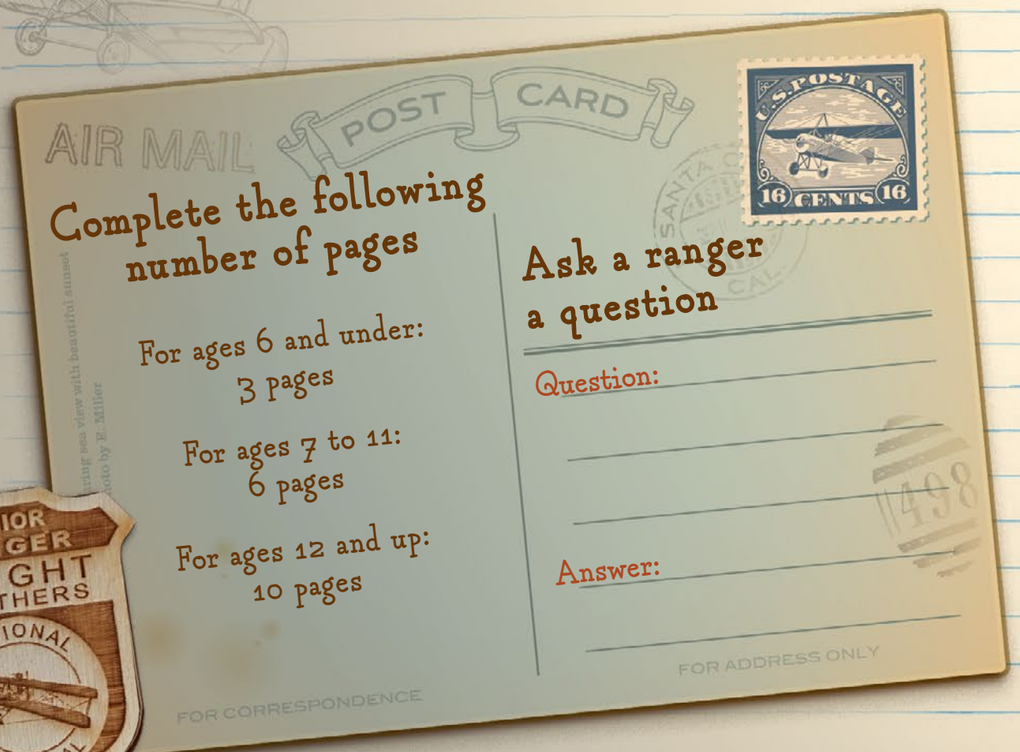
Wright Brothers
National Memorial

National Park Service
U.S. Department of the Interior

JUNIOR
FLIGHT RANGER ACTIVITY BOOK

HOW TO EARN A JUNIOR RANGER BADGE

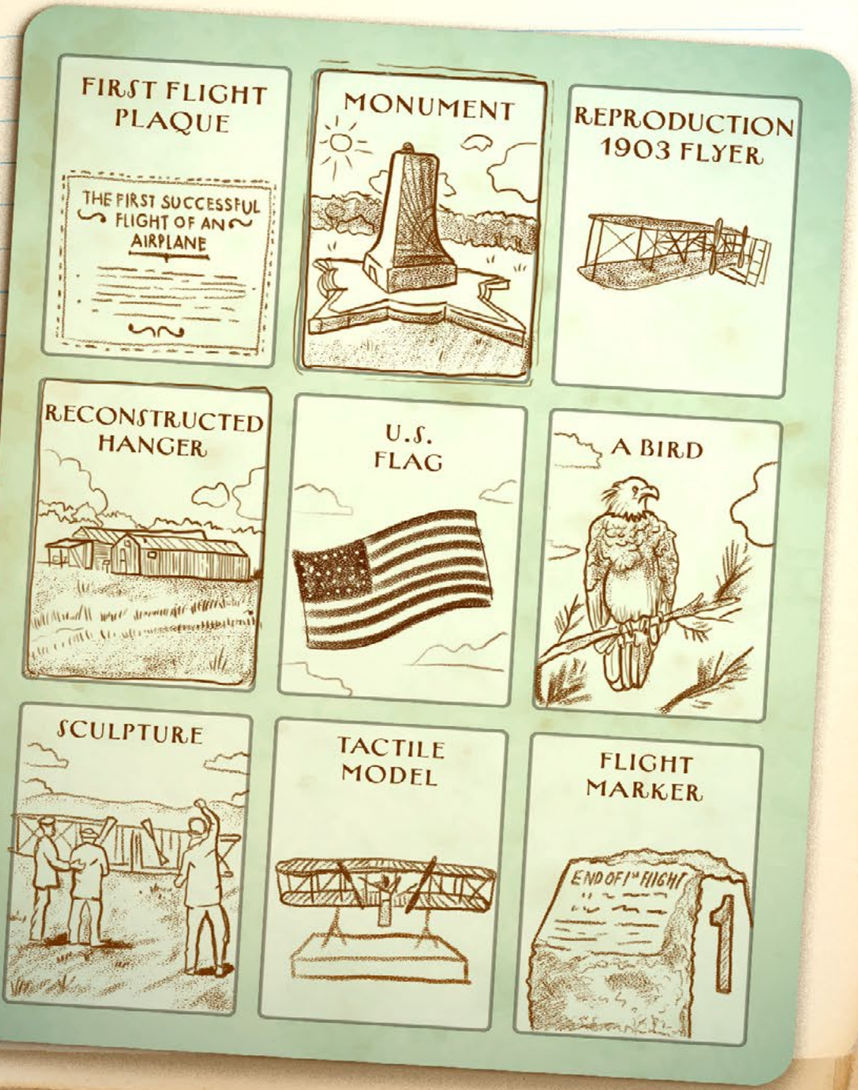


Spend a Day at Wright Brothers:

1. **Attend a Ranger Program** (more information available at the front desk or on the park website).
2. **Explore the Visitor Center to learn their story.**
3. **Travel along the flight line.**
4. **Visit the Monument on top of the hill.**
5. **Walk around the December 17, 1903 Sculpture.**

WRIGHT BROTHERS BINGO

As you walk throughout the park, look for these items. When you see one, circle it. Find three in a row or all four corners to complete the activity.



THE HISTORY OF HUMAN FLIGHT

For thousands of years, humans have tried to fly—using myths, wings, balloons, and even basic glider. The eight bronze panels on the doors to the monument demonstrate some of the inspiration and ideas for early human flight. Using the panels for inspiration, design your own flying machine.

1 Bird wings have been studied since ancient times to learn how they fly.

2 People thought they could attach paddles to their arms and legs to use as wings.

3 Unpowered gliders used the power of wind to soar into the air.

4 Heating bags of water with the sun was once thought to create lift and fly upwards into the sky.

5 Many different designs of propellers were created to push early airplanes forward.

6 Mythological Icarus had wings made of wax, but flew too close to the sun so his wings melted.

7 A phoenix, a mythological bird, was thought to rise from its ashes to fly again.

8 Kites were invented thousands of years ago as one of the first inventions to take flight.

Draw Your Flying Machine

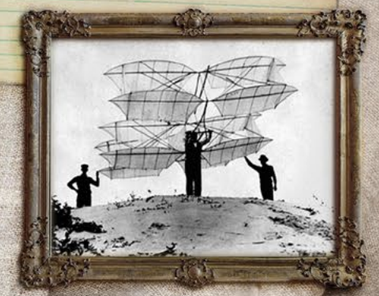
PIONEERS OF FLIGHT

Before Wilbur and Orville built their first flyer, they learned from others who were attempting to fly. The two main challenges to overcome were control and power. Below are four people whom Wilbur and Orville learned from. Read about each person, perform the actions mimicking their flying machines, and answer the question at the bottom of the page.

Samuel Langley constructed a motorized aircraft that he launched from a catapult for thrust. Find an open space and launch yourself by jumping forward. Count how many footsteps your catapult launch took you.

_____

Octave Chanute made a 12-wing glider for more lift. Hold your arms out to the side and flap them as fast as you can for 10 seconds. How many flaps could you get? _____



Otto Lilienthal built a glider controlled by moving one's legs to shift the center of gravity for control. Find a place to sit. For 10 seconds lean side-to-side as quickly as you can. How many times did you lean side-to-side?

_____

Hiram Maxim built a steam engine plane to power the propellers for thrust. Take ten seconds and spin your arms in circles as fast as you can. Count how many spins you could get.

_____

BEFORE THEY WERE AVIATORS

Before the Wright brothers began their journey to conquer the air, they had two different businesses that provided them with skills for their future as aviators and business owners.

In the 1890s, Wilbur and Orville operated a printing shop and created two newspapers in Dayton called "The West Side News" and "The Evening Item." If you were going to print a newspaper, what would you call it? Create a name and design for your newspaper in the banner below:

Two Cents KITTY HAWK, NC Daily

The brothers also opened the Wright Cycle Co. Bicycle shop in 1892. They repaired, designed, and manufactured bicycles. The mechanical skills they developed at the bicycle shop helped them in their future as airplane mechanics, designers, and manufacturers!

What is your dream job? _____

_____

What skills will you need for that job, and where can you start to learn them? _____

_____

_____

_____

LET'S GO CAMPING

When Wilbur and Orville Wright first arrived on the Outer Banks, they saw a sandy, isolated island with very few people.

To collect supplies, they walked to the post office, a trip that took three hours roundtrip. The brothers' camp had mice and pests, as well as constant wind and cold. It was often very challenging for Wilbur and Orville. Imagine what it would have been like to stay here with Wilbur and Orville during their years in Kitty Hawk.

Name three items you would want to bring here? Why?

_____

_____

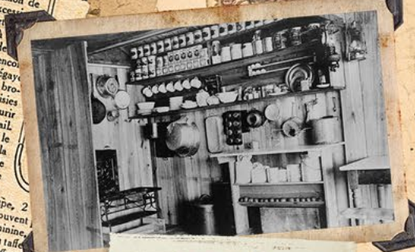
Each year at Kitty Hawk, the Wright brothers improved their camp.

If you could choose to make one improvement to where you live, what would you change?

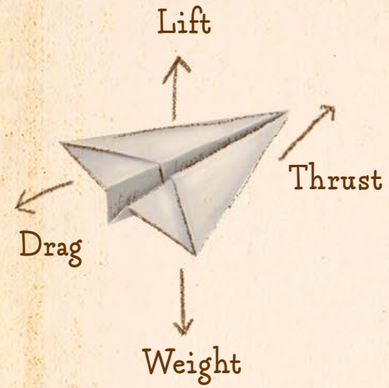
_____

_____

_____



THE FORCES OF FLIGHT



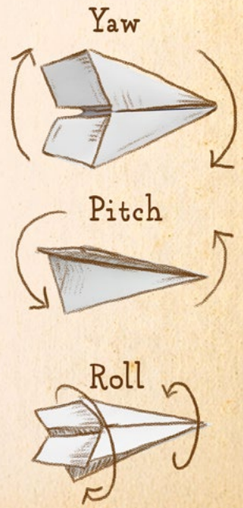
1. _____is the force of gravity. It acts in a downward direction - toward the center of the Earth.

2._____is the force that acts to raise a flying machine into the air. It is created by differences in air pressure above and below the wings

3._____is the force that propels a flying machine forward through the air.

4._____is the force that acts to slow a flying machine down. It is caused by friction with the air around the flying machine.

Roll, Pitch, and Yaw



1_____is the up and down movement of the nose of the airplane. This is similar to nodding your head up and down.

2_____turns the nose of the plane left or right. This is similar to shaking your head left and right.

3_____allows the airplane to tilt either left or right to make a banking turn. This is like tilting your head towards your shoulders.

Try to make a paper airplane yourself and give it a throw to see the forces acting on it.

PARTS OF A FLYER

Use the image and descriptions below to label the parts of the 1903 Wright Flyer. If you get stuck, look at the park brochure or visit the Flight Room to see a reproduction of the flyer.

A. The **rudder** controls the yaw, or right and left movement, of the aircraft from the back of the flyer.

B. The **propellers** on the back of the aircraft provide the thrust needed to get into the air. The brothers dismissed the idea of using a boat's propeller and designed their own instead.

C. The **bracing wires** reinforce the separate parts of the flyer, ensuring that the more fragile wooden parts would not easily break during flight.

D. The **wings**, covered with cotton muslin, were designed using the information Wilbur and Orville gathered from their extensive wind tunnel testing.

E. The **elevator** controls pitch. This allows the flyer to go up or down during flight.

FAMILY AND FRIENDS

Wilbur and Orville Wright did something the world had never seen before, but they didn't do it without support. Many friends, family, and colleagues helped them overcome challenges and obstacles on their way to achieving their dream of flight.

Match the images below with the description of what each person did to help Wilbur and Orville Wright achieve their dream.

1._____Charles E. Taylor ran the brothers' bicycle shop during their experiments and built the Wright brothers an engine for the 1903 Flyer.

2.____ Katharine Wright was the only Wright brothers sibling to graduate from college and was a major source of encouragement and support for the brothers, especially after their failures.

3.____ Bill Tate was the Kitty Hawk postmaster. Bill and his family welcomed the brothers to the area and provided food, information, labor, and a vital sewing machine.

4.____ Susan Wright was Orville and Wilbur's mother and used her self-taught engineering skills to teach them to tinker and fix things.

The friends, family, and colleagues of the Wright brothers provided vital support for the brothers to achieve their dreams. Who do you want to support to help them achieve their dreams?

_____

_____

_____

GOING THE DISTANCE

When Wilbur and Orville were ready to test their 1903 Flyer, they had one last decision: who will fly first? They flipped a coin. Wilbur won and attempted to fly on December 14 but was unsuccessful. Three days later Orville flew. How would you decide who goes first? _____

_____

Use the December 17 Flight log and Flight Markers to fill out the Flight Log and answer the following questions:

PILOT	AIRPLANE MAKE AND MODEL	FLIGHT TIME	FLIGHT DISTANCE	NOTES
	1903 Wright Flyer		0 feet	Unsuccessful
Orville		12 seconds		First Flight!
	1903 Wright Flyer		175 feet	
		15 seconds		New Distance Record
Wilbur			852 feet	

27 MPH wind

6.8 MPH ground speed

Airspeed is the speed of an airplane with no wind. You can find airspeed by adding ground speed and wind speed together. The ground speed of the first flight was only 6.8 MPH. However, Orville flew against a 27 MPH wind. What was their airspeed?

Ground speed + Wind Speed = Airspeed _____

Are you faster than the Wright Flyer? Sprint from the takeoff boulder to the first marker and record your time. Did you get there faster than 12 seconds? _____

How long did it take you to get to the first flight marker?

_____

A PICTURE IS WORTH A THOUSAND WORDS

On the morning of December 17th, 1903, Orville set up a camera facing where the Wright Flyer would fly. He gave John T. Daniels control of the camera, telling him to squeeze the bulb to take a photo if anything interesting happened. He ended up taking the first-ever photo of a powered airplane taking flight!

Now it's your turn to take photos while you are at the park. Explore the park and take some photos during your visit.

Which photo from your visit is the most interesting?

_____

_____

_____

Why is that photo the most interesting you took?

_____

_____

Show your interesting photo to the park ranger when you finish your book.

MONUMENT TO A DREAM

In the 1920s, government officials, pilots, and citizens of the Outer Banks came together to create a monument to celebrate the Wright brothers on Big Kill Devil Hill. They worked together, created a plan, and brought in more people to help build the monument. In 1932, the monument was finished.

Wright Brothers National Memorial is about 7 feet above sea level. Big Kill Devil Hill is 90 feet tall, and the Wright Monument is 60 feet tall.

How high above sea level is the top of the Monument?_____

If you were going to start a movement to create a monument to celebrate an important event, what would the monument look like? Use the box to the left to draw your monument and answer some questions about your monument.

How tall would you make your monument? _____

Who would you invite to help you build the monument? _____

_____

_____

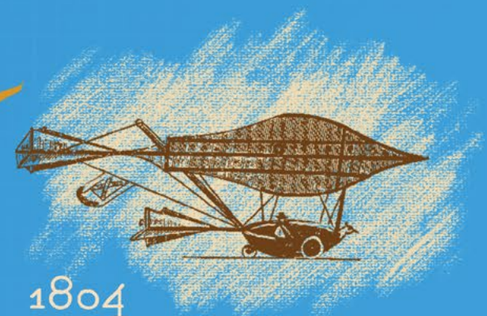
What would you name your monument?

_____

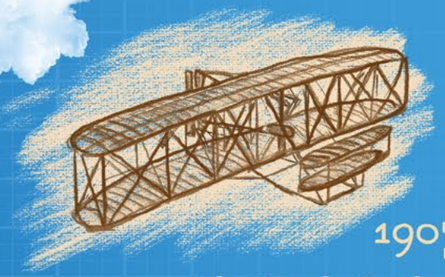
TIMELINE OF MAJOR AVIATION EVENTS

Both before and after the Wright brothers, many different people made history by inventing, testing, and succeeding where others failed. Ever since the Wright brothers, aviation has continued to grow. Read about the timeline of major aviation events and fill in 2050, 2100, and 2200 with what you think will be the major aviation events in those years.

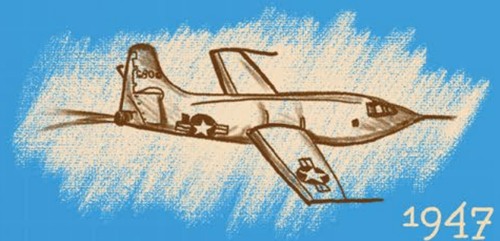
1783
The Montgolfier Brothers create the first hot air balloon.



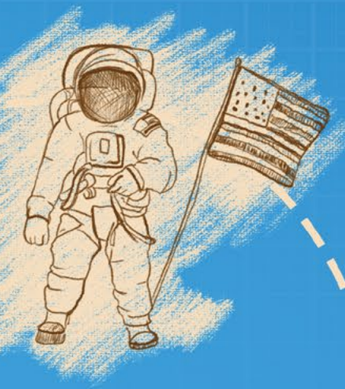
1804
George Cayley invents the first successful glider.



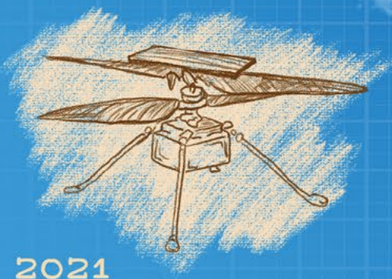
1903
The Wright Brothers successfully test their Wright Flyer for the first time.



1947
Chuck Yeager breaks the sound barrier in an airplane.



1969
Neil Armstrong and Buzz Aldrin are the first humans on the moon.



2021
Ingenuity, a helicopter, flies on Mars becoming the first human powered flight on another planet.

2050

2100

2200

JUNIOR RANGER PLEDGE

AS A JUNIOR RANGER I PROMISE TO

Change the impossible to possible
Keep looking for new solutions
Let my passions soar through the air
And never give up on my dreams

JUNIOR RANGER

STAMP

NPS PARK RANGER SIGNATURE