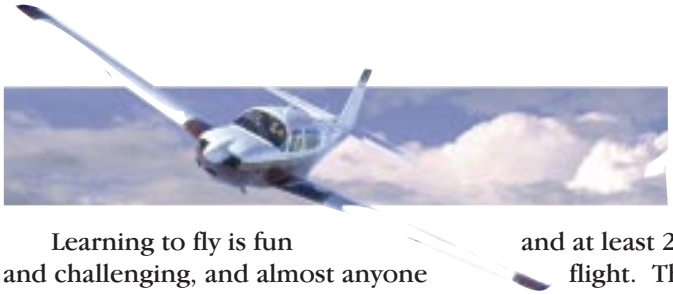
A Student's Guide

Aviation and You

Answers to Your Questions About

Learning to Fly
Careers in Aviation
And Much More



Learn to Fly!

Learning to fly is fun and challenging, and almost anyone can do it. It's probably not as difficult or expensive as you might think, and the rewards are great!

The first goal in learning to fly is the solo flight, being able to pilot a plane by yourself. Most people can achieve this in just 10-12 hours of flying lessons. You must be 16 years old to solo an aircraft, but you may begin training before then. This first step can be relatively affordable, costing from $500 to $1500 – money many young student pilots earn from part-time work, mowing lawns, or summer jobs.

You can continue on to earn a Private pilot certificate now or later. For this you must fly a minimum of 40 hours, including "dual instruction" with a flight instructor and at least 20 hours of solo flight. The flying lessons taken before your first solo count towards this total. There is a written test, a simple medical exam, and a test flight required to be issued a pilot's license. Many people complete the requirements for a private pilot certificate in six to 12 months.

Sure, learning to fly takes time and money, but it's an investment for a lifetime. Total cost runs about $3,000-$5,000, including what was spent to solo. Costs vary depending on where you live, how long it takes you to finish, and the kind of flight school you attend.

Many schools offer financial packages that allow low monthly payments, and scholarships and loans may be available.

Okay, I'm ready! Where do I start? First, check the Yellow Pages under "Flight Training," "Aircraft," "Aviation," or "Flight Schools," or the Internet (www.aopa.org or www.beapilot.com) to find your local airport where flight training is given. Then visit the fixed-base operators (FBOs) there. FBOs are businesses that provide flight instruction, rent and sell aircraft, sell fuel, and provide parking space for aircraft. Check out the FBO's airplanes, instructors, training program, and prices, and go for an introductory flight. If you like what you see, go for it!

There are also vocational and technical schools, colleges, and universities that offer flight training. If you're seeking an aviation career, you may want to see what they offer.

What keeps an airplane in the air?

Let's look at the simple, natural laws that allow airplanes to lift off the ground, stay in the sky and move forward.

An airplane in flight is the center of a continuous tug-of-war between four forces: lift, gravity, thrust and drag.

Gravity acts on the airplane in flight, just as it does on people and objects on the ground. What overcomes gravity and allows the airplane to fly is **lift.**

Lift is created when the forward motion of the plane (and its wing) means air must flow over the wing.

Theories include Bernoulli's Law, angle of attack, and airflow deflection.

1) Air flowing over the curved top surface of a wing (airfoil) must travel faster than air flowing under the essentially flat bottom of the wing. According to Bernoulli's Law, this difference in speed produces lower pressure above the wing than below it, and the difference in pressure produces lift (see diagram).

2) To generate lift on symmetric wings, the wing must be tilted with respect to airflow, so the flow travels farther across the top than under the bottom. This tilting is called angle of attack.

3) Downward airflow deflection occurs when air flows over the upper wing surface. Since for every action there is an equal but opposite reaction, the opposite action of the downward deflection is a push upwards (lift).

Pulling the plane (and the wing) through the air is **thrust,** the power of the engine. Thrust is opposed by **drag,** air resistance from a number of sources.

Learning to fly, you'll feel all these forces at work but you'll deal with them in a practical way, not in a theoretical way. Learning to fly is action-oriented and fun, not complicated theory.

How do you learn to speak the pilot's special language?

It's not difficult. Mostly, pilots speak like everyone else. But some of their special words and phrases come from the need for pilots and air traffic controllers to "speak the same language" on the radio to be clearly understood without misunderstandings.

For instance, pilots use a special "phonetic alphabet" when spelling things out. Instead of saying the letter, they substitute a special word beginning with that letter. Pilots and controllers around the world use the same set of words when spelling things out, like Alpha for "A" and Bravo for "B" or Zulu for "Z."

The pilot's vocabulary also includes aviation terms such as those for the parts of an airplane. Many of these are from the original French (like aileron or empennage), since many aviation innovations were pioneered in France.

You can learn many new words and concepts by studying aviation. Here is the phonetic alphabet.

A Alpha	N November
B Bravo	O Oscar
C Charlie	P Papa
D Delta	Q Quebec
E Echo	R Romeo
F Foxtrot	S Sierra
G Golf	T Tango
H Hotel	U Uniform
I India	V Victor
J Juliet	W Whiskey
K Kilo	X X-ray
L Lima	Y Yankee
M Mike	Z Zulu

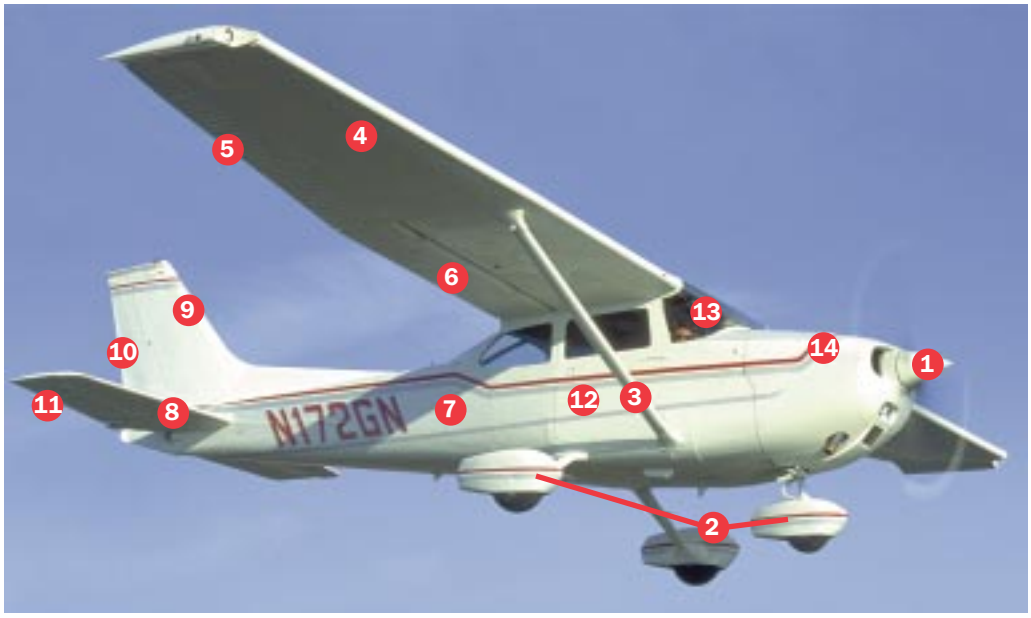
Key Aviation Terms and Definitions

ATC (Air Traffic Control): The FAA service providing separation services to participating airborne traffic and clearances to land, take off or taxi at airports with a control tower.
Altimeter: A highly sensitive barometer which shows an aircraft's altitude above mean sea level by measuring atmospheric pressure.
CFI (Certificated Flight Instructor): A pilot holding a Commercial pilot certificate who, after passing two written tests and a practical flight exam, is FAA-rated to give flight instruction. The flight instructor rating is specific as to type of instruction, e.g., single-engine airplane, multi-engine airplane, instrument flying (CFII), helicopter, etc.
FAA (Federal Aviation Administration): The Department of Transportation's agency for aviation. In addition to regulating airports, aircraft manufacturing and parts certification, aircraft operation and pilot certification ("licensing"), the FAA operates Air Traffic Control, purchases and maintains navigation equipment, certifies airports and aids airport development, among other activities.
FAR (Federal Aviation Regulations): The rules and regulations covering every aspect of aviation.
FBO (Fixed Base Operator): An airport-based business which parks, services, fuels and may repair aircraft; often rents aircraft and provides flight training. The term was coined to differentiate FBOs from businesses or individuals without an established place of business on the airport.
General Aviation: The 96% of U.S. aircraft and 60% of U.S. flight hours flown by other than major and regional airlines or the military. Often misunderstood as only small, propeller-driven aircraft. Even a large jet or cargo plane operated under FAR Part 91 can be a general aviation aircraft.
Knot: Nautical mile per hour. Most common measure of aircraft speed. 100 knots equals 115 statute miles per hour. (For mph, multiply knots by 1.15.)
Stall: Purely an aerodynamic condition - nothing to do with engine operation. Occurs when lift-producing airflow over the wings is disrupted or lost because angle of wings to airflow (angle of attack) is too high. Most commonly occurs when a pilot doesn't maintain sufficient airspeed in a climb or turn. Student pilots are trained in stall prevention, recognition and recovery.

For more aviation terms, see *AOPA's ABCs of Aviation*.

aopa's ABC's of aviation

What are the main parts of an airplane?



1. Propeller
2. Landing gear
3. Wing strut
4. Wing
5. Wing aileron
6. Wing flap
7. Fuselage
8. Horizontal stabilizer
9. Vertical stabilizer
10. Rudder
11. Elevator
12. Door
13. Windshield
14. Engine cowl

Should I consider a career in aviation?

That is probably an excellent idea—especially if you're interested in a field with a large and growing demand for people who are prepared to keep up with the exciting challenges of an ever-advancing technology.

As one of the fastest growing segments in the transportation industry, aviation is expected to produce a huge resource for jobs in virtually every major skill area. There are good jobs in aviation now and an even greater number predicted for the future.

The number of jobs in commercial aviation is expected to reach a total of more than nine million by the year 2005, according to the FAA. This forecast classifies commercial aviation as a growth industry today with a great variety of occupations.

In addition to the well-known airline cockpit careers, there are many careers in other aspects of aviation. For example, general aviation, which is all civilian flying except the airlines, includes many important activities using other educational qualifications such as emergency medical evacuation, corporate air transportation, airborne law enforcement, surveying and mapping, news and traffic reporting, crop dusting, pipeline patrol, and many others.

You can begin thinking now about a career in aviation. Success in your courses is important, and will help prepare you for the training you will need after high school.

There are a great number of resources available on all aspects of aviation, including career and college scholarship information. Some of the key initial contacts you can make are listed on the back of this Guide.

Explore resources to learn about vocational schools and colleges that offer training leading to careers such as:

Agricultural pilot
Airline pilot
Military pilot
Corporate pilot
Flight instructor
Airport manager
Air freight cargo agent
Operations chief
Flight dispatcher
Air traffic controller
Flight attendant
Reservations agent
Aircraft manufacturing
Computer programmer
Avionics technician
Security officer
Meteorologist
Financial manager
Airframe and powerplant mechanic

Outstanding Individuals in Aviation

Leonardo da Vinci was the first man to study the problems of flight scientifically. He was concerned with flapping-winged aircraft known as ornithopters which operate on the principle of flight of birds. He also designed helicopters, propellers and a parachute.

Joseph and Etienne Mongolfier designed the first hot air balloon, which was made of paper and flew in 1783, rising to a height of 6,000 feet and traveling about a mile.

Sir George Cayley is known as the "Father of Modern Aviation." He formulated the basic principles upon which modern aeronautics is founded. Cayley built and flew the world's first practical and successful airplane — a model glider in 1804.

Wilbur and Orville Wright, with the availability of the internal combustion engine, designed a control system which meant for the first time that lift, power and control were combined to enable the first controlled and sustained flight in 1903.

Daniel Bernoulli developed the underlying principle of airplane wing design — that an upward-curved wing gives more lift than a flat wing when moving through the air.

Otto Lilienthal was one of the world's greatest proponents of gliding and made over 2000 glider flights.

Glenn Curtiss was known for his pioneering in water-based aircraft. He built and flew the first seaplane and founded the first U.S. airplane manufacturing company.

Count Ferdinand von Zeppelin was credited with developing the first airliner. The airship was a dirigible and provided air service between Europe and America in the early 1900s.

Harriet Quimby became the first American woman to earn a pilot's license and the first woman to fly the English Channel.

Charles Lindbergh was best known for accomplishing the first solo, non-stop transatlantic flight from New York to Paris in 1928. He covered the distance of 3,610 miles in 33.5 hours.

Amelia Earhart was a well-known American pilot in the 1930s. She was the first female pilot to fly solo across the Atlantic, and the first female to fly solo across the United States non-stop.

Chuck Yeager was the first pilot to exceed the speed of sound in level flight. He flew a Bell XS-1 at 670 mph in 1947.

Neil Armstrong, a civilian test pilot and NASA astronaut on the Apollo II mission was the first man to set foot on the moon in 1969.

Orville and Wilbur Wright

Some aviation facts

(1997 data)

- U.S. civilian aircraft, numbering more than 200,000, fly almost 47 million hours a year.
- Of all U.S. civilian aircraft, more than 192,000 (96%) are general aviation aircraft.
- General aviation is all flying except that by the military and airlines.
- More than 616,000 Americans are pilots.
- There are more than 18,000 landing facilities in the United States, including airports, heliports, STOLports (short takeoff and landing), and seaplane bases.
- General aviation serves all 18,000 U.S. landing facilities; major scheduled airlines fly into fewer than 700 of them.
- The busiest airport in the world is Dallas-Fort Worth International Airport.

Did you know?

- Bessie Coleman was the first African American (woman or man) to receive a pilot certificate.
- The name of Charles Lindbergh's plane was "The Spirit of St. Louis."
- The oldest tale of man's effort to fly is about the mythical character Icarus.
- The Wright brothers made the first powered, sustained controlled flight in 1903. It lasted just 12 seconds, covering 120 feet.
- Theodore Roosevelt, in 1910, was the first U.S. president to fly in an airplane.
- The first around-the-world, non-stop, non-refueled airplane flight was completed by Jeana Yeager and Dick Rutan in 1986 in "Voyager."

For more information...

There are many resources available to you on all aspects of aviation, including career and college scholarship information. Some initial contacts you can make are listed here.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302
765/287-1256
Fax: 765/289-4248
http://www.modelaircraft.org

Aerospace Industries of America
1250 Eye St NW, Ste 1200
Washington, DC 20005
http://aia-aerospace.org
202/371-8544
Fax: 202/371-8470

Air Line Pilots Association
535 Herndon Parkway
Herndon, VA 22070
703/481-4444
Fax: 703/689-4370
http://www.alpa.org

Air Transport Association
1301 Pennsylvania Ave NW, Ste 1100
Washington, DC 20004
202/626-4172
Fax: 202/626-4181
http://www.air-transport.org

Aviation Exploring Division
Boy Scouts of America
1325 Walnut Hill Ln
Irving, TX 75015-2079
214/580-2427
http://www.learning-for-life.org/exploring/aviation/index.html

Civil Air Patrol Cadet Program
105 South Hansell St
Maxwell AFB, AL 36112-6332
http://cap.af.mil
334/953-5095
Fax: 334/953-7771

EAA Aviation Foundation, Inc.
P.O. Box 3065
Oshkosh, WI 54903-3065
414/426-6815
Fax: 414/426-6765
http://www.eaa.org
http://www.youngeagles.com

Federal Aviation Administration
Aviation Education, APA 100
800 Indepedence Ave SW
Washington, DC 20591
http://www.faa.gov/education.htm

General Aviation Manufacturers Association
1400 K St NW, Ste 801
Washington, DC 20005-2485
202/673-1378
Fax: 202/842-4063
http://www.generalaviation.org

Helicopter Association International
1635 Prince Street
Alexandria, VA 22314
703/683-4646
Fax: 703-683-4745
http://www.rotor.com

National Aeronautics & Space Administration
Education Division/Code FE
400 Maryland Ave SW
Washington, DC 20546
http://www.hq.nasa.gov/

National Air & Space Museum
Education Services MRC 305
6th & Independence Ave SW
Washington, DC 20560
http://www.nasm.si.edu
202/786-2106
Fax: 202/633-8928

National Association of State Aviation Officials
Center for Aviation Research and Education
8401 Colesville Rd, Ste 505A
Silver Spring, MD 20910
http://www.nasao.org
301/585-0587
Fax: 301/585-1803

National Business Aviation Association
1200 Eighteenth St NW, Ste 400
Washington, DC 20036-2506
202/783-9000
Fax: 202/331-8364
http://www.nbaa.org/careers/

National Coalition for Aviation Education
P.O. Box 28086
Washington, DC 20038
http://www.aviationeducation.org

Professional Aviation Maintenance Association
1200 18th St NW, Ste 401
Washington, DC 20036-2506
202/296-0545
Fax: 202/296-0618
hq@pama.org
http://www.pama.org

University Aviation Association
3410 Skyway Drive
Auburn, AL 36830
334/844-2434
Fax: 334/844-2432
http://uaa.auburn.edu/uaahome.htm

Women in Aviation, International
3647 S.R. 503 South
West Alexandria, OH 45381
937/839-4647
Fax: 937/839-4645
http://www.wiai.org

AOPA

Aircraft Owners and Pilots Association
421 Aviation Way, Frederick, MD 21701
301/695-2000 • Fax 301/695-2375
www.aopa.org

STOP DREAMING
START FLYING

For more information on flight training and learning to fly, contact the industry-sponsored Be A Pilot program at:
1-888-BE-A-PILOT or www.beapilot.com