National Park Service
U.S. Department of the Interior

Wright Brothers National Memorial

Junior Flight Ranger Activity Book

Welcome to Wright Brothers National Memorial!

Complete the pages and activities for your age group and attend a ranger program to become a **Junior Flight Ranger!**

Ages 6 and under: Pages 1-3.

Ages 7-11: Pages 1-7.

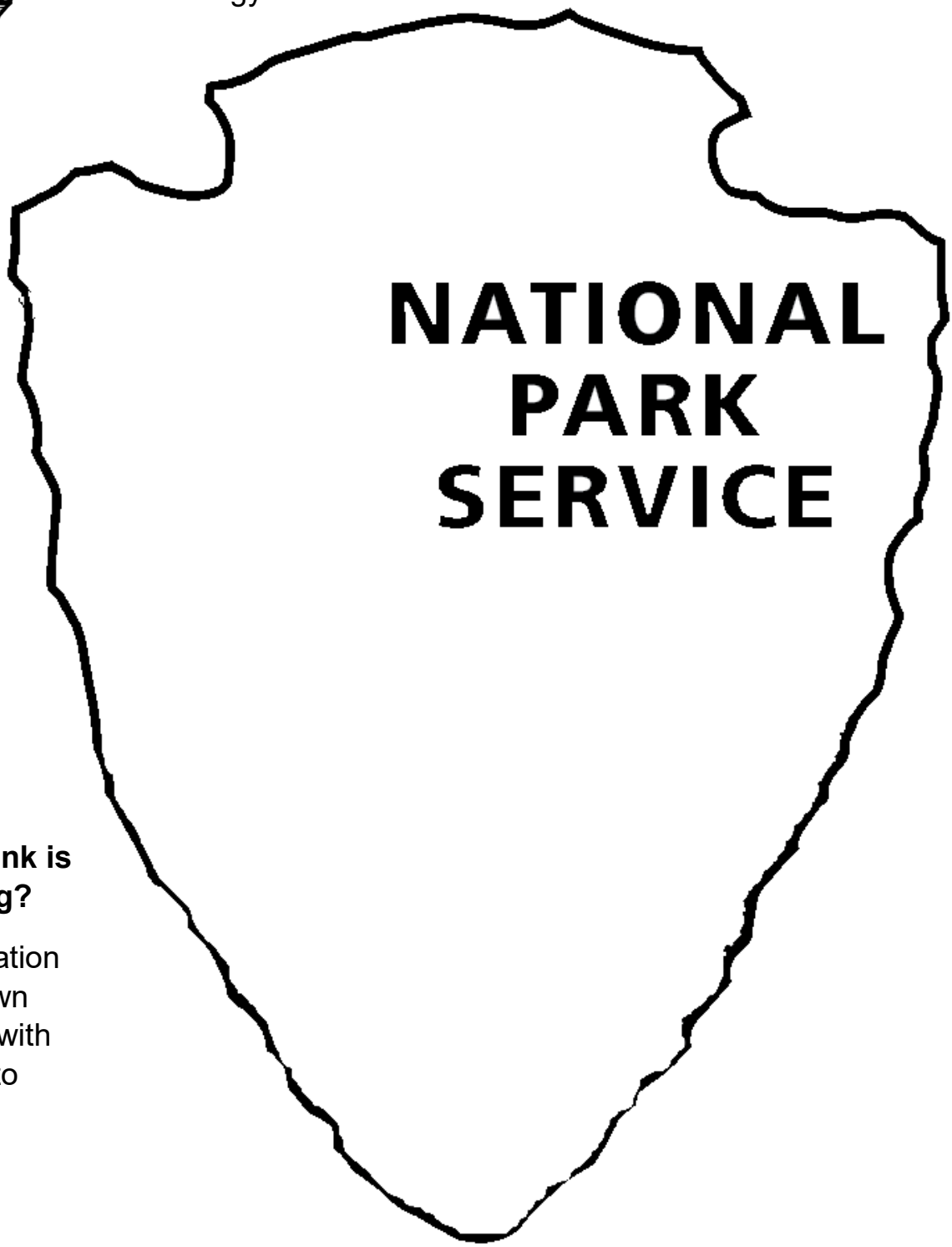
Ages 12 and up: Pages 1 & 5-14.

What did you learn?

If a ranger program is offered during your visit, attend the program and then **draw or write one thing you learned from the program.**

Protecting Special Places

Each item on the National Park Service arrowhead symbolizes something that the National Park Service was created to protect. The **SEQUOIA TREE** and **BISON** represent plants and wildlife. The **MOUNTAIN** and **LAKE** represent scenery and places for recreation. The shape of the **ARROWHEAD** represents culture, history, and archeology.



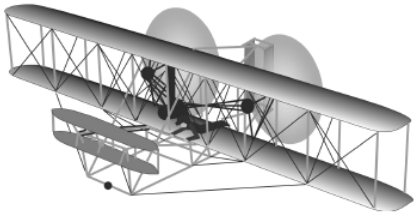
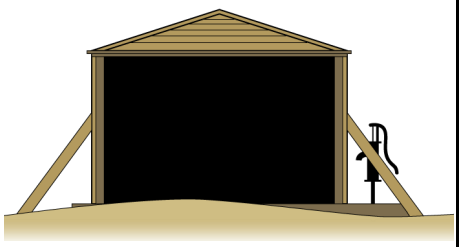
What do you think is worth protecting?

Use your imagination to design your own arrowhead filled with things you want to protect!

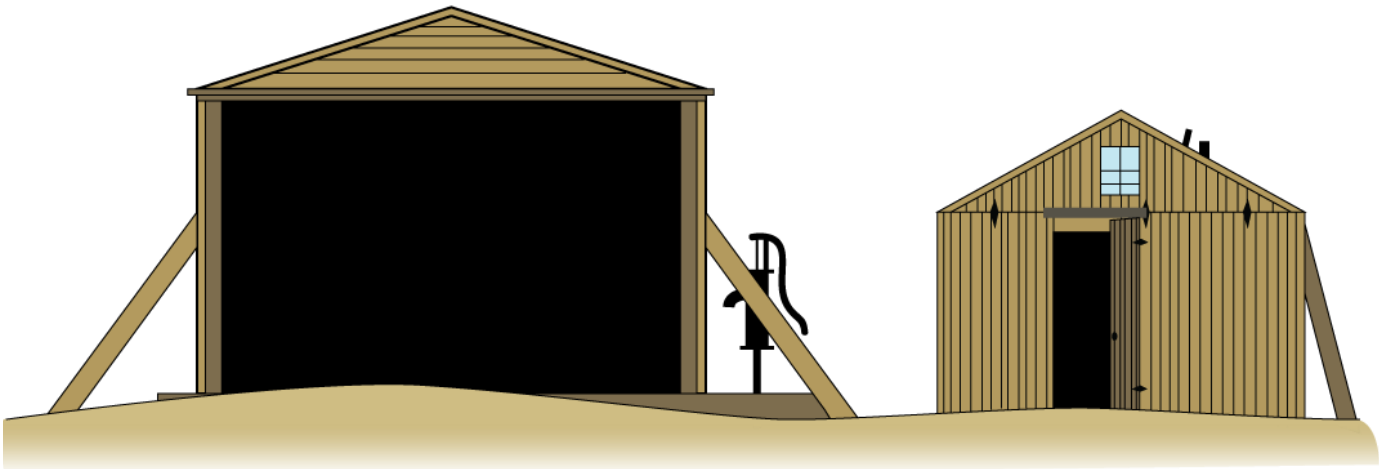
Kitty Hawk Bingo

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.

First Flight Plaque 	Monument 	Reproduction 1903 Flyer 
Reconstructed Hangar 	NPS Arrowhead 	A Bird 
Orville Wright 	American Flag 	Flight Marker 

Let's Go Camping



Visit the reconstructed camp building and hangar from 1903. On the left is the hangar where the Wright Flyer was stored to protect it from the wind, sand, and harsh weather of the Outer Banks. On the right is a workshop and living quarters where Wilbur and Orville slept, made meals, and worked on their machines.

Take a look inside the buildings, and imagine what it would have been like to stay here with Wilbur and Orville during their years in Kitty Hawk. **Think of three items you would bring with you from home and explain why.**

1. _____

2. _____

3. _____

Bonus! What do you think camp life was like for Wilbur and Orville? Would you want to live in these same conditions, why or why not?

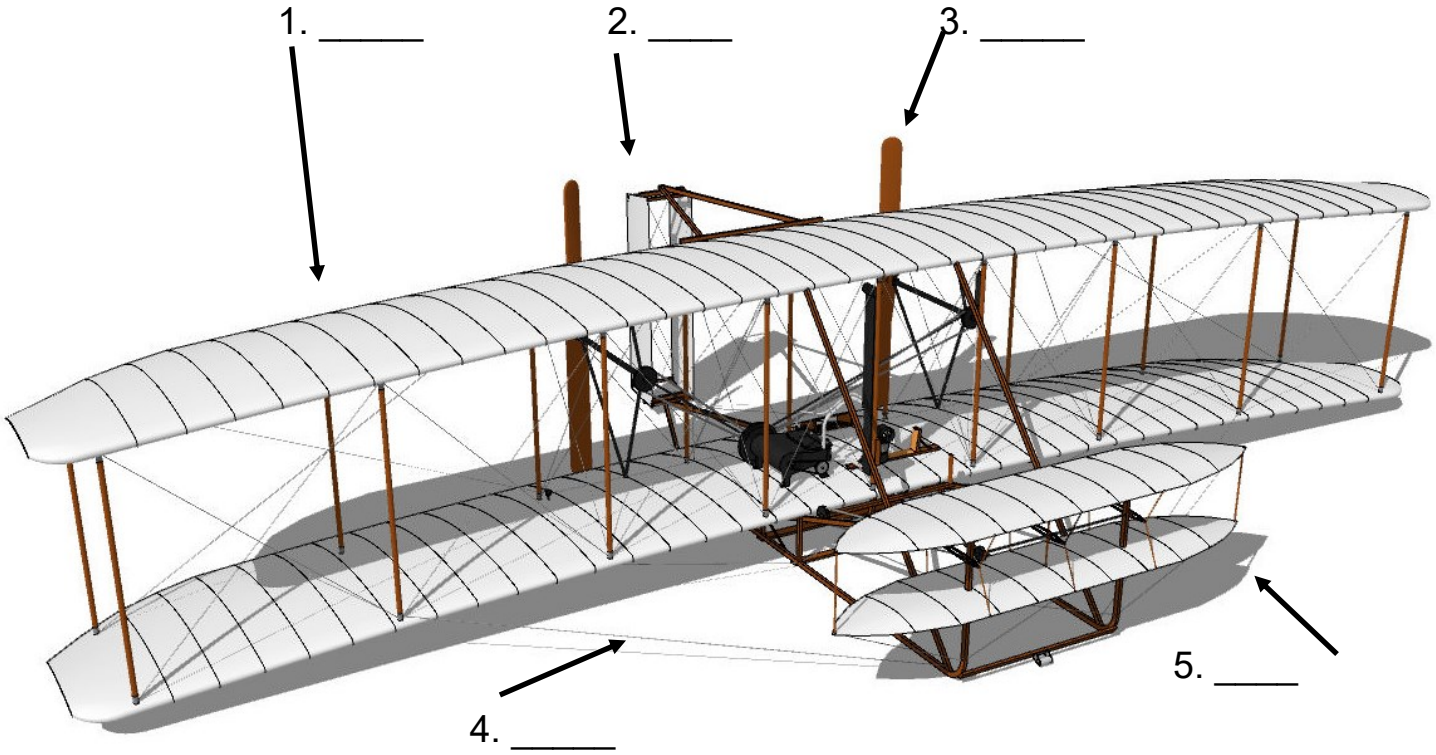
_____

_____

_____

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. Wilbur and Orville designed **propellers** for the back of their flyer to provide the thrust they needed to get into the air. They dismissed the idea of a propeller as an “air screw,” like a ship propeller, and instead saw it as a wing that rotates.

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

D. The **wings,** made of Muslin Cotton, were designed using the information Wilbur and Orville gathered from their extensive wind tunnel testing.

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

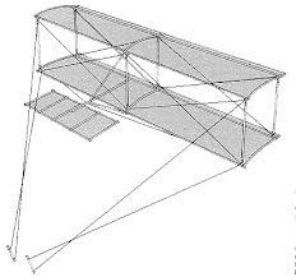
The Wright Timeline

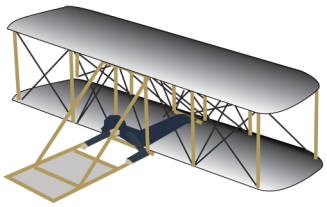
Wilbur and Orville visited the Outer Banks for a few years before their first flight.

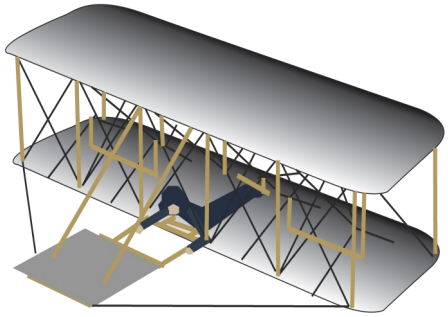
Create a timeline of Wilbur and Orville's flying experiments by matching the letter of the following events with the years when they took place.

Hint: Use the pictures of the flying machines below the dates to help you figure out what happened when.

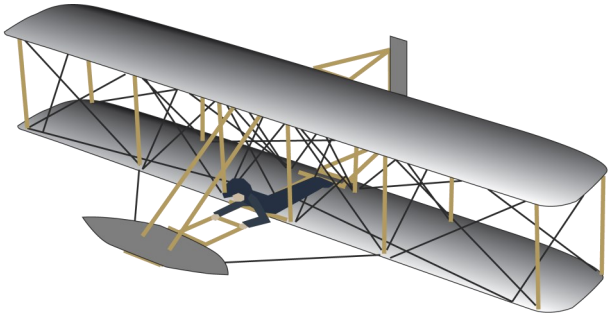
1899 —— **1900 ——** **1901 ——**

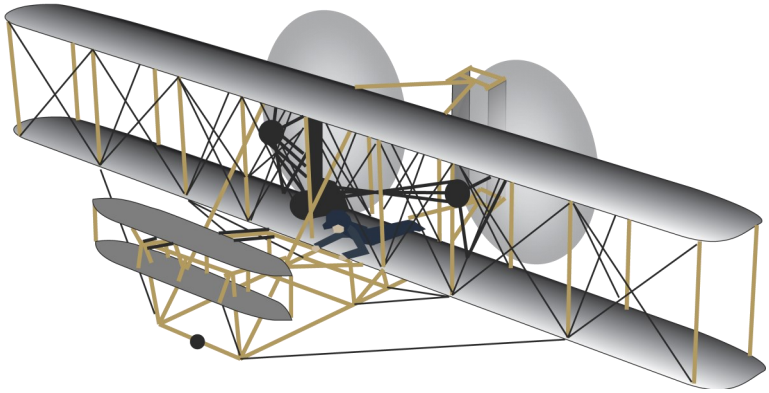






1902 —— **1903 ——**





A. Wilbur and Orville tested their first glider in the strong winds of Kitty Hawk.

B. On the morning of December 17, 1903 the Wright brothers made the first successful power driven flight in world history in their Wright Flyer.

C. This glider was the first to use a moveable tail called a rudder. This allowed them to control the yaw (side to side motion) and perform a full turn. They tested it 1000 times!

D. Wilbur and Orville first began their journey by testing a small kite in Dayton, Ohio.

E. This was the second glider the Wright brothers built and it had many problems with lift and control.

Going the Distance

Today, the historic location where Wilbur and Orville made the first flights is marked by the First Flight Boulder and Flight Line.

The boulder marks where the first flight took off and the numbered stones of the flight line mark the distance of each flight.

Take a walk along the path of the first four flights, and at each landing marker find the information you need to finish the chart below.

Flight	Distance	Time	Pilot
#1	**120 feet**	_____	_____
#2	_____	**12 seconds**	_____
#3	_____	_____	**Orville**
#4	_____	**59 seconds**	_____

Now that you've found the times and distances of the flights, let's talk about **speed**! **Airspeed** is the speed of an airplane in relation to the wind around it. You can find the airspeed by adding the **ground speed** and the **speed of the wind** together.

The speed of the 1st flight over the ground was only **6.8 mph**. However, Wilbur and Orville flew directly into a wind that was blowing at about **27 mph**. **What was their airspeed?**

_____

Remember: Ground Speed + Speed of the wind = Air Speed

Bonus! Are you faster than the Wright Flyer? Have someone record your time. Sprint as fast as you can from the boulder to the first marker. Use your sprint time to find the difference from the time of the first flight.

How much faster are you than the first flight? _____

Monument to a Dream

Finished in 1932, the Wright Brothers Monument on Kill Devil Hill was built to remember Wilbur and Orville Wright and all that they accomplished.

The monument sits on a star base and the monument itself is designed to look like bird wings. At the top of the monument is a beacon that shines at night to light the way for aviators. Do you think this monument is fitting for the first people to fly?

Who is someone you think deserves a monument? Why?

_____

_____

_____

Draw your own monument for that person in the space below!

Fables of Flight

The doors to the Wright Brothers Monument contain eight bronze panels that tell the stories of human's attempt to fly. **Read the stories that each image represents and complete the doors by drawing the panels that are left blank.**

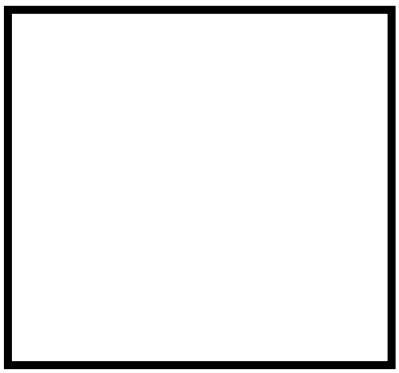
1.The study of bird wings influenced the Wrights early flying attempts.

5. The Wright brothers invented a unique design for modern propellers to achieve forward thrust.

2. A locksmith thought he could fly by attaching paddles to his arms and legs and jumping from chairs.

6. In Greek mythology, Icarus attempted to fly by using wax to attach feathers to his arms, but he flew to close to the sun.

3. Early gliding experiments inspired the Wrights to explore problems of controlled flight.



7. A Phoenix, a mythological bird, rose into the sky.

4. A philosopher believed he could add water to bags attached to a sail, and they would lift him into the sky when heated by the sun.

8. Kites were used by the Wright brothers during early experiments of lift and control.

Support from Family and Friends

Wilbur and Orville Wright had to overcome many hardships and problems to achieve success. Through trust in one another and very supportive family and friends, from both Dayton and the Outer Banks, they were able to overcome all obstacles and achieve their dream of flight.

Match the images below with descriptions of what each person or persons did to help Wilbur and Orville.

A.

B.

C.

D.

1. _____ **Charles E. Taylor** was initially hired to work in the Wright brothers' bicycle shop in 1901. He helps Orville work out the design for the flyer's engine.

2. _____ **Members of the Kill Devil Hill Life Saving Station,** trained to rescue shipwrecked mariners, help the Wright brothers launch the gliders and flyer. One member, John T. Daniels, even takes the famous photograph of the first flight.

3. ____ **Katharine Wright**, Wilbur and Orville's younger sister, is a great source of support and encouragement for her brothers and is instrumental in getting Wilbur to accept a chance to speak at a meeting of the Western Society of Engineers. This helps Wilbur and Orville gain back their confidence after their second glider had many problems with lift and control.

4. ____ **Bill Tate** is the postmaster of Kitty Hawk and welcomes Wilbur to the Outer Banks. His wife, **Addie**, loans her sewing machine to the Wright brothers so they can sew the cloth material on the wings.

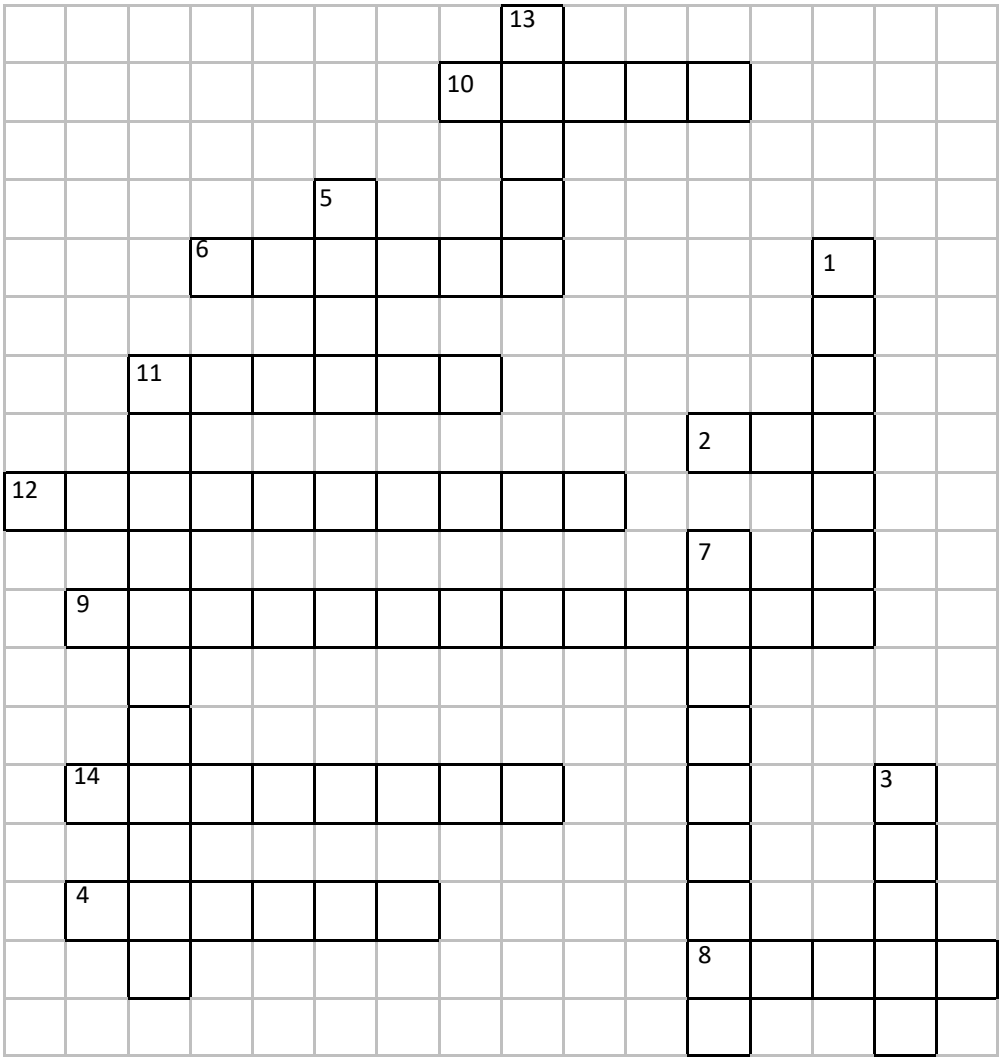
Wright Brothers Crossword

Using your brochure and the exhibits in the visitor center, fill in the blanks and complete the crossword puzzle below.

The Wright brothers, (1.)_____mechanics, wanted to learn how to (2.)_____. So they studied (3.) _____and wrote the Smithsonian to get some expert (4.)_____. In 1899, they built a (5.)_____ to test their ideas at home. Then they built a (6.)_____and brought it to (7.)_____ to test it in the steady (8.)_____of the Outer Banks. They used a (9.)_____ to sew the (10.)_____ wing coverings and ate (11↓.)_____ because food was scarce in the Outer Banks. In 1901 they built a (12.)_____ to gain more understanding of flight. Finally, the 1902 Glider was very successful, so they built a (13.)_____ which succeeded when they flew on December 17, 1903. Before their flight they asked John Daniels to take a picture with their (11→.)_____ of the first famous flight. Today, we honor their hard work and efforts with a national park and a (14.)_____ commemorating their achievements.

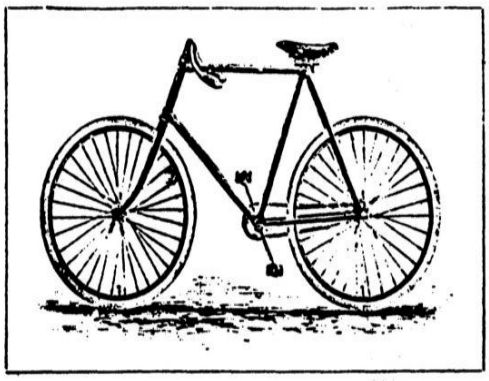
Word Bank

fly	glider
flyer	cloth
kite	birds
advice	monument
camera	winds
bicycle	
‘wind tunnel’	
‘Kitty Hawk’	
‘canned goods’	
‘sewing machine’	



Like Riding a Bike

From their experiences at the cycle shop, Wilbur and Orville understood that with a little practice a rider could learn how to control and balance an unstable bicycle. They believed that balance and control were also the key to flying. However, control is much more difficult for an airplane because it has to move freely in three ways, called **roll**, **pitch**, and **yaw**, as opposed to bicycles which move in only two directions.



WRIGHT CYCLE CO.,

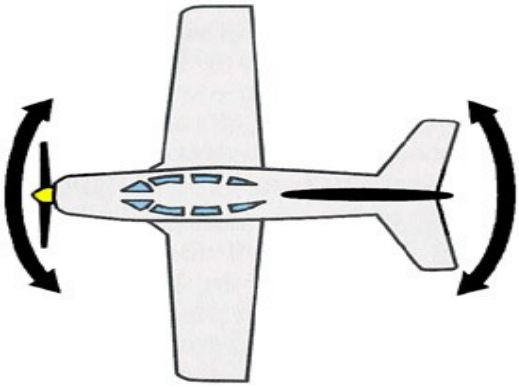
Use the park brochure and Flight Room exhibits to fill in the blanks below.

Word bank: pitch, roll, yaw.

1. _____ allows the airplane to tilt either left or right. Though the Wright Flyer controlled this with wing-warping, planes today typically use ailerons, flaps located on the edge of the wings.

2. _____ is the up and down movement of the nose of the airplane. This is controlled by the elevator.

3. _____ turns the nose of the plane left or right. This is controlled with a rudder that pushes the tail either left or right and turns the airplane.



Decoding History

Telegraphs were used to send electrical messages over long distances through wires before the invention of telephones. A short signal is represented by a **dot** and a long signal is represented by a **dash**. Stringing the dots and dashes together, words and sentences are created that could be sent by wires across the country. This is called Morse code. After their first flight, Wilbur and Orville sent a telegraph from Kitty Hawk to their father in Dayton, Ohio.

Use the Morse code below to solve the important message they sent.

Morse Code:

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

Message:

... ..._ _. _. _._. . ...

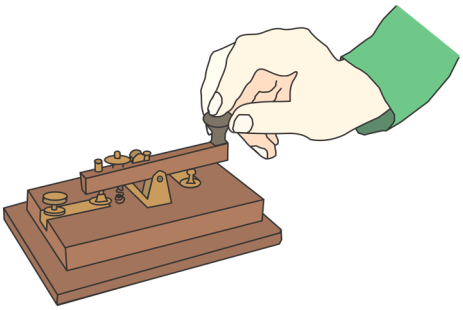
_____

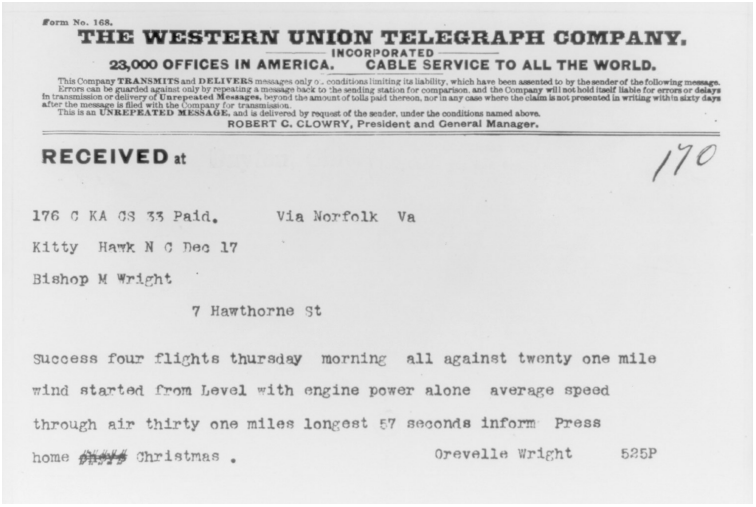
..._. _ _ _ ..._ ._.

_____

..._. ._.. .. _ _. .... _ ...

_____





Form No. 168.

THE WESTERN UNION TELEGRAPH COMPANY.

INCORPORATED

23,000 OFFICES IN AMERICA. CABLE SERVICE TO ALL THE WORLD.

This Company TRANSMITS and DELIVERS messages only o.. conditions limiting its liability, which have been assented to by the sender of the following message. Errors can be guarded against only by repeating a message back to the sending station for comparison, and the Company will not hold itself liable for errors or delays in transmission or delivery of Unrepeated Messages, beyond the amount of tolls paid thereon, nor in any case where the claim is not presented in writing within sixty days after the message is filed with the Company for transmission.

This is an UNREPEATED MESSAGE, and is delivered by request of the sender, under the conditions named above.

ROBERT C. CLOWRY, President and General Manager.

RECEIVED at 170

176 C KA CS 33 Paid. Via Norfolk Va

Kitty Hawk N C Dec 17

Bishop M Wright

7 Hawthorne St

Success four flights thursday morning all against twenty one mile wind started from Level with engine power alone average speed through air thirty one miles longest 57 seconds inform Press home ~~Christmas~~ Christmas .

Orevelle Wright 525P

Think about a goal you have reached or something you've accomplished. What would you want people to know? **Create your own Morse code message below.**

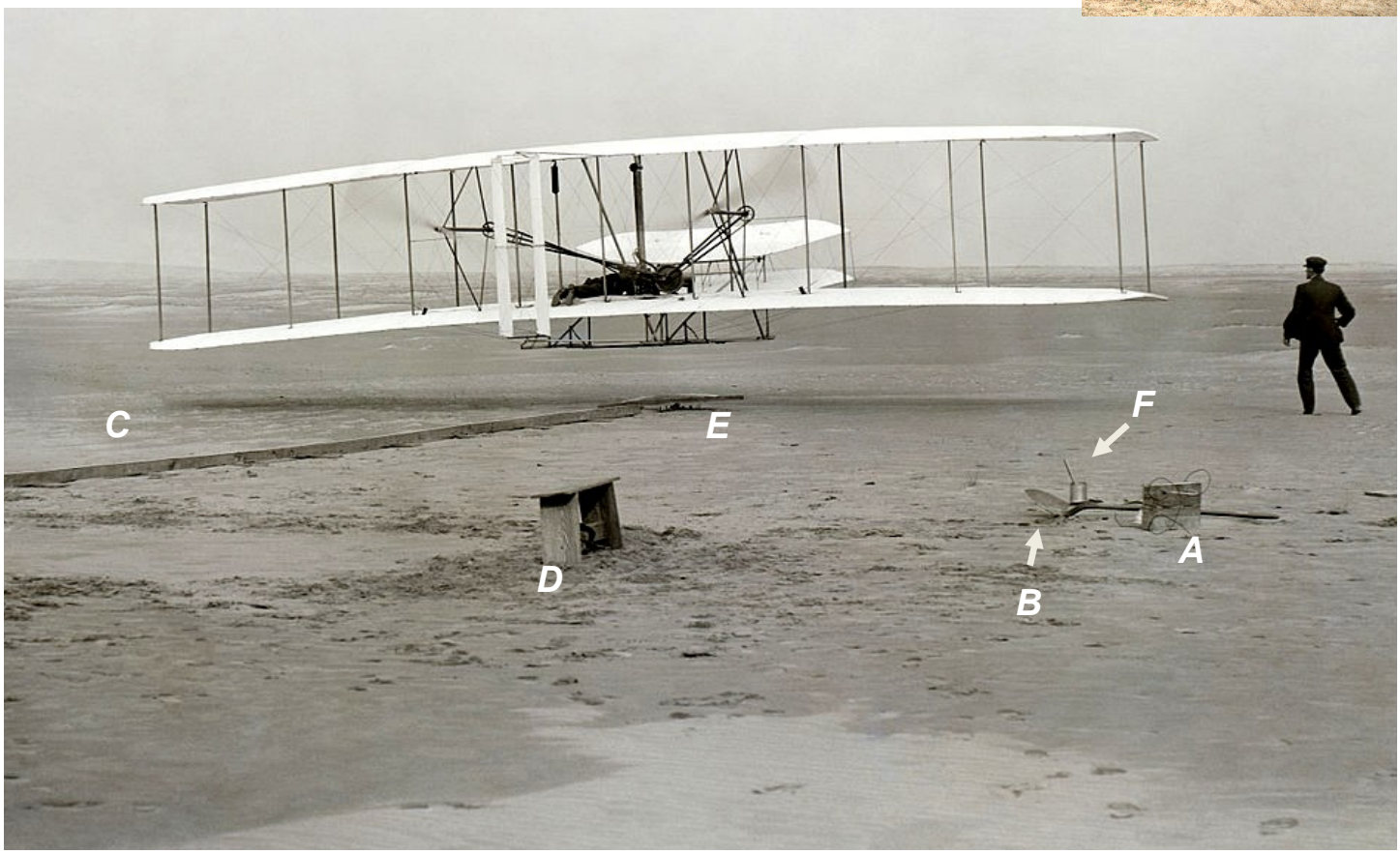
_____

_____

_____

A Picture is Worth 1,000 Words

On the morning of December 17, 1903, Orville set up a camera facing the spot where he thought the Wright Flyer would first fly. Wilbur handed John T. Daniels a small bulb to activate the shutter. Having never touched a camera, John was told to squeeze the bulb if anything interesting happened! This is the famous photograph that he took of the first flight.



Study the picture above and match the following items:

1. ___ The flyer slid down a 60-foot **rail** because it did not have wheels.

2. ___ A small **dolly** and a bicycle hub under the flyer acted as a set of wheels.

3. ___ A wooden **bench** was used to support the heavy wings before flight.

4. ___ They used a **shovel** to bury the rail in the sand and to dig an anchor.

5. ___ A **battery** provided the spark that was needed to start the engine.

6. __ A small **can** containing nails and a hammer were used for making minor repairs.

Bonus! Find and circle Wilbur's footprints and the outline of the flyer's right wing in the sand.

A Moment Carved in Time

Visit the December 17, 1903 Sculpture at the base of the hill and use the signs to find the following answers:

1. What is the name of the sculptor? _____

2. Who donated the sculpture to the National Park Service? _____

3. What are the names of the five men who witnessed the first flight?

_____ _____ _____

_____ _____

4. What profession did three of the witnesses share? _____

Bonus! Get a new perspective of the world and what the Wright brothers accomplished – pose with Wilbur or Orville. Imagine the thrill of being the first to fly! **Describe your feelings in three words.**

_____ _____ _____

Junior Flight Ranger Pledge

As a Junior Flight Ranger, I promise to share my experiences here with others.

I also promise to continue to explore, learn about, and protect all National Parks.

This award certifies the recipient as an official Wright Brothers National Memorial Junior Flight Ranger.

Junior Ranger Name

Awarded by:

NPS Official Signature

Stamp