GRADE 10
UNIT 10
SECTION C
LESSON 1

AIRCRAFT SYSTEMS AND PERFORMANCE
AIRCRAFT DOCUMENTATION AND MANUALS
PILOT RESPONSIBILITIES

v1.0

YOU CAN FLY
AOPA FOUNDATION
HIGH SCHOOLS

Acting as Pilot in Command

🕐 **Session Time:** Two, 50-minute sessions

DESIRED RESULTS

ESSENTIAL UNDERSTANDINGS

Safe and efficient aviation operations require that pilots use math, science, and technology. (EU4)

ESSENTIAL QUESTIONS

1. What does it mean to be in command?

LEARNING GOALS

Students Will Know	Students Will Be Able To
• The role of a pilot in command • Documents, currency requirements, and knowledge that must be obtained prior to each flight	• *Name* the pilot documents, currency requirements, and information that is required for each flight. (DOK-L1) • *Describe* the role of pilot in command. (DOK-L2) • *Assess* aeronautical decision-making in a flight scenario. (DOK-L3)

ASSESSMENT EVIDENCE

Warm-up
Students briefly review what they have learned about the documents required to ensure that an aircraft is legal and ready for flight.

Formative Assessment
Have students summarize the documents, currency requirements, and knowledge required for flight. Also, ask them to write in their own words what the role of pilot in command means and the responsibilities that come with it.

Summative Assessment
Students are shown a video with a flight scenario and asked to assess the pilot in command's performance of his duties and responsibilities.

LESSON PREPARATION

MATERIALS/RESOURCES

- [Acting as Pilot in Command Presentation](#)
- [Acting as Pilot in Command Student Activity 1](#)
- [Acting as Pilot in Command Student Activity 2](#)
- [Acting as Pilot in Command Student Activity 3](#)
- [Acting as Pilot in Command Teacher Notes 1](#)
- [Acting as Pilot in Command Teacher Notes 2](#)
- [Acting as Pilot in Command Teacher Notes 3](#)

LESSON SUMMARY

The lesson will begin with a warm-up in which students recall the documents that a pilot must have on board the aircraft.

During the next part of the lesson, students will define "pilot in command" (PIC) and learn about the required pilot documents that a PIC must carry and the currency requirements for PICs under various conditions. Students will also learn about preflight actions that PICs must take, including the kinds of information they must know and the internal and external resources they have at their disposal. The first session concludes with a Formative Assessment in which students summarize what they have learned to that point.

In the second session, students will be introduced to aeronautical decision-making (ADM). After learning about the accident chain, students will take the Summative Assessment, which is a video accident case study in which students will evaluate the actions of a pilot in command.

Finally, students will answer questions from the Private Pilot Knowledge Test.

BACKGROUND

There are few areas in modern society that offer an individual as much authority as that given the pilot in command of an aircraft. Despite all of technology, rules, and ground-based assistance, it comes down to one person being responsible for the safe operation of the aircraft and the lives of all aboard. At times that might even mean breaking the rules, and the FAA says that's OK.

That degree of authority isn't given freely. Pilots are expected to know the rules, know how to operate their aircraft, and make good decisions.

Fortunately, they are given a lot of guidance with regulations meant to ensure proper initial training, ongoing practice (known as currency), and decision-making models.

More than a hundred years of flying airplanes has taught us that pilots who act responsibility and follow the rules almost always deliver their aircraft to its destination safely, day after day, making pilots a critical part of the utility and safety of modern aviation.

MISCONCEPTIONS

Many accidents or incidents appear to have a single cause. In fact, there are typically a number of things that fall into place, leading to the accident. The aviation industry uses the term "error chain" to describe this concept. If a pilot can identify and break just one link in the chain of errors, an accident or incident can be prevented.

DIFFERENTIATION

To support student memory and motivation in the **EXPLORE** section of the lesson plan, have students create a graphic organizer by folding a piece of paper into thirds horizontally. Have them label one section "Documents," another section "Currency Requirements," and the third section "Knowledge." Encourage students to take notes and jot down their questions. You may want to allow struggling students to use these notes to help them complete the Formative Assessment.

To challenge students and extend their analysis in the **EVALUATE** section of the lesson plan, ask students if they think the pilot in the scenario used the PAVE model preflight. Ask them to provide examples and reasons to support their opinion either on their handouts or during the class discussion.

LEARNING PLAN

ENGAGE

Teacher Materials: Acting as Pilot in Command Presentation, Acting as Pilot in Command Teacher Notes 1
Student Material: Acting as Pilot in Command Student Activity 1

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

Slide 4: Conduct the **Warm-Up**.

> **Warm-Up**
>
> Distribute **Acting as Pilot in Command Student Activity 1**. Working individually or with a partner, students should complete the activity by recalling the documents that a pilot must have on board the aircraft. Consider adding an element of competition by making the warm-up a race: The first three students (or pairs of students) to finish correctly get extra credit. See **Acting as Pilot in Command Teacher Notes 1** for the answers.
>
> Conclude the warm-up by reminding students that ensuring an aircraft is ready for flight is only one aspect of acting as pilot in command of an aircraft. In this lesson, students will learn about other aspects.
>
> [DOK-L1; *recall*]

EXPLORE

Teacher Material: Acting as Pilot in Command Presentation

Slide 5: Remind students that, in previous lessons, they learned how pilots ensure their aircraft is ready for flight. In this lesson, students will learn how pilots ensure they are themselves ready for flight.

In 14 CFR § 91.3, the FAA defines the pilot in command (PIC) of an aircraft as the person who is directly responsible for, and is the final authority regarding, the operation of that aircraft. The PIC is responsible for the aircraft, the passengers, and the cargo aboard that aircraft. In an emergency situation, the PIC has the authority to deviate from any rule or regulation to the extent necessary to deal with that emergency.

With this in mind, lead a discussion of the following question.

> **Questions**
>
> Why does the FAA give the PIC so much authority in an emergency?
> *Student answers will vary, but may include that the pilot in command may be the only person who has the information and skill to determine how best to resolve the emergency, it is ultimately the pilot's life on the line (along with any passengers) and so he/or she must make the decisions, or that regulations cannot take into account every possible scenario, so pilots must be allowed to use their judgment to handle whatever situations may arise.*

There is no correct answer to this question. It is intended to get students thinking about the role of the PIC.

Slide 6: Whether acting as pilot in command of an aircraft or as a required member of the flight crew, a pilot must have several documents available at all times:

- A valid pilot certificate

    ○ Remind students that this does not expire.

- A valid, government-issued photo ID

    ○ Examples include a driver's license, passport, or military ID.

- A current medical certificate appropriate for the level of pilot certificate or the type of operation being conducted.

    ○ For example, a private pilot must carry at least a current third-class medical certificate or be certified under Basic Med.

In addition, to meet the International Civil Aviation Organization's (ICAO) requirements, a valid FCC Radiotelephone Operator Permit must be carried on international flights.

Anyone from the Federal Aviation Administration (FAA), the National Transportation Safety Board, or any federal, state, or local law enforcement agency can ask to see the pilot's documents.

Slides 7-8: To act as a pilot in command, a pilot must meet specific currency requirements, which are described in the Federal Aviation Regulations (FARs).

The first currency requirement for all pilots who intend to act as PIC of an aircraft is the flight review:

    ○ A flight review consists of a minimum of 1 hour of flight training and 1 hour of ground training.

    ○ To act as PIC, a pilot must have successfully completed a flight review within the previous 24 calendar months. (See below for an example.)

    ○ The pilot must have received a logbook endorsement from a certificated flight instructor (CFI), indicating the pilot has completed the review satisfactorily.

Example: If a private pilot successfully completed a flight review on October 9, 2018, they are current to act as a PIC through October 31, 2020.

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② Questions

A private pilot intends to serve as PIC for a flight scheduled to depart on June 15, 2019. When must this pilot have last completed a flight review?
The pilot must have successfully completed a flight review on or after June 1, 2017. This would allow the pilot to serve as PIC through June 30, 2019 (i.e., 24 months later).

Slide 9: 14 CFR § 91.57 spells out currency requirements for pilots who want to carry passengers during the day, at night, and in a tailwheel aircraft.

- To carry passengers during the day, a pilot must have completed three takeoffs and three landings within the preceding 90 days.

- To carry passengers at night, a pilot must have completed three takeoffs and three landingsto a full stop during the period beginning one hour after sunset and ending one hour before sunrise, within the preceding 90 days.

- To carry passengers in a tailwheel aircraft, a pilot must have completed three takeoffs and three landings, to a full stop, in a tailwheel aircraft within the preceding 90 days.

To satisfy these currency requirements, all landings must be made in the same category, class (Example: Category: Airplane; Class: Single Engine Land) and type (if type rating is required) of aircraft in which the passengers are to be carried.

💡 **Teaching Tips**

Remind students that they learned about categories and classes of aircraft in lesson 1.B.1, during the first semester of this course. Those categories and classes are different as they are based on aircraft certification, whereas these are based on airman certification:

Common aircraft categories include the following:

- Airplane

- Rotorcraft

- Glider

- Lighter than Air

- Powered Lift

Aircraft classes are as follows (some classes have further refined limitations):

- Airplane - Single Engine Land; Airplane - Single Engine Sea

- Airplane - Multiengine Land; Airplane - Multiengine Sea

- Rotorcraft - Helicopter; Rotorcraft - Gyrocopter

- Glider is a category/class all in one.
    - However, there are limitations for the type of launching system used.
    - Examples are Aerotow, Winch, and Autotow.
    - A logbook endorsement is required for each.

- Lighter than Air - Free Balloon; Lighter than Air - Airship
    - Limitations include airborne heaters (i.e., hot air) and gas (helium)

- Powered Lift - Tiltrotor

Finally, emphasize that all these currency requirements are <u>minimums</u>. Pilots should fly regularly and complete frequent refresher training with a CFI to maintain sharp flying skills and keep up-to-date with changing information and requirements.

EXPLAIN

Teacher Materials: <u>Acting as Pilot in Command Presentation</u>, <u>Acting as Pilot in Command Teacher Notes 2</u>
Student Material: <u>Acting as Pilot in Command Student Activity 2</u>

Slide 10: According to 14 CFR § 91.103 (Preflight Action), pilots must "become familiar with *all available information* concerning the flight."

- For any flight, a pilot must know the runway lengths at all airports of intended use, as well as the takeoff and landing distances required. The pilot must also know the factors that affect airplane performance, including airport elevation and runway slope, aircraft gross weight, wind, and temperature.

- For a flight under instrument flight rules (IFR) or a flight not in the vicinity of an airport, a pilot must obtain all available weather reports and forecasts and learn of any traffic delays. A pilot must also know the aircraft's fuel requirements. Using this information, the pilot must plan alternative routes in the event that the original route cannot be completed.

Slide 11: This table lists some sources of important information for pilots. In general, Flight Service is the primary means of gathering all available weather and other pertinent information for a flight. Flight Service also provides information such as Notices to Airmen (NOTAMs) and Temporary Flight Restrictions (TFRs). Flight Service is available by phone (1-800-WX-BRIEF), on the aircraft radio (122.2 and many other local frequencies), or online (<u>https://www.1800wxbrief.com/Website/home?desktop=true#!/</u>)

Note that pilots must get their information from an official source. Even though TV weather and public websites may have good information, they are not official sources. Official sources have the capability to record pilot activity, thus proving that pilots have met the requirement of the regulations.

Slide 12: Resources available to the PIC may be found both inside and outside the cockpit.

- Internal resources are found in the cockpit during flight and include:

  - Equipment and systems in the aircraft.

  - Pilot's Operating Handbook (POH) or Airplane Flight Manual (AFM).

  - Checklists

  - Other members of the flight crew.

  - Passengers (Can read checklists or look for other aircraft)

- External resources are found outside the cockpit during flight.

  - Air-traffic control (ATC) is possibly the greatest resource. Air-traffic controllers can help decrease workload and provide assistance in an emergency.

  - Flight service can provide weather information and take flight plans.

  - Through ATC, pilots can also access maintenance personnel and even representatives of the aircraft manufacturer.

Slide 13: Complete the **Formative Assessment**.

EXTEND

Teacher Materials: [Acting as Pilot in Command Presentation](#), [Acting as Pilot in Command Teacher Notes 3](#)
Student Material: [Acting as Pilot in Command Student Activity 3](#)

Slide 14: Aeronautical decision-making (ADM) is a systematic way for pilots to decide their best course of action in any situation. It is the process by which pilots use their best judgment to ensure the best outcome for a flight. ADM will be taught in more detail in a future lesson, but is being introduced here as an essential element of acting as pilot in command.

Slide 15: Many accidents or incidents that appear to have a single cause actually have numerous contributing factors, which occurred in a sequence known as an "error chain" or "accident chain." Often, a pilot need only break one link in the "chain" to prevent a catastrophe such as a crash. Another way to think of this concept is by imagining a piece of swiss cheese. Now, imagine someone trying to pull a thread through the holes in the cheese, from one end to another. If one hole is plugged up, the thread cannot go through. Ultimately, it is the responsibility of the PIC to use checklists, standard operating procedures, situational awareness, training, and experience to "break the links in the error chain" or "plug the holes in the cheese."

To facilitate this, the FAA gives PICs the authority to deviate from any rule or regulation in order to deal with an emergency at hand, but only to the extent necessary.

EVALUATE

Teacher Materials: [Acting as Pilot in Command Presentation](#), [Acting as Pilot in Command Teacher Notes 3](#)
Student Material: [Acting as Pilot in Command Student Activity 3](#)

Slides 16-19: Review the Private Pilot Knowledge Test Questions related to this lesson.

Slide 20: Conduct the **Summative Assessment**.

UNIT .10 | Section C | Pilot Responsibilities

Aircraft Systems - GRADE 10

Summative Assessment Scoring Rubric

- Follows assignment instructions

- Responses show evidence of the following:

    ○ Understanding of the role and responsibilities of the pilot in command

    ○ Understanding of the requirement to become familiar with "all available information" before a flight, including obtaining a weather briefing, fuel planning, and performing weight and balance calculations

    ○ Understanding of the concept of an "error chain" and the role of the pilot in command in breaking that chain to prevent an accident

Points   Performance Levels

9-10   Student correctly answers all questions, providing detailed information about the responsibilities and obligations of the pilot in command in preparation for the flight.

7-8   Student answers most questions correctly, providing accurate information about the responsibilities and obligations of the pilot in command in preparation for the flight. Student may omit one or two elements of the preflight planning requirement.

5-6   Student answers at least half of the questions incorrectly or provides incomplete answers to the majority of questions, showing an incomplete understanding of the role and responsibilities of the Pilot in command.

0-4   Student answers the majority of questions incorrectly and does not demonstrate an understanding of the roles and responsibilities of the pilot in command.

STANDARDS ALIGNMENT

NGSS STANDARDS

- **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

- **RST.9-10.2** - Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

- **RST.9-10.4** - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.

- **WHST.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.

- **WHST.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.

- **WHST.9-10.9** - Draw evidence from informational texts to support analysis, reflection, and research.

REFERENCES

Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25B): Chapter 2, Aeronautical Decision-Making https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak/media/04_phak_ch2.pdf
Risk Management Handbook (FAA-H-8083-2): Chapter 5, Aeronautical Decision-Making https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/media/faa-h-8083-2.pdf
Federal Aviation Administration - Manuals and Publications https://www.faa.gov/air_traffic/publications/
FAA Aeronautical Information Publication https://www.faa.gov/air_traffic/publications/atpubs/aip_html/index.html
Federal Aviation Regulations https://www.ecfr.gov/cgi-bin/text-idx?&c=ecfr&tpl=/ecfrbrowse/Title14/14tab_02.tpl