



## Would you like to be a pilot?

Learning to fly is not as hard as you might think. In fact, each year thousands of people from all walks of life learn to fly. Today there are more than 650,000 active pilots in the United States. Most of these pilots hold a private pilot's certificate, which is a student pilot's first goal.

Some pilots continue their training to obtain an instrument rating or additional certificates, such as commercial pilot, flight instructor, or airline transport pilot. However, many pilots are content with a private pilot certificate, which permits them to fly themselves and non-paying passengers virtually anywhere in good weather. Another alternative is a recreational pilot certificate, which allows a pilot to fly within fifty nautical miles of the airport at which he or she received ground school and flight instruction. Many pilots fly for the sheer exhilaration and sense of accomplishment, while others fly because it is a fast, convenient form of transportation. Instead of driving or being tied down to public transportation schedules, they fly on business, vacation, or other types of trips they would like to make.

The rental plane is a tremendous benefit to the general aviation pilot, because pilots do not need to buy their own planes in order to fly. With a recreational or private certificate, pilots are able to rent airplanes at most airports. In fact, of the approximately 24 million general aviation hours flown each year, the majority are flown in rented aircraft.

That's the overall picture. Now, here are some specific answers to the most frequently asked questions.

## What are the requirements to become a pilot in the United States?

The governing agency of the aviation community in the United States is the Federal Aviation Administration (FAA). The FAA's primary responsibility is to promote and regulate aviation. It issues and enforces the Federal Aviation Regulations (FARs), which govern all aspects of aviation.

To fly in the United States as an FAA-certified pilot, you must pass a practical test, a written test, and meet three requirements. First, you must be at least 16 years of age to solo and 17 to receive an airplane or rotorcraft pilot certificate. (Glider and balloon pilots must be at least 14 years old to solo, 16 years old to earn their pilot certificate). Second, for airplane or rotorcraft certification, you must pass a physical examination by an FAA-designated aviation medical examiner. Third, you must be able to speak, read,

and understand English, the international language of aviation. This last requirement is important because all air traffic control flight instructions and other vital flight information are transmitted in English.

## How difficult is it to learn how to fly?

To get your pilot certificate, you must complete two types of instruction: ground school training and flight training.

Ground school training teaches you the principles of flight, aircraft instruments, systems and performance, meteorology and weather patterns, navigation, radio communications, flight planning, and regulations.

Flight training begins with lessons in a training aircraft with a flight instructor. When the instructor believes you are ready, you will make your first solo flight. All the knowledge you have accumulated in ground school training is put into practice. Although it is not necessary to have completed ground school before beginning flight training, it is a good idea to have a fundamental knowledge of the principles of flight. You will find that ground school instruction and flight training complement each other, resulting in a more meaningful and comprehensive training program. A concentrated learning effort consisting of regular flying and ground school is usually the most effective and economical way to obtain your pilot certificate.

## How do I start and when do I learn to fly?

There are FAA-certificated instructors at most general aviation airports. Fixed Base Operators, or "FBOs," are aviation businesses located at airports. They provide a variety of services such as aircraft rental, storage, fuel, repairs, and ground school and flight instruction. FBOs are not operated by the FAA, but may have pilot schools that have been certificated by the FAA to provide flight instruction under FAR Part 141.

## What will flying lessons be like?

Most flight schools offer a short, introductory flight lesson to prospective students. You may want to take an introductory flight with more than one school or instructor before you decide which school to attend and who you want as your instructor.

When you start your lessons, you will begin flying in a single-engine, two-place or four-place training aircraft with an instructor. You may start your training as soon as you decide you are ready.

Right from the beginning, you will do most of the actual flying. From takeoff and climbout to turning the aircraft, your instructor will allow you to operate the controls of the airplane. At first you will fly a straight and level course, keeping the wings level and the nose of the airplane at just the right spot on the horizon.

As your lessons continue, you will guide the airplane in gentle turns, moving gradually to steeper ones. Eventually you'll learn how to identify and recover from stalls. After a few lessons, you will start making takeoffs and landings, while you continue to practice other maneuvers. Eventually you will be ready to fly the airplane alone—on your unforgettable first solo flight.

During your first solo flight, the plane will perform better than it did in your training flights; the plane will climb out faster and you will have to level off earlier at the correct altitude (usually at 1,000 feet above ground in the "pattern" around the airport). At first you might think that these changes are in your imagination, but they are not. The fact you are flying without your instructor's weight in a small aircraft can make a noticeable difference in aircraft performance.

As you turn into the final approach for your first landing, you will be excited—maybe a little apprehensive. As you line up with the runway, you will put into practice everything you've been trained to do. Your concentration may be so intense that will not stop to think about what you have done and how smooth the landing was until you have taxied off the runway.

The first solo flight is a milestone in your training. After this flight, you are well on your way to becoming a pilot, but you still have a significant amount of flying and studying to do before you earn your private pilot certificate.

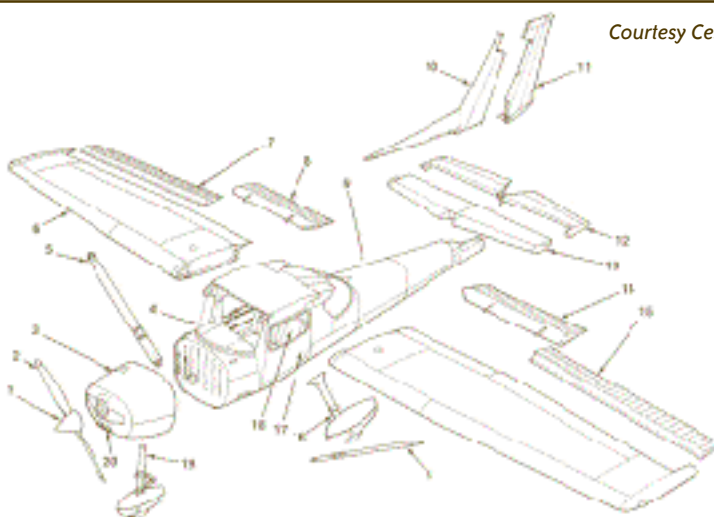
## How long does it take to obtain a private pilot certificate?

This answer depends upon a number of factors, including how familiar you are with aviation, the consistency and regularity of your flight lessons, and the amount of time you can devote to studying. Many people try to average three or four hours of flight training a week. If financial or time constraints do not permit this schedule, don't worry! Flying is supposed to be fun—you don't have to adhere to a strict schedule each week. However, the more time you can put in, the more familiar and confident you will become with how the aircraft operates.

The FAA requires that you have at least thirty hours of flight time for a recreational pilot certificate and at least forty hours for a private pilot certificate, but most people have slightly more. Fifty-five hours is the average in Minnesota, and sixty-four hours is the national average. After starting your solo flights, most of the remainder of your time will be spent improving the maneuvers you have learned and practicing takeoffs and landings. Maneuvers teach you the performance limits of your aircraft. After you have passed a written examination and your instructor believes that you have had enough instruction, you will take an oral exam and a flight test with an FAA-designated pilot examiner. As you fly, the examiner will evaluate your ability to control the aircraft at all times—your ability to fly safely. If you are applying for a private pilot certificate, you will also be tested on your radio procedures and your use of navigational equipment.

## How safe is flying a small airplane?

As your flight time increases and you become more familiar with the aircraft's operating characteristics, you will find that general aviation aircraft are very safe in the hands of competent pilots. Aircraft construction adheres to strict safety regulations imposed by the FAA, and the aircraft are frequently inspected by qualified mechanics.



Courtesy Cessna Aircraft Company

- |                |                         |                           |                       |
|----------------|-------------------------|---------------------------|-----------------------|
| 1. Spinner     | 6. Wing                 | 11. Rudder                | 16. Main Landing Gear |
| 2. Propeller   | 7. Right Aileron        | 12. Elevator              | 17. Door              |
| 3. Engine Cowl | 8. Right Flap           | 13. Horizontal Stabilizer | 18. Seat              |
| 4. Windshield  | 9. Fuselage             | 14. Left Flap             | 19. Nose Gear         |
| 5. Wing Strut  | 10. Vertical Stabilizer | 15. Left Aileron          | 20. Landing Lights    |

## How much does it cost to obtain a private pilot certificate?

Because learning to fly is an individual experience, the total cost (as well as the total number of hours required) can vary substantially from student to student. The national average cost to become a private pilot is \$5,000, while the cost in Minnesota can range from \$4,500 to \$4,900 depending upon the type of aircraft used for flight time. These numbers are based upon the minimum flight time required and also include the cost of ground school instruction, books and supplies, a medical examination, flight training, and the FAA written examination and practical test (oral exam and flight test).

## How does an airplane fly?

Four basic aerodynamic forces act upon an airplane during flight: LIFT, GRAVITY, THRUST, and DRAG.

LIFT is generated by the wings, which function as airfoils. An airfoil is any surface, such as a wing, that provides aerodynamic force when it interacts with a moving stream of air. The wings on an airplane have more camber, or curvature, on the upper portion than on the lower portion. The camber causes air to flow more quickly over the top of the wing than underneath it. One of the primary laws of lift comes from Bernoulli's Principle, which states that as the velocity of a fluid (in this case, air) increases, its pressure decreases. As the wing separates the airflow, it creates an area of decreased pressure above the wing as compared to the air pressure below the wing. The pressure differential is the primary source of lift.

GRAVITY, or WEIGHT, is the opposing force of lift and is caused by the earth's gravitational pull on the aircraft and its contents. When enough lift is generated to overcome gravity, the aircraft becomes airborne.

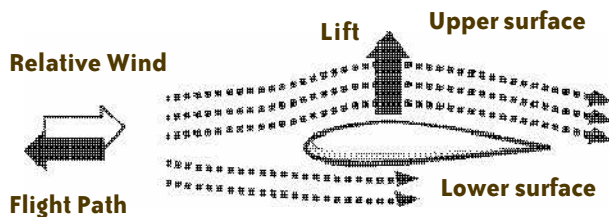
THRUST is the force that propels the aircraft forward. As the amount of thrust increases, speed and lift are generated. On most training aircraft, a single engine provides the necessary thrust to move the aircraft.

DRAG is the deflection or impediment of smooth airflow around the aircraft. Drag acts in the opposite direction of thrust. As thrust increases, drag also increases and eventually limits the speed of the aircraft. When thrust is greater than drag, the aircraft accelerates; conversely, when drag exceeds thrust, the aircraft's speed decreases.

## How does an aircraft maneuver?

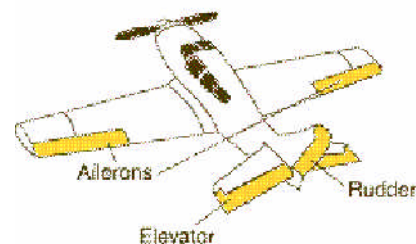
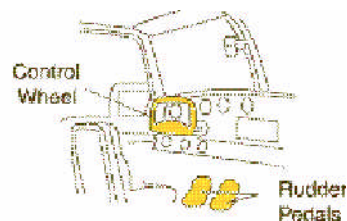
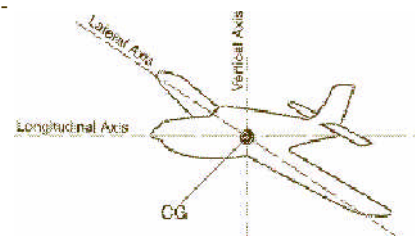
All aircraft maneuver about three axes—longitudinal, lateral, and vertical. The point at which all axes intersect is referred to as the center of gravity (CG). Movement about each axis is controlled by the pilot using flight controls inside the aircraft that are mechanically connected or hinged to movable surfaces on the airplane. The controls inside the aircraft are the yoke, or "control wheel," and rudder pedals. The movable control surfaces on the airplane are the ailerons, elevator, and rudder.

Increased velocity, decreased pressure



### LONGITUDINAL AXIS

Movement about the longitudinal axis is known as "roll" and is controlled by ailerons. (Aileron is a French word for "little wing.") The ailerons are interconnected and operate simultaneously in opposite directions. For example, when the pilot turns the control wheel to the left, the left aileron moves upward and the right aileron moves downward. As this occurs, the right wing generates more lift and moves upward. Conversely, the left wing moves downward. The airplane then rolls to the left.



### LATERAL AXIS

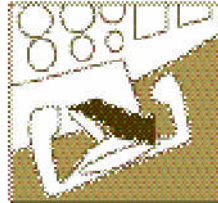
Movement about the lateral axis is known as "pitch" and is controlled by the elevator. Since the control wheel inside the aircraft is mechanically connected to the elevator on the tail, pulling or pushing the control wheel moves the elevator upward or downward. Pulling the control wheel toward you raises the elevator. This action pushes the tail down and the nose up, placing the aircraft in a climb attitude. Conversely, as you push the control wheel forward, the elevator lowers, the tail rises, and the nose moves downward.



## VERTICAL AXIS

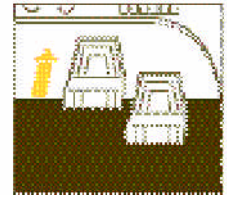
Movement about the vertical axis is known as "yaw" and is controlled by the rudder. The rudder pedals on the cockpit floor are interconnected and control the rudder movement on the tail of the aircraft.

Pressing the left rudder pedal moves the tail to the right and the nose to the left (and vice versa). The rudder and the ailerons are used together to produce a smooth, coordinated turn.



your private pilot certificate, you may decide you'd like to learn how to fly seaplanes or multi-engine aircraft. The more experience you have, the more potential there is.

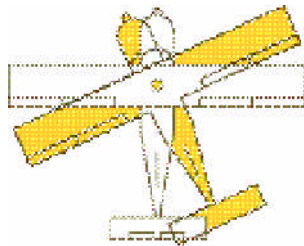
You could become a certified flight instructor and teach others the thrill of flying or become an air transport pilot and carry passengers to a variety of interesting places.



When you begin your flying lessons, you will enter a whole new world of education and excitement. When you receive your pilot certificate, you'll feel exhilaration and tremendous satisfaction in accomplishing your goal. Why not experience for yourself the challenge, satisfaction, and reward of being an FAA-certified pilot! What are you waiting for? Start your flying lessons today! You're cleared for takeoff!

## Is it as easy as it seems?

Yes, flying is as easy as that. Once you have received your pilot certificate, the sky's the limit! You can continue your flight training and earn your instrument rating, or you may want to increase your proficiency and train for a commercial pilot certificate. After receiving



## What are the main instruments?

Although the cockpit may seem confusing at first, most aircraft have six basic instruments to aid the pilot during flight.

### 1. Airspeed Indicator

This instrument shows how fast the aircraft is traveling through the air; similar to a speedometer in a car.

### 2. Attitude Indicator

This instrument functions as an artificial horizon. It shows whether the aircraft is banking to the left or right and if the nose is above or below the horizon.

### 3. Altimeter

This instrument shows the aircraft's altitude in feet above mean sea level, which is a function of barometric pressure.

### 4. Turn Coordinator

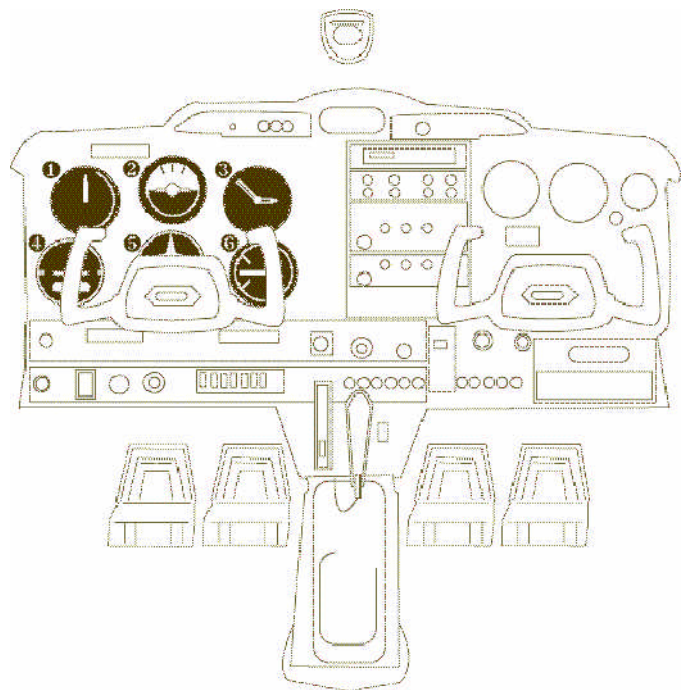
This instrument features a miniature airplane inside the dial and gauges turn rate and direction.

### 5. Heading Indicator

This instrument is a directional gyro (DG) and functions as a compass to indicate the current heading of the aircraft.

### 6. Vertical Speed Indicator

This instrument measures the change in air pressure as the aircraft ascends or descends and registers the change in altitude in feet per minute.



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