

Kites In The Sky

Lesson Plans



About These Lesson Plans

We strongly recommend you demonstrate a completed, flying kite before you do anything else. Make no assumptions that your students have ever seen, held, or flown a kite! This can be a very short flying session, but should be motivating, and it's a great time to introduce vocabulary, procedures, and safety considerations.

HELPFUL RESOURCES:

[How to Fly a Kite](#) and [Kites In The Classroom](#) will give you a good overview of what you need/want to know about flying kites.



Fun Kite Facts

Kites have been used to help pull cargo ships across the ocean to reduce fuel use and improve speed.

The Wright Brothers based the first airplane on their earlier biplane kite experiments.

The first photograph taken from a kite was in 1887 by Douglas Archibald, a British Meteorologist.

MEASURING WIND

A variety of methods are explored for estimating wind speed and determining whether you have adequate weather for kite flying. Some methods in this lesson require internet access.

Standards Addressed:

SEP1 - Asking Questions And Defining Problems
SEP2 - Developing And Using Models
SEP3 - Planning And Carrying Out Investigations
SEP4 - Analyzing And Interpreting Data
SEP5 - Using Mathematics And Computational Thinking
SEP6 - Constructing Explanations And Design Solutions

SEP7 - Engaging In Argument From Evidence
SEP8 - Obtaining, Evaluating, and Communicating Info
CCC1 - Patterns
CCC2 - Cause And Effect: Mechanism and Explanation
CCC3 - Scale, Proportion, and Quantity

A Note for Teachers

Welcome to the wonderful world of flying kites with students! We've created structured activities to develop structured kite-oriented STEAM thinking (Science / Technology / Engineering / Art / Math).

We've described each activity and connected it to [NGSS](#) (Next Generation Science Standards) and/or Common Core Standards. We recognize that many locales in the United States recognize local standards which may supersede these. Fundamentally, kites are highly engaging and a great platform for STEAM. Whatever your standards targets, you can't go wrong with kites.

Many of the activities are adaptable to small group work and peer to peer sharing of results. Of course, the decision about how, when, and where to do those things is up to you and how you run your classroom. Does every student build a kite or do they work in pairs? Similarly, does every student open up their own computer to study an internet site or do you do it as a group or as an entire class?

As highly experienced teachers, we acknowledge that the best teaching occurs when teachers locate curriculum and modify it to best serve their students. While you are welcome to use our materials as we present them, they are NOT set in stone. Please adapt and modify as needed.

We'd love to hear from you about what worked and what was less successful. Send us a message and any photos you would like to share to fun@kitekits.com.



Measuring The Wind

This lesson plan is going to look at different ways to determine how fast the Wind is blowing. Students will do experiments to see how wind affects kites and how kite tails can affect how kites fly in different wind speeds. To prepare for this lesson start with a discussion about wind.

What is Wind?

Wind is the movement of large amounts of air molecules. Air molecules are made of oxygen and nitrogen gasses. We cannot see air, we cannot smell it, but we can feel it. When it's really moving fast we can hear it. Can you touch it?



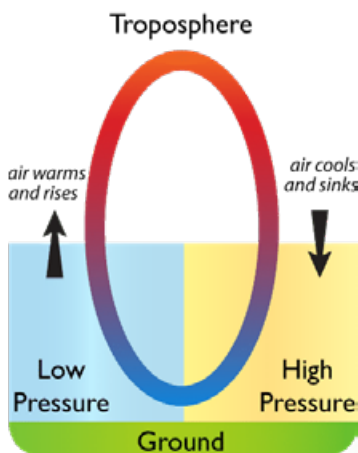
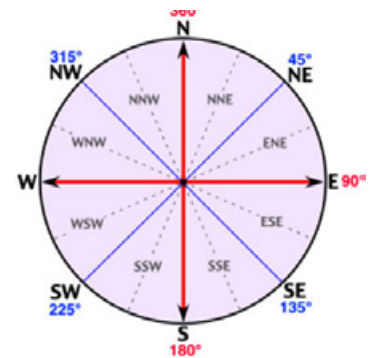
Most of the time you might hardly notice the wind, but in wind-storms it can blow over trees, trucks, and buildings.

In fact, the fastest recorded wind speed, 318 mph happened during a tornado in Oklahoma, 1999.

How is Wind Described

Wind is described by the direction it is blowing from and how fast it's moving. A Northerly wind means the wind is blowing from the North to the South. A Westerly wind is blowing from the West to the East.

Wind moves at different speeds. Sometimes it's a breeze and sometimes it's a gale.



What Causes Wind to Move?

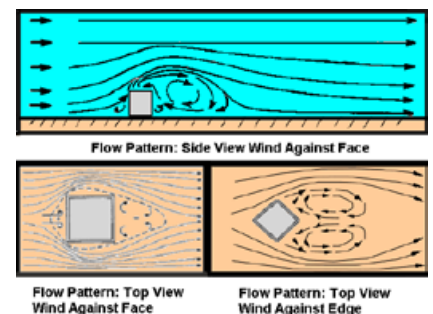
Wind is caused by 3 things:

1. The difference between Air Pressures. Air will move from high-pressure towards a low-pressure area. The greater in pressure the faster the air will move.
2. The earth rotating. The wind moves slower closer to the ground. The higher up you go, from earth, the faster the wind.
3. The heating of the earth's surface. Warm air wants to rise and as it does it is replaced by cooler air.

Turbulence is the irregular movement of air.

When wind runs into building, hills or other obstacles it must find a way around the object. This wind is rolling or moving in all kinds of directions.

It's best to fly kites in open areas for smooth winds.



Measuring The Wind



If you're going to do any experimenting with kites outside, it will be important to be able to estimate the speed of the wind.

There are fancy anemometers available, even ones you can hold in your hand. But most likely, you probably don't have anything like that. So let's see what else we can use!

1) Weather Underground - www.wunderground.com

Over 250,000 people have personal weather stations, and chances are, if you live in North America, you're not too far away from one. Look it up, find the station closest to you right now, and note the following information:

- a) Name of station:
- b) Wind from what direction:
- c) Wind Speed:

2) Windy.com - www.windy.com

This is a beautiful "weather product" that shows winds all over the globe. In the lower right is a key that connects colors to wind speeds. The speeds are listed in "knots", not miles per hour or kilometers per hour or meters per second.

Good kite flying wind is about between 5 and 10 knots.

- a) What color is that on the map?
- b) How is the wind today, where you are, for kite flying?
- c) Use the play button, and report on predicted wind for kite flying where you are over the next several days. When should we plan on flying kites?
- d) Your Dermer Sled kite kit came from Oklahoma. How's the wind there today?

Use a unit converter - www.kylesconverter.com/speed-or-velocity/knots to figure out good kite flying wind speeds in

- e) Miles per hour (abbreviation: _____): Between _____ & _____
- f) Kilometers per hour (abbreviation: _____): Between _____ & _____
- g) Meters per second (abbreviation: _____): Between _____ & _____

3) Determining Wind by Observation:

Estimating wind visually by looking at flags, smoke, or trees.

Several hundred years ago, Francis Beaufort developed the Beaufort Scale for use by sailors. The Beaufort Scale uses things found around you to tell how fast the wind is moving. It is universal and has also been adapted for use on land. Sailors and Kite flyers around the world still use the Beaufort Scale. It's convenient and does not require any equipment. Learn the scale, practice your knowledge and test your results.













Learning the Beaufort Scale: Print the scale and keep for easy reference. Every chance you get, go outside and look around at your environment. What do you see that indicates the wind speed?

Make a guess what the wind speed is. Check the actual speed by using a weather apps available for your phone: Windy, Weather Underground, Weather Radar, Storm Tracker, Weather Channel or use an anemometer.

- a) What Beaufort #'s are best for kite flying?
- b) You step outside, look around, and say "too much wind for kites today". What did you see?
- c) You step outside, look around, and say "not enough wind for kites today". What did you see?
- d) You step outside, look around, and say "PERFECT for kites today". What did you see?



Beaufort Wind Scale

Beaufort Number	Description	Wind speed	Wave height	Sea conditions	Land conditions	
0	Calm	< 1 knot < 1 mph < 2 km/h	0 ft 0 m	Sea like a mirror	Smoke rises vertically	
1	Light air	1–3 knots 1–3 mph 2–5 km/h	0–1 ft 0–0.3 m	Ripples	Direction shown by smoke drift	
2	Light breeze	4–6 knots 4–7 mph 6–11 km/h	1–2 ft 0.3–0.6 m	Small wavelets	Wind felt on face	
3	Gentle breeze	7–10 knots 8–12 mph 12–19 km/h	2–4 ft 0.6–1.2 m	Large wavelets	Leaves and small twigs in constant motion	
4	Moderate breeze	11–16 knots 13–18 mph 20–28 km/h	3.5–6 ft 1–2 m	Small waves	Raises dust and loose paper	
5	Fresh breeze	17–21 knots 19–24 mph 29–38 km/h	6–10 ft 2–3 m	Moderate waves	Small trees and leaves begin to sway	
6	Strong breeze	22–27 knots 25–31 mph 39–49 km/h	9–13 ft 3–4 m	Large waves	Large branches in motion	
7	High wind, moderate gale, near gale	28–33 knots 32–38 mph 50–61 km/h	13–19 ft 4–5.5 m	Sea heaps up	Whole trees in motion	
8	Gale, fresh gale	34–40 knots 39–46 mph 62–74 km/h	18–25 ft 5.5–7.5 m	Moderately high waves	Twigs break off trees	
9	Strong/severe gale	41–47 knots 47–54 mph 75–88 km/h	23–32 ft 7–10 m	High waves	Slight structural damage	
10	Storm, whole gale	48–55 knots 55–63 mph 89–102 km/h	29–41 ft 9–12.5 m	Very high waves	Trees uprooted, considerable structural damage	
11	Violent storm	56–63 knots 64–72 mph 103–117 km/h	37–52 ft 11.5–16 m	Exceptionally high waves	Widespread damage	
12	Hurricane force	≥ 64 knots ≥ 73 mph ≥ 118 km/h	≥ 46 ft ≥ 14 m	Exceptionally high waves, sea is completely white	Devastation	

4) Dropping Grass Method

This comes from the Army. Pick up some grass, hold out your arm from your body horizontally pointed downwind, drop it and watch where it lands. Point your arm straight at where it landed.

a) Using this method, draw a stick figure at starting position. Be sure to show wind direction, and arm position	b) Draw a stick figure with the grass landing in a place where your arm points at 45 degrees	d) Draw a stick figure with the grass landing in a place where your arm points at 15 degrees	f) Draw a stick figure with the grass landing in a place where your arm points at 30 degrees
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WIND SPEED:

KNOTS: MPH:	KNOTS: MPH:	KNOTS: MPH:
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Divide the angle between your body and your arm by four to determine the wind velocity in knots.

5) Flying Kites

Kites are all a little bit different, and some kites have a narrow range of optimum wind speeds, and some are much more adaptable.

- Describe what might happen if there's too much wind for your kite.
- If there's not enough wind, what's your kite going to do?
- In almost EVERY kite flying situation, the slowest air is going to be where?