Discover Aviation Patch

To earn this patch, complete the two required activities, plus:
Daisies - Complete one additional activity.
Brownies - Complete two additional activities.
Juniors - Complete three additional activities.
Cadettes – Complete four additional activities.
Seniors Complete five additional activities.
Ambassadors – Complete six additional activities.

(Required) Activity 1 – Why Does it Fly?

Lift - Look at some of the characteristics of things that fly, like the shape of a bird's wing or the shape of an airplane's wing. This is called the aerofoil shape. This shape produces a force called lift as it moves through the air. (Check out activity 13 to examine this concept further.)

Soar Higher by answering these questions!

Lift: Does it fly better with or without wind? Does it help to fly with the wind or into the wind?

Weight: Does its ability to fly change if you add weight (like a paperclip) to the wings?

Thrust: Does it fly differently if you throw it hard or gently, or if you throw it from a height, like off a balcony?

Drag: How does the shape impact your design? Would it fly as well with an index card taped to the front?

Weight – The effect of gravity pulling us down is weight. To fly, we must overcome gravity.

Thrust – Thrust is the forward force required to move through the air. It has to provide enough speed for a wing to develop enough lift to fly. Thrust can be provided by an engine (like in an airplane), by gravity (like in a glider), or by muscles (like birds).

Drag - Something that slows us down is drag. Drag is the opposite of thrust.

Make your own paper airplane or paper helicopter or make an airplane out of balsa wood, and describe how the forces of lift, weight, thrust, and drag affect its flight.

(Required) Activity 2 – Aviation Career Exploration

Talk to somebody who works in the aviation industry. What do they like about their career? What kind of education and experience do they have? Would you like to do this career? Why or why not?

Activity 3 – What Flies?

Flying is controlled sustained movement through the air. Many things can become airborne, but are they actually flying and under control? For example, if you throw a ball, is it flying? What about a frisbee? Or a paper airplane? A hang glider? A bat? A flying fox? A kite?

Make a list with your troop or group of things that fly, then group them into different categories. Your groups might include things that are natural, things made by humans, things that can fly on earth, things that can fly in space, things that can fly long distances or short distances ... what other categories can you think of? Can something belong to more than one category?

Activity 4 – Phonetic Alphabet

Learn about the Phonetic Alphabet, and why it is used in aviation. Practice sending and receiving simple messages using the phonetic alphabet.

Activity 5 – Control Surfaces
Aircraft flight control surfaces may include the ailerons, control stick, elevators, rudder, and more. Demonstrate how the control surfaces of an aircraft affect attitude, and how they are used for takeoff, turning, descent, and landing.

Activity 6 – Communication
How do aircraft stay in touch with ground control? How do they know who's listening on the other end of the radio call? What is the International Civil Aviation Organization (ICAO), and what do they do? Explain the difference between a Mayday radio call and a Pan-Pan radio call. When might each be used?

Activity 7 – Interesting Aircraft
Visit an airfield, airshow, or flight museum. Find at least five aircraft that interest you. Name them, and identify their uses. What makes them unique?

Activity 8 – Flight Check
Under supervision, help conduct a pre-flight check on an aircraft. Why is this important?

Activity 9 – Flight Simulation
Using flight simulator software on a computer, establish and "fly" a course, including takeoff and landing.

Activity 10 – Take a flight!
After completing the required activities, take a flight in an aircraft. If possible, ask to tour the cockpit either before or after the flight (the doors will be closed during the flight). What can you identify about the controls? (Be sure to follow the guidelines in *Safety Activity Checkpoints*.)

Activity 11 – History of Flight
Learn how humans went from observing birds to flying, and how they overcame some obstacles along the way. What are the current challenges and opportunities facing the aviation industry today?

Activity 12 – Women in Aviation
Learn about at least one of the many ways women have impacted aviation. For example, learn about the Wing Scout Program in Girl Scouts, the Women Airforce Service Pilots (WASP) program, Women in Aviation International, or the Ninety-Nines.

Activity 13 – Bernoulli's Principle
Describe Bernoulli's principle, and how it impacts the design of aircraft. Demonstrate how Bernoulli's Principle works. (Science Kids has some great experiments to try, or you can come up with your own demonstration!)

Activity 14 – Ballooning
How do hot air balloons fly, and how do their pilots steer? What is the difference between a hot air balloon and a blimp?

Activity 15 – Pilot's License
What is the process to obtain a pilot's license, and what are the different types of licenses? How old do you have to be to become a pilot?

Activity 16 – Safe Flight Skills

Pilots need to master several concepts to ensure they have a safe flight. Explain at least one of the concepts below:

- Weather
  - How do pilots check the weather report? Why do the wind direction, wind speed, temperature, and atmospheric pressure matter? How does this impact VFR and IFR?
- Navigation:
  - What is a trip planning log? How do an altimeter and compass work? Why are they important for pilots?
- Weight & Balance:
  - How do you know an airplane's load is within safe weight and balance limits? What happens when the center of gravity changes?
- Maintenance:
  - Planes tend to last a lot longer than cars do. Why is that? What do mechanics do to keep planes safe?
- Angle of Attack:
  - What is the Angle of Attack, and how can pilots avoid stalls?

Activity 17 – Lots of "A" Words

What is the relationship between aviation, aeronautics and aerospace? What are the "A" words in NASA? How has NASA impacted the aviation industry in the United States and around the world?

Activity 18 – FAA

What is the FAA, and how does it manage airspace in the United States? How does it help avoid traffic accidents between planes, space launches, hot air balloons, drones, and more? What are the people that work for the FAA and talk to airplanes called? How do they monitor aircraft?

Activity 19 – Aircraft Construction

What materials are used to construct aircraft? Are they the same materials that were used in the past? Why or why not?

Activity 20 – Creating Thrust

How are engines used to create thrust in aircraft? Explain the similarities and differences between a piston engine and a jet engine. Are any other types of engines used in aircraft?

Activity 21 – Virtual Model

Using a computer software program, build and test your own aircraft. Can you create a flying machine that works? What happens if you change the wing shape or size, or adjust the weight?

Activity 22 – Let's Go Fly a Kite!

How do kites fly? How do the principles of lift, thrust, weight, and drag apply to a kite? On your own or with a group, create and test at least three different kite designs. What happens if you use different materials to build the kite? Does the size of the kite affect its flight? What about the tail? How does the kite's design affect its ability to fly steadily or to do twists and turns? Will the kite fly if you turn it upside down? What is your favorite kite design?

Resources:

There are several software programs available that include both aircraft building and flying components, such as Simple Planes or Balsa Model Flight Sim. Many programs also include a free demo.

The EAA eActivities offers several free virtual learning activities to help kids learn about topics in aviation.

The Houston Airport System has historical information available, as well as a list of local career opportunities in the aviation industry.

The Lone Star Flight Museum Aviation Learning Center in Houston offers field trip opportunities with flight simulators, hands-on displays, ground school, a pre-flight check on a real aircraft, and more.

NASA's Glenn Research Center offers The Beginner's Guide to Aeronautics

The National Museum of the United States Air Force offers a variety of lesson plans and activities for different age groups available to download.