



# Aviation

## Merit Badge Workbook

This workbook can help you but you still need to read the merit badge pamphlet.

The work space provided for each requirement should be used by the Scout to make notes for discussing the item with his counselor, not for providing the full and complete answers. Each Scout must do each requirement.

No one may add or subtract from the official requirements found in **Boy Scout Requirements** (Pub. 33216 – SKU 34765).

The requirements were last issued or revised in 2007 • This workbook was updated in April 2012.

Scout's Name: \_\_\_\_\_ Unit: \_\_\_\_\_

Counselor's Name: \_\_\_\_\_ Counselor's Phone No.: \_\_\_\_\_

<http://www.USScouts.Org> • <http://www.MeritBadge.Org>

Please submit errors, omissions, comments or suggestions about improving this workbook to: [Workbooks@USScouts.org](mailto:Workbooks@USScouts.org)

1. Do the following:

a. Define "aircraft." \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Describe some kinds and uses of aircraft today.

Kind:	Uses:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

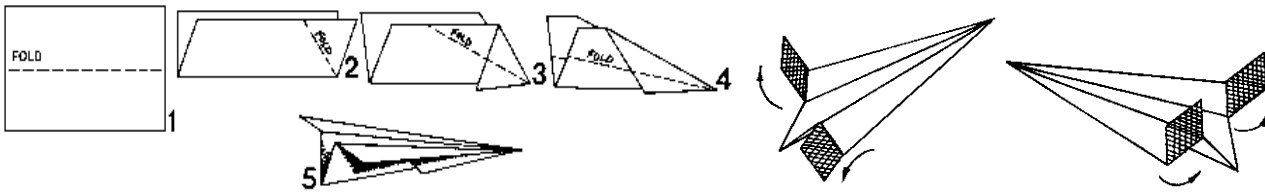
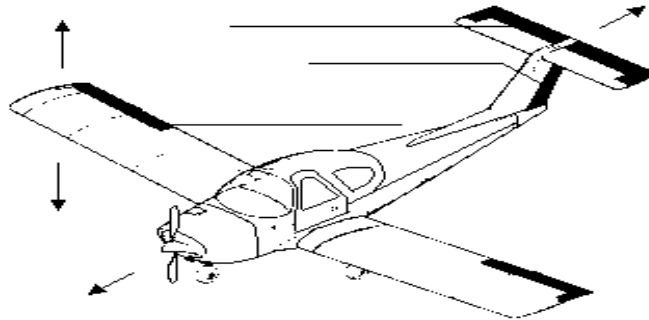
Explain the operation of piston, turboprop, and jet engines. \_\_\_\_\_

Piston: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

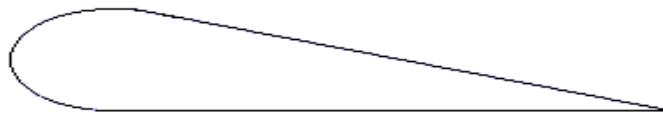
Turboprop: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Jet: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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.



**Airfoil:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Ailerons: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Elevators: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Rudder: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Propeller: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

- 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.

	Ailerons	Elevators	Rudder	Flaps
Takeoff				
Straight climb				
Level turn				
Climbing turn				
Descending turn				
Straight descent				
<b>Landing</b>				

- e. Explain the following: the recreational pilot and the private pilot certificates; the instrument rating. \_\_\_\_\_

Recreational pilot certificate: \_\_\_\_\_  
 \_\_\_\_\_

Private pilot certificate: \_\_\_\_\_  
 \_\_\_\_\_

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.

Date: \_\_\_\_\_

Place: \_\_\_\_\_

Type of aircraft: \_\_\_\_\_

Duration of flight: \_\_\_\_\_

Impressions: \_\_\_\_\_

\_\_\_\_\_

- 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. \_\_\_\_\_
  - Arrive at 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. On a map, mark a route for an imaginary airline trip to at least three different locations. Start from the commercial airport nearest your home. From timetables (obtained from agents or online from a computer, with your parent's permission), decide when you will get to and leave from all connecting points. Create an aviation flight plan and itinerary for each destination.

Leg 1: From \_\_\_\_\_ To \_\_\_\_\_

Leg 2: From \_\_\_\_\_ To \_\_\_\_\_

Leg 3: From \_\_\_\_\_ To \_\_\_\_\_

Leg 4: From \_\_\_\_\_ To \_\_\_\_\_



Departure from:	Flight	Time	Arrival at:	Time

- f. 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) communication radios, tachometer, oil pressure gauge, and oil temperature gauge.

Attitude indicator: \_\_\_\_\_

Heading indicator: \_\_\_\_\_

Altimeter: \_\_\_\_\_

Airspeed indicator: \_\_\_\_\_

Turn and bank indicator: \_\_\_\_\_

Vertical speed indicator: \_\_\_\_\_

Compass: \_\_\_\_\_

Navigation (GPS and VOR): \_\_\_\_\_

Communication radios: \_\_\_\_\_

Tachometer: \_\_\_\_\_

Oil pressure gauge: \_\_\_\_\_

Oil temperature gauge: \_\_\_\_\_

- g. Create an original poster of an aircraft instrument panel. Include and identify the instruments and radios discussed in requirement 2f.

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." \_\_\_\_\_

How the facilities are used \_\_\_\_\_  
 \_\_\_\_\_

How runways are numbered, \_\_\_\_\_  
 \_\_\_\_\_

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, flight service station, or Flight Standards District Office. (Phone directory listings are under U.S. Government Offices, Transportation Department, and 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.

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_

Pick one and find out the education, training, and experience required for this profession. \_\_\_\_\_

Education: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Training: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Experience: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Discuss this with your counselor, and explain why this profession might interest you. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Requirement resources can be found here:**  
[http://www.meritbadge.org/wiki/index.php/Aviation#Requirement\\_resources](http://www.meritbadge.org/wiki/index.php/Aviation#Requirement_resources)

## Important excerpts from the [‘Guide To Advancement’](#), No. 33088:

Effective January 1, 2012, the ‘Guide to Advancement’ (which replaced the publication ‘Advancement Committee Policies and Procedures’) is now the *official* Boy Scouts of America source on advancement policies and procedures.

- **[ Inside front cover, and 5.0.1.4 ] — Unauthorized Changes to Advancement Program**  
***No council, committee, district, unit, or individual has the authority to add to, or subtract from, advancement requirements.***  
(There are limited exceptions relating only to youth members with disabilities. For details see section 10, “Advancement for Members With Special Needs”.)
- **[ Inside front cover, and 7.0.1.1 ] — The [‘Guide to Safe Scouting’](#) Applies**  
Policies and procedures outlined in the ‘Guide to Safe Scouting’, No. 34416, apply to all BSA activities, including those related to advancement and Eagle Scout service projects. [Note: Always reference the online version, which is updated quarterly.]
- **[ 7.0.3.1 ] — The Buddy System and Certifying Completion**  
Youth members must not meet one-on-one with adults. Sessions with counselors must take place where others can view the interaction, or the Scout must have a buddy: a friend, parent, guardian, brother, sister, or other relative —or better yet, another Scout working on the same badge— along with him attending the session. When the Scout meets with the counselor, he should bring any required projects. If these cannot be transported, he should present evidence, such as photographs or adult certification. His unit leader, for example, might state that a satisfactory bridge or tower has been built for the Pioneering merit badge, or that meals were prepared for Cooking. If there are questions that requirements were met, a counselor may confirm with adults involved. Once satisfied, the counselor signs the blue card using the date upon which the Scout completed the requirements, or in the case of partials, initials the individual requirements passed.
- **[ 7.0.3.2 ] — Group Instruction**  
It is acceptable—and sometimes desirable—for merit badges to be taught in group settings. This often occurs at camp and merit badge midways or similar events. Interactive group discussions can support learning. The method can also be attractive to “guest experts” assisting registered and approved counselors. Slide shows, skits, demonstrations, panels, and various other techniques can also be employed, but as any teacher can attest, not everyone will learn all the material.

There must be attention to each individual’s projects and his fulfillment of *all* requirements. We must know that every Scout — actually and *personally*— completed them. If, for example, a requirement uses words like “show,” “demonstrate,” or “discuss,” then every Scout must do that. It is unacceptable to award badges on the basis of sitting in classrooms *watching* demonstrations, or remaining silent during discussions. Because of the importance of individual attention in the merit badge plan, group instruction should be limited to those scenarios where the benefits are compelling.

- **[ 7.0.3.3 ] — Partial Completions**  
Scouts need not pass all requirements with one counselor. The Application for Merit Badge has a place to record what has been finished — a “partial.” In the center section on the reverse of the blue card, the counselor initials for each requirement passed. In the case of a partial completion, he or she does not retain the counselor’s portion of the card. A subsequent counselor may choose not to accept partial work, but this should be rare. A Scout, if he believes he is being treated unfairly, may work with his Scoutmaster to find another counselor. An example for the use of a signed partial would be to take it to camp as proof of prerequisites. Partials have no expiration except the 18th birthday.