Part 107: Operating Rules and Waivers

Session Time: Three, 50-minute sessions

DESIRED RESULTS

ESSENTIAL UNDERSTANDINGS

UAS are regulated by the FAA to ensure safe operations within the National Airspace System, and remote pilots must be familiar with these regulations.

ESSENTIAL QUESTIONS

1. How does 14 CFR Part 107 regulate sUAS operations, and what is the process for obtaining a waiver to deviate from these rules?

LEARNING GOALS

Students Will Know

- The process for registering an sUAS with the FAA.
- How to conduct sUAS operations in accordance with 14 CFR Part 107.
- How a remote pilot can obtain an authorization or waiver for an sUAS.

Students Will Be Able To

- *Summarize* the process in which a remote pilot can register an sUAS under 14 CFR Part 107. [DOK-L2]
- *Distinguish* between sUAS operations that adhere to Part 107 regulations and those that do not. [DOK-L2]
- *Develop a logical argument* about how to proceed when faced with operational scenarios. [DOK-L3]

ASSESSMENT EVIDENCE

Warm-up
Students will be exposed to a drone flight in unsafe conditions and contemplate the conditions for later assessment as they learn the regulatory aspects of Part 107.

Formative Assessment
Students will implement the regulations covered in the lesson to respond to scenarios that mimic real-life circumstances.

Summative Assessment
Students will be asked to demonstrate a working knowledge of the regulations of Part 107 and the regulatory processes available to circumnavigate them.

LESSON PREPARATION

MATERIALS/RESOURCES

- Part 107: Operating Rules and Waivers Presentation
- Part 107: Operating Rules and Waivers Student Activity 1
- Part 107: Operating Rules and Waivers Student Activity 2
- Part 107: Operating Rules and Waivers Teacher Notes 1
- Part 107: Operating Rules and Waivers Teacher Notes 2

LESSON SUMMARY

Lesson 1: Part 107: An Introduction
Lesson 2: Part 107: Operating Rules and Waivers
Lesson 3: Beyond 107: Best Practices and Being a Good Neighbor

The lesson will begin by introducing students to regulations concerning Part 107 operations, including operational limitations, drug and alcohol regulations, accident reporting, and the areas an sUAS can safely operate.

During the next part of the lesson, students will be introduced to the concept of waivers and authorizations, including how these items are handled, what they apply to, and what the scope of a waiver or authorization is.

Finally, students will be given operation theory and a demonstration on automated airspace authorizations. Students will complete a final assessment covering Part 107 rules, waivers, and authorizations.

BACKGROUND

Small unmanned aerial systems (sUAS) are innovative tools that, while useful, can present a hazard to manned aircraft, people, and property if not operated safely and sensibly. In their current form, drones are a relatively new technology, and nearly anyone can purchase them. Additionally, the National Airspace System (NAS) was created to accommodate manned flights, so it was unequipped to accommodate the low-altitude, omnidirectional flight plans most drone operators use. In response, the FAA has begun to incorporate sUAS operations into the NAS by implementing sensible rules and restrictions under 14 Code of Federal Regulations Part 107. In short, Part 107 covers commercial operations of sUAS and enables the NAS to operate smoothly and safely while reasonably accommodating drone operators' expanding needs and capabilities.

MISCONCEPTIONS

Students may have a misperception that drones—particularly sUAS—fall outside most regulations, and that drone operators are free to fly them in locations and in conditions of their choosing. In fact, under Part 107, details of sUAS flights, including airspace restrictions, altitude restrictions, and right of way rules, are regulated in a similar way to manned flights because all aircraft must share the NAS.

Students might also think that because remote pilots, unlike pilots of manned aircraft, are not required to get a medical certificate, the FAA does not have medical requirements or restrictions for drone pilots. However, Part 107 requires that all crewmembers be able to carry out their responsibilities without being impaired. Medical conditions that could affect one's ability to safely operate a sUAS are disqualifying, and remote pilots must also be cognizant of the effects of over-the-counter medications that could impair their abilities.

DIFFERENTIATION

To support student comprehension, provide students with a graphic organizer or encourage them to create a table to organize notes around the Part 107 operations. This will allow students to organize their ideas and make connections to operational procedures.

LEARNING PLAN

ENGAGE

Teacher Material: Part 107: Operating Rules and Waivers Presentation

Session 1

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

Slides 4-5: Conduct the **Warm-Up**.

Warm-Up

Ask students to recall some of the airspace requirements (cloud clearances, communications, etc.) that they learned about first semester for manned flight.

- What were the reasons for these restrictions?

Answers may vary, but reasons should center around the fact that VFR flight requires seeing and avoiding and that cloud clearances are necessary not only so the pilot can see other aircraft and ground references, but also so that other aircraft have time to see the pilot's aircraft.

Have students watch the following video and discuss the questions that follow:

- "FPV drone above the Clouds" (Length 3:05)
  https://video.link/w/uNnx

For teachers unable to access Safe YouTube links, the video is also available here: https://youtu.be/YWNUOBPmhSs

- Are there portions of the video that students would call unsafe? Why or why not?
- Could these safety issues have been prevented?

It is not necessary for students to arrive at a definite conclusion regarding what is and is not safe, but they should continue to think about the video throughout the lesson. The violations shown in the video include flying too close to the clouds (more than 400 feet above ground level) and breaking visual line of sight. Students will likely not be familiar with specific regulations at this point in the lesson, but might still be able to discern the safety risks involved.

EXPLORE

Teacher Material: Part 107: Operating Rules and Waivers Presentation

Slide 6: Later in the semester, students will get hands-on experience flying an sUAS. To help them prepare for this experience, discuss the following question as a class.

Questions

What kind of locations (nearby or in the school) might be good places to fly the drone?

In all cases, open space is the safest for the drone and property. Indoors, or other more challenging locations, are acceptable for enhancing operating skill and finesse, while there is an inherently greater risk to the drone and property.

Write students' ideas on the board and allow them to discuss the following questions which explore why these locations might (or might not) be ideal.

Questions

- Within the locations you identified, what safety concerns would you have to address?

Examples of safety concerns would be large amounts of foot traffic, vehicles, airports, and power lines.

- What might be some risks?

In addition to the safety concerns students have identified, risks could include damage to the UAV from trees, power lines, and buildings. Students may also note that tall or wide outdoor obstructions could block the line of sight.

- What rules could be established to mitigate or eliminate these risks?

Examples are maintaining a set radius of flight, setting the flight software to limit range and altitude, blocking the area off from passersby, and moving the takeoff and landing zones.

Discuss students' ideas and revisit them throughout the lesson in light of Part 107 regulations.

EXPLAIN

Teacher Materials: Part 107: Operating Rules and Waivers Presentation, Part 107: Operating Rules and Waivers Teacher Notes 1
Student Material: Part 107: Operating Rules and Waivers Student Activity 1

Slide 7: Now that students have an initial familiarity with Part 107 and the certification process, they will examine the operating rules that pertain to sUAS pilots. Pilots must register their sUAS with the Federal Aviation Administration (FAA) before flying them in the National Airspace System (NAS). Part 47 ("Aircraft Registration") and Part 48 ("Registration and Marking Requirements for Small Unmanned Aircraft") list the requirements for registering sUAS. Drones over 0.55 lbs are covered under Part 47; drones under 0.55 lbs are covered under Part 48.

An explanation of how to register a drone can be found in the following video:

- How to Register Your Drone with the FAA (Length 5:37)
  https://video.link/w/0hox

For teachers unable to access Safe YouTube links, the video is also available here: https://youtu.be/yzKdVuwtsK0

Slide 8: Part 48, quoted here, says that sUAS will be operated only within the territorial limits of the United States: "If a sUAS is registered in a foreign country or owned, controlled, or operated by someone who is not a U.S. citizen or permanent resident, a Foreign Aircraft Permit must be obtained."

Before flying an sUAS outside, it should be marked externally with its unique registration number. This number should be both legible and visible without opening any compartments or interacting with the drone.

Slide 9: Manned aircraft require airworthiness certificates and registration to be flown legally in the United States. sUAS do not require an airworthiness certification, which is a document that the FAA issues stating an aircraft can be safely operated. However, UAS and sUAS do require registration.

In lieu of an airworthiness certificate, the remote pilot-in-command (PIC), who is the person responsible for the flight, must maintain and inspect the entire aircraft system, including the ground control station, to make sure that the operation can be conducted safely. Some other things to account for are weather conditions and the conditions for which the aircraft manufacturer has approved the aircraft.

More suggestions can be found under 14 CFR 107.49 "Preflight familiarization, inspection, and actions for aircraft operation."

Slide 10: A preflight inspection is a physical check that must take place before any flight.

On the ground control station (GCS), the wireless and wired control links between the ground control station and the UAV must be checked. They should have a strong signal to each other, wires should be firmly connected, and the GPS signal should be locked on to the aircraft and/or GCS, if the aircraft supports it. Any GCS cabling and screens should be secure, and control sticks should be calibrated.

Close attention must be given to the condition of the UAV airframe. Navigation, landing, and accessory lighting should be charged and connected. The propellers should be examined to ensure that they do not have nicks and that they are serviceable (in good condition). The remote pilot should also confirm that there will be sufficient power for the sUAS to operate for the required flight time. The onboard compass should also be calibrated along with any inflight telemetry instruments in accordance with the manufacturer.

If anything is attached to the aircraft, the PIC must make take into account how they may affect the flight characteristics of the sUAS. Preflight inspections will be looked at in more detail later this semester, and students will learn how to perform one on the class's drone(s).

Slide 11: To ensure understanding of the preflight check concept for a PIC as it relates to drones, ask students the following questions.

Questions

What must a PIC do prior to a flight to meet the requirements of Part 107?

Answer should be similar to "complete a preflight inspection of the (s)UAS." Ensure students understand that the preflight includes a complete aircraft and ground control station inspection. The term sUAS*, which students learned consists of the entire aircraft system, including the ground station, aircraft, and any accessories, is key here.*

What are some things a PIC should check on the UAV?

Answers will vary but can include: propellers, battery levels, airframe, landing gear, lighting, and that all attached items are secure.

What should a PIC check as part of the GCS?

Answers will vary but can include: cabling is secure, screens are secure, a sun-blocking hood is used if needed, control sticks are calibrated, batteries are sufficiently charged.

Slide 12: sUAS are prohibited from carrying hazardous materials, or HAZMAT, which is defined as: "A substance or material that the Secretary of Transportation has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce." Under Part 107, lithium batteries—which are by far the most common power source for drones—are not considered a hazardous material. The exception for lithium batteries only applies when the battery is installed in the sUAS for power. Uninstalled batteries are considered a hazardous material and cannot be carried.

Slide 13: Before flying, the PIC is responsible for briefing all participants in the operation on their roles and the scope of the flight. This briefing includes emergency procedures, communication methods, special flight considerations, and the physical locations of the participants.

Slide 14: Finally, the PIC needs to perform a visual sweep of the operating environment, taking into account weather conditions, airspace or flight restrictions, and the location of people, property, and other potential hazards. In addition to assessing the mission environment, remote PICs need to ensure that they have the required documentation, including a Part 107 pilot certificate, aircraft registration, waivers, authorizations, or exemptions, and any other documentation related to the operation. The PIC is responsible for ensuring that all documentation is available onsite to comply with regulations if an FAA onsite inspection occurs.

Session 2

Slide 15: Part 107.29 "Daylight Operation" prohibits night flying of an sUAS. The FAA defines night as the time between the end of evening civil twilight and the beginning of morning civil twilight. In the United States, evening civil twilight occurs 30 minutes after the local sunset, and morning civil twilight occurs 30 minutes prior to sunrise.

Teaching Tips

- Students may mention that night flying is allowed under a waiver. This will be covered later in the lesson.
- The times for morning and evening civil twilight can be found in the Federal Air Almanac.
- In Alaska, the definition of civil twilight differs and is described in The Air Almanac. The Air Almanac provides tables which are used to determine sunrise and sunset at various latitudes. These tables can also be downloaded from the Naval Observatory and customized for your location. The link for the Naval Observatory is http://aa.usno.navy.mil/publications/docs/aira.php.

Slide 16: To fly an sUAS during the civil twilight 30-minute window, the sUAS must be equipped with anti-collision lights that are visible for at least 3 statute miles (a *statute mile* is the "regular land mile" that one would use when driving a car or running a mile). However, the intensity of the anti-collision lights can be reduced for safety reasons or if the lights are negatively impacting the remote pilot's night vision.

Slide 17: 14 CFR Parts 107.31 and 107.33 state that "operators are required to keep the sUAS within visual line of sight (VLOS) of at least one of the flight crewmembers who has direct communication with the others" and that "crewmembers must be able to see the UAV at all times with vision unaided by anything other than corrective lenses." Corrective lenses refers to eyeglasses or contact lenses.

"Vision-enhancing devices, such as binoculars, can be used to aid in situational awareness and the conditions of the environment (e.g. viewing the sUAS through branches or narrow openings or simply being able to see the orientation more accurately in the air)." However, vision aiding devices "cannot be the only method of keeping VLOS during any part of the flight."

Slide 18: The requirement of remaining in VLOS does not mean the pilot cannot look away from the aircraft. For example, pilots may need to look away from the aircraft briefly to check the control station or scan the airspace.

Questions

Why might a PIC or crew member need to look away from the aircraft?

Possible answers: To scan the airspace, check the GCS or screen, or verify that the flight area remains clear of bystanders.

This is acceptable, but the crew members must be able to quickly regain sight of the aircraft after looking away. If VLOS is lost, crew members should regain it as soon as practicable because the PIC has see-and-avoid responsibility, regardless of the size of the UAV.

Slide 19: An sUAS never has the right-of-way over another aircraft. If an sUAS encounters a manned aircraft or another unmanned aircraft, the remote pilot must ensure that the drone remains clear of the aircraft. This responsibility is known as "see and avoid." This responsibility cannot be met using first-person camera view; the UAV must be viewable from the ground (by the PIC, the manipulator of the controls, or a visual observer). To ensure that this responsibility is met, sUAS pilots must always maintain situational awareness. This means always knowing where a UAV is (and will be) flying and monitoring the environment for other aircraft throughout a flight. If another aircraft is spotted, whether in the air or on the ground, right of way should be immediately yielded to the other aircraft.

Slide 20: "Remote pilots must avoid operating small unmanned aircraft in a way that would interfere with operations or traffic patterns at any airport, heliport or seaplane base."

This can include flying near runways, near the path of aircraft approaching to land, or near aircraft taking off.

"sUAS pilots shouldn't fly their UAVs over people unless they are involved in the operation, under a safe protective cover or in a stationary vehicle." The FAA does not care about "dwell time" (that is, the amount of time a pilot is actually passing over a person). Any crossing over an imaginary vertical line extending from all parts of the body (e.g., hands and feet) is considered a violation.

Awareness is key; it is important to know where crew and nonparticipants are. The best areas to fly a drone are those that are sparsely populated.

Slide 21: "sUAS operations from a moving vehicle (whether on land or on water) are permitted, provided the aircraft is not transporting another person's property for compensation or hire. The vehicle should be in a sparsely populated area. It is unlawful to operate a sUAS from an aircraft."

Operations from a vehicle are subject to all of the same requirements (for example, maintaining VLOS) as other operations. "Sparsely populated" means a population density of less than 10 people per square mile. Ideally, a vehicle such as a convertible will allow for more reliable VLOS during operation, and a country road without people nearby is the ideal operation area. A person cannot safely operate a vehicle and aircraft at the same time, so another person would be required to safely conduct any operation under Part 107.25. Additionally, since the PIC must be able to take control of the UAV at any time, the PIC may not be the vehicle operator on such a mission.

Slide 22: A remote pilot must follow limits on speed and altitude.

"No sUAS can be flown faster than a ground speed of 100 miles per hour, and UAVs must remain below 400 ft AGL unless they are flown within a 400 ft limit of a structure and not higher than 400 ft above the structure. Crewmember visibility must be no less than 3 statute miles, the UAV must be no less than 500 feet below a cloud and 2,000 feet horizontally from the cloud."

These are regulatory limits, but pilots should strive to fly in an even more conservative manner to promote safety culture—not just for drone operators and their equipment, but also for manned aircraft operations. There have been recorded occasions where an automated sUAS flight system fails, causing a drone to maintain heading and speed without the pilot having control of the flight. Potential failures should be anticipated, and flights should follow parameters that would be safe even when unforeseen issues occur.

Teaching Tips

Remind students that the video shown during the Warm-Up showed a clear violation of the cloud and altitude rules. It is not necessary to show this video again unless time permits and students would like a refresher.

- "FPV Drone above the Clouds" (Length 3:05)
  https://video.link/w/uNnx

For teachers unable to access Safe YouTube links, the video is also available here: https://youtu.be/YWNUOBPmhSs

Slide 23: Part 107 states that an sUAS cannot be operated in a reckless manner that could endanger a person or property. Blocking an active walking path with a hovering multicopter, overloading an sUAS beyond safe limits, operating at high rates of speed near a group of people (even if not above them), and interfering with manned aircraft are a few examples. While operating an sUAS, a PIC must not only keep regulations in mind (both FAA regulations and those created at a state or local level), but also think further to exercise good judgement.

Slide 24: Should an sUAS accident occur, the remote PIC must notify the FAA within 10 days if one of the following occurs:

- Serious injury to any person or any loss of consciousness
- Damage to any property, other than the sUAS, if the cost is greater than $500 to repair or replace the property

Teaching Tips

A serious injury is one that qualifies as Level 3 or higher on the Abbreviated Injury Scale (AIS) of the Association for the Advancement of Automotive Medicine. These injuries might include (but are not limited to) head trauma, broken bone(s), and laceration(s) to the skin that require suturing.

"If an accident report is required, it must be made within 10 calendar days of the incident and submitted to the appropriate FAA Regional Operations Center (ROC) or Flight Standards District Office (FSDO) electronically (www.faa.gov/uas) or by telephone."

In any type of reporting (accident reporting, logbook entries, records, and so on), the FAA relies on information remote pilots have provided when making determinations or granting authorization. Therefore, "If fraudulent information is ever provided, the FAA could pursue civil sanctions and the suspension or revocation of a certificate or waiver."

Slide 25: Use the example accident scenarios to query the class on which incidents require accident reports.

Questions

A $6,000 multicopter strikes a mailbox, knocking the flag off. The drone then loses control, crashing headlong into the pavement.
No need to report. A traditional mailbox is far less than $500 to replace. Drone value is not a factor in reporting.

A $50 multicopter crashes through a neighbor's window and gracefully lands on the coffee table.
Reportable. Replacement or repair of the window is likely to cost more than $500. If in doubt, report it.

A $500 multicopter strikes two pigeons mid-flight, killing two birds with one drone.
No need to report. Drone value is not a factor in reporting, and no humans or property were harmed.

Slide 26: The next rules that will be covered prohibit the operation of an sUAS if anyone in the crew (PIC, person manipulating the controls, or VO) is unable to safely carry out their responsibilities.

14 CFR Part 107.27 states that "a person cannot serve as remote PIC, manipulator of sUAS controls, VO, or any other crew member . . . if they have consumed an alcoholic beverage in the preceding 8 hours, are under the influence of alcohol, have a blood alcohol concentration of 0.04% or greater, or are using a drug that affects their physical or mental capabilities."

The PIC must determine if a medical condition could pose a risk to an operation, though no medical certificate is needed. 14 CFR Part 107.17 addresses medical conditions:

"No person may manipulate the flight controls of a small unmanned aircraft system or act as a remote pilot in command, visual observer, or direct participant in the operation of the small unmanned aircraft if a physical or mental condition exists that would interfere with the safe operation of the small unmanned aircraft system."

Additionally, 14 CFR 91.19 states that one may not operate an sUAS "with knowledge that narcotic drugs, marihuana, and depressant or stimulant drugs or substances as defined in Federal or State statutes are carried in or on the aircraft."

Overall, it is the PIC's responsibility to ensure that no crewmembers are impaired, whether by alcohol, drugs, over-the-counter (OTC) medications, lack of sleep, or any other factor that could affect one's ability to safely operate a UAV or participate in the mission.

Slide 27: If anyone in a crew refuses an alcohol test requested by a law enforcement officer, this refusal is grounds for the denial of an application for a remote pilot certificate for a period of up to 1 year after the date of refusal, or suspension or revocation of the remote pilot certificate.

Slide 28: Complete the **Formative Assessment**.

Formative Assessment

In this assessment, students will make joint decisions together as flight crews/groups, responding to different factors surrounding realistic situations.

Within each group, you can assign the roles of PIC and control manipulator if desired, filling out remaining roles with visual observers.

Students can then share these decisions with the rest of the class, allowing for discussion if answers diverge. Provide students with **Part 107 Operating Rules and Waivers Student Activity 1.**

Sample answers are provided in **Part 107 Operating Rules and Waivers Teacher Notes 1.** After students complete the activity, moderate a class discussion of students' answers.

[DOK-L3; *assess*]

EXTEND

Teacher Material: Part 107: Operating Rules and Waivers Presentation

Session 3

Slide 29: This lesson has highlighted various standards and sUAS rules under Part 107 regulations. Sometimes, a pilot may need to deviate from these rules. Examples might include taking real estate photographs where the airspace is controlled Class D or flying above the crowd at a concert venue. In situations like these, pilots can apply for a waiver or certificate of authorization (COA) that will allow them to deviate from specific rules, such as airspace restrictions or flying above people.

Slide 30: How do a waiver and a COA differ? As defined by the FAA, a waiver is "an official document issued by the FAA which authorizes certain operations of aircraft outside the limitations of the regulation, but under conditions ensuring an equivalent level of safety." A certificate of authorization, by contrast, is "an authorization issued by the Air Traffic Organization to a public operator for a specific UA activity."

Slide 31: Although a waiver will allow a PIC to operate outside a specific rule (for example, flying over 400 feet), it will never give a pilot permission to act in a way that is reckless or that could pose a danger to people or property. When a pilot applies for a waiver, the pilot must propose a safe procedure for the operation to show the FAA that it can be safely conducted under the certificate's terms.

Slide 32: Examples of Part 107 regulations that could be waived include those pertaining to nighttime operation, visual line of sight, operation of multiple small unmanned systems, operation over people, operation in certain airspace, altitude restrictions, and others. If an operator needs a Part 107 rule waived, the operator must submit a written request to the FAA explaining how they can safely operate in spite of the waived rule(s). This might take the form of an operations manual specifically written around supplemental safety procedures that will be used.

Slide 33: The FAA will then either deny the application (giving a reason for the denial) or grant it. If a waiver is approved, the responsible person will be made aware of the conditions under which it can be used, including any additional safety considerations not mentioned in the application. Although not a requirement within Part 107, the FAA encourages applicants to apply for a waiver at least 90 days prior to when they would like to operate under the waiver.

Slide 34: An authorization allows flight in specific airspace classes, such as B, C, D, and surface areas of E. Certificates of Authorization, also known as COAs, do not allow a remote pilot to deviate from Part 107 rules unless a COA specifically states that an approved waiver a pilot holds can be used in conjunction with the COA. Without a COA, sUAS pilots are restricted to Class G (uncontrolled) airspace.

Slide 35: Low Altitude Authorization and Notification Capability (LAANC, pronounced "lance") has changed how authorizations are handled by leveraging data from live sources and using automation to grant Part 107 operators flight approvals in near real-time. Prior to LAANC, applications for authorizations were being reviewed manually, and the

process was slow. Now, they are handled through LAANC, which can be accessed through the FAA DroneZone website or third-party apps such as B4UFLY, which will be covered next.

The following video provides an explanation of LAANC:

- "Unmanned Update: Low Altitude Authorization and Notification Capability (LAANC)" (Length 3:02) https://video.link/w/X0rx

For teachers unable to access Safe YouTube links, the video is also available here: https://youtu.be/TU3VtnWGfIQ

Slide 36: Features of B4UFLY, an app for iOS and Android with LAANC capability that has been endorsed by the FAA and can be used to get authorization, can be seen in the following video, which shows the ease with which authorizations can be obtained:

- "iOS LAANC Tutorial From Kittyhawk" (Length 5:51) https://video.link/w/R0rx

For teachers unable to access Safe YouTube links, the video is also available here: https://www.youtube.com/watch?v=6300rlaksuw

Apps that the FAA has not approved (such as AirMap) have been found to contain false airspace information. sUAS operators should always use an approved source because they will be held liable for how and where they fly.

EVALUATE

Teacher Materials: Part 107: Operating Rules and Waivers Presentation, Part 107: Operating Rules and Waivers Teacher Notes 2
Student Material: Part 107: Operating Rules and Waivers Student Activity 2

Slides 37-56: These lessons are building the knowledge to pass the FAA Remote Pilot Knowledge test. The following questions resemble actual questions on the FAA exam. Review the questions and answers with students.

Slide 57: Conduct the **Summative Assessment**.

Summative Assessment

Provide students with the **Part 107 Operating Rules and Waivers Student Activity 2.** Students will answer the questions in the worksheet using what they have learned about Part 107 regulations and operating limitations in the lesson. Answers are provided in the **Part 107 Operating Rules and Waivers Teacher Notes 2 document.**

Collect student work and grade using the scoring rubric.

[DOK-L3; *formulate*,DOK-L1; *recall*]

Summative Assessment Scoring Rubric

- Student follows assignment instructions
- Postings show evidence of one or more of the following:
    - Knowledge of regulations that affect drone pilots
    - Provides details about planning flights to avoid breaching Part 107 regulations

- Provides explanation of the function of waivers and Certificates of Authorization

- 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**
9–10 The student demonstrates a thorough understanding of the learning goals for this lesson; Answers 23-25 questions correctly.
7–8 The student demonstrates a sufficient understanding of the learning goals for this lesson; Answers 18-22 questions correctly.
5–6 The student shows a partial understanding of the learning goals for this lesson; Answers 13-17 questions correctly.
0–4 The student demonstrates little or no understanding of the learning goals for this lesson. There are many gaps in understanding; Answers 12 or fewer questions correctly.

GOING FURTHER

Students can learn more about federal regulations by exploring these websites:

- www.ecfr.gov
- FAA DroneZone: https://faadronezone.faa.gov

STANDARDS ALIGNMENT

COMMON CORE STATE STANDARDS

- **RST.11-12.2** - Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
- **RST.11-12.4** - 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 11-12 texts and topics*.
- **WHST.11-12.6** - Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
- **WHST.11-12.8** - Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
- **WHST.11-12.9** - Draw evidence from informational texts to support analysis, reflection, and research

FAA AIRMAN CERTIFICATION STANDARDS

REMOTE PILOT

I. Regulations, Task A. General

- Knowledge The applicant demonstrates understanding of:
    - **UA.I.A.K1** Applicability of 14 CFR part 107 to small unmanned aircraft operations.
    - **UA.I.A.K2** Definitions used in 14 CFR part 107.
    - **UA.I.A.K3** The ramifications of falsification, reproduction, or alteration of a certificate, rating, authorization, record, or report.
    - **UA.I.A.K4** Accident Reporting.
    - **UA.I.A.K5** Inspection, testing, and demonstration of compliance.

I. Regulations, Task B. Operating Rules

- Knowledge The applicant demonstrates understanding of
    - **UA.I.B.K1** Registration requirements for sUAS.
    - **UA.I.B.K2** Requirement for the sUAS to be in a condition for safe operation.
    - **UA.I.B.K3** Medical condition(s) that would interfere with safe operation of an sUAS.
    - **UA.I.B.K4** Responsibility and authority of the remote PIC.
        - **UA.I.B.K4a** Allowing a person other than the remote PIC to manipulate the flight controls.
    - **UA.I.B.K5** Regulatory deviation and reporting requirements for in-flight emergencies.
    - **UA.I.B.K6** Hazardous operations.
        - **UA.I.B.K6a** Careless or reckless
        - **UA.I.B.K6b** Dropping an object
    - **UA.I.B.K7** Operating from a moving aircraft or moving land- or water-borne vehicle.
    - **UA.I.B.K8** Alcohol or drugs and the provisions on prohibition of use.
    - **UA.I.B.K9** Daylight operation.
    - **UA.I.B.K10** Visual line of sight (VLOS) aircraft operations.
    - **UA.I.B.K11** Requirements when a visual observer is used.
    - **UA.I.B.K12** Prohibition of operating multiple sUAS.
    - **UA.I.B.K13** Prohibition of carrying hazardous material.
    - **UA.I.B.K14** Staying safely away from other aircraft and right-of-way rules.
        - **UA.I.B.K14a** See and avoid other aircraft and other potential hazard considerations of the remote PIC
    - **UA.I.B.K15** Operations over human beings.
    - **UA.I.B.K16** Prior authorization required for operation in certain airspace.
    - **UA.I.B.K17** Operating in the vicinity of airports.
    - **UA.I.B.K18** Operating in prohibited or restricted areas.
    - **UA.I.B.K19** Flight restrictions in the proximity of certain areas designated by notice to airmen (NOTAM).
    - **UA.I.B.K20** Preflight familiarization, inspection, and actions for aircraft operations.
    - **UA.I.B.K21** Operating limitations for sUAS.

- **UA.I.B.K21a** Maximum groundspeed
- **UA.I.B.K21b** Altitude limitations
- **UA.I.B.K21c** Minimum visibility
- **UA.I.B.K21d** Cloud clearance requirements

I. Regulations, Task C. Remote Pilot Certification with an sUAS rating

- Knowledge The applicant demonstrates understanding of:
  - **UA.I.C.K1** Offenses involving alcohol or drugs.
  - **UA.I.C.K2** The consequences of refusing to submit to a drug or alcohol test or to furnish test results.

I. Regulations, Task D. Waivers

- Knowledge The applicant demonstrates understanding of:
  - **UA.I.D.K1** Waiver policy and requirements.

REFERENCES

FAA e-CFR Part 107: https://bit.ly/32VJUMm

FAA e-CFR Part 101: https://bit.ly/2CSdB6q

FAA DroneZone: https://faadronezone.faa.gov/#/

The Air Almanac https://bookstore.gpo.gov/products/air-almanac-year-2019