



Thank you for taking the time to check out this thematic unit for an high flyin' exploration of the world of kites. Students will "travel the world" as they learn about the history and uses of kites throughout time.

Sandie Flynn

Kites

A Thematic Unit

Student
Selected
Subject



Grades 4-6

Includes detailed Substitute Plans



Kites

Overview of Materials

"If you could study anything you wanted, what topics would you choose?" That's the question I asked my third and fourth graders. After thinking and talking about it for a week, they listed and discussed all the possibilities, and then voted for 10 subjects. Kites was one of their top ten. If you're looking for something for the first few days of school, an exciting subject for use when you need a substitute, or just a fun week to practice useful skills, this may be the unit for you! You'll need a copy of *Kite Fighters* by Linda Sue Park for the Read Aloud Activities. Here's what you'll find in these materials:



File 1: Teacher's Guide
Overview, Standards, Book List, Credits, detailed Lesson Plans you can leave for a substitute, and Worksheet Answers. This is an exciting, student-selected topic for a special time.



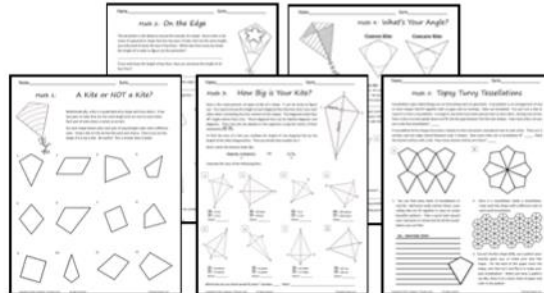
File 2: Reading Files
Students read from a collection of 8 articles about kites. Topics include Kites of the Ancients, Military Kites, Weather Kites, Benjamin Franklin, The Fall of Icarus, Kites of the Gods, Sporting Kites, and Types of Kites. A Reading Scavenger Hunt is included. Two formats are included: Print, and Digital Power Point®



File 3: Writing Directions
Students create a set of step-by-step directions, with illustrations, that walk a customer through constructing a kite from a kit.



File 4: Language Arts
Students use vocabulary, parts of speech, context, proofreading, poetry, and listening skills to complete language arts activities.



File 5: Math
Students learn the geometric properties of a kite and how to measure perimeter, area, and angles. They explore kite tessellations.



File 6: Science Activities
Five science activities allow students to explore principles of flight and wind. Common classroom objects are used to test air pressure using the scientific process.



File 7: Geography
Students use maps to explore the Silk Road, which may have spread the use of kites around the world.



File 8: Build a Kite
Students will read about sled kites, and then read and follow directions to build one of their own.



File 9: Posters
Posters (about 11X17) help students in their study of kites.

Kites of the Ancients



Kites have been in use for thousands of years, but they haven't always been top. In fact, the first kites were one of the earliest forms of technology!

CHINA

Historians believe kites may have come into use sometime around 330-476 BC (303) in China. The first written story of kite flying tells about a Chinese general named Han Xin. He used a kite to capture a town. He wanted to understand the walls and needed to find a way in. He flew a kite, probably carrying a man, above the wall so that he could get information on how wide the wall was. Then he knew how the troops would have to dig to tunnel underneath. Then dig the tunnel, sneak into the town, surprise the townsmen, and win the battle!

Another story tells of Emperor Han Thang of the Han Dynasty. His palace was surrounded by enemy soldiers so he ordered every person in the palace to make a kite specially designed to make noise at night. Hundreds of kites were set up in the dark, mountains high, over the city of the enemy where they measured and gathered all night long, frightening the foe so much that they ran away.

Mao Z, a master of justice is reported to have built a kite strong enough to lift up a man. It was called the Wooden Black Bird Kite. At least one other Chinese carpenter, Lu Ban, built a kite from the same design. Chinese armies used this type of kite to lift up a spy to the air and fly him over enemy camps to gather information.

In the early days, Chinese peasants were not allowed to fly kites. Too often they ran across banned fields, destroying the farmer's crops. The penalty for this was to be put in the stocks. Of course the farmers may have chosen to do this, but because their crops were ruined!

KOREA

News of these strange flying objects traveled from China to other countries. The people of Korea began to experiment with kites during the period of the Three Kingdoms (66-668). The battle group of General Son Yu-son was sent to get down a result. The night before the battle his troops saw a

Military Kites



Long before there were airplanes, satellites, and drones, kites were used in battle by the military of many countries. Although the invention of aircraft replaced some of their functions, it didn't replace them all.

- Chinese kite builders made the first kite that was strong enough to lift a man into the air. Military officers used these kites to fly spies over enemy territory so they could avoid out-train numbers, reconnoiter camps, villages, and towns, and learn about the land around them. And this was thousands of years ago!
- A young ruler from India named Shivaji attached a rope to a kite and flew it across a deep canyon to get the rope on the other side. At night he was able to use the rope to climb the cliff and attack the fortress wall.
- During the Civil War in the United States kites were used to send messages behind enemy lines. In one message, the Union forces tried to convince Confederate soldiers to desert by offering them money for horses and guns.
- The hydrogen kite, also called a box kite, was invented by Lawrence Hargrave in the late 1800s. This type of kite was very stable and could be built in many different ways. It was a very popular kite for military uses.
- The Russians used kites that were twelve feet tall to tow torpedoes toward their targets. They were quick and right on the mark. Sometimes they hooked many kites together (called kite trains) to get enough lifting power to carry the torpedoes.
- In 1910, Samuel Franklin Cook, working for the British, made a man-flying kite that could be flown through the air. It was loaded with a camera, telescope, compass, and a telephone so that the spy could talk with commanders

Benjamin Franklin




Benjamin Franklin was an American inventor, scientist, publisher, and founding father of the United States. One of his most famous accomplishments was his work with electricity.

In the 1740s electricity was interesting and amusing to many people, but it didn't have any real practical use in life. Scientists had not yet learned how to use it or there were no electric lights, no electric machines, and no electrical appliances! Static electricity formed in nature gave little shocks now and then, but that was all for it.

In 1752, a Dutch scientist, Peter van Musschenbroek, invented the Leyden jar. It was a scientific tool that could store an electrical charge of static electricity, the type of electricity made by friction. If it were connected to the top of a tall spire close to the electrode on the jar it caused a spark. It was fun to make the jar spark, but it didn't help people much in real life.

Scientists were studying electricity, though, and Franklin, curious about everything in life, grew interested in electricity. He had observed numerous lightning storms and hypothesized that lightning was a form of electricity. One day in June of 1752, a thunderstorm came up suddenly. He was thinking about it too much, Franklin decided to test his hypothesis using a kite. He was wondering if the earth and sky could conduct an electrical charge that he could capture and collect in a Leyden jar. He and his son, who was 12 years old at the time, made a small kite out of a parchment, he added a pointed piece of metal to the head of the kite, attached a silk string to it, and tied on a metal key. He thought he would need the key to identify the electrical current. He didn't feel anyone what he was doing was wrong. He was afraid others would make fun of him if his experiment failed. Franklin and his son then went out to a field and sent the kite soaring into the turbulent air. They had the ladder for with them, connected to the string with a key. The kite was up for a long time and they had not seen anything happen. Then, Franklin noticed some of the silk fibers on the kite string were sticking out, just like his hair did on a windy day. He thought that might be caused by static electricity so he touched a knuckle to the key and felt "a very certain electrical shock." The static electricity had traveled down the pointed metal shaft at the top of the kite, to the

Weather Kites



Ever since Benjamin Franklin completed his famous experiment with a kite and lightning, kites have been used to study weather and the atmosphere.

MEASURING THE TEMPERATURE

In 1749 Dr. Alexander Wilson, of Scotland, got the idea that he could use a train of kite to take temperature readings at different areas of the atmosphere. Since such a thing had never been tried before, Dr. Wilson and his friend, Thomas Melville, spent several months designing their experiment and building the kites. They were made of the lightest material that could be found and were four to seven feet tall.

On the day of the launch, thermometers were tied to each kite and one-by-one they were sent aloft. When the line of the first kite ran out, another kite was tied onto it. The kites went higher and higher with each one added. Sometimes they disappeared into the clouds! By the time all the kites were airborne, it became so hard to hold on to the lines and manage the kites, that everyone watching had to help! Each thermometer was released from its kite using a pull cord to allow them to drop to the ground. Just as they expected, the thermometers showed different temperatures for different altitudes in the sky. Their experiment was a success!

About a year and a half later, the man legend of Benjamin Franklin's experiment with lightning. They would never have tried such a thing because they would only send up their kites when the weather was clear.

The Fall of Icarus



They say "necessity is the mother of invention." In this story from Greek mythology, a man designs a tool to get himself out of a really bad situation.

The Fall of Icarus—A Greek Myth

Minos, the king of the island of Crete, had in his family a minotaur, a horrifying monster with the body of a man, but the head and tail of a bull. It was gigantic, and kept growing larger and more vicious every day. Minos was ashamed (and afraid) of the creature and wanted to build a secure and strong cage for it, where it could be hidden from sight—a place from which it could never escape. He called upon Daedalus (DAR-uh-DAW), a master craftsman and builder. Daedalus also designed a labyrinth as the monster's new home.

The labyrinth, a garden maze made of hedges, was huge and designed very carefully. The monster must be contained safely inside and hidden from curious eyes. Daedalus was so clever in his design that he almost couldn't find the way out himself. The minotaur was moved into his new home and the king was relieved. The monster was safely tucked away.

King Minos, however, was afraid of Daedalus. He didn't trust the builder, thinking he would tell others about the labyrinth of which he was very proud, and so before the king, so Minos had him thrown into a high tower, along with his son, Icarus (IK-uh-RAH). Every day the two prisoners sat in the tower, dreaming of their escape. It wasn't long before Daedalus began to study the birds flying by the tower. He watched closely for how they flew, and he came up with a design for a pair of wings—one for himself, and one for Icarus.

For many days Daedalus collected feathers all that he could find, and began to glue them together.

At last the day came when the wings were closely. You must be extremely careful to melt the wax and your feathers will tell you will dream."

Kites of the Gods



Mao's Kite

Mao, a young demigod of Hawaii, was lying on his back on the top of a mountain watching the South Sea across the sky. He noticed the distant winging of the light breeze, and feeling the comforting flow of the trade winds blowing across his skin, he decided to build a kite. He made a long piece of paper, folded it into a V-shape, and attached a tail. He made a long piece of paper, folded it into a V-shape, and attached a tail. He made a long piece of paper, folded it into a V-shape, and attached a tail.

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Sporting Kites



Many kites before a kite must be tethered, tied to the ground, but sporting kites have no problem with being kites. A French inventor, Le Bris, was the first person to invent a kite that he could fly. He made a kite that he could fly. He made a kite that he could fly. He made a kite that he could fly.

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Types of Kites



The Eddy Kite, sometimes called the Malay kite, was invented in Malaysia and perfected by William Miller in 1883. This type of kite has a broad cross spar and does not need a tail to fly. It is the most common type of kite in western countries.

The Box Kite is a great kite to fly in light wind. It has a lot of surface area so it can take advantage of an much breeze as there is. It is a very stable kite with strong lift.

The Star Kite was invented in the 1930s. This kite only has 2 spars, both of which are vertical. The wind curves out the center area of the kite. This is the type of kite frequently used by hang gliders, kite surfers, and kite surfers.

The Delta Kite is a flat kite that flies well in light winds. It's very stable and easy to handle and build.

The Rubber Kite is great in light to moderate winds. It doesn't need a tail and it looks very attractive flying against the blue sky.

The Bow Dart Kite has been around for quite a while. It flies best in light to moderate winds. It is a popular kite in the United States. Some kites especially enjoy flying over the beach. Does it fly from the New York City kite festival?

Reading Scavenger Hunt

As you read the passages about kites, look for the information below. See how many items on the Scavenger Hunt you can find. When you are finished, count how many items you have for each answer and write the number on the left hand line. Then find the total. How fun!

_____ Total associated with kites

_____ Scientists associated with kites

_____ Kites are hard to handle operations had to help

_____ A kite that is hard to catch when riding a horse or a train

_____ An artist who painted a portrait of Benjamin Franklin

_____ Materials used as kite lines

_____ A frame for a number

_____ Wind goals and prizes

_____ Kite sports

_____ Kites fly in moderate winds

_____ Total number of answers found

Reading Scavenger Hunt: Answers

As you read the passages about kites, look for the information below. See how many items on the Scavenger Hunt you can find. When you are finished, count how many items you have for each answer and write the number on the left hand line. Then find the total. How fun!

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_____ A frame for a number

_____ Wind goals and prizes

_____ Kite sports

_____ Kites fly in moderate winds

_____ Total number of answers found

Student Readers: Articles

Students read a collection of 8 articles which include the history of kites, their uses, myths, and types. There are 2 versions of the articles—print and digital (PDF). Students fill out a Reading Scavenger Hunt as they read the articles.



Kites of the Ancients

Kites have been in use for thousands of years, but they haven't always been toys. In fact, the first kites were one of the earliest forms of technology!

CHINA

Historians believe kites may have come into use sometime around 770-476 BC (BCE) in China. The first written story of kite flying tells about a Chinese general named Han Hsin. He used a kite to capture a town! His warriors had surrounded the walls and needed to find a way in. He flew a kite, probably carrying a man, above the wall so that he could find out how wide the wall was. Then he knew how far the troops would have to dig to tunnel underneath. They dug the tunnel, snuck into the town, surprised the townspeople, and won the battle!



Chinese Architecture: Image by Linnaea Mallette via PublicDomainPictures.net.

Another story tells of Emperor Huan Theng of the Han Dynasty. His palace was surrounded by enemy soldiers so he ordered every person in the place to make a kite specially designed to make noise as it flew. Hundreds of kites were sent up in the dark, moonless sky, over the camp of the enemy where they moaned and groaned all night long, frightening the foe so much that they ran away.

Mu Zi, a master of joinery (a carpenter) spent three years building a kite strong enough to lift up a man. It was called the Wooden-Black-Eard-Kite. At least one other Chinese carpenter, Lu Ban, built a kite from the same design. Chinese armies used this type of kite to lift a spy up into the air and fly him over enemy camps to gather information.

In the early days, Chinese peasants were not allowed to fly kites. Too often they ran across planted fields, destroying the farmer's crops. The penalty for this was death, by starvation. Of course the farmers may have starved to death, too, because their crops were ruined!



Korean Village: Image by tau nguyen from Pixabay.

KOREA

News of these strange flying objects traveled from China to other countries. The people of Korea began to experiment with kites during the period of the Three Kingdoms (4-645 AD/ACE). The battle group of General Gim Yu-sin was sent in to put down a revolt. The night before the battle his troops saw a

shooting star and refused to fight the next day. They believed the star had fallen from the sky to the earth. That night the general attached a ball to a kite, set it afire, and launched it into the air. The fireball went out high up in the sky and the general told his men, "See, the star has returned to the sky." The soldiers rejoiced and put down the rebellion the next day.

JAPAN

Buddhist monks brought kites to the land of Japan in the 700s. They believed the kites would ward off evil spirits. For hundreds of years, only members of the warrior Samurai class were allowed to fly kites. In the 1600s, regular Japanese citizens began to use them. Many families flew kites over their houses every night to keep evil spirits away. Today kite festivals are held all over Japan, and families often fly fish kites to announce the birth of a baby.



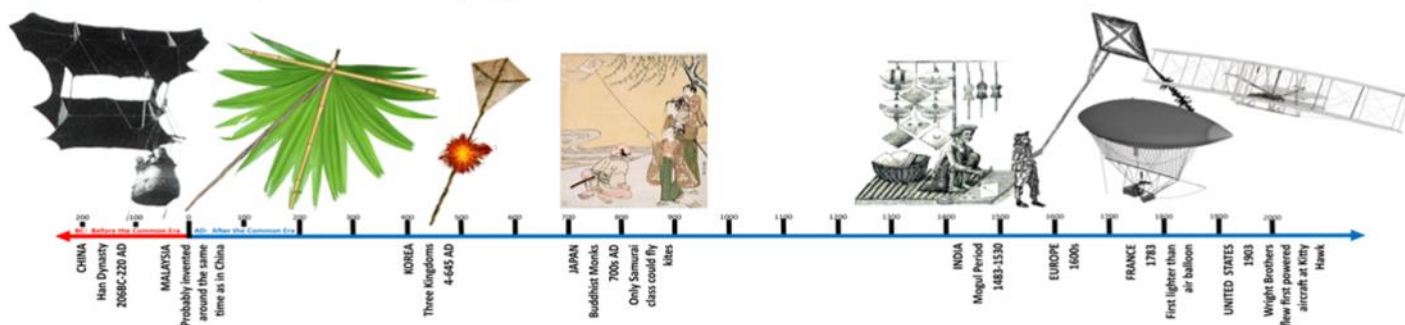
Woodblock print of kite flying by Japanese artist Suzuki Harunobu via Wikimedia Commons.

MALAYSIA

Wind is a powerful force of nature in tropical areas, and ancient people who lived on the Malaysian Peninsula long ago worshipped the wind as a god. Island natives sent large leaf kites high into the sky as gifts to him. Foreigners sailing to the islands reported seeing lots of these objects floating in the air above the trees, but they were nowhere to be found once the sailors had landed. All that was left was some broken wreckage floating in the ocean. From the wreckage, visitors learned these strange flying things were made of palm fronds tied to bamboo frames. The kite strings were made of twisted vines. Later the people of Malaysia used cloth to make kites as tall as men with long tails decorated with feathers and flowers, although these kites didn't need tails because they had a bowed frame. Today, kites made with a bowed frame are called Malay or Eddy kites. Some historians believe kites were invented in both China and Malaysia at near the same time.

EUROPE

Flat kites did not become popular in Europe until the 16th century. They were mainly used to create fireworks in the sky and were called firedrakes. The kite was made of fabric and covered in oil and gunpowder. Fire crackers were tied onto the tail, which was also sprinkled with gunpowder. At night, the kite was lifted into the sky and the fire crackers were lit. They went off one by one, with the fire traveling up the tail of the kite until it at last reached the kite itself, igniting a huge flare of flame. Some religious leaders used these fire-drakes to scare the people into obeying them.



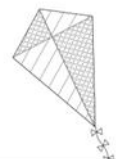
Yolen, Will. *The Complete Book of Kites and Kite Flying*. Simon and Schuster: New York, 1976.

Name _____
Date _____

Parts of Speech:
Weird and Wacky Kites

People have done some really strange things with kites. Read the sentences below to learn about some of them. Later, maybe you can do some research to discover more about the weird world of kites!

Follow the directions for identifying each part of speech.



Name _____
Date _____

Proofreading:
Fool Proof Kite Fight

Can you be fooled? Proofread this paragraph about a kite fight in Central Park. There are 26 mistakes. Correct the paragraph, then check the story to see if you were a foolproof kite flyer!



Name _____
Date _____

Parts of Speech:
Weird and Wacky Kites ANSWERS

Circle the nouns (person, place, or thing). Underline the verbs (action words) and their help. Cross out (X) the prepositions (of, for, to, on, by, in). Make a cloud around the articles (a, an, the).

1. People use kites to keep birds off their fields.
2. A minister flies prayers on his kite.
3. A worker flies kites out of bad checks.
4. Kites carrying little people do acrobatic tricks in the air.
5. Kites to advertise their products included man-carrying kites.
6. A carriage at twenty-five miles an hour uses a kite to take pictures.
7. A kite used to take pictures of his. At either.

Name _____
Date _____

Vocabulary: Crossword Puzzle

Kite Fight in Central Park

He loves to fly kite. He lived in New York City and was married to a woman. He began flying kites when he was an adult, way before the 1900s. He and his wife didn't play with kites and the police often asked him to stop. One of his neighbor also loved flying kites—he flew them. Will called him Pablo. Pablo lived above central park, and one day he fell suddenly, out of the blue. The fight was on! Pablo's kite came down, the fight was on! Pablo's kite came down, the fight was on! Pablo's kite came down, the fight was on!

ACROSS

1. a string of objects attached to the bottom of the kite that helps balance the kite in flight
2. the paper or fabric part of the kite that catches the wind
3. a person who flies a kite
4. a piece of wood or bamboo used in the kite's frame to support the sail
5. air moving suddenly from the atmosphere toward the ground
6. a sudden gust of wind
7. a scale to identify how strong the wind is
8. movement of the kite type that take the kite exactly where the flyer wants it to go
9. the bottom edge of the kite
10. rings created by pointed hedges
11. device used to hold kite string so it can be let out and reeled in
12. how the wind swirls, how the air moves and interacts with objects

DOWN

1. wild and stormy
2. sudden
3. part of the kite and the string
4. a kite fly
5. air moving suddenly
6. part of the kite that catches the wind
7. a sudden gust of wind
8. a scale to identify how strong the wind is
9. movement of the kite type that take the kite exactly where the flyer wants it to go
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Name _____
Date _____

Poetry:
Diamonds in the Sky

Did you know that some formulas? A diamond (all lines beginning with one on the second, five word fourth, and one word on

1. Make a list of interesting words that are related to kites.



KITES

Kite Fighting: Road Ahead

Read Aloud Activities

Kite Fighters by Linda Sue Park is the story of two brothers and a king in Seoul, Korea in 1473. It is intended that this be a listening activity during the last few days of the unit, after the students have completed the reading activities. You will need to purchase the book ahead of time, or check it out from a library.

It takes about 2 hours to read the entire novel. There are a couple of different options for dividing up the book into reading chunks:

- Divide how many days you have left in the unit into 2 hours and read for that period of time each day, dividing it into several smaller chunks of time during the day if necessary.
- Continue reading the novel after the unit is over for 15-20 minutes each day.
- Start reading on the first day of the unit, and read for 20-25 minutes each day.

You can read the novel to the students for pleasure and information, ask them some questions at the end of each listening period (a list of questions and answers for each chapter is attached), or divide them into small groups and allow them to discuss each day's reading independently using the included Bloom's Taxonomy Book Marks.

Choose what works best for your group of students.

Preparation:

1. To ask questions after each chapter, print pages 2-4 on copy paper, 1 copy for yourself, 2 sided if you wish.
2. To use the Bloom's Taxonomy Book Marks, print pages 10-11 on cover stock. Make as many copies as you need. There are 2 sets of book marks on each page. (See directions on page 9.) Students may need some instruction on how to use these book marks.
3. There are two pictures included which feature the Palace in Seoul, South Korea, as well as a picture of a palanquin used to carry the kings of an earlier period. Print 1 copy of pages 7-8 if you wish to use these images.

Instruction:
Read the novel as you would any read aloud. Use the included materials any way you wish.



Name _____
Date _____

Ad Libs with Ben

_____ American statesman, is well known
In 1752, during a _____ storm,
_____ that _____
_____ a _____
_____ and sent the _____
_____ The _____
_____ was touched by _____
_____ don't _____

Ad Libs with Ben ANSWERS

All this is a fun way to practice parts of speech. You'll need a partner to play this game. Tell them the kind of word you need (noun, adjective, verb, adverb, etc.) and write it on the blank. Read the story to them until all the blanks are filled in. You share your hilarious story with them, switch places and they fill in the blanks with your words.

Benjamin Franklin, the _____ American statesman, is well known for his use of a _____ in 1752, during a _____ storm, _____ that _____ a _____ and sent the _____ The _____ was touched by _____ don't _____

Name _____
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Parts of Speech:
Weird and Wacky Kites ANSWERS

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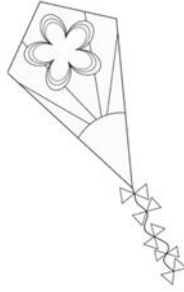
Language Arts

Students practice proofreading, parts of speech, poetry, and vocabulary.

Name _____ Date _____

Writing Directions:

How to Assemble a Kite Kit



Pretend you are a kite manufacturer and you are making kite kits for children. It is your job to create the direction sheet to show how to put the kite together. Choose the type of kite you wish to use. (A simple kite is easiest.) Then follow the steps below to write the directions for your kit. You may include drawings. We will work on this for several days.

1. What kind of kite is in your kit?

2. Make a list of all the parts that are in your kit. Include the materials needed to put the kite together.

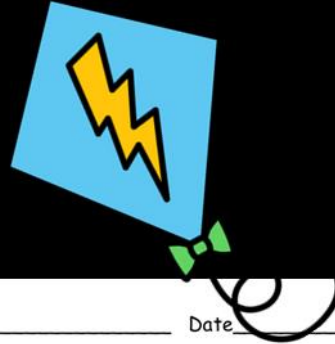
3. On another sheet of paper make a separate drawing of each part of the kite. Make the drawings large enough so that you can cut them out and actually put them together. Then cut them out! You will use them to help you write your directions.
4. Use the kite pieces from step 3 to help you write step-by-step directions to show and tell a child how to build the kite. Include drawings for each step.
5. Share the rough draft of your directions with a friend. Give them the pieces of your kite and ask them to try out your directions by "building" the kite as you watch.
6. Use what you learned when your friend tried your instruction sheet. Revise your directions to make them more clear and easier to understand. Have your friend check out your revisions.
7. Write the final copy of your directions on white drawing paper. Be sure to include:
 - ___ A Title
 - ___ List of Parts
 - ___ List of materials needed—include items that your kit does not have
 - ___ Step-by-step directions with drawings
 - ___ Where to call if help is needed (You can make this up!)

8. Edit your directions on white drawing paper. Be sure to include:
 - ___ Capital letters
 - ___ Usage—clear directions
 - ___ Punctuation
 - ___ Spelling

Congratulations! You are ready for a job with a kite manufacturer! Well, maybe not a paying job!

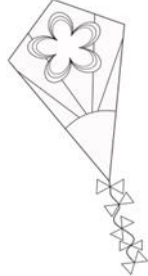
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Date _____

How to Assemble a Kite Kit ANSWERS



1. Pretend you are a kite manufacturer and you are making kite kits for children. It is your job to create the direction sheet to show how to put the kite together. Choose the type of kite you wish to use. (A simple kite is easiest.) Then follow the steps below to write the directions for your kit. You may include drawings. We will work on this for several days.

2. What kind of kite is in your kit?
Any kind of kite is acceptable. A simple kite style is preferred for this activity.

3. Make a list of all the parts that are in your kit. Include the materials needed to put the kite together. Most will include paper or fabric, wood, string, line reel, tail, tail ties, glue or staples.

4. On another sheet of paper make a separate drawing of each part of the kite. Make the drawings large enough so that you can cut them out and actually put them together. Then cut them out! You will use them to help you write your directions. **Students make these pictures large enough to manipulate. They do not need to be as large as the actual kite.**

5. Use the kite pieces from step 3 to help you write step-by-step directions to show and tell a child how to build the kite. Include drawings for each step. **Each student's draft will be different.**

6. Share your directions with a friend. Give them the pieces of your kite and ask them to try out your directions as you watch. **Circulate around the room and monitor as necessary.**

7. When your friend tried your instruction sheet. Revise your directions to make them more clear and easier to understand. **Circulate around the room and monitor as necessary.**

8. Write the final copy of your directions on white drawing paper. Be sure to include:
A Title
List of Parts
List of materials needed—include items that your kit does not have
Step-by-step directions with drawings
Where to call if help is needed (You can make this up!)

9. Edit your directions on white drawing paper. Be sure to include:
Capital letters
Usage—clear directions
Punctuation
Spelling

Evaluate the final copies on a scale of 1-4 based on

- 1) Are all parts included?
- 2) How clear are the directions?
- 3) How clear are the illustrations?
- 4) Could a child assemble the kite using these instructions?
- 5) How correct is the editing job?

Congratulations! You are ready for a job with a kite manufacturer! Well, maybe not a paying job!

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Writing

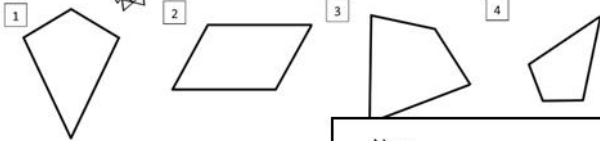
Students write and illustrate a direction sheet explaining how to assemble a kite kit purchased from a kite manufacturer.

Math 1: A Kite or NOT a Kite?



Mathematically, a kite is a quadrilateral (a shape with four sides). It has two pairs of sides that are the same length and are next to each other. Each pair of sides share a vertex (a corner).

For each shape below color each pair of equal length sides with a different color. Draw a dot on the vertex that each pair shares. Then cross out the shape if it is not a kite. Be careful! This is trickier than it looks!



Math 2: On the Edge

The perimeter is the distance around the outside of a shape. Since a kite is the name of a geometric shape that has two pairs of sides that are the same length, you only need to know the length of two lines. Which two lines must you know the length of in order to figure out the perimeter?

If you only know the length of two lines, how can you know the length of all four lines?

How can you find the distance around the outside edge of a whole kite?

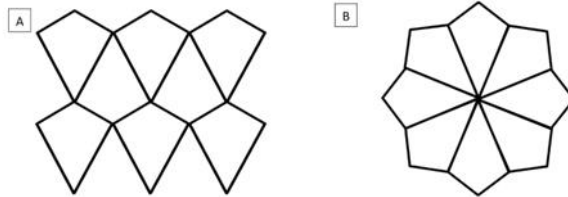
Calculate the perimeter for each of the following kites:



Math 5: Topsy Turvy Tessellations

Tessellations (also called tilings) are an interesting twist on geometry. A tessellation is an arrangement of one or more shapes that fit together with no gaps and no overlaps. Kites can tessellate! You can turn a kite or move it to form a tessellation. In image A, two kites have been placed next to each other, sharing one vertex. Then a kite is turned upside down and fit into the gap between the first two shapes. How many kites can you see in the first tessellation?

In tessellation B the shapes have been rotated on their end points and placed next to each other. There are 2 vertices and one edge shared between each 2 shapes. How many kites are in tessellation B? Mark the shared vertices with a dot. How many shared vertices are there?



- 1. You can find many kinds of tessellations in real life. Bathroom walls, kitchen floors, even ceiling tiles are fit together in ways to create beautiful patterns. Take a quick look around your classroom or school to find tessellations you can find.
- 2. Here is a tessellation inside a tessellation. Color each kite shape with a different color in each small tessellation.

ex: restroom floor

Answers for Math 5: Tessellations. Includes diagrams of tessellations and instructions for coloring and identifying shapes.

Math 3: How Big is Your Kite?

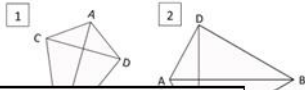
Area is the measurement of space inside of a shape. It is how much space a shape takes up. You need to know the length of each diagonal line (the lines that connect the four vertices of the shape). The angles where they cross. These diagonal lines can be labeled with letters. They may also be labeled as line segments using points A, B, C, D. Diagonal 1 is AB. Diagonal 2 is CD.

To find the area of a kite you multiply the length of length of the other diagonal line. Then you divide that

Here's what the formula looks like:

$$\frac{\text{diagonal}_1 \times \text{diagonal}_2}{2}$$

Calculate the area of the following kites:



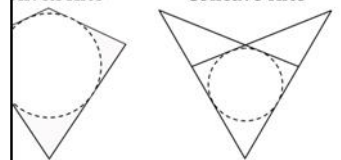
Area calculations for kites with given diagonals: 1. AB=3m, CD=2cm. 2. AB=36 inches, CD=18 inches.

Area calculations for kites with given diagonals: 3. AB=4.5 feet, CD=2.5 feet. 4. AB=42 cm, CD=36 cm.

Area calculations for kites with given diagonals: 5. AB=10 cm, CD=12 cm. 6. AB=15 cm, CD=18 cm. 7. AB=20 cm, CD=25 cm. 8. AB=30 cm, CD=35 cm.

Math 4: What's Your Angle?

Convex Kite Concave Kite



Both types of mathematical kites contain a circle. It's called a tangential circle. Mark the point the circle touches. Do you think the points will always be at the same locations?

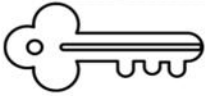
Angles of a kite are marked with a curved line (see number 1 below). Mark each of the inside angles on the kite. Then use a protractor to measure the angles. Round to the nearest 5° and write the measurement of each angle in each corner. Then add the measurements of the four angles together and

Angle measurement exercises for kites. Kite 1 has angles 95°, 115°, 95°, 55°. Kite 2 is a concave kite. Kite 3 is a convex kite.

What patterns do you notice in the angle measurements? Do you know what a convex kite is called in the kiting world? Do you know what a concave kite is called in the kiting world?

Answers for Math 4: What's Your Angle? Includes diagrams of kites with angle measurements and explanations of convex and concave kites.

The Mathematics of Kites



Science 1: The Scientific Method

Scientists often use a process called the Scientific Method to design and perform experiments. There are several steps to this process:

- Observation:** They notice something that makes them wonder.
- Question:** What are they wondering about?
- Hypothesis:** What they think the answer may be.
- Experiment:** They then plan an experiment to prove or disprove the hypothesis.
- Results:** They observe what happened during the experiment and write it down.
- Conclusion:** A statement about the outcome of the experiment and what it means.

Read the sentences below. Decide which part of the scientific method it is and then write the label in the blank.

_____ the electrical shock as it hit my body. The Leyden Jar gave off a spark.

_____ in nature.

_____ does it get so much power

_____ a metal key to the string

_____ end of the kite string in

_____ lot of power and can bu

_____ es this.

_____ of electricity and that

_____ is reserved.

Science 5: Let's Go Fly a Kite!

Kites can be a lot of fun, but they can also be frustrating. Getting them up in the air and keeping them there can be a lot harder than it looks! Here are some tips to make your kite flying more successful.

Use the **Beaufort Wind Scale** to decide if it's a good day to fly a kite. Wind levels of 1-3 are best for beginners.

Choose an open area—your school's grassy field area may be a good choice. Check to make sure there are no power lines, trees, or light posts that your kite may snag on. Beaches, hillsides, meadows, and deserts are all open spaces good for kite flying. Anywhere hot air rises from the ground will provide good lift for your kite.

Determine which direction the wind is coming from. You can watch how the wind blows blades of grass, the leaves on a tree, observe what direction smoke is blowing, or just turn your body until the wind is blowing your hair away from your face. That's where the wind is coming from!

Turn around so your back is facing the wind. (Then your hair will blow into your face.) Let out some of your kite line and let the line hang loose. Hold the kite by the bridle so that the wind blows into the kite. Lift it up and let the air grab onto it.

If you're flying a sled kite, it may be hard to keep it open when you are trying to launch. If that happens, work with a friend. Give them the kite while you keep the line. They can use two hands to help hold the sail open as they lift it up and toss it gently into the air. You will need to tug on the line, or pump it a little, to give the kite some lift and thrust. You also might want to plead with your kite a little to give it some encouragement. Getting your kite off the ground can be a challenge!

Once your kite is in the air, try slowly letting out more line to see what happens. Then try slowly reeling in some of the line. If your kite starts to dive, quickly pull on the line to give it more lift. It will take some experimentation to learn how best to maneuver a kite.

To land your kite, slowly reel the line in, wrapping it on the reel as you go. You don't want a tangled mess of line! When you are more advanced you may be able to pull the kite right into your hands without bouncing it off the ground at all.

Let's go fly a kite!

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Science 2: Air Pressure

Air takes up space, it has weight, and therefore it exerts pressure on the objects that are in and below it. How strong the pressure is depends on how much air is pressing on or against an object. If you are standing on a mountain top, the pressure on your body will be much less than if you are standing on an ocean beach. That's because the mountain top is much higher up in the atmosphere, so there is not as much air above you as there would be if you were playing on the ocean's shore. Kites, airplanes, and rockets all are impacted by the amount of air pressing against them. The higher up they go in the atmosphere, the less pressure there will be.

You can see the results of air pressure when you blow up a balloon. The more air that is forced into the balloon, the greater the pressure will be. If you fill up a balloon with more air than it can hold, what will happen to it?

How does this prove that air takes up space?

Blow up three balloons. Put a little air in one, a moderate amount of air in the next, and a lot of air in the third. Don't tie off the ends, just hold them shut and look at each closely. What do you notice about each balloon?

Balloon 1, least amount of air: _____

Balloon 2, moderate amount of air: _____

Balloon 3, most amount of air: _____

Lining up the balloons you and your friends are holding, release the

Science 2: Air Pressure ANSWERS

How strong the pressure is depends on how much air is pressing on or against an object. If you are standing on a mountain top, the pressure on your body will be much less than if you are standing on an ocean beach. That's because the mountain top is much higher up in the atmosphere, so there is not as much air above you as there would be if you were playing on the ocean's shore. Kites, airplanes, and rockets all are impacted by the amount of air pressing against them. The higher up they go in the atmosphere, the less pressure there will be.

You can see the results of air pressure when you blow up a balloon. The more air that is forced into the balloon, the greater the pressure will be. If you fill up a balloon with more air than it can hold, what will happen to it? **The balloon will burst because there is too much pressure inside it to be held together.**

How does this prove that air takes up space? **It shows that air takes up space.**

Blow up three balloons. Put a little air in one, a moderate amount of air in the next, and a lot of air in the third. Don't tie off the ends, just hold them shut and look at each closely. What do you notice about each balloon? All answers will vary. Accept all that are reasonable.

Balloon 1, least amount of air: (lighter color, smaller size, not flexible or when inflated, soft, inflates easily, inflates quickly)

Balloon 2, moderate amount of air: (lighter color, larger size, soft, flexible, inflates quickly)

Balloon 3, most amount of air: (darker color, largest size, very flexible and soft, inflates quickly)

Lining up the balloons you and your friends are holding, release the balloons all of the same time. What do you observe? All balloons flow off, largest balloon inflated the fastest, smallest never inflated, middle one inflated last.

Materials:

- 3 plastic cups
- 3 sheets of paper
- 3 paper towels
- water

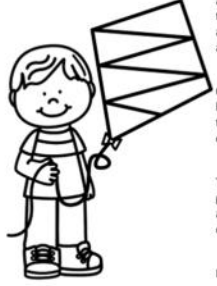
Directions:

- Fill a plastic cup with enough water to cover the cup.
- Place a sheet of paper towel in a plastic cup and push it down into the bottom of the cup. Turn the cup upside down and make sure the paper towel fits snugly.
- Hold the cup upside down over the water and quickly push it down to the bottom of the bin. Wait a few seconds and then pull it straight up out of the water.
- Take the paper towel out of the cup. What happened? The paper is dry. Why do you think this happened? The air pressure inside the cup held the water out.
- Put the paper towel back into the cup and do the same thing again, but this time lift the cup so you push it all the way down into the water. Watch the cup come up and push it down. What do you see? Nothing is coming out!
- Take the paper towel out. What happened? The water is wet. Why did it happen? Putting the cup straight up in the water pushed the water in.

What does all this tell you about air pressure? Air takes up space and exerts pressure whenever it is present. It can fill cups, break objects, move objects. It is a powerful force.

Science 3: Beaufort Wind Scale

WIND FORCE	MILES PER HOUR	KNOTS	KILOMETERS PER HOUR	DESCRIPTION	SEA LIKE A...
0	0-1	0-1	0-1	Calm	Sea like a mirror
1	1-3	1-3	2-6	Light Air	Ripples that without foam
2	4-7	4-6	7-11	Light Breeze	Small waves pronounced look and feel
3	8-12	7-10	13-19	Gentle Breeze	Large waves break. Foam may have sea
4	13-18	11-16	20-30	Moderate Breeze	Small waves some white
5	19-24	17-21	31-39	Fresh Breeze	Moderate waves horses are flying
6	25-31	22-27	40-50	Strong Breeze	Large waves foam crests
7	32-38	28-33	51-61	Near Gale	Sea heaps up with breaking waves; white foam begins to blow in streaks in the direction of the wind.



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Science 4: Air Forces in Flight

forces that come into play in making a kite (or any aircraft) fly: lift, drag, thrust, and gravity. Understanding a little of how these forces work may help you understand how a kite flies.

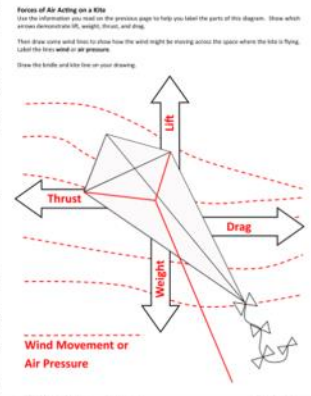
Lift is the force that moves the kite upward and causes it to stay in the air. The lighter your kite is, the less lift you need. To keep your kite in the air, you need lift that is equal to or greater than the weight of your kite. That's why it's helpful to make your kite out of lightweight materials.

Drag is the force that comes from air resistance—the air moving against the kite. To move the kite forward, the thrust must be greater than the drag.

Thrust is the force that moves the kite forward and causes it to stay in the air. The lighter your kite is, the less lift you need. To keep your kite in the air, you need lift that is equal to or greater than the weight of your kite. That's why it's helpful to make your kite out of lightweight materials.

Gravity is the force that pulls the kite downward and causes it to stay in the air. The heavier your kite is, the more lift you will need to get it into the air. The lighter your kite is, the less lift you need. To keep your kite in the air, you need lift that is equal to or greater than the weight of your kite. That's why it's helpful to make your kite out of lightweight materials.

How is weight shown in the experiment above?

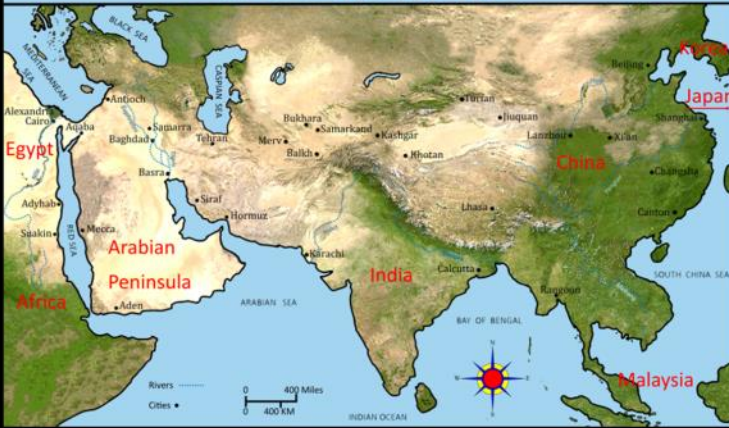


WIND AND AIR PRESSURE
Wind, which is moving air, travels across the sky in different ways, depending on the landscape—water, trees, cities, forests: they are different temperatures, and a different pressure, than cooler air. warm air and cool air meet, it causes wind. All of these things will affect the wind. You can get a little feel of this yourself: the next time you're riding a bike, you will feel a little like a kite itself as the wind knocks it around. You'll see the results of air pressure when you blow up a balloon. The more air that is forced into the balloon, the greater the pressure will be. If you fill up a balloon with more air than it can hold, what will happen to it? The balloon will burst because there is too much pressure inside it to be held together.

Opheim, Amy. Getting Curious about the Science of Kites. Website: Accessed 04/11/2020

Science Activities

The Silk Road



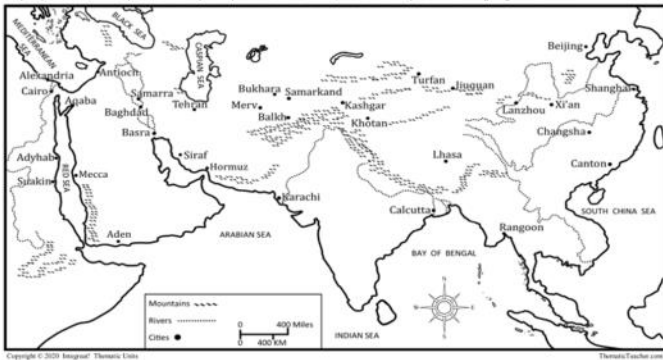
The Silk Road



Name _____ Date _____

The Silk Road

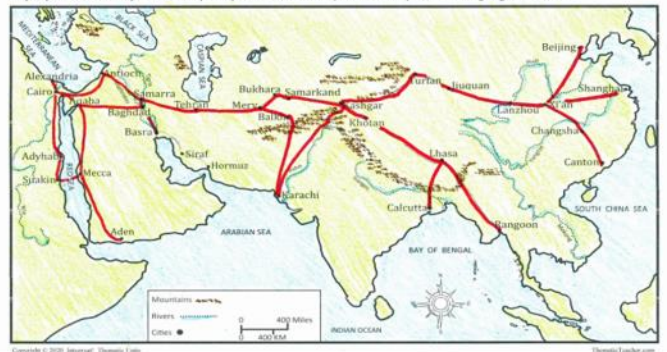
Historians believe that kites may have been invented in both China and Malaysia at around the same time. They believe the use of kites was exported from China to the rest of Asia, the Middle East, and Europe over hundreds of years via traders traveling along the "Silk Road". This travel route allowed trade between the great civilizations of Greece, Rome, and China between the second century BC (BCE) and the 18th century. Large caravans carried silk and spices to the West and silver, gold, and wool were sent to the East. There was also an exchange of ideas, science, and technology (such as the use of kites) carried on through the trade route. The map below shows some of the main cities along the Silk Road. Study the landforms (rivers, mountains, placement of cities). The traders walked in large caravans using horses and camels as pack animals and traveled thousands of miles. Think about the easiest way to connect the cities, keeping in mind the mountains and rivers that must be crossed. Then draw a road connecting the towns. Historians have LOTS of different ideas of exactly where the route went, so your map may be as accurate as any of theirs! Color your map to make it easier to read, and then outline your Silk Road using a high contrast color.



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The Silk Road

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Geography

Students explore possible paths of the Silk Road as they learn about the spread of kites around the world.



The Sled Kite



The sled kite was invented in 1950 by William Allison. He was amazed at how flexible the kite was as it darted on the light breeze, so he named it after a popular snow sled of his day—the flexible flier. A sled kite flies beautifully.

This type of kite is easy to build, but can be hard to fly. It likes to fly high up in the sky on a light breeze, but if you try to fly it in a heavy wind it may drop out of the sky—that is if you even get it up there to begin with. This is because it doesn't have a side-to-side support. The original sled kite design has two spars running from top to bottom. This allows the wind to spread the kite out in different curvatures so it can adjust in many ways in wind speed and direction. This makes it a very light, delicate, and darting type of kite. A sled kite can also have a third spar going straight down the center, from top to bottom. How do you think this might affect the way the kite would fly?

Sled kites are made with vents cut into them which allows the wind to move in even more ways across the surface of the kite. When you are making your kite you'll need to decide if you want to make it with a vent or without. If you decide to go with a vent, cut it AFTER you have the spars attached. That will make it easier to tape the spars down smoothly. Also, your kite may fly better if you round off the corners of the triangular vent a little bit. You'll need to make these decisions BEFORE you start construction on your kite, so start thinking about them now.

Another variation in the sled kite is whether or not it has tails. Some kite fliers like to attach tails to the ends of each spar. (The drawstrings on the kitchen trash bag that you may use to make the sail can be good tails.) You can also cut tails out of the extra material left over from the sail, from crepe paper, or strips of newspaper. It's time to start making your plans now.

The main problem with flying a sled kite is getting it off the ground and up into the air without it collapsing. This is because it doesn't have any lateral spars. It will fly best once you get it at a 45 degree angle to the ground. If you want to "cheat" a little when you are first learning to get your craft airborne, you can staple a one inch strip of cardboard across the top of the kite, about 1 inch down from the edge. But you won't want to use this beginner's method once you learn how to get your sled up, up, and away!



Kite Soaring. Image by Michael Becker from Pixabay.

Sled Kites. American Kite Fliers Association. Website: Accessed December 7, 2020 from <http://kite.org/education/types/sledkite/>

Yolen, Will. *The Complete Book of Kites and Kite Flying*. Simon and Schuster, New York, 1976.

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Build a Sled Kite

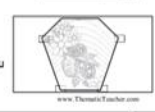
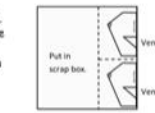
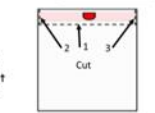
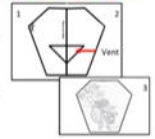


Materials:

- 1 white drawing paper, 12"x18"
- 1 white, smooth plastic kitchen trash bag with drawstrings
- 2 12" bamboo cooking skewers
- colored marking pens
- kite template
- scotch tape
- strapping tape (optional)
- hole punch
- kite string, 30' or more
- yard stick or meter stick
- 1 paper clip
- 1 cardboard strip, 2"x4"

Directions:

1. Fold a piece of white drawing paper (12X18) in half, then open the paper back up. 1) Lay a kite template with the edge along the fold. Trace it. 2) Flip the template over and draw the other half of the kite sail. (Draw the vent only if you want one.) 3) Then draw a design inside the kite sail outline using a pencil. Take your time as this will be the decoration for your kite. You will color it later.
2. Find one other friend to work with.
3. Together, cut the top off a white kitchen trash bag (1). Be careful NOT to cut the drawstrings. Cut off the ends of the top where the drawstrings are attached (2 & 3). Carefully pull the drawstrings out of the bag. Fold each string in half and cut on the fold. Each person needs 2 drawstring pieces. Put them in a safe place.
4. Lay the kite sail template along one edge of the trash bag fold. (Be sure there is NOT a seam on that fold.) Place the template close to the top of the bag, so there is enough room below it for your partner's kite sail. Trace around each template with a marking pen. Cut the kite sails out, but DON'T cut the vents yet. Then open the kite sail to its full shape.
5. Lay your plastic kite sail on top of your drawing. Smooth out the plastic so it is flat and statically sticks to your drawing paper. Place a small piece of tape on the side and bottom corners and tape the plastic kite sail to the drawing paper. You should be able to see your design through the plastic.



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6. Carefully trace and color your design onto your plastic kite sail using colored markers. Color lightly because the plastic tears easily. (You can fix tears with tape after coloring.) If the ink smudges onto your hand, lay a paper towel beneath your hand as you color. Let the ink dry overnight.



7. To remove your plastic kite sail from the drawing paper, pull the tape off the paper (NOT off the plastic) and fold it over to the back side of your kite.



8. Lay a bamboo skewer from the top left corner to the bottom left corner of the kite sail. Tape it into place using scotch tape. Do the same thing on the right side. Cut off the sharp points of the bamboo. Place a 1 inch piece of strapping tape at each end of the spars (the bamboo skewers) and fold half of the tape over to the back of the kite.



9. Place strapping tape on the left and right wingtips and fold it over to the back of the kite sail. Punch a hole at each corner through the tape, about 1/2 inch in from the side. Cut off any tape edges that stick out all around the edge of the kite sail.



10. If you changed your mind about a vent and now want one, lay the kite template on top of your kite sail and trace the vent. Flip the template over and trace the other side of the vent.



Carefully cut the vent out.

If you don't want a vent, go on to step 11.

11. Cut a piece of kite string that is 30' long. Tie each end of the string through a wingtip hole and tie a knot. Don't pinch the sail material with the knot. This is your kite's bridle.



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12. Fold the kite sail in half so that the wingtip holes are lined up. Paper clip them together.



13. Pull the bridle string tight so that it is folded exactly in half. Tie a loop at the end of the folded string. This is the bridle point and will hold your kite line.



14. Cut a slit on one long side of a piece of cardboard that is 2"x4".



15. Cut a line for your kite that is 10 yards or 10 meters' long.



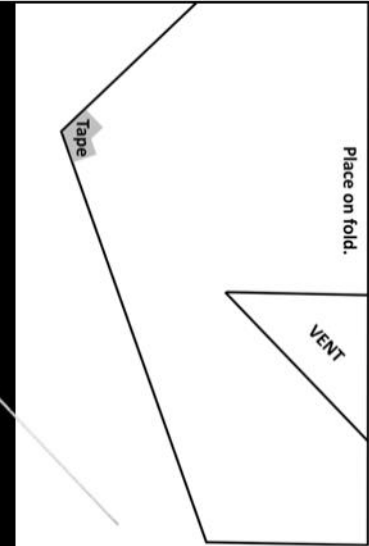
16. Slide one end of the kite line into the slit and tie the string onto the cardboard. Cover the slit with a piece of strapping tape. Wrap the string around the cardboard, leaving the other end of the line loose.



17. Tie the loose end of the kite line to the loop in the bridle at the bridle point. Tie a knot.



18. If you want tails on your kite, firmly tape the plastic tails (the ties you saved from the trash bag) to the bottom of the spars. Tails are only needed in very strong wind. Once you attach them, they may be hard to remove.



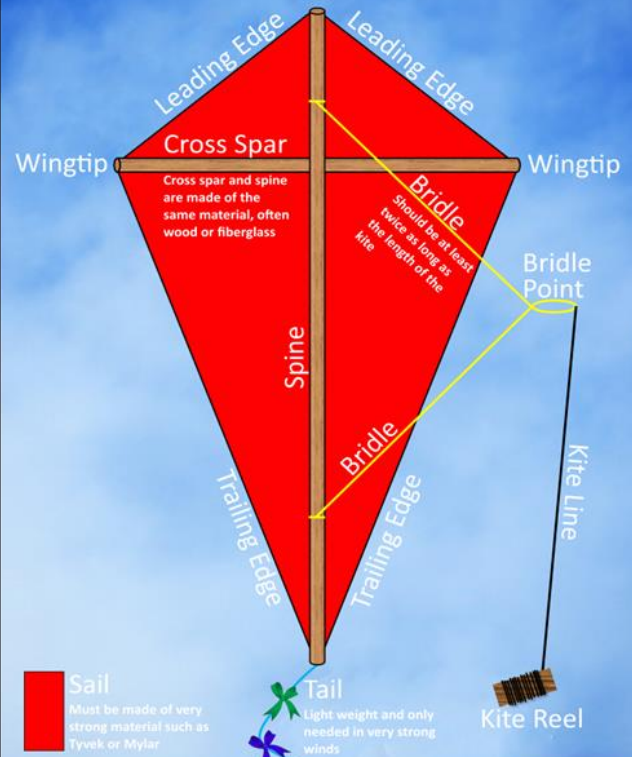
Art Project

Students read about sled kites, and then follow written directions to build a sled kite of their own.

The Beaufort Wind Scale

WIND FORCE	MILES PER HOUR	KNOTS	KILOMETERS PER HOUR	DESCRIPTION	SEA	LAND
0	0-1	0-1	0-1	Calm	Sea like a mirror, glassy.	Calm; smoke rises straight up.
1	1-3	1-3	2-6	Light Air	Ripples that look like scales, but without foam crests.	Smoke drifts in direction of wind, but doesn't move wind vanes.
2	4-7	4-6	7-11	Light Breeze	Small wavelets, still short, but more pronounced. Crests have a glassy look and do not break.	Wind felt on face; leaves rustle; weather vanes moved by wind.
3	8-12	7-10	13-19	Gentle Breeze	Large wavelets. Crests begin to break. Foam has a glassy look. May have scattered white horses.	Leaves and small twigs in constant motion; wind extends light flag.
4	13-18	11-16	20-30	Moderate Breeze	Small waves, becoming larger; some white horses.	Raisies dust and loose paper; small branches are moved.
5	19-24	17-21	31-39	Fresh Breeze	Moderate waves; many white horses are formed.	Small trees in leaf begin to sway; medium sized branches move; medium weight kite string breaks.
6	25-31	22-27	40-50	Strong Breeze	Large waves begin to form; white foam crests are everywhere.	Large branches in motion; whistling heard in telegraph wires; umbrellas are difficult to use; experienced stunt kite fliers only.
7	32-38	28-33	51-61	Near Gale	Sea heaps up with breaking waves; white foam begins to blow in streaks in the direction of the wind.	Whole trees in motion; inconvenient to walk against the wind.
8	39-46	34-40	62-74	Gale	Moderately high waves that are getting longer; edges of crests begin to break into spray. The foam blows in clear streaks in the direction of the wind.	Breaks twigs off trees; wind makes it very hard to move forward.
9	47-54	41-47	75-88	Severe Gale	High waves. Heavy streaks of foam in the direction of the wind. Wave crests begin to topple, tumble, and roll over. Spray begins to affect visibility.	Slight structural damage occurs; chimney pots and slates removed.
10	55-63	48-55	89-102	Storm	Very high waves with long overhanging crests. Foam blows in dense white streaks in the direction of the wind. The surface of the sea looks all white. Very hard to see.	Trees uprooted; lots of structural damage occurs.
11	64-72	56-63	103-117	Violent Storm	Exceptionally high waves; small and medium size ships get lost in wave troughs. The sea is completely covered with long white patches of foam lying in the direction of the wind. Everywhere the wave crests are blown into froth. Visibility very impaired.	Very rarely experienced on land; wide-spread damage.
12	72-83	64-71	118+	Hurricane	The air is filled with foam and spray. Sea completely white with driving spray; visibility seriously impaired.	Devastation.

Parts of a Kite



Kites Around the World

CHINA
Han Dynasty
208BC-220 AD

MALAYSIA
Probably invented around the same time as in China

KOREA
Three Kingdoms
4-645 AD

JAPAN
Buddhist Monks
700s AD
Only Samurais class could fly kites

INDIA
Mogul Period
1483-1530

EUROPE
1600s

FRANCE
1783
First lighter than air balloon

UNITED STATES
1903
Wright Brothers flew first powered aircraft at Kitty Hawk

Posters

Posters (about 11X17) help students learn interesting and useful information about the world of kiting.

Unit References

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