

YOUTH AVIATION ADVENTURE

Participant Handbook



Introducing Young People to the Exciting World of Aviation

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Airport Operations

Compass Rose

The compass rose is always oriented so zero degrees points toward the North.

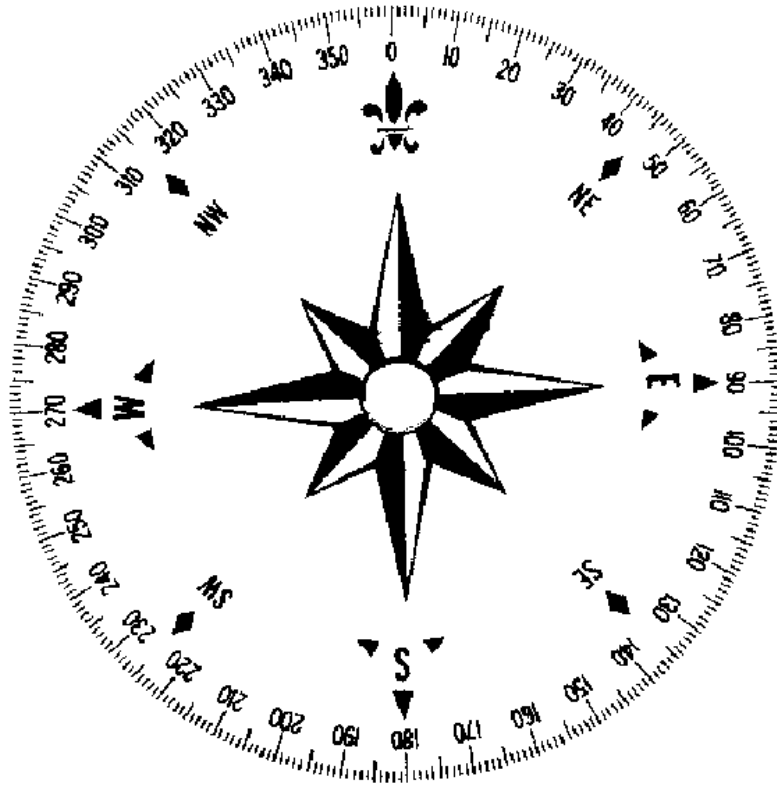


Image courtesy of Dave Chappell, Station Operator
NOAA Weather Spotter ID #LEWIS4
<http://mywebpages.comcast.net/dchappell/weather/compass.gif>

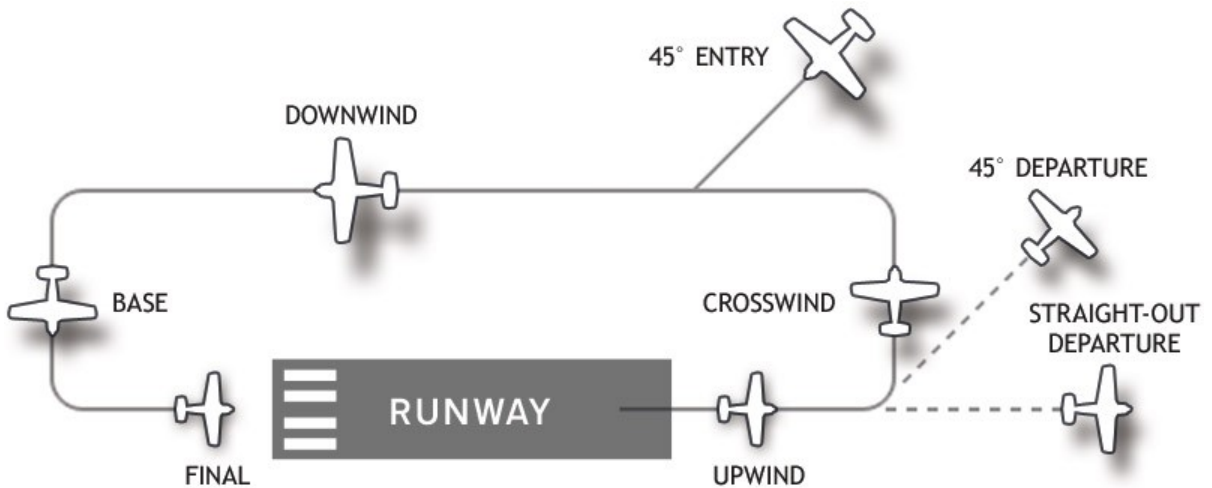
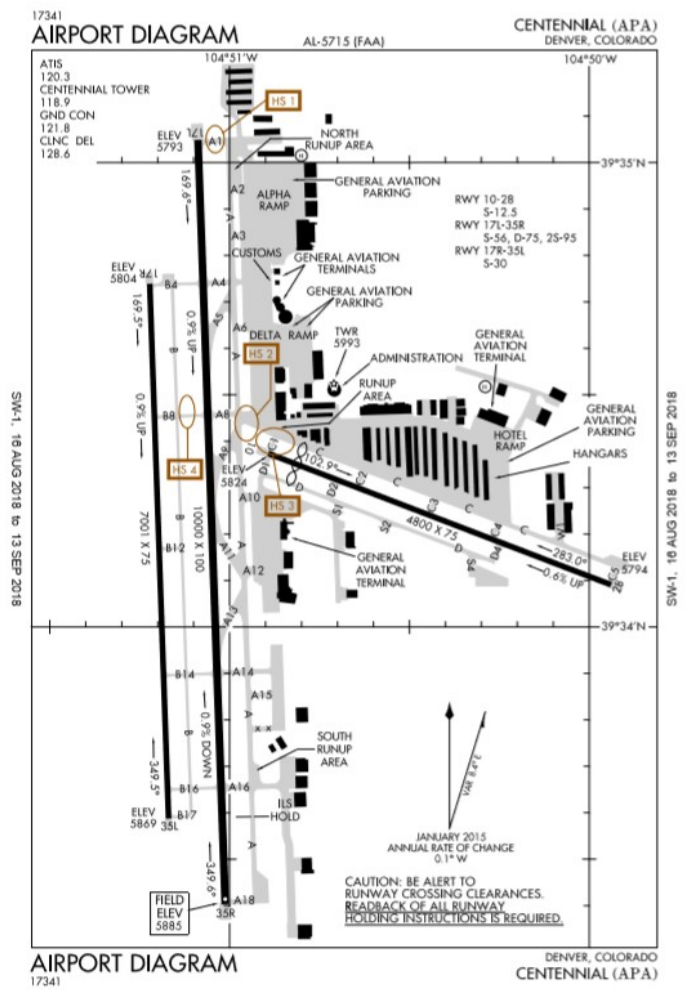
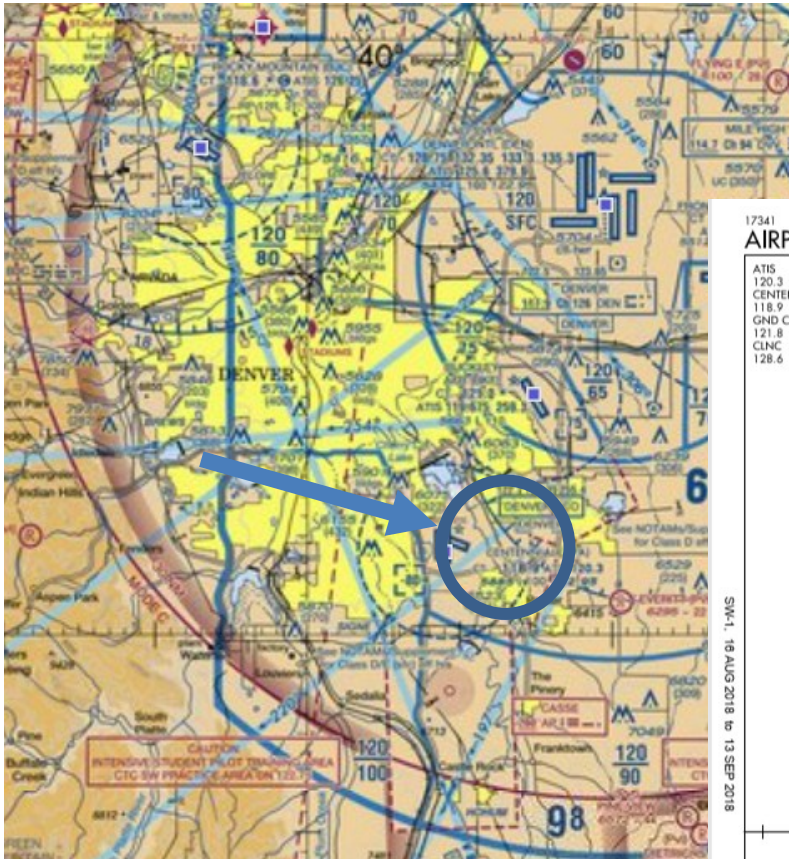


Image Source: https://en.wikipedia.org/wiki/File:Airport_traffic_pattern.jpg

Centennial Airport Information

FAA Identifier: APA
Elevation: 5885'
Pattern altitude: 6885' MSL

Runway 17L/35R
Dimensions: 10000 x 100'
Surface: asphalt/grooved, in good condition



Phonetic Alphabet

Radio communications are done in a way that ensures everyone knows what's being communicated, and no time is wasted with extra words. One of the ways pilots and air traffic controllers make sure they communicate is to use the phonetic alphabet. It helps insure that the letters D, T, P, E, C, G, V, or Z are not confused since they all end in the "ee" sound. Did you know that the international language in aviation is English? That's why it is a requirement to be able to read, write, speak and understand English in order to be certified.

Letter	Pronunciation¹
A	Alpha (AL fah)
B	Bravo (BRAH VOH)
C	Charlie (CHAR lee)
D	Delta (DELL tah)
E	Echo (ECK oh)
F	Foxtrot (FOKS trot)
G	Golf (GOLF)
H	Hotel (hoh TELL)
I	India (IN dee ah)
J	Juliet (JEW lee ETT)
K	Kilo (KEY loh)
L	Lima (LEE mah)
M	Mike (MIKE)
N	November (no VEM ber)
O	Oscar (OSS cah)
P	Papa (pah PAH)
Q	Quebec (keh BECK)
R	Romeo (ROW me oh)
S	Sierra (see AIR rah)
T	Tango (TANG go)
U	Uniform (YOU nee form)
V	Victor (VIK tah)
W	Whiskey (WISS key)
X	X Ray (ECKS RAY)
Y	Yankee (YANG key)
Z	Zulu (ZOO loo)
0	ZEE row
1	WUN
2	TOO
3	TREE
4	FOW er
5	FIFE
6	SIX
7	SEVEN
8	AIT
9	NINE er

¹ Note: The syllables printed in capital letters are to be stressed.

Transcript of Pilot/ Air Traffic Controller exchange

Ground and Take-Off Sequence:

- Pilot: State Ground, Cherokee six one three eight victor with tango requests taxi for two seven zero departure.
- ATC: Cherokee six one three eight victor, State Ground, taxi to runway two seven left via Alpha, cross runway three two approach zone.
- Pilot: Taxi to two seven left via Alpha. Cherokee six one three eight victor.
- Pilot: State Tower, Cherokee six one three eight victor holding short at two seven left, ready for departure.
- ATC: Cherokee six one three eight victor, State Tower, runway two seven left, cleared for takeoff, fly heading two seven zero.
- Pilot: Cleared for takeoff, runway two seven left, heading two seven zero. Cherokee six one three eight victor.

Approaching Airport:

- Pilot: State Tower, Cherokee six one three eight victor, ten miles to the north with X-ray, inbound, full stop.
- ATC: Cherokee six one three eight victor, State Tower, report a two-mile right base for runway two seven left.
- Pilot: Report a two mile right base for two seven left, Cherokee six one three eight victor.
- Pilot: State Tower, Cherokee six one three eight victor, two mile right base for two seven left.
- ATC: Cherokee six one three eight victor, cleared to land runway two seven left.
- Pilot: Cleared to land, two seven left, Cherokee six one three eight victor.

Airport Operations Worksheet

Spell out the following words using the Phonetic Alphabet

1. Your first name _____
2. Your last name _____
3. PILOT _____
4. AIRPLANE _____
5. The three letter identifier for your local airport

Use the your local airport diagrams to answer the following

Airport Name	Identifier	Runways	Facilities

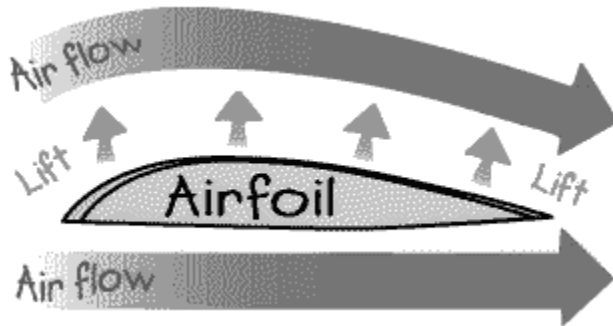
Frequency Type	Frequency	Purpose
CTAF		
Unicom		
AWOS/ATIS		
Tower		
Ground GND CON		
Clearance CLNC DEL		



Aerodynamics

Lift and Angles of Attack

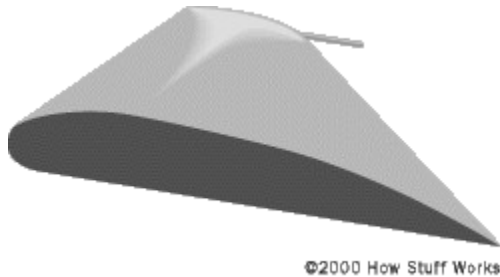
Airfoil with zero angle of attack, showing airflow and lift:



Air moving over the longer distance of the curved upper wing surface must travel faster than the air flowing the shorter distance under the flatter bottom surface of the wing. According to Bernoulli's principle, the difference in the speed of the air, which behaves like a fluid, produces lower pressure above the wing than below it. This pressure difference produces lift.

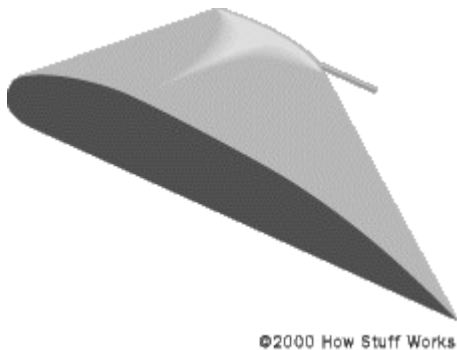
<http://z.about.com/d/inventors/1/0/q/N/wingairflow.gif>

Airfoil with shallow angle of attack:



Wings with a shallow angle of attack have less drag but also less lift.

Airfoil with steep Angle of Attack:

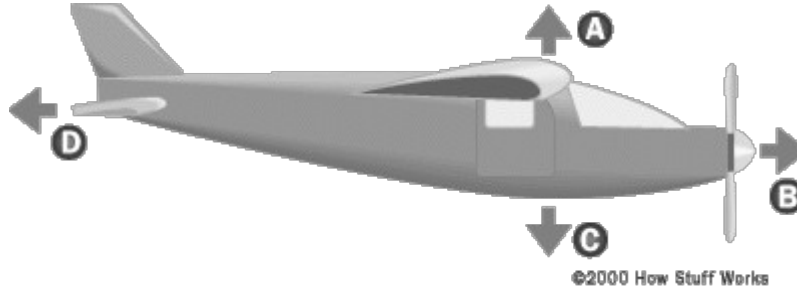


Wings with a steep angle of attack have more drag and more lift. This allows the plane to fly slower.

Photos courtesy of How Stuff Works

When in flight, there are four forces acting on a plane: lift, thrust, weight, and drag. In straight and level flight, these four forces are in equilibrium: lift = weight and thrust = drag.

Four forces in flight



A = Lift B = Thrust C = Weight/Gravity D = Drag

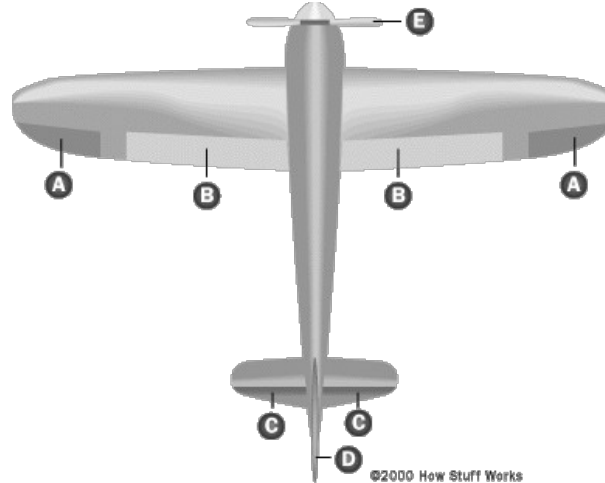
Lift: Air flowing over the wings and the angle of the wing relative to the passing air together move the aircraft upward.

Weight: The opposite of lift, weight is a force pulling down on the airplane.

Thrust: A force created by the engine that moves the airplane forward.

Drag: The opposite of thrust, drag is a force that slows the forward movement of the airplane through the air. The surfaces of the plane cause drag as they move through the air.

Airplane Controls



A = Ailerons B = Flaps C = Elevator D = Rudder E = Propeller

Ailerons: Help to turn the plane. They work in opposition to one another. When the right aileron goes up, the left one goes down and vice versa. They change the shape of the plane’s airfoil to turn the plane. Ailerons control bank.

Flaps: Help to slow the plane down. Flaps are use most often in landing, when the pilot slows the plane down to an appropriate speed for landing. Flaps change the shape of the airfoil, and both go down or up at the same time, in the same direction.

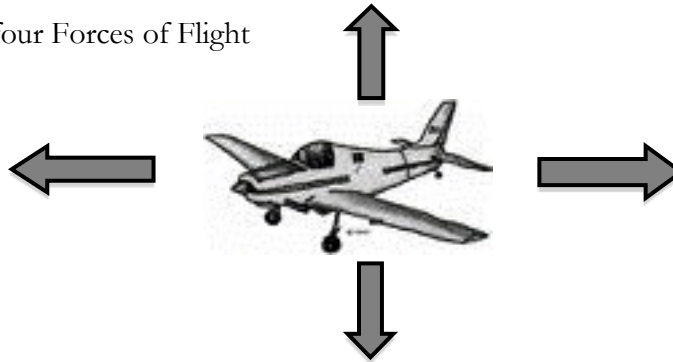
Elevator: Helps the airplane ascend and descend. When the tail goes up, the front of the plane goes down, and vice versa. Elevators control pitch.

Rudder: Together with the ailerons, the rudder helps to turn the plane. The rudder controls the yaw of the plane.

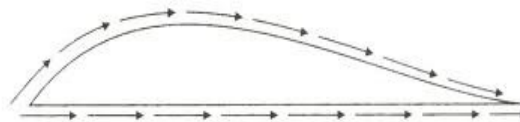
Propeller: Produces thrust, pulling the plane forward.

Aerodynamics Worksheet

1. Newton’s Third Law of Motion states, “That for every action there is an equal and _____ re-action.”
2. Label the four Forces of Flight



3. Bernoulli’s principle states that fast moving air has (more, less) _____ pressure than still air.
4. Indicate on the airfoil diagram which is the High pressure and which is the Low pressure.



Airplane Controls

5. The flight control that raises and lowers the nose: _____.
6. Like on a boat, this flight control moves the nose right or left: _____.
7. Near the tip of the wing, the flight control that banks the wing for a turn is an: _____.
8. On each wing is a _____. When lowered for takeoff and landing, it changes the shape of the wing to create more lift.
9. On a high-wing airplane, a pole like structure provides additional support to the wing. It is a _____.

Word Bank

Strut *Rudder* *Aileron* *Flap* *Elevator*

Aerodynamics Activity – Try this at home!

This activity is taken from the AOPA “Path to Aviation Pilot and Teacher Handbook.” For a free copy of this handbook, contact AOPA.

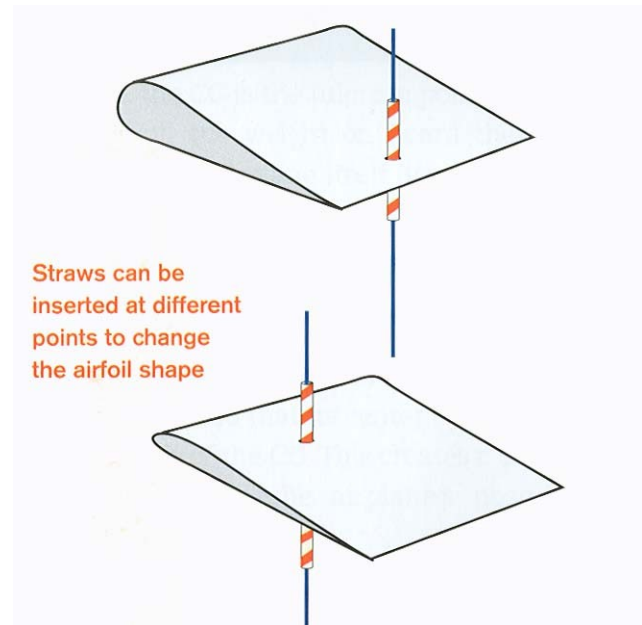
From this activity, you will learn how the shape of an airfoil influences how well that airfoil develops lift.

Materials:

Paper
Tape
Plastic straw (cut in thirds)
String
Scissors
Single-hole punch
Electric box fan

To do it:

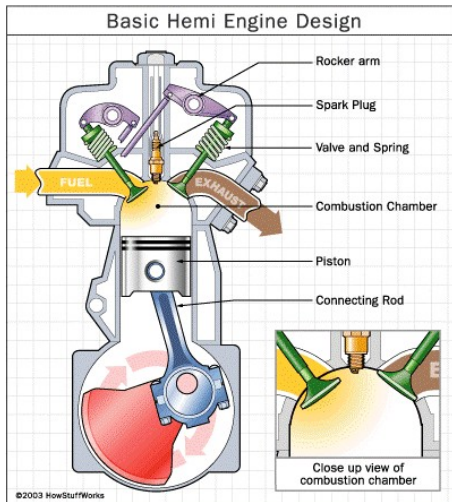
- Bend the paper in half without creasing the fold.
- Punch a hole in the paper through both sides of the paper. Where you place the hole will determine the shape of your airfoil, or wing.
- Slide the straw through the holes and secure the straw to the paper with tape.
- Look at the wing from the side. Can you guess how well it will create lift, based on what you know about Newton’s and Bernoulli’s theories?
- Insert the string through the straw so that the airfoil can slide up and down on the string freely. Hold both ends of the string so that your airfoil does not fall off.
- Set up the fan so that you can hang the airfoil in the air stream. With the fan off, position the airfoil and hold it so that it is perpendicular to the airflow, just as an airplane might fly its wing through the air.
- Holding both ends of the string, turn the fan on low, and watch the airfoil to see if it rises on the string – a sign that lift is being produced.
- Try different speeds on the fan, and various air foils. Compare how well they work with the shape of each airfoil.



This activity courtesy of AOPA Path to Aviation Pilot and Teacher Handbook, p. 27.

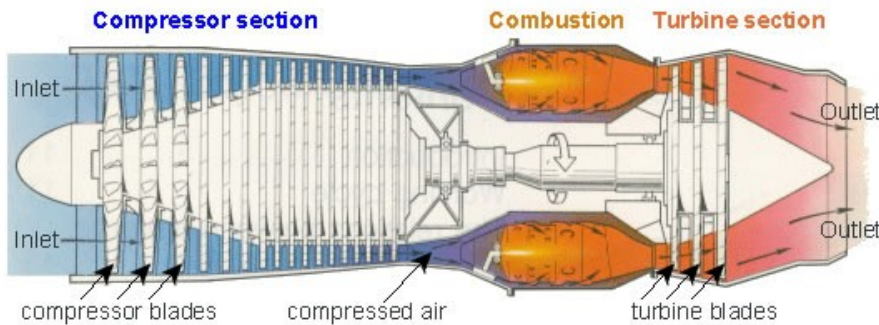
Power Plant

In order for a plane to fly, it must have thrust. The engine and propeller together are often referred to as the “powerplant.” The engine power converts chemical energy (fuel) into mechanical energy that is used to rotate the propeller. The spinning propeller (or jet engine) moves the plane forward through the air, which creates lift over the wings. (See the Aerodynamics section for why the movement of air over a wing creates lift.)



Most small planes use combustion engines to create power.

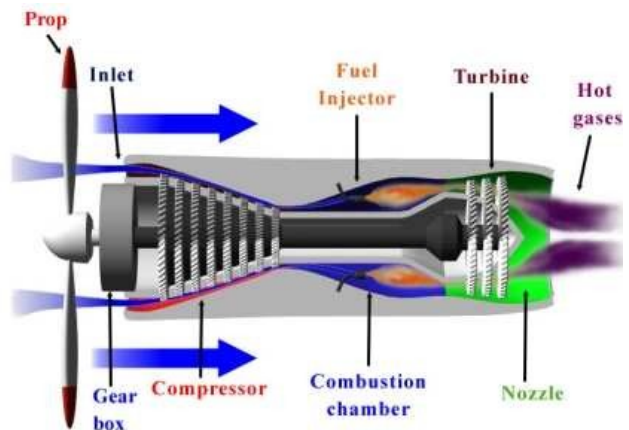
Most larger and commercial planes use jet engines to create power.



<http://www.professionalpilot.ca/aerodynamics/performance/graphics/jet-cutaway.jpg>

Some planes use turboprop engines to create power. Turbochargers give an aircraft the ability to fly at higher altitudes, allowing a pilot to get better speed and more flexibility when it comes to circumnavigating adverse weather.

For more information on engines, go to <http://howstuffworks.com>

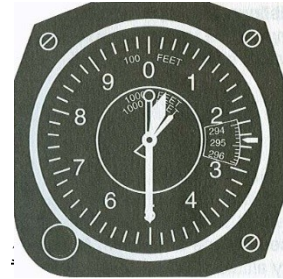
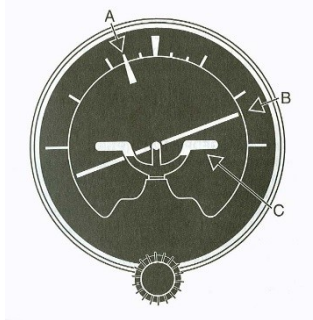


Instrument Panel Worksheet

Can you name these instruments?



1



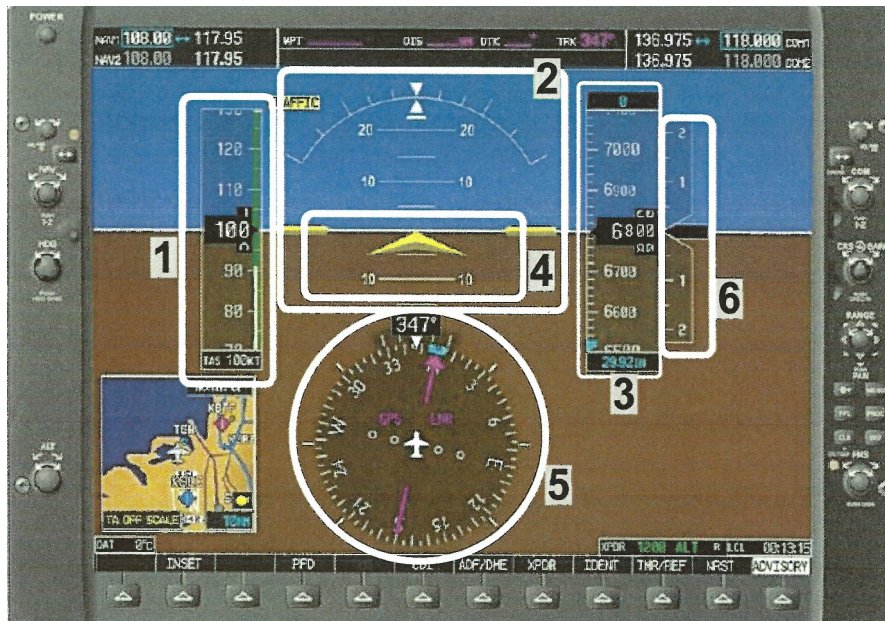
4



5



6



An electronic flight display (EFD, a.k.a. "Glass Cockpit") is a system of digital instruments using multiple liquid crystal display (LCD) screens that replace the traditional arrangement of individual instruments (6 pack.) Numbers in photo refer to instruments on traditional 6 pack pictured above.

Images courtesy of the FAA.

Preflight

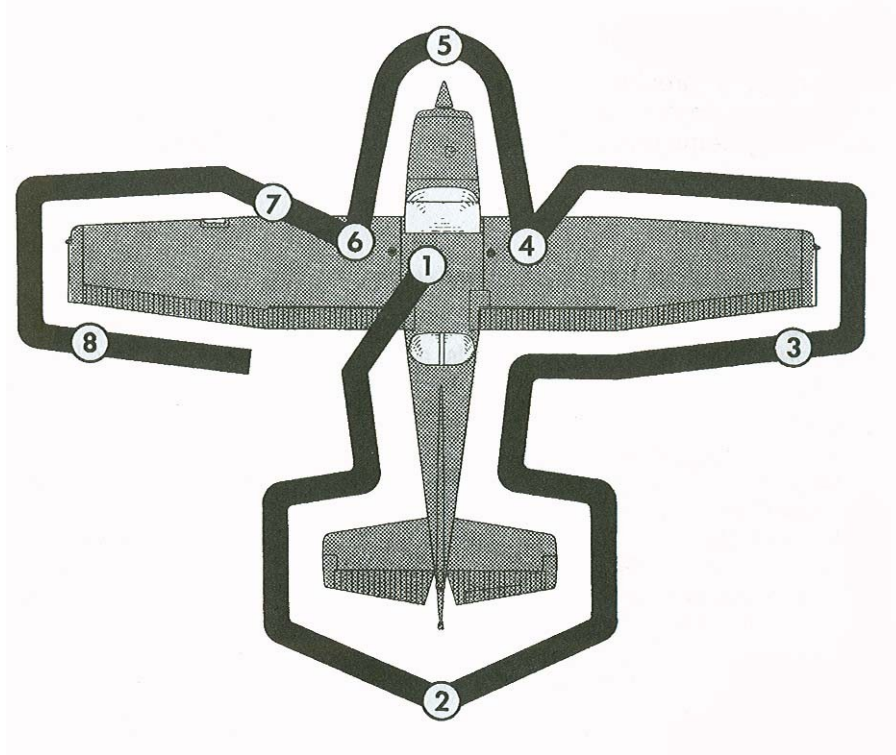


Image courtesy of Cessna

When a pilot performs a preflight inspection on an airplane, s/he walks around the plane, inspecting a variety of items, according to the plane's "POH" or Pilot Operating Handbook. Each plane is different. The above diagram is from a Cessna 172 high wing plane. Each number corresponds to something the pilot needs to check at that part of the plane. On the next page, you'll see a brief description of what the pilot does at each of the numbers 1-8.

Sample Checklist

1 – Cabin

Control lock – remove
Ignition switch – off
Master Switch – on (check landing & taxi lights, navigation lights, and rotating beacon. Extend flaps)
Fuel quantity indicator – check quantity
Master switch – off
Fuel shutoff valve – on

2- Empennage

Rudder gust lock – remove
Tail tie down – disconnect
Control surfaces – check free of movement and security

3- Right wing trailing edge

Aileron – check freedom of movement and security
Flap – check security

4- Right wing

Wing tie down – disconnect
Main wheel – check proper inflation and brake line
Fuel sump – drain sample and check for water, contamination, and proper fuel grade
Fuel quantity – check visually quantity
Fuel filler cap – secure

5- Nose

Engine oil level – check, not less than 4 quarts.
Fuel strainer – get sample and check for water, foreign matter, and contamination. Check that strainer fuel drain closed.
Propeller and spinner – check for nicks and security
Air intake – check for absence of foreign matter, clean and clear
Landing light - check for cleanliness
Nose wheel strut and tire – check for security and proper inflation
Static source opening (left side fuselage) – check for stoppage

6- Left wing

Main wheel tire – check proper inflation and brake line
Fuel sump – drain sample and check for water, contamination, and proper fuel grade.
Fuel quantity – check visually – quantity
Fuel filler cap – secure

7- Left wing leading edge

Pitot tube – remove cover & check for stoppage
Stall warning opening – check for stoppage
Fuel tank vent opening – check for stoppage
Wing tie down – disconnect

8- Left wing trailing edge

Aileron – check freedom of movement and security
Flap – check security

Careers in Aviation

Pilot Certifications, Requirements, and Privileges

Certificate	Requirements	Privileges
Student Pilot	Read, write, speak and understand English. 16 years old to solo. Medical certificate and pass written test for solo.	Fly with an instructor until solo. After solo, fly solo only with instructor permission in clear skies with no passengers.
Sport Pilot	Read, write, speak and understand English. At least 17 years old. Medical certificate <i>or</i> driver's license. Minimum of 20 hours flying time including 15 hours of instruction and 5 hours of solo flying.	Only one passenger at a time. Passenger may not pay you. VFR flying only. Daytime flying only. Fly only "light sport aircraft" which have a maximum number of seats, maximum weight and maximum speed.
Recreational Pilot	Read, write and speak English. At least 17 years old. Medical certificate. Pass written and practical tests. 30 hours flight time including some solo flying.	Fly no further than 50 nautical miles from home airport. Daytime flying only. VFR flying only. Only one passenger at a time. Passenger may not pay you.
Private Pilot	Read, write and speak English. At least 17 years old. Medical certificate. Pass written and practical tests. 40 hours total flight time including 20 with an instructor and 10 as a solo pilot. Also requires 3 hours instrument time, 3 hours night flying, and 3 hours cross country flying.	Fly with passengers, in VFR weather (clear skies), day or night, for any distance. Passengers may not pay you.
IFR Certification	Private Pilot certificate. Pass written and practical tests. 50 hours cross country as pilot in command. 40 hours instrument experience, 15 hours with an instructor, and a long cross-country flight.	Fly with passengers in instrument conditions (clouds), day or night, for any distance. Passengers may not pay you.
Commercial Pilot	At least 18 years old. Private Pilot Certificate. Medical certificate. Pass written and practical tests. At least 250 total flight time including 20 hours with an instructor, 50 hours cross country as pilot in command, 10 hours of	Fly with paying passengers in the type of weather certified for. (It is possible to earn a commercial pilot certificate without having an instrument rating. When this is the case, pilot may only fly in VFR weather.)

	instrument training, 10 hours training in a plane with retractable landing gear, and a long cross-country flight.	
Certified Flight Instructor (CFI)	At least 18 years old. Hold either commercial pilot certificate or airline transport pilot certificate. Pass two written tests and a practical test and demonstrated proficiency flying from the right seat.	Teach student pilots.
Certified Flight Instructor, Instruments (CFII)	Same requirements as a CFI but also including the instrument rating.	Teach student pilots to fly by instruments.
Airline Transport Pilot	At least 23 years old. Commercial pilot certificate and an instrument rating. Pass written and practical tests. 1500 hours total flight time, 1000 of which need to be in two different types of aircraft	Work for most commercial airlines. Work for most parcel carriers (FedEx, UPS, USPS, etc.)

Other certifications are required for multiple engine airplanes, float planes, and high performance planes.

Information taken from Federal Aviation Regulations, part 61.

Partial List of Careers in Aviation

There are many careers in aviation in addition to being a pilot. Even careers you might not have thought of! Anything you can think of probably has some application in aviation.

- Interested in art? How about designing logos or paint schemes or marketing materials for a commercial airline!
- Interested in food? How about working to create foods that can be easily transported, reheated, and still taste good at high altitude without compromising food safety, texture, or nutritional value?
- Interested in Computer Science? How about designing and writing software that controls traffic, assists with ticketing & pricing, or helps with security?

The possibilities are endless!

Some people design and build aircraft, some people test and inspect them. There are people who fly them and people who fix them. And there are people who work at airports. Below is just a sampling of some of the aviation careers available to you. Some require college degrees, and some don't. There's something for every interest!

Career Title	Education Requirements	Responsibilities
Pilot Careers		
Agricultural Pilot	HS diploma, special training, and license	Crop dusting.
Air Traffic Reporting Pilot	College preferred	Report on street traffic.
Major/National Airline Pilot	College preferred, most require 4-year degree	Fly commercial airplanes long distances.
Regional Airline Pilot	College preferred, most require 4-year degree	Fly commercial airplanes shorter distances.
Helicopter Pilot	College preferred, most require 4-year degree	Police work, traffic reporting, hospital work, military work.
Corporate Pilot	College preferred, most require 4-year degree	Fly corporate owned aircraft.
Air Taxi Pilot	College preferred	Fly private customers short distances.
Flight Instructor	HS diploma	Teach flying.
Military Pilot	College degree	Fly military aircraft.
Astronaut	Engineering, physical science, physics, or similar advanced degree	Fly Space Shuttle missions.
Airline and Airport Operations		
Airport Manager	College degree in airport management or business administration	Oversee all operations of the airport, contract with airlines and vendors, and act as "landlord" to the many people who work there.
Fixed Base Operator Manager	HS diploma; college degree sometimes preferred	Manage services (such as refueling) and sell general aviation products at an airport.
Station Manager	HS diploma; experience preferred	Coordinate flight crew, cargo crew, baggage crew, ground crew, and the information that

		must be communicated among all these teams.
Scheduling Coordinator	College degree preferred; experience helpful	Coordinate schedule of planes into and out of airport.
Flight Dispatcher	Dispatcher's license; college degree and experience preferred	In cooperation with the pilot, furnish a flight plan that enables the plane to arrive at its destination on schedule with the maximum payload and least cost.
Air Traffic Controller	FAA training; college preferred	Direct all flight activities, give advice and information by radio to pilots, and monitor planes in and around the airport.
Safety Inspector	Engineering degree and/or experience as a pilot or mechanic.	Inspect airplane and airport for safety.
Concession Workers	HS Diploma	Work in restaurants in the airport and prepare inflight meals.
Fire and Crash Rescue	Special training; college preferred	Conduct rescue and firefighting operations when planes crash.
Ramp Service Personnel	HS diploma	Work on the actual airfields such as loading and unloading baggage or driving the vehicles.
Cabin Maintenance Mechanic	HS diploma, technical training	Maintain interior of plane.
Airline and Airport Services		
Customer Services Representative	HS diploma, business experience	Manage customer satisfaction and assist airline customers in any way.
Ticket Agent	HS diploma, two years college preferred	Check in passengers, assign seats if necessary, tag bags.
Reservations Sales Agent	HS diploma; two years college preferred	Assist passengers with reservations and sell tickets.
Flight Attendants	HS diploma, special training; college preferred	Take care of in-flight needs such as security, compliance with regulations, and passenger comfort and safety.
Baggage Handlers	HS diploma	Load and unload cargo and baggage, drive baggage tractors, and operate conveyors, forklifts, and other air freight handling equipment
Sky Caps	HS diploma	Assist passengers before they board the plane and after they leave the plane.
Cargo Handlers	HS diploma	Load and unload cargo and baggage.
Air Freight/ Cargo Agent	HS diploma, shipping experience	Manage the movement of air freight and air cargo.
Aircraft and Systems Maintenance		
Airframe or Powerplant Mechanic	HS diploma, technical training; degree preferred	Make sure the plane is serviced and fit to fly.
Avionics Specialist	HS diploma, technical training; degree preferred	Make sure plane's instruments, radios, GPS receivers, and other avionics are functional.
Aircraft Manufacturing		
Manufacturing Engineers	Bachelor of Science degree	Design the processes of airplane manufacture.
Electrical Installers & Technicians	HS diploma, Associate degree	Install and maintain electronics in the airplane.
Tool, Jig & Fixture Makers, sheet metal fabricators	HS diploma, vocational school	Make the parts that will go into the airplane.
CAD Operators and Il-	College degree preferred	Design the airplane on Computer Aided De-

Illustrators		sign packages
Machine Tool Operators	HS diploma, vocational school	Make the parts that will go into the plane.
Assemblers & Installers	HS diploma	Assemble planes and install electronics, wiring, and other parts.
Quality Technicians	HS diploma, Associate degree	Inspect airplane as it is being built for quality assurance.
Scientific and Technical Services		
Engineers (Aeronautical, Aerospace, Civil, Electrical, Mechanical)	Engineering degree	Design the plane and its fuselage, the electronics, the heating, cooling, and oxygen systems, the engines, the structure, and make sure the loads on a plane are coordinated with the structure of the plane. Engineers design the seats, headsets and movie screens. Chemical engineers work with plastic compositions and fuel mixes, and aerodynamic engineers make sure the plane moves smoothly through the air. Materials engineers design the best metals and materials for strong, light airframes.
Meteorologists	Meteorology degree; experience preferred	Analyze weather data and make weather reports for the pilot.
Cartographers	Cartography degree	Create maps for use by the aviation industry.
Architects	Architecture degree	Design and build airports and airport facilities.
Technicians (Electronics, Radar, Navigation)	HS diploma, special training	Repair and maintain various electronic equipment on the plane and in the airport.
Network Planning, Network Operations and Control	College degree or higher	Network Planning & Performance matches capacity (airplane seats) with demand (Customers who want to fly) by planning the cities to fly between and the number of nonstop flights per day. Network Operations and Control (NOC) executes an airline's daily operations while effectively and efficiently managing operational disruptions.
Law-Related Services		
Aviation Attorney	Law degree	Defend and prosecute pilots when they are cited for breaking FAA rules.
Sky Marshal	HS diploma, police academy, law enforcement experience	Ride airplanes incognito to preserve safety on the planes
Drug Enforcement Agents	College degree, special training; experience preferred	Use helicopters to assist police in arrests and patrols.
Customs Agents	College degree	Work at ports of entry to screen foreign travelers.
Security Officers	HS diploma, special training	Patrol airports to maintain safety at the airport.
Accident Investigators	College degree, industry experience	Investigate aviation accidents to determine causes
Security Specialist	HS diploma, law enforcement experience	Insure the safety of all people in and around the airport. X-ray carry-on bags, search baggage, enforce airport regulations, and patrol the grounds.
Health Services		
Flight Physician/Aviation Medical Exam-	Medical degree	Perform aviation physicals on pilots.

iner		
Office Professionals		
Travel Agents	HS diploma, special training	Assist in vacation travel, including airline tickets, other ground transportation, hotel, and tours.
Information Systems Specialist	College degree	Maintain, program, and support and all aspects of aviation, airports, flying, and communications computers.
Food Preparers	HS diploma, health certificate required	Prepare in-flight meals.
Artists/Designers	College degree	Design media, promotions, plane interiors and exteriors, airport interiors and exteriors.
Revenue Management	College degree	Airlines, flight schools, universities, aircraft manufacturers, and airports all need to remain profitable. There are myriad ways that someone with a business or finance degree can be employed in aviation.
Strategic Planners	College degree or higher	Work for airlines and airports to develop and maintain sound long-term business strategies.
Customer Service	HS diploma or college degree	Work in all areas of aviation as the friendly face of the business.
Education		
Flight Instructor, University Professor, Flight Examiner,	Most require at least a college degree	All pilots, regardless of where they are in their training require ongoing instruction, review, and examination. There are many ways to be involved in aviation education.

Careers in Aviation Worksheet

1. What is involved in becoming a professional pilot?

2. After I get my pilot license, can I start applying for a job with the airlines?

3. Are there flying jobs other than working for an airline? Name three!

4. What are you interested in doing? How could you incorporate that into aviation?

From the previous pages, choose three careers that look interesting and then elaborate on one.

Career Opportunities in Aviation

- 1.
- 2.
- 3.

Elaborate on one of the careers listed above: _____

- a) Educational Requirements –

- b) Training Requirements –

- c) Experience needed -

Career Word Scramble

Have you ever wondered about a career in aviation? The aviation industry offers opportunities to suit many interests and backgrounds. Play our word scramble and see if you can circle all the hidden Careers. AVJobs.com has an in depth look at the variety of aviation careers, salary range, and required training.

The Aviation Careers to Look for are:

- Air Traffic Controller
- Meteorologist Medical Examiner
- Skycap
- Ticket Agent
- Customs Agent
- Flight Dispatcher
- Corporate Pilot
- Cartographer
- Safety Inspector
- Mechanic
- Airport Planner
- Sky Marshall
- Engineer
- Airline Pilot
- Attorney

A O P A G C O R P O R A T E P I L O T N
 Z I W R E N I M A X E L A C I D E M I A
 C S R S E F A A K S J Y Q U X E L A C S
 P U Y T U H N A S A O B S H F F E J K E
 A Q S N R P C A R T O G R A P H E R E A
 T Z I T B A E T M A S E C S K Y N W T B
 R C M X O Z F R A I R T A X I J G M A X
 E I V A G M K F M P M E C A A D I N G T
 N W A Y R B S G I A S K Y C A P N F E O
 N O A E M C L A B C N I A Z Q C E L N L
 A N C N R I O R G N C G D T A S E Y T I
 L A D R S N U V W E J O R T M D R B I P
 P T E O J A N E A J N X N R H S K O L E
 T R V T N H Q Y J F S T L T D G Q W O N
 R A A T U C R I A S E C P M R X I Y V I
 O B S A F E T Y I N S P E C T O R L E L
 P R S K Y M A R S H A L L E R S L U F R
 R D C A S E C I R O L N J A E C X L Q I
 I N A S A S A F E T Y C R O L Y A T E A
 A F L Y T S I G O L O R O E T E M D G R

Build and Fly!

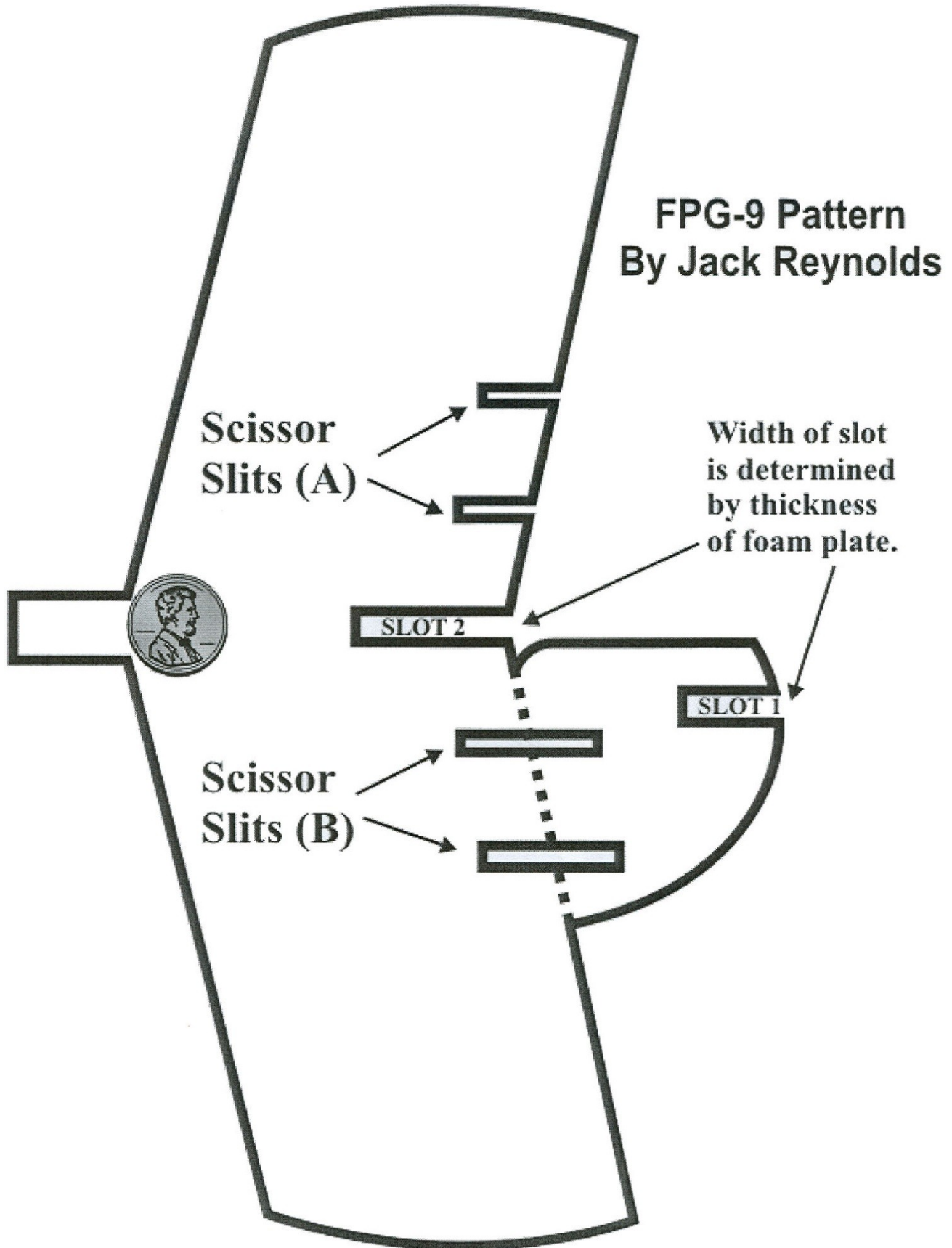
Academy of Model Aeronautics FPG-9

On the following page is a pattern for the Foam Plate Glider (FPG) that you will build at YAA. You will be supplied with a pre-cut plate there, but use this one if you wish to recreate the plane with your own materials at home.



The FPG-9 uses “elevons” to control both pitch and roll. In a conventional airplane, elevators control pitch and ailerons control roll.

When you fly your glider, use the ailerons and rudder to try to make it turn to the left. Try to make it turn to the right. What happens if you remove the penny? What happens if you remove the tail?



NASA Quest Paper Helicopter Plans

Try this too! Helicopters use the same aerodynamic principles as airplanes, but they work vertically instead of horizontally.

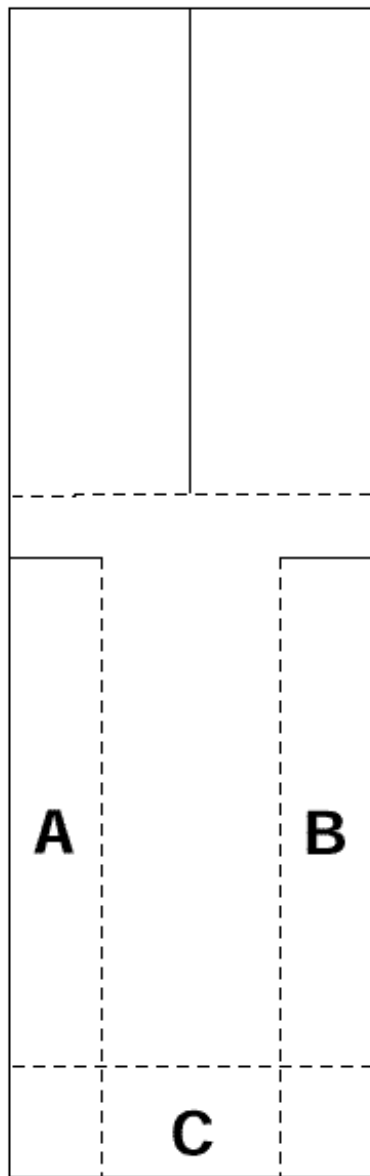
**1. Cut on solid black lines.
Fold on dashed lines.**

**2. Fold A and B
to middle.**

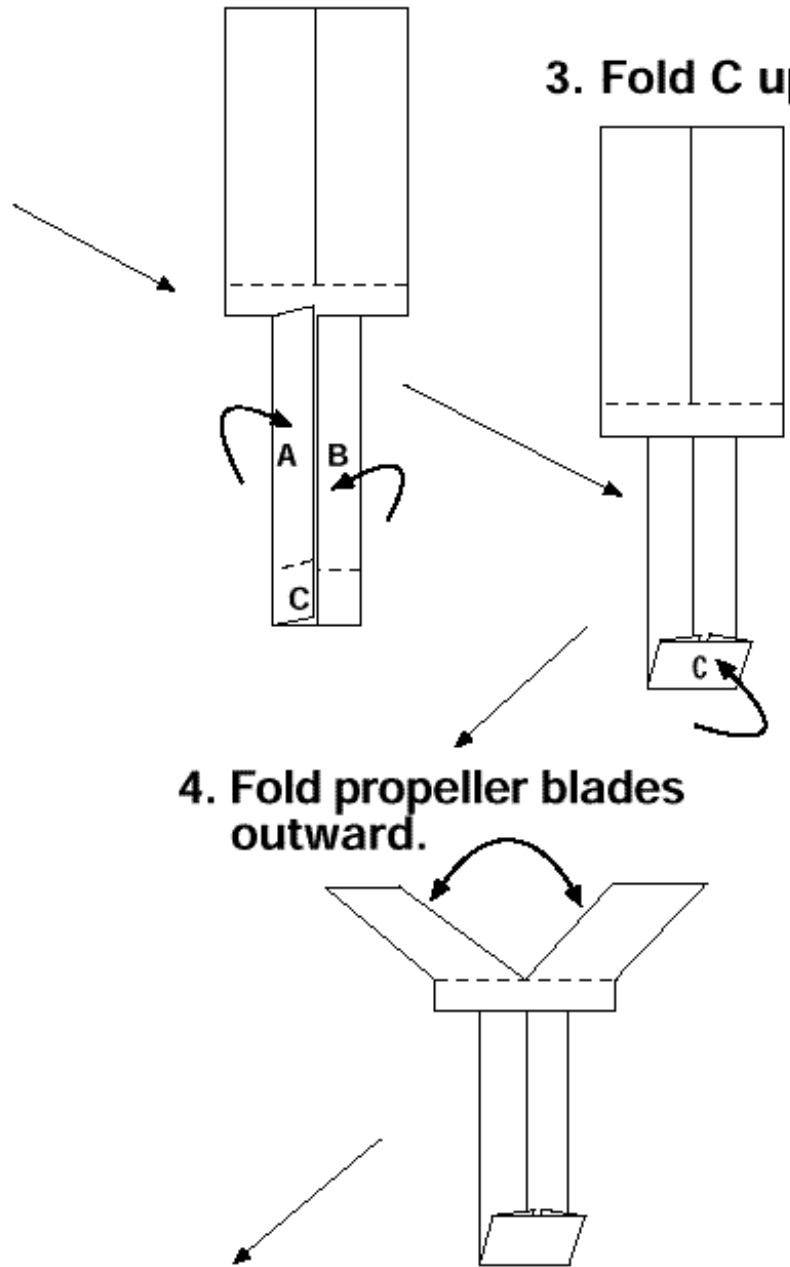
3. Fold C up.

**4. Fold propeller blades
outward.**

**5. Test fly by dropping
from over your head.**



**Paper Helicopter
Pattern**



Where Can I Go from Here?

If you liked what you learned today, here are a few places to go to learn more:

- Find a Young Eagles “Rally” near you and sign up to get a free flight on a small plane. Check their Website at <http://www.youngeagles.org/programs/youngeagles/>.
- Then check out the next four steps in The Young Eagles “Flight Plan”: <http://www.eaa.org/en/eea/aviation-education-and-resources/eea-youth-education/eea-young-eagles-program/eea-flight-plan>
 1. Join EAA with a Student Membership.
 2. Take Sporty’s Complete Flight Training Course.
 3. Get a free first flying lesson.
 4. Apply for an EAA Scholarship.
- If you’re in high school, go to the NASA “Virtual Skies” site at <http://virtualskies.arc.nasa.gov/index.html> . Here are excellent resources to help you learn about Aeronautics, Navigation, Weather, Air Traffic Management, Communications, Airport Design, Research, find additional Online Resources, and learn about Careers.
- If you are in middle school, go to NASA’s Smart Skies at <http://smartskies.nasa.gov/> where you’ll find two different programs “Line Up With Math” and “Fly By Math” to help you practice Air Traffic Controller puzzles and Distance, Rate, Time problems.
- Attend an EAA Air Academy Camp – available to ages 12-18. Find more information at <http://www.youngeagles.org/programs/airacademy/>
- Check out the Academy of Model Aeronautics at <http://www.modelaircraft.org>. At this site, you can learn to build and fly radio controlled aircraft.
- Contact Aircraft Owners and Pilots Association’s AOPA Project Pilot for information about pilot training: <http://flighttraining.aopa.org/projectpilot/>.
- Search YouTube for Wings Over Indiana, which is an Emmy Award winning set of documentary videos about aviation, including the science behind flying.
- Contact a local university’s Department of Aviation to find out how you can prepare for a degree in aviation.
- Contact your airport’s FAA Air Traffic Control Tower to have a tour.
- Contact a local flying club to find out how you can begin lessons.

- Find out if there's an Aviation Exploring Post near you. Go to <http://exploring.learningforlife.org/services/career-exploring/aviation-career-exploring/> to find out more.
- Look for a scholarship to help you pay for flying lessons. Many organizations offer scholarships. All you have to do is find them and apply.
- Find a local chapter of the Ninety-Nines. They are an international organization of women pilots. Find out more at <http://www.ninety-nines.org/>.
- Take free online courses through AOPA and the FAA "Wings" program. Find these at <http://www.aopa.org/education/online-courses.aspx>.
- The Civil Air Patrol's Cadet Program is for teens between 12 and 18 years old. Check their Web site for programs near you. <http://www.gocivilairpatrol.com/>
- NACTA (National Air Traffic Controllers Association) has a Web site with career information about being an air traffic controller as well as an air traffic controller simulation game. http://www.natca.org/career_day_classroom_materials.aspx#content
- Go to an FAA Aviation Career Education (ACE) Academy camp during the summer. Programs are for grades 6-12. Check out the information at their Web site. http://www.faa.gov/education/student_resources/ace_camps/
- Look for any aero camps in your area. There are many across the country, some associated with the Flight School Association of North America.
- Check out Build A Plane's Web site at <http://www.buildaplane.org/> if you're interested in their "Real World Design Challenge" or if you want to get involved with a group that's building a plane.
- Aeroscholars is a Web site with online high school courses. <http://aeroscholars.com/>
- The FAA has a "Pilot's Handbook of Aviation Knowledge" that is quite comprehensive if you're interested in learning about many aspects of aviation: https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak/media/pilot_handbook.pdf
- Finally, ask today's leader if they have ideas about resources close to your home!

Aviation Websites

Aviation and Aerospace Career descriptions

<http://www.khake.com/page41.html>

FAA site – Become a Pilot

<http://www.faa.gov/pilots/become/>

FAA Kids Corner for ages 13 & up

http://www.faa.gov/education/student_resources/kids_corner/ages_13/

How Stuff Works – Articles about Airplanes

<http://electronics.howstuffworks.com/search.php?terms=airplanes>

How Things Fly – list of online activities from the National Air and Space Museum

<http://airandspace.si.edu/explore-and-learn/online.cfm>

NASA – online activities

<http://www.grc.nasa.gov/WWW/k-12/airplane/>

Organization of Black Airline Pilots

www.obap.org

Smithsonian National Air and Space Museum – Explore & Learn

<http://www.nasm.si.edu/education/>

The Ninety-Nines – International organization of women pilots

<http://ninety-nines.org/>

Children’s Museum, Indianapolis – Flight Adventures Flight School game <https://www.childrensmuseum.org/content/flight-adventures>

For Further information,
visit our Web site at
<http://youthaviationadventure.org>.