KITES

Lesson Plan: Tetrahedron Kite

Grade Level: 4-6

Subject Area: Science and Math

Time Required: **Preparation:** 30 minutes
Activity: Three 45 minute sessions

National Standards Correlation:

Science (grades K-4)

- Science in Personal and Social Perspectives: Personal health.
- Unifying Concepts and Processes Standard: Systems, order, and organization.

Science (grades 5-8)

- Physical Science Standard: Motions and forces.
- Science as Inquiry Standard: Abilities necessary to do scientific inquiry.

Math (grades 3-5)

- Measurement Standard: Understand measurable attributes of objects and the units, systems, and processes of measurement.

Math (grades 5-8)

- Measurement Standard: Apply appropriate techniques, tools, and formulas to determine measurements.

Summary:

Students will construct a tetrahedron kite and successfully fly the kite. Prior to building the kite, the students will be given information about the principles of flight. Note: this project requires patience and organization.

Objectives:

Students will:

- Build and fly tetrahedron kites.
- Measure perimeter and area.
- Measure angles using a protractor.
- Understand the principles of flight.

Background:

This type of kite is built of tetrahedra, solid geometric figures constructed of four equilateral triangles. It is basically a three-dimensional equilateral triangle. Since four tetrahedra are put together to make the kite, it is shaped like a tetrahedron. There are a couple of advantages to this design. First, the tetrahedron is one of the most stable of all solid shapes. Second, by covering only two sides of each tetrahedron, we can channel the air. The three forces that affect the flight of a kite are lift, gravity, and drag. The three forces must be in balance for the kite to fly. First, lift is the upward force that causes the kite to rise. Next, gravity is the downward force and pulls the kite toward the center of the Earth. Lastly, drag is the pull on the kite by the passing air.

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Materials:

For each kite (groups of two students each):

- 24 eight inch straws
- Kite string – 2 rolls
- Glue stick
- Tissue paper – several sheets
- Scissors
- Ruler
- Pencil
- Protractor

Safety Instructions:

Review kite flying guidelines before allowing students to fly their kites. 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 background information on kites.

2. Explain that when constructing the kite, all knots should be tied as square knots (left over right, right over left). Practice tying a couple of them.

3. Explain that all knots must be snug up to the straw. The tighter the figure, the better the kite.

4. Review how to measure angles with protractors.

5. Show a picture of the kite before getting started. Make sure students can refer back to it at any given time.

B. Activity

Session #1:

1. Have students work with a partner.

2. Take three straws and thread one piece of kite string through all three straws.

3. Tie a square knot, and clip off any extra string.

4. Have the students measure all three sides of the triangle. Ask: Are all the sides equal length? Explain to them that this is an equilateral triangle. Have the students measure all three angles of the triangle with a protractor. Ask: What did you find out about the angles? The students should notice that all three angles are the same degrees? Explain to the students that this is another characteristic of an equilateral triangle. Also, all of the angles add up to 180 degrees.

5. Explain to the students that they are going to find the area and perimeter of this triangle. Ask for a volunteer to show how to come up with each. (Example: Area of a triangle is ½ base x heights. To find the perimeter you add up the lengths of all sides.) Remind the students that the base of a triangle is the bottom of the triangle. *Area- 32 square inches *Perimeter- 24 inches

6. Next, tie a 10" piece of string onto all three corners of the triangle.

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7. Thread a straw on each of the three strings.

8. Gather all three strings together and tie a tight square knot. Clip off any extra string.

9. One cell of the tetrahedron kite is completed. Each cell is three dimensional.

10. Set the first cell aside.

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