

MERIT BADGE SERIES



AVIATION



BOY SCOUTS OF AMERICA®

STEM-Based

BOY SCOUTS OF AMERICA
MERIT BADGE SERIES

AVIATION



"Enhancing our youths' competitive edge through merit badges"



BOY SCOUTS OF AMERICA®

Requirements

1. Do the following:
 - a. Define “aircraft.” Describe some kinds and uses of aircraft today. Explain the operation of piston, turboprop, and jet engines.
 - b. Point out on a model airplane the forces that act on an airplane in flight.
 - c. Explain how an airfoil generates lift, how the primary control surfaces (ailerons, elevators, and rudder) affect the airplane’s attitude, and how a propeller produces thrust.
 - d. Demonstrate how the control surfaces of an airplane are used for takeoff, straight climb, level turn, climbing turn, descending turn, straight descent, and landing.
 - e. Explain the following: the sport pilot, the recreational pilot, and the private pilot certificates; the instrument rating.
2. Do TWO of the following:
 - a. Take a flight in an aircraft, with your parent’s permission. Record the date, place, type of aircraft, and duration of flight, and report on your impressions of the flight.
 - b. Under supervision, perform a preflight inspection of a light airplane.
 - c. Obtain and learn how to read an aeronautical chart. Measure a true course on the chart. Correct it for magnetic variation, compass deviation, and wind drift to determine a compass heading.

- d. Using one of many flight simulator software packages available for computers, “fly” the course and heading you established in requirement 2c or another course you have plotted.
 - e. Explain the purposes and functions of the various instruments found in a typical single-engine aircraft: attitude indicator, heading indicator, altimeter, airspeed indicator, turn and bank indicator, vertical speed indicator, compass, navigation (GPS and VOR) and communication radios, tachometer, oil pressure gauge, and oil temperature gauge.
 - f. Create an original poster of an aircraft instrument panel. Include and identify the instruments and radios discussed in requirement 2e.
3. Do ONE of the following:
- a. Build and fly a fuel-driven or battery-powered electric model airplane. Describe safety rules for building and flying model airplanes. Tell safety rules for use of glue, paint, dope, plastics, fuel, and battery pack.



- b. Build a model FPG-9. Get others in your troop or patrol to make their own model, then organize a competition to test the precision of flight and landing of the models.
4. Do ONE of the following:
 - a. Visit an airport. After the visit, report on how the facilities are used, how runways are numbered, and how runways are determined to be “active.”
 - b. Visit a Federal Aviation Administration facility—a control tower, terminal radar control facility, air route traffic control center, or Flight Standards District Office. (Phone directory listings are under U.S. Government Offices, Transportation Department, Federal Aviation Administration. Call in advance.) Report on the operation and your impressions of the facility.
 - c. Visit an aviation museum or attend an air show. Report on your impressions of the museum or show.
5. Find out about three career opportunities in aviation. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor, and explain why this profession might interest you.



Aviation Resources

Scouting Literature

Auto Mechanics, Electronics, Engineering, Model Design and Building, Orienteering, and Space Exploration merit badge pamphlets

For more information about Scouting-related resources, visit the BSA's online retail catalog (with your parent's permission) at www.scoutstuff.org.

Books

Bell, Dana. *In the Cockpit: Inside 50 History-Making Aircraft*. Harper Design, 2007.

———. *Smithsonian Atlas of World Aviation*. Smithsonian, 2008.

Echaore-McDavid, Susan. *Career Opportunities in Aviation and the Aerospace Industry: A Guide to 80 Careers in Aviation and the Aerospace Industry*. Checkmark Books, 2004.

Eichenberger, Jerry A. *Your Pilot's License*, 8th ed. McGraw Hill, 2011.

Grant, R.G. *Flight: The Complete History*. DK Publishing, 2007.

Nahum, Andrew. *Flight: DK Eyewitness Book*. DK Children, 2011.

Whiteman, Phillip. *Aircraft: The Definitive Visual History*. DK Adult, 2013.

Periodicals

Flying

Telephone: 407-628-4802

Website: www.flyingmag.com

Model Airplane News

Air Age Media

Toll-free telephone: 800-827-0323

Website: www.modelairplanenews.com

Plane & Pilot

Werner Publishing Corp.

Telephone: 310-820-1500

Website: www.planeandpilotmag.com

Organizations and Websites

Academy of Model Aeronautics

5161 East Memorial Drive

Muncie, IN 47302

Toll-free telephone: 800-435-9262

Website: www.modelaircraft.org

Aircraft Owners and Pilots Association

421 Aviation Way

Frederick, MD 21701

Toll-free telephone: 800-872-2672

Website: www.aopa.org

ALLSTAR Network

Aeronautics Learning Laboratory for
Science, Technology, and Research
Website: www.allstar.fiu.edu

The Aviation History Online Museum

Website: www.aviation-history.com

Chasing the Sun

The History of Commercial
Aviation Seen Through the
Eyes of Its Innovators
Website:

www.pbs.org/kcet/chasingthesun

Federal Aviation Administration

800 Independence Ave. SW
Washington, DC 20591
Toll-free telephone: 866-835-5322
Website: www.faa.gov

National Aeronautics and Space Administration

Suite 1M32
Washington, DC 20546-0001
Telephone: 202-358-0001
Website: www.nasa.gov

National Oceanic and Atmospheric Administration

1401 Constitution Ave., NW, Room 5128
Washington, DC 20230
Telephone: 202-482-6090
Website: www.noaa.gov

Sporty's Pilot Shop

Website: www.sportys.com
Toll-free telephone: 800-776-7897

University Aviation Association

2415 Moore's Mill Road, Suite 265-216
Auburn, AL 36830
Telephone: 334-528-0300
Website: www.imis100us1.com/uaa

DVDs

Be a Sport Pilot: Learn to Fly a Fixed-Wing Light-Sport Aircraft. DVD, 75 min.

Sporty's Learn to Fly Course. DVD, 23 hours.

Sporty's Introduction to Flying—A Non-Pilot's Guide. DVD, 56 min.

Sporty's So You Want to Fly Helicopters. DVD, 2 hrs.

Start Flying! Understand What's Involved With Learning to Fly and Earning a Pilot's License. DVD, 34 min.

Acknowledgments

The Boy Scouts of America gives special thanks to Sporty's Pilot Shop for making this major revision of the *Aviation* merit badge pamphlet possible. In particular, thanks to Mark Wiesenhahn for his assistance.

Thanks to Robert Lamb Jr. and to Ed Mitchell and his colleagues in Phantom Works at Boeing Aircraft Company for their assistance with past updates to this pamphlet.

The BSA is grateful to Rear Adm. J. Dan McCarthy, U.S. Pacific Fleet, U.S. Navy, for facilitating the use of U.S. Navy photographs in the production of this book.

Thanks also to staff members at the Academy of Model Aeronautics for their time and expertise in reviewing the text, and for providing some of the photos used in this pamphlet.