



# AVIATION

## Merit Badge Requirements

### 1) Do the following:

- A) Define "aircraft." Describe some kinds of aircraft in use today. Explain the operation of piston, turboprop, and jet engines.
- B) Point out on a model plane 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 recreational pilot and the private pilot certificates; the instrument rating.
- F) Find out what job opportunities there are in aviation. Describe the qualifications and working conditions for one job in which you are interested. Tell what it offers for reaching your goal in life.

### 2) Do TWO of the following:

- A) Take a flight in an aircraft. Record the date, place, type of aircraft, duration of flight, and your impressions of the flight.
- B) 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."
- C) 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, Federal Aviation Administration. Call in advance.) 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.
- 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) Visit an aircraft maintenance shop. Interview a technician and report on his/her ideas about aircraft maintenance.
- G) Create an original poster of an aircraft instrument panel. Include and identify the instruments and radios discussed in requirement 2e.

### 3) Do TWO of the following:

- A) Interview a professional or military pilot. Report on what you learned.
- B) Interview a flight attendant. Report on what you learned.
- C) Interview a certified flight instructor. Report on what you learned.
- D) Under supervision, perform a preflight inspection of a light airplane.
- E) 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.
- F) Using one of many flight simulator software packages available for computers, "fly" the course and heading you established in requirement 3e or another course you have plotted.
- G) On a map, mark a route for an imaginary airline trip to at least three foreign countries. Start from the commercial airport nearest your home. From timetables (obtained from agents or online from a computer), decide when you will get to and leave from all connecting points.
- H) Build and fly a fuel-driven model airplane. Describe safety rules for building and flying model airplanes. Tell safety rules for use of glue, paint, dope, plastics, and fuel.
- I) Assemble a poster (or album) of original photographs taken while accomplishing the requirements.

Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

## Requirement 1

Define *aircraft*: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Describe some kinds of aircraft in use today:

Type: \_\_\_\_\_ Description: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Type: \_\_\_\_\_ Description: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Type: \_\_\_\_\_ Description: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Type: \_\_\_\_\_ Description: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Explain the operation of piston engines: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Explain the operation of turboprop engines: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Explain the operation of jet engines: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Point out on a model airplane the forces that act upon an airplane in flight. Tell & explain what you pointed out: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Explain how an airfoil generates lift: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Explain how the primary control surfaces (ailerons, elevator, and rudder) affect the aircraft's attitude: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Explain how a propeller produces thrust: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

How are the control surfaces of an airplane used for take off? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

How are the control surfaces of an airplane used for a straight climb? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

How are the control surfaces of an airplane used for a level turn? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

How are the control surfaces of an airplane used for a climbing turn? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

How are the control surfaces of an airplane used for a descending turn? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

How are the control surfaces of an airplane used for a straight descent? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

How are the control surfaces of an airplane used for landing? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Explain the recreational pilot certificate: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Explain private pilot certificate: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

What is meant by "instrument rating" when talking about the recreational pilot and private pilot certificates? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

List and describe some of the job opportunities in aviation:

Job Name: \_\_\_\_\_ Description: \_\_\_\_\_

Job Name: \_\_\_\_\_ Description: \_\_\_\_\_

Job Name: \_\_\_\_\_ Description: \_\_\_\_\_

Which job interests you most? \_\_\_\_\_

What are some of the qualifications for this job? \_\_\_\_\_  
\_\_\_\_\_

Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

What are some of the working conditions of this job? \_\_\_\_\_  
\_\_\_\_\_

What does this particular job offer for reaching your goal in life? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Requirement 2

You have been given seven options for this requirement. Select and complete two of them.

If you selected *Option A*:

Take a flight in an aircraft. Record the date, place, type of aircraft, and duration of flight.

Date: \_\_\_\_\_ Place: \_\_\_\_\_ Type of aircraft: \_\_\_\_\_ Duration: \_\_\_\_\_

Report on your impressions of the flight: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If you selected *Option B*:

Visit an airport.

Describe how the facilities are used: \_\_\_\_\_  
\_\_\_\_\_

Describe how the runways are numbered: \_\_\_\_\_  
\_\_\_\_\_

Describe how runways are determined to be "active": \_\_\_\_\_  
\_\_\_\_\_

If you selected *Option C*:

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, Federal Aviation Administration. Call in advance.) Report on the operation and your impressions of the facility: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

If you selected **Option D**:

Visit an aviation museum or attend an air show. Report on your impression of the museum or show: \_\_\_\_\_

---

---

---

---

---

---

---

---

---

---

If you selected **Option E**:

Explain the purposes and functions of the various instruments found in a typical single-engine aircraft:

Attitude Indicator

Purpose: \_\_\_\_\_

Function: \_\_\_\_\_

Heading Indicator

Purpose: \_\_\_\_\_

Function: \_\_\_\_\_

Altimeter

Purpose: \_\_\_\_\_

Function: \_\_\_\_\_

Airspeed Indicator

Purpose: \_\_\_\_\_

Function: \_\_\_\_\_

Turn & Bank Indicator

Purpose: \_\_\_\_\_

Function: \_\_\_\_\_

Vertical Speed Indicator

Purpose: \_\_\_\_\_

Function: \_\_\_\_\_

Compass

Purpose: \_\_\_\_\_

Function: \_\_\_\_\_

Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

Navigation (GPS and VOR) and Communication Radios

Purpose: \_\_\_\_\_

Function: \_\_\_\_\_

Tachometer

Purpose: \_\_\_\_\_

Function: \_\_\_\_\_

Oil Pressure Gauge

Purpose: \_\_\_\_\_

Function: \_\_\_\_\_

Oil Temperature Gauge

Purpose: \_\_\_\_\_

Function: \_\_\_\_\_

If you selected **Option F**:

Visit an aircraft maintenance shop. Interview a technician and report on his/her ideas about aircraft maintenance: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If you selected **Option G**:

Create an original poster of an aircraft instrument panel. Include and identify the instruments and radios discussed in requirement 2e. Use the rest of this page to draw a small sketch of your poster or use it to help you come up with ideas for your poster.



Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

If you selected **Option E**:

Learn how to read an aeronautical chart. What do some of the special symbols indicate on the aeronautical chart? \_\_\_\_\_

---

---

---

What kinds of information will you find on the back of an aeronautical chart? \_\_\_\_\_

---

---

---

Measure a true course on the aeronautical chart. Describe the course: \_\_\_\_\_

---

---

---

Correct your course for magnetic variation, compass deviation and wind drift. Describe the steps you took to make the corrections: \_\_\_\_\_

---

---

---

What is the compass heading that you arrived at? \_\_\_\_\_

If you selected **Option F**:

Using one of many flight simulator software packages available for computers, "fly" the course and heading you established in requirement 3e or another course you have plotted. Give a summary of your flight: \_\_\_\_\_

---

---

---

---

---

If you selected **Option G**:

On a map, mark a route for an imaginary airline trip to at least three foreign countries. Start from the commercial airport nearest your home. From timetables (obtained from agents or online from a computer), decide when you will get to and leave from all connecting points.

What is your starting point (nearest commercial airport to your home)? \_\_\_\_\_

From timetables, decide from when you will get to and leave from all connecting points. List your times below

Depart From: \_\_\_\_\_ Time: \_\_\_\_\_ Arrive At: \_\_\_\_\_ Time: \_\_\_\_\_

Depart From: \_\_\_\_\_ Time: \_\_\_\_\_ Arrive At: \_\_\_\_\_ Time: \_\_\_\_\_

Depart From: \_\_\_\_\_ Time: \_\_\_\_\_ Arrive At: \_\_\_\_\_ Time: \_\_\_\_\_

Depart From: \_\_\_\_\_ Time: \_\_\_\_\_ Arrive At: \_\_\_\_\_ Time: \_\_\_\_\_

Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

If you selected *Option H*:

Build and fly a fuel-driven model airplane. Give a short summary of the building and the flight: \_\_\_\_\_

---

---

---

---

---

---

---

---

---

---

List the three safety rules in building model planes:

Rule 1: \_\_\_\_\_

---

---

Rule 2: \_\_\_\_\_

---

---

Rule 3: \_\_\_\_\_

---

---

List the safety rules in flying model planes:

Commonsense rule of safety: \_\_\_\_\_

Safety Rule for Free-Flight Models: \_\_\_\_\_

---

---

Safety Rule for U-Control Models: \_\_\_\_\_

---

---

Safety Rule(s) for Radio-Control Models: \_\_\_\_\_

---

---

---

---

Tell safety rules for use of the following:

Glue: \_\_\_\_\_

Paint: \_\_\_\_\_

Dope: \_\_\_\_\_

Plastics: \_\_\_\_\_

Fuel: \_\_\_\_\_

Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

If you selected *Option I*:

Assemble a poster (or album) of original photographs taken while accomplishing the requirements.

If you wish, paste some of your photos on this page and show them to your counselor.