Mysteries of Flight

A Reading A–Z Level V Leveled Book
Word Count: 1,324

Connections

Writing

Use the book to create a timeline of important dates and events in the history of flight. Research other events in aviation history and add them to your timeline.

Social Studies

Research a famous person in aviation history. Prepare a speech about the person's life for a wax museum presentation.

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Mysteries of Flight

Written by Lisa Trumbauer

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Focus Question

What is the key to flight? How does it make flying possible?

Words to Know

ailerons	lift
aviation	rudder
elevators	speculation

Front cover: A single-engine plane flies over snowcapped mountains.

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Correlation

LEVEL V	
Fountas & Pinnell	R
Reading Recovery	40
DRA	40

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The interior of a typical commercial airplane

Take Off

Imagine you are walking down a narrow aisle. A short row of seats lies on either side of you, with three seats on each side. Everyone around you is stuffing luggage into large compartments overhead, or they're pushing things under seats. You do the same, and then you scoot into your seat and buckle your seatbelt.

You continue to look around. You notice that the walls curve up toward the ceiling. The small plastic window beside you has a thick shade that you can lift and lower. People continue to walk down the aisle with more and more luggage.

And suddenly you wonder, "How is this big, heavy, metal tube, with all these people and all this stuff, ever going to get off the ground?"

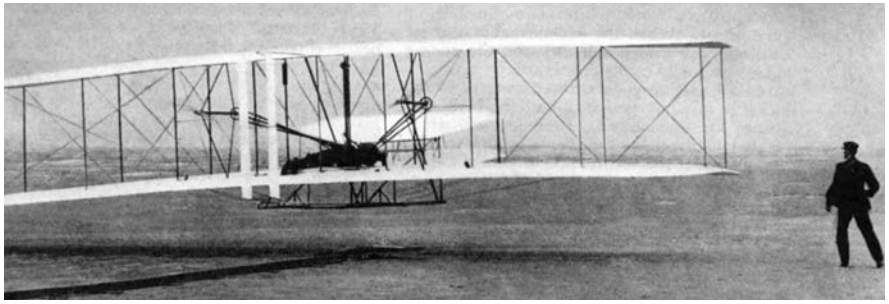
What you're really asking is, "How does an airplane fly?"

Throughout history, the question of how to fly, of how to soar through the sky like a bird, has intrigued and mystified people. After all, if birds can fly, why not humans? Some people even made wings that resembled those of a bird and attached them to their arms. Flapping their arms wildly, they soon discovered that homemade wings were not the key to human flight.

Then, in 1783, someone found a way to fly. In that year, two brothers in France figured out that hot air was lighter than cooler air. If they filled a giant balloon with hot air, the warmer air inside the balloon would rise above the cooler air surrounding it. Ingenious! With this discovery, the brothers proceeded to create the first hot-air balloon—and the first successful attempt at flight.

Over the next few decades, people continued to experiment with various methods of **aviation**. Slowly, these flying machines began to resemble what would one day evolve into the modern airplane.

A drawing of Henri Giffard's hot-air ship, the first powered aircraft



Wilbur watches as Orville makes the first flight.

The Brothers Are Wright

Orville and Wilbur Wright were not scientists. In fact, the contraption they knew the most about was the bicycle. But, like so many others before them, Orville and Wilbur also were intrigued with the prospect of being able to fly.

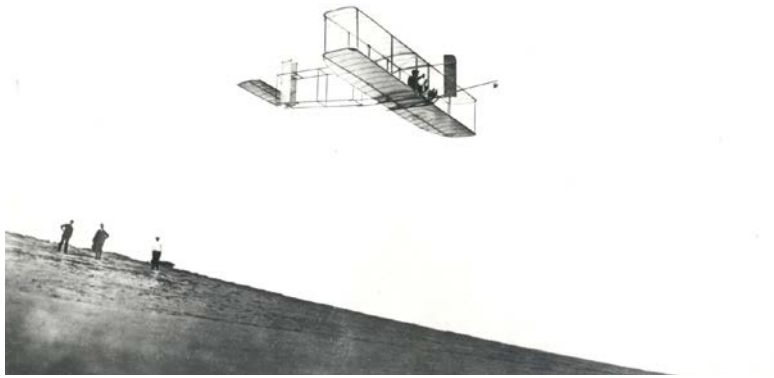
The Wright brothers wanted to build a plane that could take off from the earth and keep itself flying through the air. They believed that the newly invented gasoline engine would be a key component to their dream of a flying machine.

The Wright Brothers

Wilbur Wright (1867–1912) and Orville Wright (1871–1948) grew up in Ohio. They owned a bicycle-repair shop in Dayton, Ohio. They introduced their powered airplane to people in the United States and Europe.

It was on December 17, 1903, when the Wright brothers pulled their newly created flying machine, called Flyer, onto a North Carolina field overlooking the Atlantic Ocean. The strange-looking contraption had a long pair of wings toward the front and a pair of shorter wings near the rear. The plane also had two propellers that were driven by a single engine.

Orville Wright stretched out on his stomach upon the lower wing and fired up the engine. As the propellers turned and the plane moved forward on two small wheels, Wilbur ran alongside, holding a wing to steady the plane. Within moments, the machine was airborne. To their delight, the invention was a success. They made three more successful flights that day, though none lasted more than a minute.



In this 1911 glider flight, Orville Wright remained airborne for 9 minutes and 45 seconds, setting a record that lasted for over 10 years.

The Wright brothers continued to modify and experiment with their flying machines. Other people also worked with the Wright brothers' incredible design, hoping to build bigger, quicker, and better flyers.

Over the years that followed, airplanes became more complex and advanced. Even so, all airplanes, no matter how different in size or form, had some of the same basic parts that were on the Wright brothers' first plane—engines and wings.

Charles Lindbergh

Amelia Earhart

Early Pilots

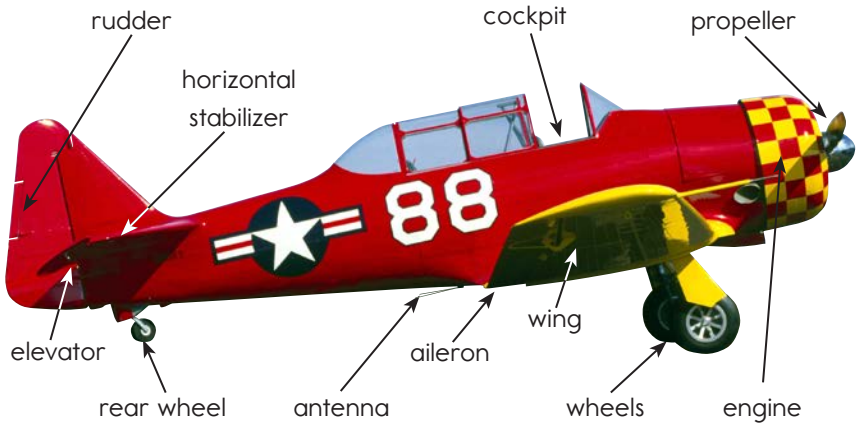
With the invention of the airplane, people began challenging themselves and their aircraft to see how far they could go. Two of the most well-known pilots of early aircraft were Charles Lindbergh and Amelia Earhart. In 1927, Lindbergh became the first person to fly solo across the Atlantic Ocean, taking off from New York and landing in Paris. Five years later, Amelia Earhart became the first woman to fly solo across the Atlantic.

The Plane Facts

In order to fly, all self-powered planes must have an engine. Like the engine of a car, the engine of an airplane moves the airplane forward. All airplanes must also have wings, because the wings are the feature that actually lifts the plane into the air. In addition, all airplanes must have parts on their wings that move. These moving parts, called **ailerons**, help control the airplane.

Planes have other parts that enable them to fly and that help pilots control their movements. A plane has a tail section with a **rudder** that moves right and left, and **elevators** that move up and down. The pilot is able to determine the movement of these parts with controls inside the plane's cockpit.

A Simple Single-Engine Plane



A stunt airplane

Do You Know?

The ways in which an airplane can move have specific terminology. *Rolling* is when an airplane tilts to either side. *Pitching* is when an airplane moves its nose up or down. And *yawing* is when a plane moves its nose left or right.

Controlling an airplane is almost like controlling a car, except that the pilot has an extra dimension to deal with. When driving a car or riding a bike, the driver or rider can make the vehicle go forward, as well as right or left. You can think of these directions as two dimensions—what's in front of you, and what's on either side of you.

An airplane, though, can move forward, right, left, as well as up and down. The pilot has the extra dimensions of the space below and above the plane in which to move. Controls inside the cockpit help the pilot maneuver through the air in all these dimensions.

The cockpit contains several instruments that give important information to the pilot. The control column is similar to the steering wheel on a car. Turning the column right or left moves the ailerons on the wings up or down, which causes the plane to roll from side to side. The control column can also be pulled back and pushed forward, which will move the elevators on the tail up and down. When the elevators go down, the nose of the plane pitches down, and when the elevators go up, the nose of the plane pitches up.

A pilot monitoring his many instruments

Most planes also have pedals that control the rudder. Pushing the right pedal moves the rudder to the right, which makes the nose of the plane yaw right. Pushing the left pedal has the opposite effect, yawing the plane to the left.

The wings of an airplane are the key to flight.

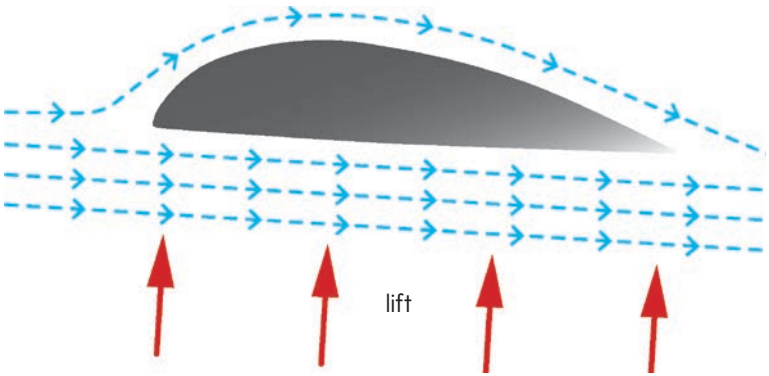
The Big Mystery

So now we know how a pilot controls the airplane, but the big question remains: How does an airplane fly?

If you compare the wings of different airplanes, you'll notice that, no matter to which airplane the wing is attached, all the wings have the same shape. This wing construction is the secret—and the science—behind what makes an airplane fly.

The upper surface of an airplane's wing is curved, and the bottom surface is flat. This means that air flowing across the upper surface has a greater distance to travel than the air moving across the lower surface. In order to keep pace with the air flowing under the wing, the air flowing over the top of the wing must move faster.

The faster the air moves, the less pressure it exerts. The slow-moving air beneath the wing exerts greater pressure on the wing's lower surface than the fast-moving air exerts on the wing's upper surface. The greater pressure under the wing pushes the wing upward. This upward push of air, called **lift**, causes a plane to leave the ground and fly.



Air moving over the top of a wing moves farther and faster than air under the wing.

An airplane engine up close

Because moving air causes these different air pressures, the airplane's forward momentum is critical for it to fly. The forward motion makes the air flow over the airplane's wings and creates the differences in pressure—it creates the lift needed for the plane to overcome gravity. As long as the aircraft's wings keep moving forward fast enough to generate lift, the airplane will remain airborne.

Into the Air

As you imagine yourself sitting inside an airplane and gazing out the window, don't think about how heavy the airplane is, loaded down with people and cargo. Instead, notice the shape of the wings and consider the air flowing over them. The Wright brothers did! And because of their **speculation** and experimentation with wing shape and engines, the airplanes of today are able to take us just about anyplace in the world.

Where would you like to go?

Airplanes line up before take-off.

Glossary

ailerons *(n.)* hinged surfaces attached to the back edges of an airplane's wings (p. 9)

aviation *(n.)* the flying of aircraft (p. 5)

elevators *(n.)* hinged flaps on the tail sections of airplanes (p. 9)

lift *(n.)* an upward aerodynamic force that goes against the force of gravity (p. 13)

rudder *(n.)* a device near the back of a boat, ship, or airplane that controls steering (p. 9)

speculation *(n.)* guesses based on ideas and theories that are not proven (p. 15)

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