



**USS Hornet
(CV 12)**

AVIATION Merit Badge Requirements



Name: _____

1. Do the following:
 - a. Define "aircraft." Describe some kinds and uses of aircraft today. Explain the operation of piston, turboprop, and jet engines.
 - 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.
 - 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.
2. Do TWO of the following:
 - b. Under supervision, perform a preflight inspection of a light aircraft.
 - 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, tachometer, oil pressure gauge, and oil temperature gauge.
3. Do the following:
 - 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:
 - c. Visit an aviation museum or attend an air show. Report on your impressions of the museum or show.
5. Do the following
 - a. Find out about three career opportunities in aviation. Pick one and find out the education, training, and experience required for these professions. Discuss this with your counselor, and explain why this profession might interest you.

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Did the USS Hornet Participate in the following historical events? Circle your answers:

World War II? Yes No
 Viet Nam War Yes No
 Recovery of Apollo 11 7 14

Definition of an Aircraft

An Aircraft is a vehicle that flies through the air. Circle your answer. True False

Describe some kinds of aircraft in use today:

Type: Boeing 747: Is used for passenger transport? Circle your answer Yes No

Type: Supper Guppy: What did the Super Guppy transport?

Circle your answer: Helicopters Saturn V Rocket Stages Refrigerators

Type: Helicopter Can it be used for traffic reporting? Circle your answer Yes No

Type: Agcat How is it used? Circle one answer: Crop Dusting Skywriting Pipe Line Patrol

Newton's Laws of Motion

Description
A. Force = Mass x Acceleration
B. For every action there is an equal and opposite reaction
C. Every object will remain at rest or in uniform motion in a straight line unless compelled to change its state by the action of an external force

Match the Law to the Letter	Newton's Laws
	1 st Law
	2 nd Law
	3 rd Law

Turboprop Engines

A turboprop engine uses thrust to turn a propeller. As in a turbojet, hot gases flowing through the engine rotate a turbine wheel that drives the compressor. The gases then pass through another turbine, called a power turbine. This power turbine is coupled to the shaft, which drives the propeller through gear connections.

A turboprop engine has many of the same components as a turbojet engine.

Circle your answer: True False

Aircraft Control Surfaces

Explain how the primary control surfaces (ailerons, elevator, and rudder) affect the aircraft's attitude. Match the correct control surface to the aircraft motion:

Control Surface	Aircraft Motion
	Pitch
	Roll
	Yaw

Which control surface is used to change the pitch attitude of the wing during takeoff rotation?

Circle One: Rudder Flaps Ailerons Spoilers Elevator

Which of the control surfaces of an airplane used for a straight and level climb?

Circle Two: Rudder Flaps Ailerons Spoilers Elevator

Which of the control surfaces are used to make a level turn in an airplane:

Circle all that apply: Rudder Flaps Ailerons Spoilers Elevator

Which of the control surfaces are used to make a climbing turn in an airplane?

Circle all that apply: Rudder Flaps Ailerons Spoilers Elevator

Is Power Added or Reduced? Circle your answer Added Reduced

Which of the control surfaces are used to make a descending turn in an airplane?

Circle all that apply: Rudder Flaps Ailerons Spoilers Elevator

Is Power Added or Reduced? Circle your answer Added Reduced

Which of the control surfaces are used to make straight and level descent in an airplane?

Circle all that apply: Rudder Flaps Ailerons Spoilers Elevator

Is Power Added or Reduced? Circle your answer Added Reduced

Which of the control surfaces allows you to flair the airplane during a landing?

Circle one: Rudder Flaps Ailerons Spoilers Elevator

Aircraft Preflight Inspection

Under supervision, perform a preflight inspection of an airplane. Describe your inspection below:

Who is the manufacturer and what is model number of the aircraft? _____

How many engines does it have? _____

What type of engines does the aircraft have? _____

What type of fuel does the aircraft use? _____

How much fuel does the aircraft hold? _____

FPG-9 Team Exercise

Record the control surface position data: and aircraft response

Both control surfaces deflected up: Aircraft Response: _____

Both control surfaces deflected down: Aircraft Response: _____

Left control surface deflected up, Right Control surface deflected down:

Aircraft Response: _____

Both control surfaces level: Aircraft Response: _____

Maximum Glide distance: _____

Aircraft Instruments

Attitude Indicator

Provides and artificial horizon and pitch and roll information. True False

It functions by the use of a? Circle the correct answer. Watch spring Gyroscope Alternator

Heading Indicator

Provides a stabilized magnetic heading indication.

True False

It functions by the use of a? Circle the correct answer.

Speeder Spring Gyroscope Alternator

Altimeter

An Altimeter indicates the aircraft's height above?

Circle the correct answer:

Sea Level Flight Level Mean Sea Level

It functions by the use of a? Circle the correct answer.

Thermometer Vacuum Pump Barometer

Airspeed Indicator

An airspeed indicator measures which of the aircraft's speeds?

Circle the correct answer:

Groundspeed Mach Speed Indicated Airspeed Calibrated Airspeed

It functions by the use of a? Circle the correct answer:

Venturi Tube Dewar flask Pitot Static System

Turn & Bank Indicator

The Turn & Bank indicator measures a standard rate of turn and quality of turn. What is the standard rate of turn in degrees per second?

Circle the correct answer.

6 3 2 360

It functions by the use of a? Circle the correct answer.
Static System

Electric Gyroscope Vacuum Gyroscope Pitot

Vertical Speed Indicator

The vertical Speed Indicator measures the **rate** of climb or descent of an aircraft. It is calibrated in what measurement unit?

Circle the correct answer:

Meters per minute Thousands of feet per minute Feet per second

It functions by the use of a? Circle the correct answer.

Gyroscope Barometer with calibrated leak Pitot Static System

Compass

The compass needle indicates the following?

Circle one: True North

Magnetic North

Magnetic Variation

What type of magnet does the compass use?

Circle one. Magnet

Horseshoe Magnet

Ceramic Magnet

Navigation (VOR) and Communication Radios

Navigation Radios (VOR) indicates the magnetic radial magnetic radial from the station.

Circle your answer: True False

Communication Radios in general aviation aircraft use which of the following type of radio frequency?

Circle one answer: Ultra High Frequency High Frequency Very High Frequency

Tachometer

The tachometer measures propeller rotation speed. True False

It functions by the use of a? Circle the correct answer. Venturi Tube Electric Sensor Teleflex Cable

Oil Pressure Gauge

The oil pressure gauge measures air pressure. True False

It functions by the use of a? Circle the correct answer. Venturi Tube Electric Sensor
Teleflex Cable

Oil Temperature Gauge

The oil temperature gauge measures oil temperature: True False

It functions by the use of a?

Circle the correct answer. Kohlman Window Electric Sensor Teleflex Cable

Careers in Aviation

Fill in the blanks:

Job Name: Military Pilot Education Required

Job Name: Air Traffic Controller Education Required

Job Name: Safety Inspector Education Required

Pilot Certification & Ratings

In order to hold a **Student Pilot** certificate the student must be at least _____ years of age. Fill in the blank

A **Recreational Pilot** may carry the following number of passengers. Circle the correct answer: 2 4 1

May a **Private Pilot** operate an aircraft further then 50 miles from the airport? Circle the correct answer:
Yes No

What is considered **Instrument Meteorological Conditions**? Fill in the blanks:

Visibility less then _____ statute miles.

Cloud ceiling less then _____ feet.

Course Completion Information

Scout Applicant Name: _____

Program Date: _____

Troop # _____ **Location:** _____

Merit Badge Endorsement: I certify that I have personally reviewed the Applicant's completion of the requirements for the Boy Scouts of America, Aviation Merit Badge and have found the applicant has satisfactorily completed the requirements for this merit badge.

Print Councilor Name: _____

Councilor Signature: _____ **Date:** _____