You Can Fly!

Session Time: One, 50-minute session

DESIRED RESULTS

ESSENTIAL UNDERSTANDINGS

The aviation industry provides a multitude of pathways to pursue a career as a pilot. (EU6)

ESSENTIAL QUESTIONS

1. How can you start flying now?
2. How can your path to an aviation career begin now?

LEARNING GOALS

Students Will Know

- Practical steps they can take now to experience flying
- The training required to become a professional pilot

Students Will Be Able To

- *Explain* the requirements to become a pilot. (DOK-L1)
- *Describe* the options available to high school students to begin flying. (DOK-L1)
- *Create* a personal aviation plan with goals to pursue outside of class. (DOK-L4)

ASSESSMENT EVIDENCE

Warm-up
Students watch a motivational video about learning how to fly, list different kinds of pilots, and discuss the kind of flying that is most interesting to them.

Formative Assessment
Students complete an activity about the three primary pilot licenses and the requirements to attain each license.

Summative Assessment
Students create plans to begin pursuing their aviation goals outside of class and define action items to achieve their goals.

LESSON PREPARATION

MATERIALS/RESOURCES

- You Can Fly! Presentation
- You Can Fly! Student Activity 1
- You Can Fly! Student Activity 2
- You Can Fly! Student Activity 3
- You Can Fly! Teacher Notes

Recommended Student Reading

- **Pilot's Handbook of Aeronautical Knowledge**

Chapter One, Section on Pilot Certifications https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak/media/pilot_handbook.pdf

LESSON SUMMARY

Lesson 1: You Can Fly!

The lesson will begin by giving students an overview of the different types of pilot licenses, ranging from sport pilots to drone and commercial pilots. Students will learn about the different requirements needed for each type of flying.

During the next part of the lesson, students will learn the steps high school students can take to get started on the path to becoming a pilot—some students may be surprised to learn they can begin the process as high school students.

Finally, students will explore the tools and resources available to help them get started on an exciting career as a pilot. During this section of the lesson, students will complete an activity to help them research local flying options. As a summative assessment, students will create a personal action plan that includes steps they wish to take to begin pursuing their goals and interests in aviation.

BACKGROUND

For many people, flying feels magical, and those entrusted with the controls of an aircraft are awarded a mighty place in our imaginations. But as this course will reveal, flying is a matter of physics. Specifically, an object's ability to fly depends on the relationship among several forces, and pilots are trained to understand and control these forces. It's not a magic trick…it's science.

Becoming a pilot requires training and certification. There are several types of training and certification options (i.e., licenses) available. How long it takes to earn a pilot certificate and how much it costs, depend in part on the type of certificate. Different types of pilot certificates have different requirements and come with different privileges.The fastest route to flying is to obtain a Sport Pilot Certificate, which typically costs between $4,000 and $5,000 and takes roughly three to six months to acquire if you fly regularly. Another option is the Recreational Pilot Certificate, which allows the pilot to fly aircraft larger than light sport aircraft, but with similar limitations on where and when the pilot may fly. A Private Pilot Certificate is a third option; it allows the pilot to fly longer distances, as well as at night. A private pilot who wishes to fly at higher altitudes, climb above the clouds, and navigate challenging weather conditions must also obtain an instrument rating, which requires additional time and training.. These three types of certificates are considered primary certificates and are open to individuals age 17 or older. However, you can begin flying solo, a necessary part of the training for any primary certificate, at age 16.

Depending on the certificate, the pilot may need to prove other eligibility, such as fluency in English, possession of a valid driver's license (all three pilot licenses), and possession of a valid medical certificate (recreational and private licenses). In addition, people as young as 14 can fly solo in non-motorized gliders and balloons, and at age 16 they can obtain a license to pilot these types of aircraft.

Some students may dream of flying as a profession—a step that requires additional training and time. A Commercial Pilot Certificate allows the pilot to fly for hire. To work as an airline pilot requires an additional certificate called an Airline Transport Pilot Certificate.

Not all pilots leave the ground! Drone pilots are becoming increasingly common. While many hobbyists enjoy flying drones to capture stunning videos, the activity is also rapidly becoming a rewarding career option. Drone pilots who fly commercially must obtain a Remote Pilot Certificate. Today, drones are used in a wide variety of fields, including law enforcement, real estate, mining, filmmaking, and more. As drone capabilities continue to improve, expect the uses and applications for this technology to continue to grow. Students interested in flying drones today could find themselves at the leading edge of an advanced field in the future.

MISCONCEPTIONS

Students may think they can do little as high school students to become pilots. In fact, students as young as 14 can fly non-motorized gliders and balloons; at age 16, students can be licensed to pilot these types of aircraft. At age 16, students can also fly an airplane solo; at age 17, qualified students can earn any of the three primary pilot licenses. High school students are at an ideal age to learn to fly.

DIFFERENTIATION

To support student comprehension in the **EXPLORE** section, conduct the brainstorm and discussion as a Think-Pair-Share rather than as a large group activity. Consider having partners conduct an initial brainstorm, then work with another pair of students (forming a group of four) to add to their lists and discuss the similarities and differences between the options listed. This strategy ensures that all students contribute to the discussion, generate ideas, and verbally analyze information.

To help students successfully complete the student activity in the **EXTEND** section, use a collaborative writing workshop to help students generate a list of questions with a partner. Allowing students to generate questions with a partner can foster advanced literacy in the classroom, especially when students are encouraged to edit and revise their lists. In addition, collaboration can spark motivation, which will lead to greater success when students contact flight-related organizations.

LEARNING PLAN

ENGAGE

Teacher Material: You Can Fly! Presentation

Slides 1–3: Introduce the topic and learning objectives of the lesson.

Slide 4: Introduce students to the course by explaining they will learn the information they need to become pilots; this includes information about the science of flight, which will be covered in later units and lessons, and which will help to prepare students to pass the private pilot written exam. However, students can begin flying now! In this lesson, students will start on the road to a career in aviation by learning about the options available to high school students who wish to begin flying; they will also learn about the requirements to become a pilot, including the different licenses they may earn and the many resources available to support students interested in flight.

Slide 5: Conduct the **Warm-Up**.

Warm-Up

Have students watch the motivational video *Student Pilot at Pilot Flight Academy.* (Length 4:10)

http://video.link/w/teWd

After the video, have students individually list as many of the different kinds of pilots they can think of. From the list, have students write about which kind of piloting interests them the most, and explain why. Ask volunteers to share their answers with the class and allow for a brief discussion. Collect student work.

Note that at this point in the lesson, it is fine for students not to be aware of the distinctions between the types of pilot licenses, though most students should be able to identify different types of pilots (e.g., airline pilot, law enforcement pilot, private pilot). Students may also identify military/fighter pilots, though this type is not covered in this lesson.

[DOK 2: explain, DOK 1; identify]

EXPLORE

Teacher Material: You Can Fly! Presentation

Slide 6: Explain that new pilots typically start flying by obtaining one of the three primary certificates. To fly solo in a powered aircraft, a student pilot must be 16 years old; pilots must be 17 in order to receive a license. To fly solo in a non-motorized glider or balloon, one must be at least 14 years old; one must be at least 16 years old to receive a license to pilot such an aircraft. While we commonly talk about pilot licenses, the FAA, which issues licenses to fly, officially calls them certificates. Throughout this course, both terms will be used.

Slide 7: Earning a Sport Pilot Certificate is the fastest and easiest route to becoming a pilot; this license was created in 2004 to interest more people in flying. Sport pilots can expect to pay between $4,000 and $5,000 to become licensed, and the process generally takes about three to six months. This license requires at least 20 hours of flight time (15 hours with an instructor, 5 hours of solo flying). Keep in mind that this is a minimum and most people take a little longer to earn the certificate. Hours gained while training for the sport pilot license may count toward other licenses. A sport pilot can fly small, light sport aircraft that have up to two seats, so you can bring a friend! They can fly cross-country, but only during daylight and in good weather.

Slide 8: Another option is the Recreational Pilot Certificate. This license requires at least 30 hours of flight time, including at least 15 hours with an instructor. Keep in mind that this is a minimum and most people take a little longer to earn the certificate. Training costs approximately $7,500. Recreational pilots may fly larger aircraft than sport pilots can, but they may still carry only one passenger. Generally they must fly near the airport where they received instruction, though they can receive additional training to fly cross-country. Like sport pilots, recreational pilots cannot fly at night or during bad weather. In part due to these restrictions, many people with a recreational license choose to go on to earn a Private Pilot Certificate, but these are separate options; you don't need to be a recreational pilot before you can become a private pilot.

Slide 9: A Private Pilot Certificate is the highest level of the three primary certificates. This license requires a minimum of 40 hours of flight time (though many pilots need closer to 65 hours of training), including at least 10 hours of solo flying, and it has fewer restrictions that the other two primary certificates. The process costs approximately $10,000 and can be completed in six to 12 months. Private pilots may fly up to 18,000 feet, anywhere in the United States. In many instances, private pilots may even fly in foreign countries. Private pilots may fly at night, but they may not fly in the clouds or in bad weather unless they have received additional training.

At the end of this slide, show students the following video, which offers additional information on what students can expect when training to become a private pilot.

- What Does It Take to Get Your Private Pilot License (Length 6:29)
  http://video.link/w/8fWd

Slide 10: Mention the following additional requirements students must meet to obtain a license. (Explain that FAA stands for Federal Aviation Administration, the government agency that regulates the nation's civil, or non-military, airspace.)

- Pass the multiple-choice FAA Knowledge Test
- Take a Practical Test (commonly called a checkride) with the FAA
- Obtain an FAA medical certificate for all except the Recreational Pilot Certificate
- Hold a valid driver's license

Slide 11: Private pilots who wish to extend their training can obtain an instrument rating, which allows pilots to fly at higher altitudes, in the clouds, and in bad weather. Essentially, the instrument rating covers scenarios in which simply looking out the window does not provide enough information to fly the airplane safely, and thus pilots must rely on their instruments. This rating is important for private pilots who want to advance their flying careers.

Slide 12: People wishing to earn money as a pilot will need to obtain a Commercial Pilot Certificate which allows them to get paid to fly. Many commercial pilots limit themselves to flying small private airplanes for hire, while others fly business aircraft or earn the additional training needed to fly for an airline. To fly for the airlines, pilots must receive their Airline Transport Pilot (ATP) Certificate. For each step beyond the basic private pilot license, pilots can expect to invest more time and money to obtain the higher level of certification.

Slide 13: Students may have an interest in flying unmanned aircraft systems (UAS) or drones. Emphasize that students can fly these aircraft now. Piloting UAS can also be a rewarding career, but it requires certification. To earn a certificate, UAS pilots must pass an FAA written test; they can then work in a variety of fields, including including police work (surveillance), transportation, recreation, real estate, filmmaking, military, shipping, and agriculture—essentially, anything that could benefit from a "bird's-eye view" has a possible drone application.

Teaching Tips

Have students brainstorm possible opportunities for which UAS could be useful or improve quality of life.

During this brainstorm activity, the teacher may need to lead students with examples of what they should be discussing. For example, UAS can carry emergency medical support to hikers in remote mountains that are beyond the reach of a manned aircraft.

Students may write answers on the board. Then, discuss students' answers as a class, and encourage students to consider the similarities and differences between the options they brainstormed.

EXPLAIN

Teacher Materials: You Can Fly! Presentation, You Can Fly! Teacher Notes

Student Material: You Can Fly! Student Activity 1

Slide 14: Remind students that it's not too soon to learn how to fly, even if students are younger than 16 or do not yet have a valid driver's license.

Questions

Have students explain, based on what they have learned so far, what steps they can take now to become a pilot.

Possible answers:

Students can begin working toward obtaining a driver's license, which is required for a sport pilot certificate (i.e., by enrolling in a driver's ed course); students can enroll in a flight school and start logging hours with an instructor at any age (though they cannot fly solo until they are 16); students who are at least 14 years old can solo non-motorized gliders or balloons.

Slide 15: Complete the **Formative Assessment**.

Formative Assessment

Have students complete **You Can Fly! Student Activity 1** by identifying age and training requirements for each of the three primary pilot certificates and describing what each license permits.

After students complete the activity, take a poll of the class to determine the type of license that would be of most interest to them. Ask volunteers to explain why they chose their preferred license and what they would use it for.

Collect student work.

Answers to this assessment are found in **You Can Fly! Teacher Notes**.

[DOK 2: summarize, DOK 1; Tell]

EXTEND

Teacher Material: You Can Fly! Presentation

Student Material: You Can Fly! Student Activity 2

Slides 16–17: Explain that there are many ways for students to get started with flight training. Briefly review the list of options on slides 16 and 17. Explain to students that they will likely need to reference this list as they conduct their own research and complete You Can Fly! Student Activity 2. Reinforce the idea that, even in high school, motivated students can begin to work toward a career in aviation.

Slide 18: Provide students with copies of You Can Fly! Student Activity 2, which asks them to research a local flight school, instructor, or aviation organization, find relevant contact information, and develop five questions to ask this person or organization. On their own time, students should contact the person or organization they have chosen and seek out the answers to their questions. Note that there is extra space on the activity sheet; students may take notes of other interesting information they learn when they contact their selected person or organization.

Note that the student activity sheet lists the web address for AOPA's flight school finder. Additionally, provide students with other relevant resources, including the following. It may be helpful to list these on the board for students.

- Aircraft Owners and Pilots Association AV8RS: https://www.aopa.org/login/AV8RS
- Aviation Explorers: https://www.aviationexplorers.net/

- EAA Young Eagles program: https://www.eaa.org/en/eaa/aviation-education-and-resources/eaa-youth-education/eaa-ye-program
- AOPA Flying Club finder: https://www.aopa.org/community/flying-clubs
- Civil Air Patrol: https://www.gocivilairpatrol.com/

Academy of Model Aeronautics: www.modelaircraft.org

Teaching Tips

Be prepared with a handful of sample questions to help students who may struggle to write five relevant questions to ask a flight-related person or organization. For example:

What services do you provide?

What resources does your organization have for aspiring pilots?

Who are you trying to help?

How much does [specific service] cost?

Do you have payment plans or options for students?

How can I get involved in your organization?

EVALUATE

Teacher Material: You Can Fly! Presentation
Student Material: You Can Fly! Student Activity 3

Slide 19: Conduct the **Summative Assessment**.

Summative Assessment

Students complete **You Can Fly! Student Activity 3** by creating their own plan to begin working, outside of class, towards their goals in aviation. They will identify at least three action items for achieving the goals they articulate for themselves, and create a timeline for completing these action items. Throughout the course, they will check in with the teacher on their progress. Students will turn in their plans at the end of class.

Collect student work and grade using the scoring rubric. [DOK 3; formulate, investigate]

Summative Assessment Scoring Rubric

- Student is engaged in the activity
- Student follows assignment instructions
- Student plan shows:
    - a short- and long-term outline of plans to get involved in the aviation industry

- action items that describe steps needed in order to achieve goals
- opportunities to get involved in the local aviation community
- a timeline that illustrates a path toward achieving goals

- Contributions show understanding of the concepts covered in the lesson
- Contributions show in-depth thinking, including analysis or synthesis of lesson objectives

Points	Performance Levels
910	Consistently demonstrates criteria
78	Usually demonstrates criteria
56	Sometimes demonstrates criteria
04	Rarely to never demonstrates criteria

GOING FURTHER

Challenge interested students to visit a local or regional airport on their own, or, if possible, arrange a class field trip to an airport. Actually visiting an airport will make the concepts in this lesson come to life and will spark excitement in students.

STANDARDS ALIGNMENT

NGSS STANDARDS

Three-dimensional Learning

- **HS-ETS1-2** - Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering
  - Science and Engineering Practices
    - Constructing Explanations and Designing Solutions
  - Disciplinary Core Ideas
    - ETS1.C: Optimizing the Design Solution
  - Crosscutting Concepts
    - None
- **HS-ETS1-3** - Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.
  - Science and Engineering Practices
    - Constructing Explanations and Designing Solutions
  - Disciplinary Core Ideas

        - ETS1.B: Developing Possible Solutions
    - Crosscutting Concepts
        - None

COMMON CORE STATE STANDARDS

- **MP.2**: Reason abstractly and quantitatively
- **RI.9-10.1**: Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
- **RI.9-10.2**: Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.
- **RI.9-10.4**: Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).
- **SL.9-10.1**: Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
- **W.9-10.4**: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- **W.9-10.6**: Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
- **W.9-10.7**: Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
- **W.9-10.8**: Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
- **W.9-10.9**: Draw evidence from literary or informational texts to support analysis, reflection, and research.

REFERENCES

https://www.aopa.org/training-and-safety/learn-to-fly
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https://www.aopa.org/training-and-safety/drone-pilots

https://www.aviationexplorers.net/

https://www.aopa.org/learntofly/school/index.cfm

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https://www.aopa.org/community/flying-clubs