Registration and Airworthiness Certificates

Session Time: One 50-minute session

DESIRED RESULTS

ESSENTIAL UNDERSTANDINGS

The intended purpose and use of an aircraft drives aircraft design considerations and construction techniques, materials, and components. (EU 1)

ESSENTIAL QUESTIONS

1. What documents have to be carried in a manned aircraft in flight?
2. What kind of aircraft must be registered with the FAA?

LEARNING GOALS

Students Will Know

- Manned and unmanned aircraft registration requirements
- The information contained on an airworthiness certificate

Students Will Be Able To

- *Compare* the registration requirements for manned and unmanned aircraft. (DOK-L3)
- *Analyze* manned and unmanned aircraft registration certificates and airworthiness certificates. (DOK-L4)
- *Summarize* the information contained in an airworthiness certificate. (DOK-L2)

ASSESSMENT EVIDENCE

Warm-up
Students will make predictions about registering an aircraft based on what they know about vehicle registration. The teacher should record their responses and correct any misconceptions.

Formative Assessment
Working with a partner, students will discuss the different requirements for manned and unmanned aircraft and why airworthiness certificates and registration are required. They will develop a logical argument to answer the questions provided.

Summative Assessment
Students will answer a series of analysis questions to demonstrate what they learned about registration and airworthiness certificates.

LESSON PREPARATION

MATERIALS/RESOURCES

- Registration and Airworthiness Certificates Presentation
- Registration and Airworthiness Certificates Student Activity 1
- Registration and Airworthiness Certificates Student Activity 2
- Registration and Airworthiness Certificates Student Activity 3
- Registration and Airworthiness Certificates Teacher Notes 1
- Registration and Airworthiness Certificates Teacher Notes 2
- Registration and Airworthiness Certificates Teacher Notes 3

Recommended Student Reading

- **Pilot's Handbook of Aeronautical Knowledge**
  Chapter Nine, Flight Manuals and Other Documents, pages 9-6 to 9-8
  https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak/media/11_phak_ch9.pdf

LESSON SUMMARY

Lesson 1: Airplane Flight Manual (AFM) and Pilot's Operating Handbook (POH)
Lesson 2: Registration and Airworthiness Certificates
Lesson 3: Inspections

The lesson begins with a warm-up discussion in which students consider what they may know about vehicle registration and discuss whether or not the same principles apply to aircraft.

Students then go on to review registration requirements for manned aircraft and learn about the content and role of an airworthiness certificate, including the categories of aircraft for which airworthiness certificates are issued and those which require special airworthiness certificates.

Students will then analyze different registration and airworthiness certificates to determine how they are similar and different.

Next, students will consider the registration requirements for small unmanned aircraft (sUAS) before comparing the rules for manned and unmanned aircraft.

Finally, students will review questions from the FAA's Private Pilot and Part 107 (drone) knowledge exams before completing a summative assessment in which they respond to questions relating to all parts of the lesson.

BACKGROUND

A pilot/operator or owner must renew an aircraft's certificate of registration every three years (in accordance with federal laws) and confirm that it is onboard before flight. Operating any aircraft with an invalid or missing certificate may result in airworthiness violations under the Part 91, which may also nullify or cause issues with the aircraft's insurance policies. Whenever any information on either the registration or airworthiness certificate changes, the operator/owner must obtain a revised certificate as soon as possible to avoid any possible violations.

A Standard Airworthiness Certificate remains in effect as long as the aircraft receives required maintenance and is properly registered in the United States.

Small Unmanned Aircraft Systems (sUAS) must be registered with the FAA before they can be operated in the national airspace system. All UAS weighing between 0.55 and 55 pounds are considered small UAS (sUAS) and must be registered with the FAA and marked with a registration number, whether they are for recreational or commercial use. The UAS must be registered to someone who is at least 13 years old. When drones are used exclusively for recreational purposes, the owner/operator must register once and may apply the registration number to as many UAS as desired.

When UAS are used for commercial use, each drone must be registered separately and have a unique registration number. Drones that will be operated exclusively within the United States can be registered online.

MISCONCEPTIONS

Students might assume that, because states issue vehicle registrations, they are responsible for aircraft registrations as well. Although some states do require aircraft to be registered with the state, the registration covered in this lesson is issued by the federal government.

DIFFERENTIATION

To support student engagement and comprehension in the **EXPLORE** section, create learning centers for students to rotate to in small groups to explore the lesson concepts, such as the registration guidelines, airworthiness certificates, the certificate comparison activity, and sUAS registration.

To support student motivation in the **EXTEND** and **EVALUATION** sections, allow students to compete to answer the questions in preparation for the formative and summative assessments. Put students into small groups and create a Jeopardy-style game for students to pick categories and questions.

LEARNING PLAN

ENGAGE

Teacher Material: Registration and Airworthiness Certificate Presentation

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

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

Warm-Up

Students may be familiar with registration for cars and trucks and other types of vehicles. Ask students to share what they know about vehicle registration. Include the following questions in the discussion:

- What types of vehicles need to be registered?
  Cars, trucks, motorcycles and other vehicles that travel on public roads need to be registered. Boats also need to be registered in most states.
- What government agencies handle vehicle registration?
  In most cases, states are responsible for vehicle registration through a motor vehicle department.
- Why is registration important?
  Can help track vehicles that may be stolen or involved in accidents. Can help ensure the vehicle complies with safety requirements like inspections. Can help the state keep track of what kinds of vehicles are driving on its roads--large, small, old, new, passenger, commercial, etc.

Write down student responses so they can compare their ideas about car registration with what they learn about aircraft registration in this lesson. Then ask students if the same considerations that apply to other types of vehicles apply to aircraft. Student responses will vary, and any misconceptions can be addressed during the remainder of the lesson.

[DOK-L1; *Recall,* DOK-L2; *Infer*]

EXPLORE

Teacher Material: Registration and Airworthiness Certificate Presentation
Student Materials: 1 registration certificate from a manned aircraft, 1 registration certificate from an sUAS, 1 airworthiness certificate

Slide 5: Unlike car registrations, which are typically managed at the state level, aircraft registration takes place at the federal level through the Federal Aviation Administration (FAA). An aircraft owner must renew their aircraft's registration every three years. However, operating any aircraft with an invalid or missing certificate may result in airworthiness violations under Part 91 of the Federal Aviation Regulations, which may also nullify or cause issues with the aircraft's insurance policies. Whenever any information on either the registration or airworthiness certificate changes, the owner must obtain a revised certificate as soon as possible to avoid a violation. The registration certificate must be kept in the aircraft and the pilot should confirm that is onboard before flight.

As always, whenever any changes affecting an aircraft's certification occurs, the owner must notify the FAA Aircraft Registration Branch and submit the applicable forms.

Slide 6: Now that students have a sense of what aircraft registration is, ask them two questions:

What types of information would the FAA want to collect as part of the drone registration process? (Answers will be provided on the next slide.) Why?

Student answers will vary and may include:

- *Identifying information about the owner or operator, such as name and address, so they can be identified and contacted in case the aircraft is involved in unsafe or illegal activity.*
- *Identifying information about the aircraft itself, such as make and model or serial number, so they can be sure that the registration can't easily be switched among aircraft.*
- *An issue date so they can be sure the certificate is valid.*

Slide 7: The FAA collects very specific information about the aircraft and its owner/operator as part of the registration process. The registration certificate must include:

- the tail number
- aircraft serial number
- manufacturer
- aircraft designation (category)
- the airport at which the aircraft is based
- the name and address of the person to whom the registration certificate is issued
- the date of issue (valid for 3 years)
- signature block

If any of this information changes, it is important for the owner/operator to contact the FAA and update their registration as soon as possible.

Slide 8: Just as car dealers have special "dealer registration" certificates that allow the car to be driven before it is sold, aircraft dealers also have special registration certificates. Dealer registrations are more restrictive because they are only valid for flight tests required by the manufacturer and for flights necessary for sale (i.e., flying the aircraft to a different state where the buyer is located). Immediately after the sale, the dealer is responsible for removing their registration certificate. After the sale, the new owner must fill out a new registration application. The aircraft may be flown with the pink copy of the aircraft registration application aboard for up to 90 days while the new registration is processed.

The registration certificate is not proof of ownership. This is a separate process overseen by a local FAA Flight Standards District Office (FSDO).

EXPLAIN

Teacher Materials: Registration and Airworthiness Certificate Presentation, Registration and Airworthiness Certificates Teacher Notes 1
Student Material: Registration and Airworthiness Certificates Student Activity 1

Slide 9: An Airworthiness Certificate:

- is issued by a representative of the FAA
- is issued after the aircraft has been inspected, been found to meet regulatory type requirements, and is determined to be in condition for safe operation at the time of the inspection
- must be displayed (so that it is legible to passengers and crew) in the aircraft whenever it is in operation
- must remain with the aircraft when ownership changes, unless the aircraft is sold to a foreign customer)

An airworthiness certificate states that, when the certificate was issued, the aircraft conformed to the certification issued for that design. In other words, the aircraft was built as designed or as allowed by an approved modification.

A Standard Airworthiness Certificate remains in effect as long as the aircraft receives required maintenance and is properly registered in the United States.

Slide 10: Standard Airworthiness Certificates are issued for aircraft types certificated in the following categories:

- Normal
- Utility
- Acrobatic
- Commuter
- Transport
- Manned free balloons

Slide 11: The slide shows a Standard Airworthiness Certificate. Explain each of the following fields.

1. **Nationality and Registration Marks** (commonly referred to as tail number): The "N" indicates the aircraft is registered in the United States. Registration marks consist of a series of up to five numbers or numbers and letters. In this case, N2631A is the registration number assigned to this aircraft.
2. **Manufacturer and Model**: Indicates the manufacturer, make, and model of the aircraft.
3. **Aircraft Serial Number**: Indicates the manufacturer's serial number assigned to the aircraft, as noted on the aircraft data plate.
4. **Category**: Indicates the category in which the aircraft must be operated. Such categories are normal, utility, acrobatic, commuter, transport, and manned free balloons. In this case, it must be operated in accordance with the limitations specified for the "transport" category.
5. **Authority and Basis for Issuance**: Indicates the aircraft conforms to its type certificate and is considered in condition for safe operation at the time of inspection and issuance of the certificate. Any exemptions from the

applicable airworthiness standards are briefly noted here and the exemption number given. The word “NONE” is entered if no exemptions exist.

6. **Terms and Condition**s: Indicates the Airworthiness Certificate is in effect indefinitely if the aircraft is maintained and operated in accordance with FAA regulations and the aircraft is registered in the United States.

At the bottom, there is the date the certificate was issued along with the signature and office identification of the FAA representative.

Slide 12: When an aircraft falls outside of the standard classifications (not the categories previously mentioned), a Special Airworthiness Certificate is issued. These special classifications include:

- Experimental
- Restricted
- Limited
- Provisional
- Light-Sport Aircraft (LSA)

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

Formative Assessment

Use the **Registration and Airworthiness Certifications Student Activity 1**. In this activity, students will examine three documents: a registration certificate from a manned aircraft, a registration certificate from an sUAS, and an airworthiness certificate. Students should analyze the similarities and differences among the documents and use a Venn diagram to record their observations.

Possible responses are provided in **Registration and Airworthiness Certificates Teacher Notes 1**.

[DOK-L4; *Analyze*]

EXTEND

Teacher Materials: Registration and Airworthiness Certificate Presentation, Registration and Airworthiness Certificates Teacher Notes 2
Student Material: Registration and Airworthiness Certificates Student Activity 2

Slide 14: Small Unmanned Aircraft Systems (sUAS) must be registered with the FAA before they can be operated in the National Airspace System. If time permits, show this video to explain sUAS registration and marking requirements.

- “How to register your drone 2019” (Length 6:04)
  https://video.link/w/7Cxk

Teaching Tips

If time is short, you may choose to skip this video. The most important points will be explained in the following slides.

Keep in mind that sUAS regulations are changing frequently. The information in this video is accurate as of March 2019.

Slide 15: Any sUAS weighing between 0.55 and 55 pounds must be registered with the FAA and marked with a registration number, whether it is for recreational or commercial use.

The sUAS must be registered to someone who is at least 13 years old. When drones are used exclusively for recreational purposes, the owner/operator must register once and may apply the registration number to as many aircraft as desired. However, when used for commercial use, each drone must be registered separately and have a unique registration number. Drones that will be operated exclusively within the United States can be registered online.

A Foreign Aircraft Permit is required if an sUAS is registered in a foreign country, or if it is owned, controlled, or operated by someone who is not a U.S. citizen or permanent resident.

Teaching Tips

Unmanned aircraft weighing more than 55 pounds must also be registered, but must meet different criteria than those for sUAS. This type of UAS is typically for special commercial or military use and therefore outside the scope of this lesson.

Slide 16: sUAS aircraft must be marked to show that they are registered with the FAA. The registration number must be attached to the outside of the aircraft so that it is legible, visible, accessible, and durable. Markings can be made via engraving, permanent marker, or a self-adhesive label.

The FAA does not require airworthiness certifications for sUAS, but the remote pilot is required to maintain and inspect the sUAS prior to each flight to ensure that it is safe to operate.

Slide 17: In this activity, students will discuss the different requirements for manned and unmanned aircraft and why airworthiness certificates and registration are required. Distribute a copy of **Registration and Airworthiness Certificates Student Activity 2** to each pair. Give students a few minutes to discuss, and then they should work together to write an argument (in the form of a paragraph) in response to each question.

Possible responses are provided in **Registration and Airworthiness Certificates Teacher Notes 2**.

Teaching Tips

If time is short, this activity could be assigned as homework for students to perform individually and turn in for a grade.

EVALUATE

Teacher Materials: Registration and Airworthiness Certificate Presentation, Registration and Airworthiness Certificates Teacher Notes 3
Student Material: Registration and Airworthiness Certificates Student Activity 3

Slide 18-31: Quiz students on these questions from the Private Pilot and Remote Pilot Knowledge Tests.

Slide 32: Conduct the **Summative Assessment**.

Summative Assessment

In this activity, students will put together everything they learned in this lesson and answer a series of analysis questions to demonstrate what they learned about registration and airworthiness certificates. Distribute a copy of **Registration and Airworthiness Certificates Student Activity 3** to each student.

Correct answers are provided in **Registration and Airworthiness Certificates Teacher Notes 3**.

[DOK-L2; *Summarize,* DOK-L3; *Compare*]

Summative Assessment Scoring Rubric

- Answers show evidence of each of the following:
  - Knowledge of the registration requirements for manned and unmanned aircraft
  - Comparison of registration requirements for manned and unmanned aircraft
  - Ability to summarize the registration process and information contained in an airworthiness certificate
- Contributions show in-depth thinking including synthesis of lesson objectives

Points	Performance Levels
10	Responses show an in-depth understanding of the registration and airworthiness certificates' requirements and information. Each answer provided is accurate.
8-9	Responses show a sufficient understanding of the registration and airworthiness certificates' requirements and information. Most answers are accurate, but 1-2 answers are inaccurate or incomplete.
6-7	Responses show a lack of understanding of the registration and airworthiness certificates' requirements and information with several inaccurate answers.
0-5	Responses show little understanding of understanding of the registration and airworthiness certificates' requirements and information with most answers being inaccurate or incomplete.

STANDARDS ALIGNMENT

COMMON CORE STATE STANDARDS

- **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.9-10.1 -** Write arguments focused on discipline-specific content.
- **WHST.9-10.4** - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- **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: 9-6 through 9-8:
https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak/media/11_phak_ch9.pdf
https://www.faa.gov/uas/
https://pilot-protection-services.aopa.org/news/2016/december/01/aircraft-registration-dos-and-do-nots
https://www.aopa.org/news-and-media/all-news/2017/december/13/drone-registration-requirement-returns
https://www.aopa.org/go-fly/aircraft-and-ownership/maintenance-and-inspections/aircraft-airworthiness/guide-to-aircraft-airworthiness
https://www.youtube.com/watch?v=CZ3XaMLgCOY