Lesson Plan 1: Drones

Title: What's That in the Sky?

Aerospace Workforce Educator Program lessons are designed to help students build the foundational skills needed for aviation careers while gaining early awareness of the many professions that support our aviation system. Each lesson introduces core concepts—such as navigation, communication, safety, design, or problem-solving—and connects them directly to the real work of pilots, air traffic controllers, drone operators, maintenance technicians, airport specialists, and other aviation professionals. By making these connections visible and age-appropriate, educators can help students see how classroom learning links to real careers and inspires interest in fields they may not yet know exist.

Grade Level: Varies
Primary STEM Skill Focus Area: Creativity
NextGen Science Standards: 3-5-ETS1 Engineering Design

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1. Lesson Objectives

Students will be able to:

- Give an example of how drones are used in their community
- Identify how drones can be used safely
- Describe why, where, and when it might be unsafe to fly a drone
- Identify professions that use drones

2. Overview

This lesson introduces students to the various uses and applications of drones. In addition, the lesson will review how drones fly and how they are operated safely from the ground and in the air.

The presenter, an Educator, will engage the students in a two-way discussion about whether they've seen a drone in flight and, if so, how the drone was used at that time.

The Educator will also review events in the students' local community that could benefit from drones, e.g., surveying an area after a storm, like a storm, a tornado, or a flooding incident; monitoring animals; checking on crops; fighting fires, delivering medicines to remote places, or delivering timely medical supplies or first-aid in emergency situations.

3. Resources

This section includes resources for the Educator to review in preparation for delivering the lesson. Table 1 is a list of terms to know. Table 2 is a list of possible resources that can be shared with the students as part of the lesson. Educators and the schools should review the resources and links in advance of the lessons to ensure the content is consistent with school policies and security protocols before presenting to students.

Table 1. Terms to Know

Term	Definition
Drone	An unmanned aircraft or ship guided by remote control or onboard computers.
UAS	Unmanned aircraft system, a.k.a. drones
RPA	Remotely piloted aircraft system, a.k.a. another kind of drone

Propulsion	The action of driving or pushing forward
Hover	The act of remaining in the air in one place, like a drone does
Line of Sight	The level of visual obstruction on the path between two points, like between a drone and an airplane
Altitude	Height above the ground, or generally, the distance one thing is above another thing.
Rotors	Provide propulsion and control for a drone
FAA	Federal Aviation Administration

Table 2. Potential Materials for Use During the Lesson

	Title	Length	Source	Platform	Description
1.	Buzzy the Drone – Where Your Drone Can Fly	0:20	FAA	YouTube	Buzzy the Drone explains places drones operate over and why!
2.	Buzzy the Drone – Safe Altitude	0:20	FAA	YouTube	Recreational drones cannot fly above 400 feet
3.	How to fly drones safely with Donnie and Paul	0:45 to 2:00	EASA	YouTube	How to become a safe drone pilot and to comply with European rules
4.	Demo for Drone Traffic Management	1:48	NASA	YouTube	Demonstrations of technologies using drones for monitoring traffic, search and rescue, and package delivery.
5.	Drones, like cars, have rules!	0:55	FAA	YouTube	Pass a test, register, use lights at night, and avoid restricted areas.
6.	Dragonfly: NASA's New Mission to Explore Saturn's Moon Titan	1:21	NASA	YouTube	Learn about NASA's Dragonfly dual-quadcopter that explores a variety of locations on Saturn's moon, Titan.

4. Activate Prior Knowledge (5 minutes)

The questions below are suggested prompts that can be used to introduce the lesson. Educators should modify these questions to align with their audience, community, and personal experiences.

- Today, we will be talking about drones. Who here knows what a drone is?
- Who has flown a drone with their parents? Or read about drones? Or seen a drone on TV?
- How are drones being used in your community?
- What do you need to know to fly a drone?
- Well, you need to know how to fly a drone safely first, right?
- Did you know that just like airplanes and airplane pilots, the FAA certifies every single drone pilot to help keep our skies safe? Because "if it goes in the air, we care". We'll learn more about that today, too.

5. Instructional Sections

The sections listed below are talking points to help Educators deliver a consistent message about drones and drone safety. Educators should modify these sections and the suggested timing to align with the audience, their community, and their personal experience. The section also includes links back to some of the items listed in the Resources Section.

5.1 Introduction to Drones (10 minutes)

- A drone is a remotely piloted aircraft or spacecraft (meaning there is no pilot on board flying the plane).
- Another popular name for a drone is a UAS, which stands for “unmanned aircraft system”.
- Today, drones are used for many different things. Some people use them for fun, and some use them for work, like delivering packages or helping farmers manage their crops.
- How were drones created in the first place, though? Well, just like we learned how to walk, run, and ride a horse, we humans wanted to go faster and further, and so we built trains, then bicycles, then planes, and then the first modern drones. We then built rockets, the space shuttle, and the Mars Rover.
- In fact, we can trace the origins of drones to the 1800s when people first started flying unmanned balloons.
- And just like stoplights and traffic control had to evolve back in the 1920s when the number of cars started to increase, the FAA has been working to make flying drones safe for people, planes, and drone pilots.
    - Fun fact: the 3 signs you see on a stop sign today -- Red, Yellow and Green for Stop, Caution and Go -- used to be just two signs for stop and go. The three-position traffic signal (red, yellow, green) was invented, designed, and patented by Garret Morgan in 1923 after seeing a bad accident.
- Nowadays, drones are evolving in many ways and changing the world for the better. Drones aid search-and-rescue operations, assist firefighters in locating and extinguishing fires, and deliver medicines to remote areas.

5.2 Drone Types (5 minutes)

- Drones come in different types and sizes.
- Some drones are larger to carry heavy items, others are equipped to fly at night. There are also mini and micro drones inspired by and mimicking the behavior of insects – yes, insects!
- The AiRanger weighs up to 220 pounds, has a wingspan of 18 feet 5 inches and a length of 9 feet 6 inches. It can carry up to 65 pounds and flies using a catapult launch system.
- Yet others are smaller and lighter so that they can travel long distances.
- And all of them need and consume energy to fly.
- Some drones fly on electric power. Some use combustion engines (that burn fuel) or even solar power. But they all must have a reliable power source, and that means batteries.
- The downside of batteries is that they need to be charged, they are heavy and typically expensive.

5.3 How Are Drones Different from Airplanes? How do they Fly? (5 minutes)

- Do you know what the biggest difference between a drone and an airplane is? It’s the Pilot! Planes have pilots on board and drones don’t.
- So, on a plane the pilots see and avoid other planes as the last line of defense to avoid collisions. But drones fly with sensors to detect and avoid collisions.
- Drones come in all sorts of sizes too. Some are as big as airplanes. Drones that are lighter than 55 lbs. are

called sUAS = small, unmanned aircraft system.

- Most drones use rotors to fly. Some larger drones have actual wings but they can also have rotors. The number of rotors affects how far they can fly and how fast and efficient they are.
- Check out how different drones can look.

> **Suggested Visual:** Show 1-2 slides with photos of the different types of drones

5.4 Drone Uses (10 minutes)

- Drones are used in many ways, let's talk about some of those:

5.4.1 Emergency Responses

- How are drones helpful in emergency responses in our city / town / location?
- Drones are being used as first responders because they can be deployed quickly.
- Drones are being used in search and rescue operations and have been used to find missing hikers, for example.
- Firefighters can use drones with thermal cameras to locate people trapped in a fire and in need of rescue.

> **Suggested Visual:** Show 1-2 slides with photos of drones being used in emergency situations and watch video with demo of drones doing traffic management, delivery goods and helping in search and rescue

5.4.2 Animal Conservation

- How can drones protect our animals and their habitats?
- Drones can protect animals by tracking their migration patterns.
- Drones can also help researchers understand where the wildlife are so that they can better protect them and the forests they and we depend upon.
- Can you think of other ways drones can help animals?

5.4.3 Weather Forecasting

- How can drones help us with predicting the weather?
- Drones can fly over hurricanes to provide better weather forecasts. These drones are built with special strength to withstand the force of hurricane winds.
- Drones let researchers monitor bad weather.

5.4.4 Package Delivery

- Are drones already delivering packages today? Yes, they are.
- What kind of things can drones safely deliver to your home? Small packages, food deliveries and medical supplies, to name a few.

— You may just see a grocery or package delivery in your neighborhood soon.

Table 3. Sample Drone Use in Each FAA Region

FAA Region	Drones Helping Local Communities
Alaksa	Monitoring whale migrations
Central	Monitoring crops
Eastern	Responding quickly to emergencies in cities
Great Lakes	Inspecting electric wires
New England	Monitoring sharks off the beaches
Northwest Mountain	Ski patrols for avalanches
Southern	Monitoring hurricanes from overhead
Southwest	Finding missing hikers
Western	Firefighters monitoring wildfires

5.5 Safe Drone Operation (5 minutes)

— Can anyone tell me why it would be unsafe to fly a drone near an airport? Drones can interfere with airplane takeoffs and landings.

— Does anyone know the height restriction for flying a drone safely? It is typically 400ft above ground level.

— You also need to have a "Remote Pilot Certificate" from the FAA to fly a drone. It's kind of like a driver's license. Does anyone know how old you must be to get your Remote Pilot Certificate? Just like cars, it's 16 years old.

Suggested Videos:

- Buzzy the Drone Safety Tip #3: Where Your Drones Can Fly
- Buzzy the Drone Safety Tip #2: Safe Altitude
- Buzzy the Drone BUZZY the Drone – Safety Tip #1: Must-Have Tips for Beginners

5.6 Activity (15 minutes)

The table below includes sample activities that can be used as part of the lesson. Each activity will require setup and preparation.

Table 4. Sample Activities

Activity	Objectives	Educator Actions	Student Actions	Closing
How can we help animals?	• Students will be able to identify how drones can assist with tracking animals	• The Educator will profile 2-3 different animals and detail the role drones can play in tracking	• Students will engage and answer questions • The students will choose one of the animals and draw a picture of a drone pilot operating a drone and tracking the habitat and the animals	• The Educator will ask the students to share their drawings and describe how drones can be used to track animals
How can drones help my community?	• Students will be able to identify how drones can help meet needs in their community	• Educators will ask the group of students to identify needs in their community • Educators will ask the group of students if there have been any significant weather events in the community recently • Educators will follow up the student's responses by asking how drones could help with that need or weather event • The Educator will profile 2-3 natural disasters where drones have been used (could be localized or geographically broader)	• Students will engage and answer questions • The students will draw a drone to deliver supplies or monitor fires.	• The Educator will ask the students to share their drawings and describe how drones helped keep the community safe

6. What Did You Learn? (5 minutes)

For closing and wrap-up, Educators can ask the students the following questions:

- How are drones different from airplanes?
- What are some ways drones are used?
- How high can you fly a drone?
- What can you never fly over, using a drone?
- What are some ways drones can help in natural disasters?
- What things can be made better by using drones?
- Can anyone operate a drone?
- Is anyone interested in learning more?

Suggested Game:
10 question knowledge check game

7. Extension Activities

- If you could fly a drone somewhere, where would you fly it? What would you have it see or do? Draw your drone in action.
- Do you know anyone with a recreational drone or who uses a drone for their work? Ask your student to share some of their previous exposure to drones.
- Think about the recent drone performance video vs. a fireworks display. Can you name the differences between a drone performance compared to a fireworks performance?
    - E.g., drones create less noise, are reusable equipment, less clean-up
    - But drones also require more training, special permits, coordination with others and multiple drones, and more technical skills
- Do you know why some drones have 4 rotors and why some have more?

8. Supplies

- Access to the Internet to view and share videos and slides on screen
- 3-4 sheets of 8 x 10 blank white paper
- Black, blue, yellow, red, and green color markers or crayons.
- Spark sheet (PDF) for students to have as a reference.