallel to the ground, the kite will not fly. This is because the amount of wind force that acts on the kite is the same from below as from above. These two forces will cancel each other out and the kite will not fly.
- **Vertical Angle of Attack:** A kite held vertically (straight up and down to the ground) will be pushed ahead, but there will be no lift and gravity will make the kite crash.
- **Proper Angle Of Attack:** When a kite is at the proper angle of attack the wind will catch the kite and it will travel in the direction of the force. Excess wind will be spilled off the kite.

BERNOULLI'S PRINCIPLE & AIRFOIL

Kite design has evolved from the traditional flat diamond shape to the delta and other bowed shapes. An important reason for this change is the discovery of the airfoil and Bernoulli's Principle, which were central discoveries to the understanding of flight.



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Bernoulli's Principle explains how lift works on airfoil shapes found on airplane wings, bird wings, and even kites: faster moving air produces lower (downward) pressure on the top of the rounded wing than the (upward) pressure of the slower moving air at the flat bottom of the wing. The object rises up as a result of the difference in pressure.

It can be easier to understand how the airfoil shape utilizes Bernoulli's Principle to facilitate flight by using an aircraft wing as an example:

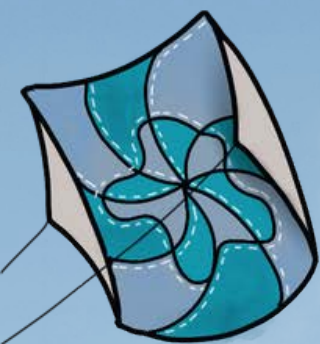
- Aircraft wings use a cross-sectional shape called the airfoil - that is to say a flat bottom and a rounded top.
- As the wing flies through the air, some air flows over the top of the wing, while some air flows under the bottom of the wing.
- The air flowing along the top (rounded) surface must travel a longer distance than the air flowing along the bottom (flat) surface.
- However, all of the air flowing over the top and bottom surface of the wing reaches the end of the airplane wing at the same time!
- This is because the air flowing along the top surface travels faster than the air flowing along the bottom surface.
- Slower moving air exerts more pressure towards the faster moving air - so from the bottom of the wing towards the top. **This is lift!**

NOTES



NOTES





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