



# Aviation

## Merit Badge Workbook

This workbook can help you but you still need to read the merit badge pamphlet (book). No one can add or subtract from the Boy Scout Requirements #33215. Merit Badge Workbooks and much more are below: [Online Resources](#).

Workbook developer: [craig@craiglincoln.com](mailto:craig@craiglincoln.com). Requirements revised: 2006, Workbook updated: December 2008.

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

Counselor's Name: \_\_\_\_\_ Counselor's Ph #: \_\_\_\_\_

### 1. Do the following:

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

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Describe some kinds and uses of aircraft today.

Kind:

Uses:

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

Explain the operation of piston, \_\_\_\_\_

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turboprop, \_\_\_\_\_

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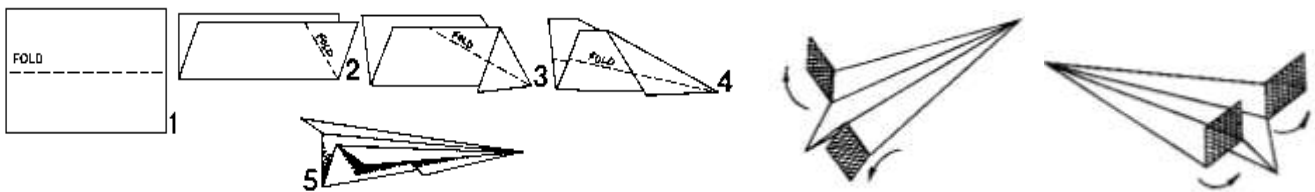
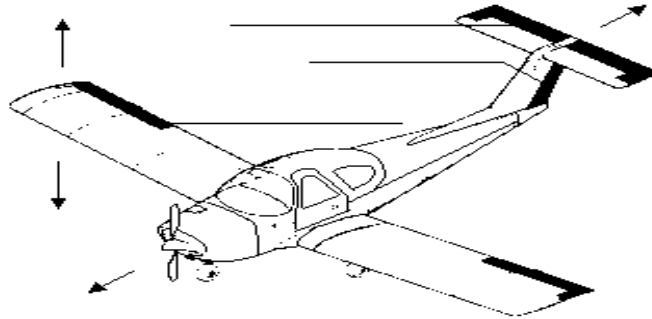
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and jet engines. \_\_\_\_\_

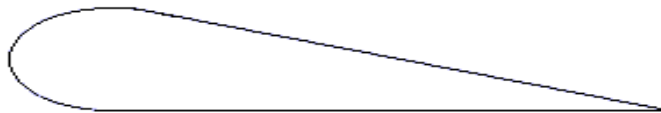
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b. Point out on a model airplane the forces that act on an airplane in flight. (Hint: To make a model airplane out of paper...)



c. Explain how an airfoil generates lift,



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how the primary control surfaces (ailerons, elevators, and rudder) affect the airplane's attitude,

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

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

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

and how a propeller produces thrust. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

d. *Demonstrate* how the control surfaces of an airplane are used for

	Ailerons	Elevators	Rudder	Flaps
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. \_\_\_\_\_  
\_\_\_\_\_

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. \_\_\_\_\_

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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. \_\_\_\_\_



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 \_\_\_\_\_

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and itinerary for each destination.

Departure from:	Flight	Time	Arrive 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) \_\_\_\_\_

and communication radios, \_\_\_\_\_

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tachometer, \_\_\_\_\_  
\_\_\_\_\_

oil pressure gauge, \_\_\_\_\_  
\_\_\_\_\_

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

\_\_\_\_\_

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.

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

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. \_\_\_\_\_

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

**Online Resources** (Use any Internet resource with caution and only with your parent's or guardian's permission.)

Boy Scouts of America: ► [scouting.org](http://scouting.org) ► [Guide to Safe Scouting](#) ► [Age-Appropriate Guidelines](#) ► [Safe Swim Defense](#)  
► [Scout](#) ► [Tenderfoot](#) ► [Second Class](#) ► [First Class](#) ► [Rank Videos](#) ► [Safety Afloat](#)

Boy Scout Merit Badge Workbooks: [usscouts.org](http://usscouts.org) -or- [meritbadge.org](http://meritbadge.org) Merit Badge Books: [www.scoutstuff.org](http://www.scoutstuff.org)

**Requirement Resources**

These resources and much more are at: <http://meritbadge.org/wiki/index.php/Aviation>

1a. [Define "aircraft." - Kinds and uses of aircraft - piston, turboprop, and jet engines](#)

1b. The blank control surfaces diagram is in the workbook above with instructions for a model paper airplane.

[How Airplanes Work: forces that act on an airplane in flight](#)

1c. The blank airfoil diagram you need is in the workbook above.

[Explain how an airfoil generates lift](#) - [How ailerons, elevators, and rudder affect the airplane's attitude](#) - [How a propeller produces thrust](#)

1d. [Control surfaces - Flaps](#)

1e. [Pilot certification](#)

2a. The flight log you need is in the workbook above.

[EAA Young Eagles Program](#) - Youth ages 8-17 can fly in small planes for free!

[Video Flying Lessons: Type of Planes](#) - [Exterior](#) - [Interior](#) - [Taking Off](#) - [Flying](#) - [Landing](#)

- 2b. [Video Lesson: How to Pre-flight a plane](#)
- 2c. [Free Online Aeronautical Charts - Navigation](#)
- 2d. [Free online flight simulators](#) - [Google Earth flight simulator](#)
- 2e. The blank US Map you need is in the workbook above.  
Commercial Aviation routes and timetables: [Travelocity](#) - [Expedia](#) - [Yahoo](#)  
See [Google maps](#) for mapping your course.  
The aviation flight plan and itinerary table you need is in the [Aviation Workbook](#).
- 2f. [EAA Purposes and functions of instruments](#)
- 2g. [Aircraft Instrument Panels](#)
- 3a. Radio Controlled Model Airplanes under \$30 (Click Search Links): [Target](#) - [eBay](#) - [Amazon Radio Shack](#)
- 3b. [FPG-9 Foam Plate Glider Links: Overview](#) - [instructions.doc Instructions](#) - [Pattern](#) - [AMA activity.doc Activities](#)  
[Another FPG-9 Site - instructions.doc Instructions](#) - [Pattern](#)  
[FPG-9 as a part of the US Air Force Project SOAR: PowerPoint Slide Show](#) - [Pattern](#)
- 4a. [How Airports Work](#)
- 4b. [FAA Educational Contacts](#)
- 4c. [Aviation Museum Locator](#) - [Aviation History Museum](#) - [Nat. Aeronautics and Space Admin.](#) - [Listing of US Airshows](#)
5. [FAA Aviation Careers Guide](#) - [Careers in Aviation](#)

**General Resources**

Academy of Model Aeronautics: <http://www.modelaircraft.org>      Aeronautics Learning Laboratory: <http://www.allstar.fiu.edu>  
Aviation History Museum: <http://www.aviation-history.com>      AvStop Magazine <http://www.avstop.com>  
Federal Aviation Administration: <http://www.faa.gov>      ► [FAA Educational Contacts](#)      ► [Aviation Careers Guide](#)  
Flight-History.com: <http://www.flight-history.com>      Nat. Aeronautics and Space Admin.: <http://www.nasa.gov>  
Nat. Oceanic and Atmospheric Admin.: <http://www.noaa.gov>      University Aviation Association: <http://uaa.auburn.edu>