

Aviation

Merit Badge Workbook



Merit badges are earned by doing: reading the pamphlet, practicing the skills, and showing your counselor what you have learned.
This workbook gives you a place to organize your notes and track your progress along the way.
Merit badge counselors may not require the use of this or any similar workbook.
You still must satisfy your counselor that you can demonstrate each skill and have learned the information.
Use the space under each requirement to note what you have done and what you want to talk about, not to write out full answers.
When a requirement says discuss, show, tell, explain, or demonstrate, that is what you must do.
No one may add to or subtract from the official requirements found on scouting.org (Guide to Advancement 7.0.4.8).
Scouting America last updated this badge's requirements page on December 4, 2025.
Requirements change from time to time. Double-check scouting.org before you start.

Scout's name: _____ Unit: _____ Date started: _____

Counselor's name: _____ Phone no.: _____ Email: _____

Links marked "Scouting America resources" are the ones Scouting America shares on its official badge page.
This workbook is unofficial and not endorsed by Scouting America.

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1. Aviation Basics and Mechanics of Flight. Do the following:

(a) Define "aircraft." Describe three kinds of aircraft today, and their typical uses.

Scouting America resources: Types of Aircraft (video) · Basics of How a Glider Works (video)

My definition of "aircraft"

Three kinds of aircraft today

Kind of aircraft	Typical uses

(b) Provide a brief overview of the evolution of flight, and discuss three notable times in history important to aviation.

Scouting America resources: The Wright Brothers, First Successful Airplane (1903) (video)
The First Flight Around the World—U.S. Army Air Service (1924) (video) · First Solo Transatlantic Flight —Charles Lindbergh (1927) (video)
First Solo Transatlantic Flight—Amelia Earhart (1932) (video) · First Commercial Jet Airliner—de Havilland Comet (1949) (video)
First Commercial Supersonic Flight—The Concorde (1969) (video)
First Flight Around the World Without Refueling—Rutan Model 86 Voyager (1986) (video)
FAA Approves Unmanned Aerial Vehicles (UAV's AKA Drones) (2006) (video)

A brief overview of the evolution of flight

Three notable times in aviation history

When	What happened	Why it was important to aviation

(c) Explain the difference between a fixed wing and a rotary wing aircraft, and the benefits of each.

Scouting America resources: Airplane or Helicopter—Which Should You Choose? (video)

Type	How it is different	Benefits
Fixed wing		
Rotary wing		

(d) Explain the operation of piston, turbine, and jet engines.

Scouting America resources: The Internal Combustion Engine (video) · How a Turbine Engine Works (video) See a Jet Engine in Action! (video)

Engine	How it operates
Piston	
Turbine	
Jet	

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

Scouting America resources: How Do Planes Fly? (video)

Model aircraft I used

The four forces

Force	How it acts on the aircraft in flight

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

Scouting America resources: Bernoulli's Principle: How Planes Fly (video)

How an airfoil generates lift, and 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.

Scouting America resources: Aircraft Control Surfaces Explained (video)

Aircraft I chose

Aerodynamic control surfaces

Control surface	Where it is	How it controls attitude or direction

(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.

Scouting America resources: Cessna Cockpit Tour (video) · How To Control an Airplane: How Does a Pilot Control the Plane? (video)

Instruments in a typical single-engine aircraft

Instrument	Purpose and function
Attitude indicator	
Heading indicator	
Altimeter	
Airspeed indicator	
Turn and bank indicator	
Vertical speed indicator	
Compass	
Navigation	
Communication	
Engine performance indicators	

Requirement 1 completed on ____ counselor initials ____

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.

Scouting America resources: AMA FPG-9 Glider Instructions (PDF) · AMA FPG-9 Glider (video)

Date I built my FPG-9 _____ Competition date _____

Our competition

Scout	Precision of flight	Landing

☐ **(b)** Build a rubber-band driven balsa wood airplane. Fly the plane for 25 feet in a straight line, with a smooth landing.

Scouting America resources: Balsa Wood Plane (video)

Date built _____ Date flown _____ Distance in a straight line (feet) _____

How the flight and landing went

_____

☐ **(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.

Scouting America resources: Learn (website) · Take the Test (website)

Model aircraft or drone _____ Fuel or battery powered _____

TRUST certification date _____ Flight date _____ Where I flew _____

How my take-off and landing went

_____

Requirement 2 completed on _____ counselor initials _____

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.

Scouting America resources: Microsoft Flight Simulator (website)

Simulator software _____ Date _____ Aircraft flown _____

My course

Leg	From	To	Heading

How my take-off and landing went

☐ **(b)** Under supervision, perform a preflight inspection of an aircraft.

Scouting America resources: How to Preflight a Cessna 172 (video)

Date | Aircraft | Supervised by

What I checked during the preflight inspection

☐ **(c)** Observe and/or participate in an aircraft maintenance activity. Describe the maintenance schedule and requirements for an aircraft of your choice.

Activity I observed or joined | Date | Where

Aircraft of my choice

Its maintenance schedule and requirements

☐ **(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.

Scouting America resources: How To Read an FAA Sectional Aeronautical Chart (video)

Aeronautical chart I used | From and to

Working out my navigational heading

Step	Value	How I found it
True course measured		
Correction for magnetic variation		
Correction for compass deviation		
Correction for wind drift		
Navigational heading		

☐ **(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 | Duration of flight

Type of aircraft | Parent or guardian permission

My impressions of the flight

Requirement 3 completed on | counselor initials

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."

Airport I visited | Date

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.

Scouting America resources: FAA's Facility Locator (website)

☐ Airport Traffic Control Tower (ATCT)
☐ Air Route Traffic Control Center (ARTCC)
☐ Terminal Radar Approach Control (TRACON)
☐ Flight Standards District Office (FSDO)

Facility I visited | Date

How the facility operates

My 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.

Scouting America resources: Identify a Nearby Military Aviation Facility (website)

Military aviation facility I visited _____ Date _____

How it supports defense and/or civilian activities

How the facility operates

My 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.

Scouting America resources: Smithsonian Affiliations (website) · Air Shows (website) · Miltary Air Shows (website) Recreational Aviation Events (website) · Find a Museum (website)

Museum or air show _____ Date _____

My impressions of the museum or show

What I learned from the experience

Requirement 4 completed on _____ counselor initials _____

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.

Certificate	What I learned about it
Student pilot	
Recreational pilot	
Remote pilot	
Private pilot	

(b) Describe the benefits of the instrument rating.

Scouting America resources: How To Use Flight Instruments When Flying an Airplane (video)
What Is Instrument Flight Rules (IFR)? (video) · Instrument Rating | Tips, Challenges & Benefits (video)
Your First Instrument Pilot's Lesson (video)

Benefits of the instrument rating

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

Scouting America resources: Pilot Licenses Explained (video) · Certified Flight Instructor (video)

Certificate	What I learned about it
Commercial pilot certificate	
Airline transport pilot certificate	
Certified flight instructor (CFI)	

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

Scouting America resources: Aviation Exploring Post Visiting Denton TX Airport (video) · Aviation Exploring Posts (website)
Gallatin Cap Visiting Montana (video) · Find a Local CAP Squadron: (website)

Group	Name and location	Activities	Membership requirements
Aviation Exploring Post			
Civil Air Patrol facility			

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

Scouting America resources: Careers in Aviation (video) · Aerospace Engineer Careers (video) · Career as a Flight Dispatcher (video)
How To Become a Helicopter Pilot (video) · Career as a Aircraft Maintenance Technician (video)
5 Qualities To Be a Good Air Traffic Controller (video) · Career as a Flight Attendant (video)
Unseen Airport Jobs You Won't Believe Exist! | Inside Hidden Roles That Keep Airports Running (video)
Airline and Commercial Pilots Occupational Outlook (website)

Three careers in aviation

Career	Skills and knowledge in aviation it uses

The career I picked

What I found out

Topic	My research
Training	
Education	
Certification requirements	
Experience	
Expenses	
Prospects for employment	
Starting salary	
Advancement opportunities	
Career goals	

What I discussed with my counselor, and whether I might be interested

Requirement 5 completed on counselor initials

Counselor sign-off

Your counselor signs your blue card or approves the badge in Scoutbook, and your unit records it. This line is for your own records.

Counselor's signature Date completed

Official Scouting America resources

Scouting America resources: Aviation merit badge page (requirements and resources) · Aviation merit badge pamphlet (free PDF)
All merit badges

Made by Cole at ScoutSmarts.com, an Eagle Scout who loves helping Scouts.
Spot an error or a requirement change? Tell me at scoutsmarts.com/contact.
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