**GRADE 11
UNIT 6
SECTION B
LESSON 3**

UAS OPERATIONS
INTRODUCTION TO DRONES AND UAS OPERATIONS
PART 107 AND BEYOND

v1.0

YOU CAN FLY
AOPA FOUNDATION
HIGH SCHOOLS

Beyond 107: Best Practices and Being a Good Neighbor

Session Time: Two, 50-minute sessions

DESIRED RESULTS

ESSENTIAL UNDERSTANDINGS

Responsible drone use and good decision making go beyond Part 107 regulations, and remote pilots should always strive to be considerate of others' privacy. (EU1)

ESSENTIAL QUESTIONS

1.
In lieu of FAA regulations, how should a remote PIC approach operations around people?

LEARNING GOALS

Students Will Know	Students Will Be Able To
• That drone operators should not just follow regulatory requirements, but strive to always be responsible, ethical, and respectful aviators. • How to approach issues involving privacy in drone operations by researching state and local ordinances and adopting National Telecommunications and Information Administration (NTIA) best practices and guidelines.	• *Recall* best practices and guidelines suggested by the NTIA. [DOK-L1] • *Construct* a list of rules, using research on local ordinances and knowledge of NTIA guidelines, that the class should adhere to while flying an sUAS. [DOK-L2] • *Develop a logical argument* for how to approach certain operational scenarios taking into consideration federal regulations, local ordinances, and operational best practices. [DOK-L3]

ASSESSMENT EVIDENCE

Warm-up
Students will analyze and debate a video focused on privacy concerns.

Formative Assessment
Students will apply their understanding of best practices for privacy preservation to a variety of scenarios involving sUAS.

Summative Assessment
Students will demonstrate a working knowledge of best practices and the reasoning behind them by identifying risks and proposing solutions for various sUAS scenarios.

MATERIALS/RESOURCES

- [Beyond 107: Best Practices and Being a Good Neighbor Presentation](#)
- [Beyond 107: Best Practices and Being a Good Neighbor Student Activity 1](#)
- [Beyond 107: Best Practices and Being a Good Neighbor Student Activity 2](#)
- [Beyond 107: Best Practices and Being a Good Neighbor Student Activity 3](#)
- [Beyond 107: Best Practices and Being a Good Neighbor Teacher Notes 1](#)
- [Beyond 107: Best Practices and Being a Good Neighbor Teacher Notes 2](#)
- [Beyond 107: Best Practices and Being a Good Neighbor Teacher Notes 3](#)

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 with a thought-provoking video, followed by class discourse/debate.

During the next part of the lesson, students will review existing regulations, and learn that the FAA's role is to regulate safety, not privacy. In lieu of federal regulations, privacy issues in the UAS industry are developed collectively among stakeholders. In this spirit, the class will draft a "master list" of best practices addressing privacy and ethical issues that they will adhere to later in the semester when they begin flying drones. They will then demonstrate their understanding of privacy concerns by completing a formative assessment.

Finally, students will be given an overview of the proposed guidelines for responsible drone operation that stakeholders in the drone industry have established. Students will then review the master list of rules they developed in the beginning of the lesson and propose additions or modifications. Finally, students will apply what they have learned about privacy risks and solutions by completing a summative assessment.

BACKGROUND

Equipped with state-of-the-art camera systems and monitoring equipment that can relay transmissions and data to distant operators, drones are extremely versatile and are capable of performing valuable work. However, as a result of these technologies, privacy concerns can arise if drones are misused or irresponsibly operated. This lesson aims to highlight these concerns, and to encourage responsible decision making before, during, and after flight operations.

As of today, the FAA does not regulate issues involving privacy, as it is concerned with the safety of aircraft in the NAS. Instead, privacy issues are addressed by state and local laws/ordinances and by best practices developed by stakeholders in the drone industry. This lesson will focus specifically on Voluntary Best Practices for UAS Privacy, Transparency, and Accountability, a document developed by stakeholders (led by the NTIA) and referenced by the FAA as a source for responsible practices.

MISCONCEPTIONS

Thus far, this section has focused on the rules within Part 107. Knowledge of these regulations is essential for any commercial remote sUAS pilot because pilots must adhere to them during all operations. What students may not realize is that the responsibilities of remote pilots extend beyond federal regulations. In reality, many of the rules governing sUAS use are local laws and ordinances.

For this reason, it is vital that remote pilots research state and local drone laws prior to conducting an operation to ensure that it is legal. Also, even in the absence of rules, remote pilots must be good neighbors and respect the privacy of people who aren't a part of an operation. This lesson will explore some aspects of privacy that remote pilots should consider prior to a flight—even in the absence of regulations.

DIFFERENTIATION

To promote critical thinking and to challenge students in the EXPLAIN section of the lesson plan, have students provide a justification for their answers in the **Formative Assessment**. If time permits, allow students to discuss their answers in small groups before reviewing with the class as a whole.

To promote student engagement and personal expression in the EXTEND section of the lesson plan, allow students to work in groups or as individuals to graphically illustrate the rules and guidelines the class has come up with in the master regulation list. The images, illustrations, or graphics students come up with can be posted in the classroom and can provide visual cues for remembering these guidelines in the future.

LEARNING PLAN

ENGAGE

Teacher Material: Beyond 107: Best Practices and Being a Good Neighbor Presentation

Session 1

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

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

Warm-Up

To begin the class, show students the following local news story from Fort Myers about residents who feel that a drone hovering nearby violated their privacy.

- "Drone over North Fort Myers causes privacy concerns" (Length 2:28)
  https://video.link/w/CIzx

For teachers unable to access Safe YouTube links, the video is also available here: https://youtu.be/d1jPHbj_uZY

After the video, ask students the following:

- Do you feel that the scenario in the video represents an invasion of privacy? If so, why?

- What concerns would you have if you were one of the individuals in the video? Why?

- How would you feel if a drone were hovering over a neighbor's yard, but with a camera aimed at your yard?

- What if you were in a public place, such as a park, and found that a drone was following you?

These questions should spark a discussion about expectations of privacy and the responsibility of drone operators. You may also choose to use a loose debate format to involve students. Note that these questions are intended to stimulate discussion about privacy surrounding drone operations and therefore don't have a "correct" answer. Allow the debate to evolve among students.

EXPLORE

Teacher Materials: Beyond 107: Best Practices and Being a Good Neighbor Presentation, Beyond 107: Best Practices and Being a Good Neighbor Teacher Notes 1
Student Material: Beyond 107: Best Practices and Being a Good Neighbor Student Activity 1

Slide 6: Conduct **Beyond 107: Best Practices and Being a Good Neighbor Student Activity 1** to foster reflection on safe practices that students will use later in the class flight operation.

- Have students break into teams and work on a computer with Internet access.

- Distribute **Beyond 107: Best Practices and Being a Good Neighbor Student Activity 1** to each team or student, as desired.

- Students should look up the state and locality where the class drone will be in operation and read any applicable drone laws that might impact the operation of the class sUAS. These regulations should be noted as specifically as possible on their activity sheets, to be compiled later as a class.

    ○ Students can use the following link as a starting point: https://uavcoach.com/drone-laws/

- If there are no additional state or local restrictions in a student's area, that doesn't mean pilots in that area can disregard privacy issues. In this case, have teams brainstorm several practices that they feel the class should adopt when operating its drone(s) to ensure that the privacy of anyone not a part of their operations is protected.

    ○ These practices don't need to be regulatory. Instead, they should reflect responsible and courteous drone flying.

Once teams have discussed practices that could be adopted, they should share, refine, and exchange their ideas with the entire class.

- Collect **Beyond 107: Best Practices and Being a Good Neighbor Student Activity 1** sheets or compile information on a whiteboard.

- Use students' responses to question 1 to compile a list of state and local laws/ordinances regarding sUAS operations. Compile a Master Regulation List using the **Beyond 107: Best Practices and Being a Good Neighbor Teacher Notes 1** sheet and retain it. It can then be scanned, copied, or digitized for redistribution because students will need to follow these regulations later in the semester when the class begins flying its drone.

- Use students' responses to question 2 to compile a list of agreed-upon best practices regarding sUAS operations. Compile a Master Best Practices List using the Beyond 107: Best Practices and Being a Good Neighbor Teacher Notes 1 sheet and retain it along with the Master Regulation List.

- Students will revisit the Master Best Practices List later in this lesson and keep it throughout the semester for reference.

- Eventually, the class will integrate both lists into a classroom flight operations manual.

> 💡 **Teaching Tips**
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> During this exercise, students will research local ordinances/laws that might impact drone operations in your area. Because the class will be flying a drone later in the semester, it is important to view this activity as a practical exercise, not just an academic one. It is vital that you

become aware of any existing ordinances, as violating them could result in legal action being taken by local authorities.

EXPLAIN

Teacher Materials: [Beyond 107: Best Practices and Being a Good Neighbor Presentation](#), [Beyond 107: Best Practices and Being a Good Neighbor Teacher Notes 2](#)
Student Material: [Beyond 107: Best Practices and Being a Good Neighbor Student Activity 2](#)

Slide 7: UAS technology benefits society in many ways, easing the lives of farmers by allowing them to survey crops efficiently, enabling search and rescue operations, and allowing delivery of goods and medicine to difficult-to-access areas. These are just a few examples.

As drones demonstrate an ability to adapt to different mission requirements, a wide variety of fields are developing new applications for drones at a remarkable rate. However, as the popularity of drones increases and drones become more prevalent, concerns have emerged.

The benefits of sUAS, in addition to being small and maneuverable, include their ability to carry different types of payloads and sensors (e.g., cameras). As a result, many segments of society have begun to express worry about privacy issues surrounding drones.

Slide 8: As the industry evolves, it will likely become more regulated. However, FAA regulations regarding pilot obligations with respect to privacy are unclear. Within Part 107, rules governing operations near people and property focus on safety instead of privacy. For example, Part 107 prohibits hazardous operations, such as dropping items in a way that creates an undue hazard to persons or property.

Slide 9: The FAA's philosophy on privacy is the same for manned flight and UAS. The FAA does not regulate data collected by manned aircraft or drones. As students will recall, the majority of airspace below 500 ft AGL is classified as Class G, which is uncontrolled airspace. This is why drones have a maximum flight ceiling of 400 feet AGL.

Slide 10: How high do drones need to be above someone's property to respect the property owner's privacy? The only case to address the subject, *United States v. Causby*, determined the height to be 83 feet above ground.

In this 1946 case, which involved manned aircraft, Causby successfully sued the United States for trespass, claiming that low-flying military aircraft were causing his chickens to kill themselves. Because there is no other legal precedent, 83 feet is still considered to be the boundary between the space above a property that is "owned" and the atmosphere above.

Slide 11: UAS pilots have a public responsibility to protect both the safety and privacy of people and property in the operating environment. Therefore, UAS should be used in an ethical and responsible manner, regardless of the lack of FAA privacy regulations. A remote pilot should avoid trying to operate at the minimum standards set forth by regulation and instead seek to operate in a more courteous manner than required.

Slide 12: Remote pilots should always strive to model best practices and encourage responsible activity among operators. An operator's reputation will follow them throughout their UAS career; a reputation for following best practices is more desirable than a reputation for being inconsiderate or reckless.

Slide 13: In 2016, several stakeholders within the drone industry, including the Department of Commerce, the National Telecommunications and Information Administration (NTIA), and other agencies, met to discuss issues surrounding drone use and privacy concerns and to create a best practices document.

At this meeting, initiated by then-President Barack Obama, stakeholders were charged with establishing a process "to develop and communicate best practices for privacy, accountability, and transparency issues regarding commercial and private sUAS use in the NAS." In response, the stakeholders drafted a publication titled "Voluntary Best Practices for

UAS Privacy, Transparency, and Accountability," which can be accessed here: https://www.ftc.gov/system/files/documents/public_comments/2016/10/00008-129242.pdf.

> 💡 **Teaching Tips**
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> Emphasize to students what is considered "covered data": "Information collected by a UAS that identifies a particular person. If data collected by UAS likely will not be linked to an individual's name or other personally identifiable information, or if the data is altered so that a specific person is not recognizable, it is not covered data."This definition is found in the "Voluntary Best Practices for UAS Privacy, Transparency, and Accountability" publication.

Slide 14: Covered data is identifiable information. This slide gives students the definition (again, from the "Voluntary Best Practices" publication).

Slides 15-19: The UAS stakeholders established the following list of best practices. Note that these practices are not intended for news reporting organizations because newsgathering activity is protected by the First Amendment to the Constitution. Additionally, they do not apply to anyone using a UAS for emergency response.

1.
Inform Others of Your Use of UAS

Create transparency. Let others around you know you will be recording images. This can include knocking on neighbors' doors before filming a property and wearing a safety vest with "UAV Operations" on the back. If an operation requires protection of data, follow a privacy policy.

1.
Show Care When Operating UAS or Collecting and Storing Covered Data

Treat data you collect with care and take the time to secure it. It may contain sensitive information and should always be treated with care. Do not intentionally infringe on others' rights to privacy. Make a reasonable effort to avoid knowingly retaining covered data longer than reasonably necessary to fulfill a legitimate purpose.

1.
Limit the Use and Sharing of Covered Data

Avoid retaining sensitive information that you do not need, and don't share it with others. Secure your transfers with end-to-end encryption if sending messages containing covered data.

1.
Secure Covered Data

To expand on the last point, follow these policies when working with covered data:

- Have a written security policy for collection, use, storage, and dissemination of covered data.

- Make a reasonable effort to regularly monitor systems for breach and data security risks.

- Provide security training to employees with access to covered data.

- Permit only authorized individuals to access covered data.

1.

Monitor and Comply with Evolving Federal, State, and Local UAS Laws

UAS operators should ensure compliance with evolving applicable laws and regulations and UAS operators' privacy and security policies by using appropriate internal processes.

> 💡 **Teaching Tips**
>
> These voluntary best practices can be found on pages 5 and 6 of the "Voluntary Best Practices" publication: https://www.ftc.gov/system/files/documents/public_comments/2016/10/00008-129242.pdf

Slide 20: There are many more state and local laws than federal laws governing privacy. The following story exemplifies how communities across the United States are determining which types of drone operations are acceptable and which aren't:

- "City of Phoenix trying to regulate drones" (Length 1:36)
  https://video.link/w/SPzx

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

> 💡 **Teaching Tips**
>
> Remote pilots should always check local ordinances. Operators can be fined or even receive jail time for breaking a state or local law, even if they follow all FAA regulations.

Session 2

Slide 21: Complete the **Formative Assessment**.

> **Formative Assessment**
>
> Provide students with the **Beyond 107: Best Practices and Being a Good Neighbor Student Activity 2** worksheet. Students will choose the best flight planning strategies for a variety of scenarios. Correct answers are found in the **Beyond 107: Best Practices and Being a Good Neighbor Teacher Notes 2** worksheet.

EXTEND

Teacher Materials: Beyond 107: Best Practices and Being a Good Neighbor Presentation, Beyond 107: Best Practices and Being a Good Neighbor Teacher Notes 1

Slide 22: In addition to the voluntary best practices discussed previously, "Voluntary Best Practices for UAS Privacy, Transparency, and Accountability" also includes a section titled "Guidelines for Neighborly Drone Use"— which are intended for both commercial and recreational drone users. These guidelines are optional as well, and are meant to help UAS operators strike a balance between their rights and the rights of other people's privacy.

Slides 23-25: These slides will cover the following eight "Guidelines for Neighborly Drone Use":

1. If you can, tell other people you'll be taking pictures or video of them before you do.

2. If you think someone has a reasonable expectation of privacy, don't violate that privacy by taking pictures, video, or otherwise gathering sensitive data, unless you've got a very good reason.

3. Don't fly over other people's private property without permission if you can easily avoid doing so.

4. Don't gather personal data for no reason, and don't keep it for longer than you think you have to.

5. If you keep sensitive data about other people, secure it against loss or theft.

6. If someone asks you to delete personal data about them that you've gathered, do so, unless you've got a good reason not to.

7. If anyone raises privacy, security, or safety concerns with you, try to listen to what they have to say, as long as they're polite and reasonable about it.

8. Don't harass people with your drone.

It's important not simply to view each individual guideline in isolation, but to consider the overarching message of the set. Taken together, all of the guidelines point toward the need for pilots to be cognizant of other people's right to privacy and to peacefully resolve problems that may occur.

Slide 26: Display the Master Best Practices List that the class developed (recorded on **Beyond 107: Best Practices and Being a Good Neighbor Teacher Notes** 1). Ask students what revisions or additions they suggest based on what they have learned. As a class:

- Make at least three revisions or additions to the Master Best Practices List. The revisions should have a strong focus on previously unaccounted-for privacy concerns.

- Alter the list as necessary, and be sure to save the final version. It will be the first portion of a classroom flight operations manual that will be created throughout the semester.

EVALUATE

Teacher Materials: [Beyond 107: Best Practices and Being a Good Neighbor Presentation](), [Beyond 107: Best Practices and Being a Good Neighbor Teacher Notes 3]()
Student Material: [Beyond 107: Best Practices and Being a Good Neighbor Student Activity 3]()

Slides 27-30: These lessons are building the knowledge to pass the FAA Remote Pilot Knowledge test. These questions resemble actual questions on the FAA exam. Review the questions and answers with students.

Slide 31: Complete the **Summative Assessment**.

Summative Assessment

- Provide students with **Beyond 107: Best Practices and Being a Good Neighbor Student Activity 3**, where they will respond creatively to scenarios using the privacy practices from the lesson.

- Sample answers are provided in **Beyond 107: Best Practices and Being a Good Neighbor Teacher Notes 3**.

[DOK-L3; *application; strategic thinking*]

Summative Assessment Scoring Rubric

- Follows assignment instructions

- Postings show evidence of one or more of the following:

  ○ Knowledge of privacy considerations when operating a sUAS

  ○ Provides details about planning operations to mitigate privacy concerns when feasible

  ○ Demonstrates reasonable navigation of privacy concerns in real-life scenarios

- 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 shows strong understanding of regulations for privacy awareness and mitigation. Answers all questions correctly.
7-8	The student shows sufficient understanding of regulations for privacy awareness and mitigation. Answers 4 questions correctly.
5-6	The student shows partial understanding regulations for privacy awareness and mitigation. Answers 3 questions correctly.
0-4	The student shows a lack of understanding of regulations for privacy awareness and mitigation. Answers 0-2 questions correctly.

GOING FURTHER

If time and resources permit, provide handouts of the "Voluntary Best Practices for UAS Privacy, Transparency, and Accountability" publication. The document is 12 pages, but only pages 3–10 of the publication (pages 1–8 of the actual report) contain relevant content: https://www.ftc.gov/system/files/documents/public_comments/2016/10/00008-129242.pdf.

STANDARDS ALIGNMENT

NGSS STANDARDS

Three-Dimensional Learning

- **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.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

REFERENCES

Voluntary Best Practices for UAS Privacy, Transparency, and Accountability - https://www.ftc.gov/system/files/documents/public_comments/2016/10/00008-129242.pdf

ASA's The Complete Remote Pilot, by Bob Gardner and David Ison (pp. 2–13)

Drone Privacy: What are a Drone Operator's Rules and Responsibilities?
https://dronelife.com/2017/02/07/drone-privacy-rules-responsibilities/

Master List of Drone Laws (Organized by State & Country)
https://uavcoach.com/drone-laws/

Drone over North Fort Myers causes privacy concerns
https://youtu.be/d1jPHbj_uZY (Length 2:28)

City of Phoenix trying to regulate drones
YouTube: https://youtu.be/QHaXsNNsRoA (Length 1:36)