Second Grade

DISCOVER AMERICA

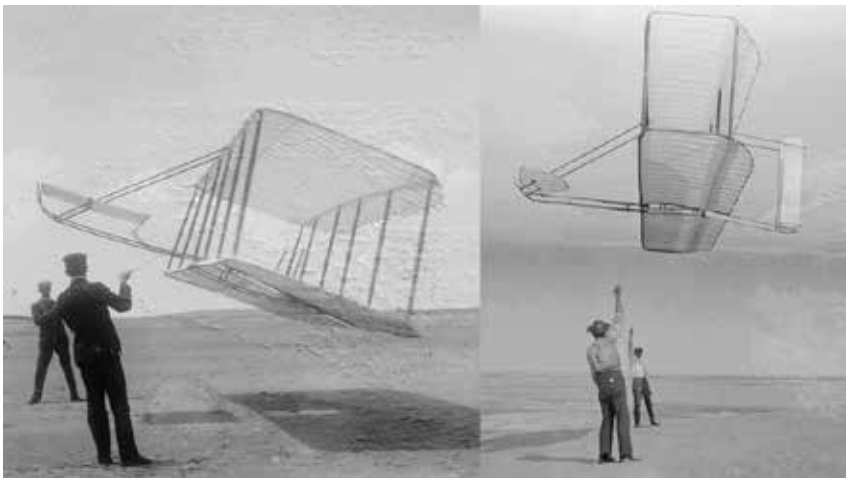
Course 22 - Teacher Guide

Skyward Pioneers: The Wright Brothers

Table of Contents

Second Grade

Teacher Guide



Key Themes

- Imagination
- Freedom to Explore
- Flight
- Perseverance
- Teamwork

Core Values

- Community
- Life
- Liberty

Learning Objectives

Students will be able to

- List two obstacles the Wright brothers faced.
- Define aviation.
- Compare and contrast a glider and an engine-powered airplane.
- List two characteristics of the Wright brothers that led to their success.

The Wright Brothers - Second Grade

Key Terms

01	**aviation:** the making and flying of aircraft that are heavier than air.
02	**fascinated:** extremely interested.
03	**glider:** an aircraft that soars through the air without the help of a motor.
04	**perseverance:** the ability to keep doing something in spite of obstacles.
05	**pursue:** to search for something.
06	**wing warping:** the twisting, or warping, of plane wings to control the roll of the plane.

The Wright Brothers - Second Grade

Introduction

TELL Students

Here's a riddle for you: I soar high up in the sky, with wings that help fly. I am not a bird, but I can glide. In the air, I love to ride. What am I? Yes, an airplane! Please turn to your neighbor and discuss everything you know about airplanes. [Give students five minutes to complete a turn and talk].

ASK Students

How does an airplane fly? Who invented the airplane?

TELL Students

We are going to learn about two remarkable brothers, Wilbur and Orville Wright. These brothers were pioneers in aviation, which means they were among the first people to successfully build and fly airplanes. Aviation refers to the making and flying of aircraft that are heavier than air. The Wright brothers were born to Milton and Susan Wright, who taught them strong values and a love for learning. Wilbur and Orville's curiosity and determination led them to achieve something incredible: inventing the first successful piloted engine-powered airplane. Let's watch another episode of Star Spangled Adventures to learn more about the Wright brothers!

WATCH

Star Spangled Adventures Cartoon Ep. 22: The Wright Brothers

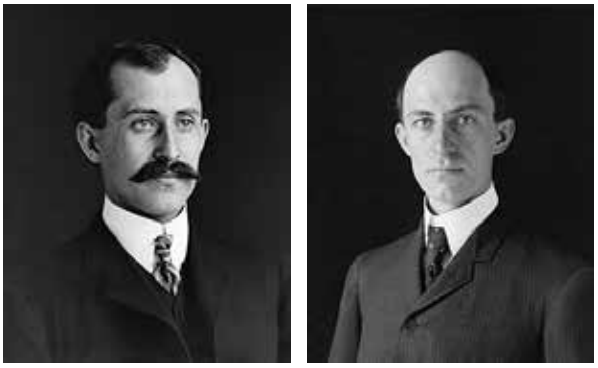
The Wright Brothers - Second Grade

Lesson

TELL Students

Wilbur was the older Wright brother. He was known as someone who stayed calm. Even as a young boy, Wilbur showed intelligence, confidence, and a knack for speaking and writing. He really enjoyed math and science. When Wilbur was about to finish high school, his family moved, but he still planned to attend Yale University. Unfortunately, he wasn't able to finish high school because of some unexpected events. Instead, he took college preparatory courses to pursue his dream of teaching. **Pursue means to search for something.**

At the age of 18, Wilbur faced a setback when he lost his teeth in an accident playing a game of ice hockey. This event made him less confident and caused other health issues. He eventually abandoned his school goals. But, Wilbur continued to learn. He spent much of his time in his father's library, reading and practicing his writing skills. He also cared for his mother, who was ill and unfortunately passed away.



Orville (left) and Wilbur Wright in 1905

ASK Students

What are two obstacles that Wilbur Wright faced?

TELL Students

The Wright brothers were always fascinated with flying. **Fascinated means extremely interested.** Their interest in flight started when their father brought them a toy helicopter in 1878. But it wasn't until later that the Wright brothers decided to seriously pursue their dream of flight.

Printing Press

Wilbur and Orville had become skilled in mechanics from working on printing presses and

Lesson

bicycles. They also saved up enough money to start this new adventure in flight. In 1899, Wilbur wrote to the Smithsonian Institution in Washington, D.C., asking for information on flying experiments. Orville joined in, and together they began to study everything they could find about flight.

ASK Students
What experiences prepared the Wright brothers for their new adventure in flight?

TELL Students
The Wright brothers didn't start out trying to invent the airplane. They were curious about flying and wanted to learn more about it. They looked at what other people had tried before, what questions still needed answers, and how they could make improvements. After studying everything they could find about flight, they were surprised to see that not much progress had been made, even though people had been interested in flying for a long time.

ASK Students
What did the Wright brothers find out after doing research on flight?

TELL Students
The Wright brothers didn't just work on their flying machine for a short time. They spent many years on it! They figured out that there were three big problems they needed to solve to make their airplane work: how to balance and control it, how to design the wings to lift it up, and how to make it go forward. While some people focused on just one problem, the Wright brothers worked on all three at the same time.

ASK Students
What are the three big problems that the Wright brothers needed to solve to make their flying machine work? How did they approach the problems?

The Wright Brothers - Second Grade

Lesson

TELL Students

The Wright brothers believed that the biggest challenge was making sure the pilot could control the airplane. They thought of it like riding a bike, where the rider keeps the bike balanced and on course. But they had to figure out how to do that in the air!

ASK Students

Think about riding your bicycle without training wheels. Does it require a lot of balance?

TELL Students

To solve the three big flight problems, the Wright brothers tried a lot of experiments and tested different kites and gliders. They did most of their work in their bicycle shop in Dayton, Ohio. Then, they went to Kitty Hawk, North Carolina, because it had perfect conditions for testing their inventions.

Kitty Hawk

The brothers discovered many important things during their experiments. They came up with an idea called "wing warping." **Wing warping is the twisting, or warping, of plane wings to control the roll of the plane.** This helped balance the airplane during flight and controlled how it moved sideways. The Wright brothers tested their ideas with gliders in 1900 and 1901, but the results weren't what they expected. **A glider is an aircraft that soars through the air without the help of a motor.** So, they built a wind tunnel and did over two hundred tests with different wings and shapes. They learned important things about how wings should be shaped and how air moves over them.

ASK Students

What is "wing warping?"

The Wright Brothers - Second Grade

Lesson

TELL Students

The Wright brothers began by experimenting with gliders and eventually found success. Then, they focused on adding power to their aircraft. With the help of their mechanic, Charlie Taylor, they designed a gasoline engine and connected it to propellers made from airplane wings. The Wright brothers achieved the first successful piloted engine-powered airplane on December 17, 1903 in Kitty Hawk. On this historic day, Orville took the first flight, covering 120 feet in 12 seconds. This marked the first powered flight in history. The brothers made three more flights that day. Although the aircraft was damaged after the last flight, their achievement paved the way for modern aviation.

ASK Students

What did the Wright brothers focus on after they found success with gliders? What is the difference between a glider and an engine-powered airplane?

Glider airplane

TELL Students

The Wright brothers made history with their continuous improvements in aircraft design. Just two years after their first flight, they achieved another milestone when their airplane flew for 39 minutes, covering a distance of 24.5 miles. Their determination and innovative spirit paved the way for modern flight. They inspired future generations, including Neil Armstrong, who carried a piece of the Wright Flyer to the moon. Their legacy reminds us to persevere and dream big, because anything is possible with determination and hard work. **Perseverance is the ability to keep doing something in spite of obstacles.**

ASK Students

What inspired the Wright brothers? Who did the Wright brothers inspire?

WATCH

Learn More With Liberty Video: What is the difference between a glider and an engine-powered airplane?

The Wright Brothers - Second Grade

Design Your Own Flying Machine!

Objective: To engage students in hands-on exploration of flight principles inspired by the achievements of the Wright Brothers.

Materials Needed:
- Assorted craft materials (e.g., cardboard, paper, straws, tape, string, popsicle sticks)
- Scissors
- Markers or crayons
- Glue
- Flight Observation worksheet

Introduction:
- Gather students and review the story of the Wright Brothers and their journey to invent the first successful piloted airplane.
- Emphasize the perseverance and determination of Wilbur and Orville Wright in pursuing their dream of flight.
- Explain that students will now have the opportunity to become inventors like the Wright Brothers by designing their own flying machines!

Brainstorming:
- Encourage students to brainstorm ideas for their flying machines. Discuss different components that are necessary for flight, such as wings, propellers, and a means of propulsion.
- Encourage creativity and remind students that there are no right or wrong ideas in this activity.

Design and Build:
- Provide students with the assorted craft materials and invite them to start designing and

building their flying machines.
- Encourage students to experiment with different shapes, sizes, and configurations for their designs.
- Circulate around the room to offer guidance and support as needed, encouraging students to think about how their designs will achieve flight.

Test Flights:
- Once students have completed their designs, set up an area where they can test their flying machines.
- Each student will have the opportunity to test their creation by launching it into the air (either by throwing it or using a simple launching mechanism).
- Encourage students to observe how their designs perform in flight and to make adjustments if necessary to improve their flying machines' performance.

Reflection:
- Gather students and facilitate a discussion about their experiences designing and testing their flying machines.
- Ask students to share what they learned from the activity and what they would do differently if they were to redesign their flying machines.
- Emphasize the importance of experimentation and perseverance in the process of innovation, just like the Wright Brothers demonstrated in their pursuit of flight.

Conclusion:
- Conclude the activity by highlighting the parallels between the students' designs and the achievements of the Wright Brothers.
- Encourage students to continue exploring their interests in science, engineering, and innovation, and to never give up on their dreams, just like the Wright Brothers did!

Flight Observation Sheet

Use the space below to write notes about your test flight. What went right? What went wrong? What do you need to modify?

The Wright Brothers - Second Grade

Thumbs Up/Thumbs Down

Instructions: Read each statement carefully. If the statement is true, circle "Thumbs Up." If the statement is false, circle "Thumbs Down."

1. Did Wilbur Wright finish high school?

2. Did Wilbur Wright enjoy math and science?

3. Did Wilbur and Orville Wright's interest in flight start when their father brought them a toy helicopter?

4.Did Wilbur and Orville save money to start their adventure in flight?

5. Did the Wright brothers set out to invent the airplane?

6. Did the Wright brothers believe that the biggest challenge in making an airplane work was controlling it?

7. Did the Wright brothers experiment with kites and gliders?

8. Did the Wright brothers find success with their gliders?

9. Did the Wright brothers focus on adding power to their aircraft after success with gliders?

10. Did Orville Wright take the first powered flight in history?

11. Did the Wright brothers achieve another milestone two years after their first flight?

12. Did the Wright brothers inspire future generations?

13. Did Neil Armstrong carry a piece of the Wright Flyer to the moon? 

14. Does the Wright brothers' legacy remind us to persevere and dream big? 

15. Did the Wright brothers' achievements pave the way for modern flight? 

The Wright Brothers - Second Grade

Answer Key

1. Thumbs down
2. Thumbs up
3. Thumbs up
4. Thumbs up
5. Thumbs down
6. Thumbs up
7. Thumbs up
8. Thumbs up
9. Thumbs up
10. Thumbs up
11. Thumbs up
12. Thumbs up
13. Thumbs up
14. Thumbs up
15. Thumbs up

The Wright Brothers - Second Grade

Resource List

https://kids.nationalgeographic.com/history/article/wright-brothers

https://www.nps.gov/articles/wright-brothers.htm

https://www.nps.gov/people/wilburwright.htm

https://www.nps.gov/people/orvillewright.htm

https://airandspace.si.edu/stories/editorial/who-were-wright-brothers

https://www.smithsonianmag.com/smithsonian-institution/how-the-wright-brothers-took-flight-180981001/

https://memory.loc.gov/diglib/legacies/loc.afc.afc-legacies.200002919/

https://airandspace.si.edu/stories/editorial/wright-before-aviators

https://airandspace.si.edu/explore/stories/researching-wright-way#aerodynamics

https://www.wright-brothers.org/History_Wing/Wright_Story/Inventing_the_Airplane/Kitty_Hawk/Afflicted.htm

https://wright.grc.nasa.gov/overview.htm

https://airandspace.si.edu/collection-objects/1903-wright-flyer/nasm_A19610048000

https://www.nps.gov/articles/roadtofirstflight.htm

https://www.nps.gov/articles/firstflight.htm?utm_source=article&utm_medium=website&utm_campaign=experience_more&utm_content=small

https://airandspace.si.edu/explore/stories/researching-wright-way#aerodynamics

https://time.com/5418950/first-man-neil-armstrong-wright-flyer/

Notes