KITES

Lesson Plan: Sled Kite

Grade Level: K-8

Subject Area: Science and Math

Time Required: ***Preparation:*** 1-1½ hours
Activity: 1-2 hours

National Standards Correlation:

Science (grades K-4)

- Science as Inquiry Standard: Understanding about scientific inquiry.
- Physical Science Standard: Position of motion and objects.
- Unifying Concepts and Processes Standard: Evidence, models, and explanation.

Science (grades 5-8)

- Science As Inquiry Standard: Abilities necessary to do scientific inquiry.
- Physical Science Standard: Position of motion and objects.
- Unifying Concepts and Processes Standard: Evidence, models and explanation.

Math (grades K-2)

- Geometry Standard - Identify two-dimensional shapes on three-dimensional objects.
- Geometry Standard - Apply transformations and use symmetry to analyze mathematical situations.

Math (grades 3-5)

- Geometry Standard - Analyze characteristics and properties of two and three dimensional geometric shapes and develop mathematical arguments about geometric relationships.

Math (grades 6-8)

- Geometry Standard - Analyze characteristics and properties of two and three dimensional geometric shapes and develop mathematical arguments about geometric relationships.

Summary:

Students will construct a basic sled kite and make necessary adjustments (if needed) to insure a successful flight. Prior to the lesson, students will be given information about fundamental principles which contribute to successful kite flying.

Objectives:

Students will:

- Build and fly kites
- Use symmetry in building the kites
- Determine the factors that made their kites successful or unsuccessful
- Fly the kite

Background:

The sled kite is a standard workshop kite which can be made in a variety of sizes and with a variety of materials. The kite is simple to make and is an excellent flyer. There are three main forces that affect the flight of a kite. They are: lift, gravity and drag. Lift causes the kite to rise. Gravity causes the kite to fall. Drag is the pull on the kite by the passing air. When all three of these forces are balanced, the kite will fly. A kite has many parts that help keep lift, gravity and drag balanced. The flying line holds the kite so that it will not fly away in the wind. The bridle connects the flying line to the kite at two points. The actual flying line is connected to the bridle at its tow point. The bridle sets the angle of the kite in the wind. If the bridle is not set at the

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correct angle the kite will not fly properly. The spine (backbone) and struts of a kite provide the framework for the kite. The sail cover, or skin of the kite is the material that covers the rods and makes up the body of the kite. The best weather conditions for flying a sled kite is light to moderate wind (approximately 6 to 18 miles per hour) with blue skies. Do not attempt to fly a kite in wet or stormy weather. Symmetry is an important concept in kite building. If the kite is out of balance it may not fly at all or may only fly for a short period of time.

Materials:

Students will need:

- (2) 1/8" diameter dowel rods (24" long)
- Plastic garbage bags (tall kitchen size) or brown craft paper
- String
- Scissors
- Reinforced packing tape
- Hole punch
- Markers (optional)

Safety Instructions:

Remind young students to keep the plastic bags away from their faces. Also see "Kites in the Classroom" presentation at http://www.nationalmuseum.af.mil/shared/media/document/AFD-070523-007.ppt

Procedure:

A. Warm-up

1. Review the background information and have additional reading materials available for the students who wish to gather more information.

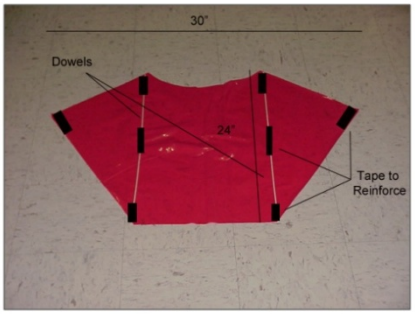
2. Review vocabulary words and their meanings (lift, drag, gravity, etc.).

3. Review symmetry.

B. Activity

1. Have a sample available of a previously made sled kite as well as all the materials needed for kite building.

2. Create a pattern according to the following diagram. All sled kites follow the same proportions. If you fold the pattern lengthwise, you can place it along the side seams of a tall kitchen garbage bag and get two kites from one bag.



3. Lay the plastic garbage bag flat. To tape the dowels in place, use about 1½"- 2" of strapping tape. It is very helpful to pre-cut the tape into 1½"- 2" pieces. Each student will need ten pieces. Place the dowels parallel to one another. Place tape on back of the kite skins (about half the length of a piece of tape) and fold it toward the front of the kite to secure the dowel. Press down firmly around the dowel and repeat at the other end. Once both dowels are taped in place, put one piece of tape (lengthwise) in the center of the dowel to hold the middle. By wrapping the tape from the back to front, the ends of the dowels are more secure.

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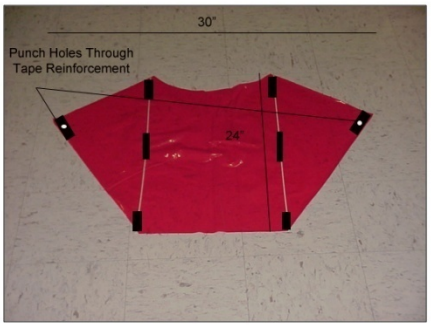
4. At the outside corners, place tape on the back side (about half the length of a piece of tape) and fold toward the front of the kite. Use another piece of tape and repeat the procedure, but tape in the opposite direction to reinforce the corner.

5. Fold the kite in half, match the reinforced corners and punch holes through the reinforced corners.



6. To make the bridle, cut a piece of string that is five times the length of the dowel (about 10 feet). This proportion works for all sled kites. If this string is cut too short the kite will not open wide enough to catch the wind. Tie one end of the string through each hole. Square knots work the best. Match the holes and find the exact midpoint of the string. This is a critical step. If the loop is not at the midpoint, the kite will dive to one side. Now tie a knot, leaving a small loop. Tie your flying line to the loop and you are ready to fly.

C. Wrap-up: Let's Go Fly A Kite!

To fly the kite, stand with the wind at your back and ask someone to lift your kite up (the dowels should be on the ground side) and let the wind carry it. No running is needed.

Special Instructions:

Here are some trouble shooting hints for successful kite-flying:

- If the kite does not rise there may not be enough wind or the bridle may be too short.
- If the kite flies and then crashes you may need to lengthen the bridle.
- If the kite tends to spin or wobble you may need to check the midpoint of the bridle.

Assessment/ Evaluation:

Students will be evaluated on how successfully they fly their kites and on the adjustments they make to achieve successful flight.

Extensions:

1. For younger students: Identify various geometric shapes found in a sled kite. Draw a model of the kite using exact dimensions.

2. For older students: Determine the perimeter and surface area of the kite. Determine The altitude of the kite.

Resources/ References:

Belsky, Nancy Ann. *Building Kites - Flying High with Math.* Palo Alto, California: Dale Seymour Publications, 1995.

Greger, Margaret. *Kites For Everyone.* Winona, Minnesota: Apollo Books, Inc., 1984.

Hosking, Wayne. *Flights of Imagination.* Washington, D.C.: National Science Teachers Association, 1990.

Michael, David. *Step -By- Step Making Kites.* New York: Kingfisher Books, 1993.

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