Aviation

Merit Badge Study Guide

• Organize thoughts to prepare • Take notes • Keep track of progress

Merit badge counselors may not require the use of this or any other workbook. Scouts must still demonstrate that have learned the material and can perform each required skill. If a requirement directs you to discuss, show," "tell, explain, demonstrate, identify, or anything similar, the requirement must be completed as written. No one may add to or remove anything from the official requirements listed in Scoutbook or on scouting.org/skills/merit-badges.

The requirements were revised in 2025 • This guide was updated in November 2025.

Scout's Name:_____ Unit_____Date Started _____

Counselor's Name: _____ Phone No.:_____Email: _____

Read the Aviation Merit Badge Pamphlet.

1. Do the following:
   a. Define "aircraft."

   b. Provide a brief overview of the evolution of flight,

   and discuss three notable times in history important to aviation.

   c. Explain the difference between a fixed wing and a rotary wing aircraft,

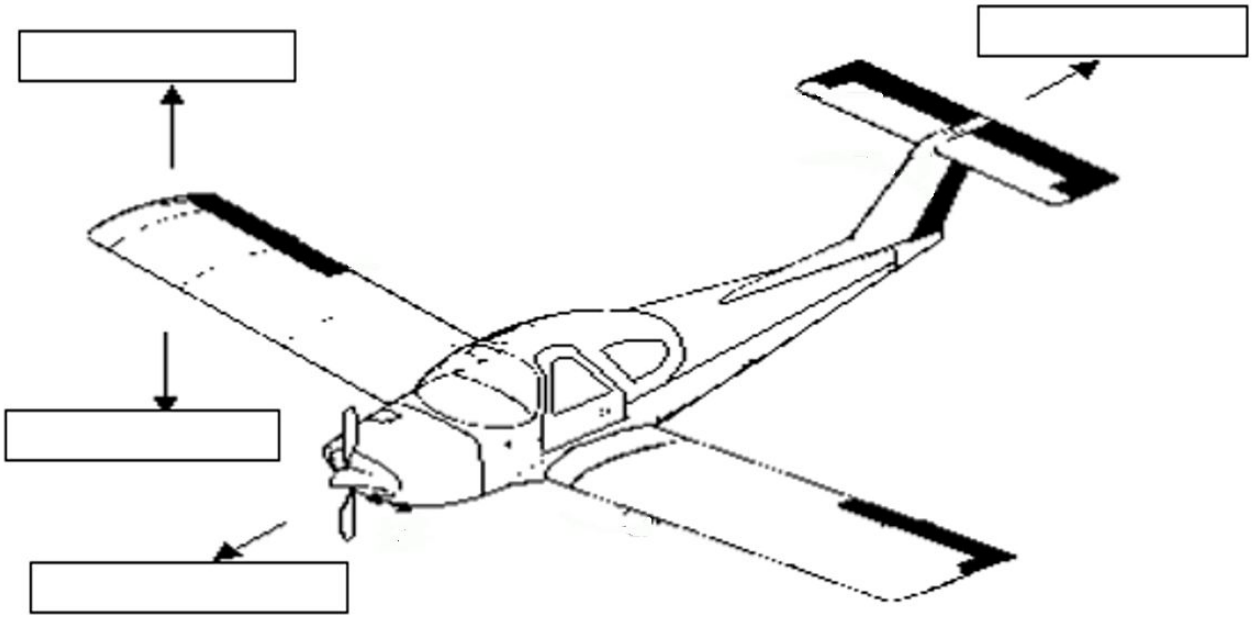
   and the benefits of each.

Fixed wing	
Rotary wing	

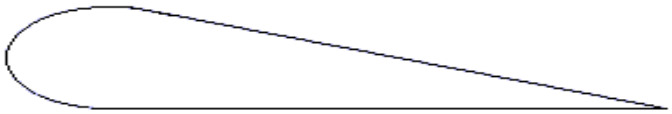
d. Explain the operation of piston, turboprop, and jet engines.

Piston:	
Turboprop:	
Jet:	

e. Using a model aircraft, describe the four forces that act on an airplane in flight.



f. Explain how an airfoil generates lift, specifically noting Bernoulli's principle.



(g) Identify and describe the aerodynamic control surfaces on the aircraft of your choice, and explain how they operate to control its attitude and direction of flight.

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(h) 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, communication, and engine performance indicators.

Attitude Indicator	
Hearing Indicator	
Altimeter	
Airspeed Indicator	
Turn and bank indicator	
Vertical speed indicator	

Compass	
Navigation	
Communication	
Engine Performance Indicator	

2. Principles of Flight. Do ONE of the following:

- ❑ (a) 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.
- ❑ (b) Build a rubber-band driven balsa wood airplane. Fly the plane for 25 feet in a straight line, with a smooth landing.
- ❑ (c) Build (or obtain) a fuel-driven or battery-powered electric model aircraft or drone. Obtain The Recreational UAS Safety Test (TRUST) certification, and fly the aircraft with a successful take-off and landing.

3. Flight Operations. Do TWO of the following:

- ❑ (a) Using a flight simulator software package, set a course and fly the headings you have established with a successful take-off and landing.
- ❑ (b) Under supervision, perform a preflight inspection of an aircraft.
- ❑ (c) Observe and/or participate in an aircraft maintenance activity. Describe the maintenance schedule and requirements for an aircraft of your choice.
- ❑ (d) 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 navigational heading for an aircraft.
- ❑ (e) With your parent or guardian's permission, take a discovery flight in an aircraft. Record the date, place, type of aircraft, and duration of flight. Report on your impressions of the flight.

Date:	
Place:	
Type of aircraft:	
Duration of flight:	
Impressions:	

4. Airport Operations. 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: Airport Traffic Control Tower (ATCT), Terminal Radar Approach Control (TRACON), Air Route Traffic Control Center (ARTCC), or Flight Standards District Office (FSDO). Report on the operation and your impressions of the facility.

- ❑ (c) Visit a military aviation facility. Learn how that facility supports defense and/or civilian activities. Report on the operation and your impressions of the facility.

- ❑ (d) Visit an aviation museum or attend an air show. Report on your impressions of the museum or show, and what you learned from the experience.

5. Personal & Professional Aviation Opportunities. Do the following:

(a) Explain the following: the student pilot, the recreational pilot, the remote pilot, and the private pilot certificates.

Student pilot certificate	
Recreational pilot certificate	
Remote pilot certificate	
Private pilot certificate	

(b) Describe the benefits of the instrument rating.

(c) Explain the following: the commercial pilot certificate, the airline transport pilot certificate, and certified flight instructor (CFI).

Commerical pilot certificate	
Airline transport pilot certificate	
Certified flight instructor (CRI)	

(d) Identify an Aviation Exploring Post and/or Civil Air Patrol facility in your area. Learn about their activities and membership requirements.

9. Careers. Do ONE of the following:

(a) Identify three career opportunities that would use skills and knowledge in aviation.

1.
2.
3.

Pick one and research the training, education, certification requirements, experience, and expenses associated with entering the field. Research the prospects for employment, starting salary, advancement opportunities, and career goals associated with this career. Discuss what you learned with your counselor and whether you might be interested in this career

Career: _____

Training	
Education	
Certification Requirements	
Experience	
Expenses associated with entering field	
Prospects for employment	
Starting salary	
Advancement opportunities	
Career goals associated with this career	

Discuss what you learned with your counselor and whether you might be interested in this career.

Notes:

(b) Visit a business or organization that does work in cybersecurity. Find out about different work roles, what they do, and how they acquired their knowledge through college degrees or certifications. Share what you learned with your counselor.

Business or organization: _____

Work Roles	
What they do	
How they acquired knowledge	