

Lesson Plan #:AELP-PHY0017

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These lesson plans are the result of the work of the teachers who have attended the Columbia Education Center's Summer Workshop. CEC is a consortium of teacher from 14 western states dedicated to improving the quality of education in the rural, western, United States, and particularly the quality of math and science Education. CEC uses Big Sky Telegraph as the hub of their telecommunications network that allows the participating teachers to stay in contact with their trainers and peers that they have met at the Workshops.

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## **Hot Air Tissue Paper Balloon**

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**GRADE LEVEL/SUBJECT:** 4-12, science

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**OVERVIEW:** Students will construct a hot air balloon.

**PURPOSE:** To learn about hot air balloon flight.

**OBJECTIVES:**

1. To learn why hot air balloons rise.
2. To learn about combustion.
3. To learn and/or reinforce metric distance measurement skills.
4. To learn about the importance of careful planning and conservation when materials are limited.
5. To learn the importance of following directions.

**RESOURCES/MATERIALS:**

5 sheets of tissue paper (20" x 30"), 1 standard-size manila file folder, 44 cm of galvanized steel wire, a cotton ball, metric ruler, rubber cement, cellophane tape, scissors, pencil

**ACTIVITIES AND PROCEDURES:**

1. Cut a large tissue paper square 50cm on a side. This will be the top of the balloon. Then cut a small 1cm square from each of its corners. This allows you to make a 1cm x 48cm glue flap on each edge of the square top. These flaps will be glued to the top edges of the sides in step 8.
2. Cut rectangular pieces of tissue paper that measure 76cm x 49cm. Then cut off two triangular pieces 30cm x 14cm from one end.
3. Mark a 1cm wide glue flap along four of the edges of each side.
4. Cut three corner notches on each side.
5. Make the bottom of your balloon by cutting two 20cm squares from a manila folder. Then cut out their centers, leaving 1.5cm frames. Put a thin layer of rubber cement on one side of each frame. When the cement has completely dried, touch the cemented surfaces together and they will bond instantly. This method of gluing surfaces with rubber cement forms the strongest bond.
6. Punch a small hole in the center of each side of the frame. These are where the two steel wires which hold the cotton ball will be attached.

7. Cut two pieces of galvanized steel wire 22 cm long. Push each wire through the center of a cotton ball and then attach them to the frame. This cotton ball will become the heat source of the balloon.
8. Glue the sides and top of the balloon together. Start by applying a thin coat of the rubber cement to the surface of part of the glue flap on side #1 and touch it to the edge of side #2 while it is still wet. Follow the same procedure, glue #2 to #3, #3 to #4, and #2 to the top. Next, glue each side to the top and then glue the edge of #1 to #4
9. Glue the lower edges of the sides together and then glue the bottoms of the sides to the manila frame.
10. To launch your balloon, gently open it up so it fills with air. With the help of a partner, hold it in an upright position and ask your teacher to add the alcohol fuel to the cotton and light it. As alcohol burns up, it will slowly fill the balloon with hot gases (air), causing the total mass of the balloon (the internal gases and fuel) to decrease. The balloon will begin to rise out of your hands because the cooler, heavier air around the balloon will push it up. Let go! Your balloon will fly very high if you built it well and the atmospheric conditions are just right.