

2015 AFRICAN AMERICAN HISTORY CALENDAR LESSON PLAN

Month/Honoree(s): April/Brig. Gen. Calvin H. Elam

Lesson Title: Let's Go Fly a Plane!

Grade Level: 3-5 (also adaptable to K-2 and 6-8)

Subject: STEM

SC Academic Standards and Skills Addressed: These are from the 2014 SC Science Standards. The standards listed here are consistent throughout the grade levels.

- Standard S.1: The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.
- S.1A. Conceptual Understanding: The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers.

Introductory Statement/Lesson Overview: In this lesson, students will apply STEM practices and the Engineering Design Process to build and fly a paper airplane that meets all of the given criteria.

Goals/Lesson Objectives:

1. Students will research to find out about the forces of flight and what makes paper airplanes fly. They may also learn about the different types of airplanes the US Air Forces uses.
2. Working in small groups, students will design and build an airplane that they believe will fly for a long distance.
3. Students will collect and analyze data about how far each type of plane built in the classroom flies and make a conclusion about which type of plane flies best.

Lesson Progression and Time Frame:

Activity 1: Share resources (see some suggestions below) with students about why paper airplanes fly. Have them take notes and create a graphic organizer that shows all of the necessary elements in order for an airplane to fly. Then introduce them to several different paper airplane designs. As a group, they should choose a design that they can build out of one sheet of paper and that will be able to fly at least 3 feet. Students must be able to explain why they chose the particular design.

Activity 2: Students will each build a plane according to the design the group choose. Explain that multiple planes built the same way will create a more fair scientific test. For an added challenge, you might have the students use different types of papers but stick with the same design. Then have students fly the planes and measure the distance each flies. Multiple trials with all of the planes will give better evidence. Ensure that all of the planes are flown in the same conditions.

Activity 3: Have students graph the distances the planes flew and figure an average distance flown for each different plane design used in the class. Now have students come to a conclusion about whether or not their plane flew the best and make predictions as to why this was true.

Activity 4: Have students write a reflection about the activity. Suggested questions might include: How did your group work as a team? Did your plane fly as well as you thought it would? Why or why not? What would you do to improve your airplane design if you wanted to test it further?

Extensions/Differentiation:

- For older students, actually study the forces that make flight possible.
- For younger students, give them a paper airplane design to begin with and then have them try to figure out how to improve it.
- Add in a research element about the types of planes that the US Air Force flies and the speed of each plane.
- Allow students to add other materials for building the planes – paper clips, tape, even balsa wood are suggestions.

Assessment:

- Use a rubric to assess the reflection students write at the end. Also add in a part of the rubric about participation in the group.
- Another possibility depending on grade level: Grade the graph the students make of flight distances and their work in finding the average of the distances flown.

Suggested Resources:

- History of Flight - <http://www.grc.nasa.gov/WWW/k-12/UEET/StudentSite/historyofflight.html>
- Paper airplane design - <http://www.kidspot.com.au/kids-activities-and-games/Activity-ideas+30/10-of-the-best-paper-plane-designs+12392.htm>
- Paper airplane gallery - <https://howthingsfly.si.edu/activities/paper-airplane/gallery>
- Planes used by the Air Force

- <http://www.nationalmuseum.af.mil/research/aircraft/>
- <http://www.usaf.com/1fight.htm>

- What makes paper airplanes fly? –
 - <http://www.scholastic.com/teachers/article/what-makes-paper-airplanes-fly>
 - <https://howthingsfly.si.edu/ask-an-explainer/how-do-paper-airplanes-fly>
 - <http://www.brunswick.k12.me.us/smccormack/files/2012/08/wht-makes-a-paper-airplane-fly.pdf>

Engineering Design Process

- <http://www.sciencebuddies.org/engineering-design-process/engineering-design-process-steps.shtml#theengineeringdesignprocess>
- <http://www.eie.org/overview/engineering-design-process>

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