

## Go Fly a (Tetrahedral) Kite!

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Suggested Grade Levels: 4-6

Subject Areas: Science, visual arts, social studies

### Rationale:

Almost all children have, at some point, attempted to fly a kite. The tetrahedral kites invented by Alexander Graham Bell are fascinating examples of early “fuel-neutral” flying machines. The individual cells of which they are constructed represent an intriguing application of the components of flight. This lesson will provide an opportunity to investigate and speculate about the kites invented by Bell and his team, examples of which are found in the Baddeck museum. Students will also build and decorate their own tetrahedral units and combine them to create a class kite in honour of Bell.

### Logistics:

#### *Classroom set-up*

Access to computers and the school or local library will help students to do research. A space will need to be cleared in the classroom for the assembly of the class kite.

#### *Materials*

- blank paper for design of kite – both individual cells and class kite
- large drinking straws- not bendable variety – 4-6 per cell
- tissue paper or lightweight plastic (e.g., shopping bags) for covering cells
- glue
- coloured markers, crayons, etc.
- string for threading through straws
- light nylon string for fastening cells together

#### *Suggested resources / images*

[www.design-technology.org/bell.htm](http://www.design-technology.org/bell.htm) (information about Bells’ kites, including great old photos)

[http://fortress.uccb.ns.ca/parks/agb\\_e.html](http://fortress.uccb.ns.ca/parks/agb_e.html) (photograph of one of Bell’s kites)

[http://www.fang-den-wind.de/bell\\_eng](http://www.fang-den-wind.de/bell_eng) (Bell’s written research re tetrahedral kites, including diagrams and photographs)

[www.cit.gu.edu.au/~anthony/kites/tetra](http://www.cit.gu.edu.au/~anthony/kites/tetra) (various photos and design suggestions, including description of kite project for a class)

<http://kckiteclub.org/DaveEllis/tetkite.htm> (another class tetrahedral kite project)

Suggested Outcomes:

Students will be expected to:

- Work individually and collaboratively to solve problems and respond to ideas in the creation of a class tetrahedral kite (visual arts)
- Demonstrate ability and initiative in the use of techniques, technologies, materials, and equipment (visual arts, science)
- Work collaboratively to carry out science-related activities and communicate ideas, procedures, and results (science)
- Investigate the theory of flight as it relates to tetrahedral kites (science)
- Demonstrate an appreciation of the richness of Alexander Graham Bell's legacy (social studies)

### Introduction:

To prepare for this lesson, the class might discuss questions such as:

- What are some devices that use wind power to operate? What is one of the oldest?
- Have you ever flown a kite? What do you remember most about it?
- What is special and magical about kites?
- What are the inventions for which Alexander Graham Bell is best known?
- What things that fly use only wind power for "fuel"?

In addition, or instead, students might brainstorm what they already know about the theory of flight and then link this discussion to speculation about various styles of kites and what makes them fly.

Explain that, working individually and together, students will create their own class tetrahedral kite. Ask students what they think they might learn from the project and have them record their response and tuck it away safely for reference at the end of the lesson.

### Suggestions for Teaching and Learning:

1. Invite students, in small groups, to conduct research (library or Internet) on one of these topics. Give students a fixed time frame for their research (e.g., 30 minutes):
  - Alexander Graham Bell's tetrahedral kites
  - How does a kite fly?
2. Students share with the class one or two interesting things that they discovered during their research.
3. Lead a brief discussion about tetrahedral cells (all sides equal in length), showing students a simple diagram. Have students speculate about how they might construct their own cell, using simple materials.
4. Show students a sample tetrahedral cell (that you have constructed in advance) and a diagram of how the tetrahedral cells can be constructed. Give time for questions and suggest tips that will be helpful. (The class projects mentioned in the resource section above give fine suggestions for this process).

5. Challenge students, working singly or in pairs, to build their own tetrahedral cells, using the materials provided. It might be helpful for them to work in pairs for tying straws together.
6. Once the individual cells are constructed, invite students to cut pieces of tissue paper or plastic shopping bags to cover two sides of their cell. Students might like to decorate the “canvas” using crayons or coloured markers before gluing it to the cell.
7. When all the cells are completed, consider the design for the class kite. Look at photos of various tetrahedral kites on the websites mentioned above, especially those created by school students. Decide together on a design.
8. Engage students, working collaboratively, to assemble the class kite, using nylon string to tie cells together. Discussion about what design will fly most successfully, how their constructed cells will be put together, and which design would be most pleasing to the eye could be a valuable aspect of this activity.  
Note: If space restrictions make it impractical to construct a class kite, it might work well to have groups of 6 or 8 students design and construct a kite.
9. When possible, provide an opportunity for the kites to be tested outdoors. They can then be displayed in the classroom, the school lobby, or another public space in the school. The names of all who contributed to the kite’s creation should be listed on an accompanying sign.

#### Extension of Ideas:

Students might read together a story about kite flying in Afghanistan and talk together about why the kite places such a special place in traditional Afghan culture.

Invite students to talk with elders in their own community about their memories of kite flying and share stories with the class.

Students who are particularly interested might investigate other kite designs that Bell and others have invented. They could then design their own kite, explaining why they made the decisions that they did.

Challenge students to design a kite for the future, using only environmentally-friendly materials.

#### Suggestions for Assessment:

Ask students to look again at what they thought that they would learn from their project. Discuss together what things they learned that they will not forget, what surprises they had, what they would do differently another time.

Using a rubric, students could assess their own group work skills and that of the others in their group.

Journal pages might be used to record designs that were considered and those that were chosen. Accompanying notes could provide insight about the process. (Reference to Bell's design notebook pages or those of Leonardo da Vinci could provide "inspiration" for the students.