Access Your Potential®
Essential Eight
Tech Experiences

Drones lesson plan
Drones—Lesson plan

Objective:
Students will explore the emerging technology of drones. They will use innovative thinking and teamwork to imagine how drones might be used to improve our lives.

Learn more about the Essential Eight here.

Audience:
High school and older.

Essential question:
How can drone technology be used to improve our lives?

Materials:
• “Drones” visual handouts—1 copy per student.
• “Designing a Drone” team design challenge handouts—1 copy per small team of 4–5 students.
• Whiteboard markers.
• A small drone such as the Parrot Mambo that is safe for indoor use, set up and ready to fly
  - A Parrot Mambo or similar drone can be requested from your local office AYP Committee
  - If possible, place the drone under a box or a piece of fabric on a tabletop at the front of the room so that the students can’t see it until you unveil the drone and fly it for them in Activity 2
• Videos
  - Consider sharing this introductory video on the Essential Eight Technologies (5:03 in length) Password is ‘E8”
  - Various example YouTube videos showing uses of drones. (Note: Provide video links to the teacher ahead of time and ask the teacher about school video policies. See the “On showing videos in class” callout in Activity 2 for more information):
    • “The Drone Revolution is Here!”

Pre-visit prep:
• Note: It is highly recommended that you spend time practicing with the drone and have a firm understanding of how to pilot it before working with students
• Make sure all devices and tech items are fully charged
• You MUST pre-load FreeFlight Mini app for the Parrot Mambo prior to the lesson. Please watch this unboxing video for set-up tips
• Work with the teacher ahead of time to figure out a room arrangement where the students can gather into groups of 4-5 for the Team Design Challenge. Knowing their students, the teacher may also want to pre-compose the groups in order to get the most out of the activity and minimize disruptions
• Gather a few interesting recent stories of drone use or technology development from the news in case there is time to share them during the lesson
• Print necessary handouts

Lesson length:
45 minutes
Considerations for facilitating virtually (via Google Hangout, WebEx, or Skype)

Much of this lesson can be delivered virtually via Google Hangout, WebEx, or Skype. The educator you are working with may have a preference on technology, so defer to them. Benefits of this include schedule flexibility for both the classroom and facilitator and elimination of travel time. Keep in mind the following elements when transitioning this lesson to a virtual format:

• Start off with a clear personal introduction—share with the students where you are (generally) geographically and some detail about your job and career journey. This will help develop a personal and engaging connection with the classroom. Consider teaching the class with a colleague as well!

• Make sure the video/sound is working well up-front!

• Share the printable handouts with the teacher in advance, as they will need to print and distribute on your behalf. Discuss with the teacher in advance what you will need and the timing on when to distribute the materials

• Edit Activity 2—Since you will not be demonstrating a drone in person, use the YouTube video of a drone in action and share it with the class. You can continue from there with the questions listed in the curriculum

• Don’t be afraid to engage with the students by asking questions as you talk through the material and show videos! This will be key to keeping them engaged and interested

Lesson outline

Introduction: (1 minute)

• Greet the students and introduce yourselves. Explain that you’re from [Company]. [Insert quick sentence or two about the Company]. Explain that you’re here to talk with them about some of the incredible emerging technologies that are changing our lives

• Let them know that today we’re going to focus on the exciting world of drones

Activity 1: “What do we know?” (3 minutes, Large group activity)

• Overview: Before telling the students what drones are, get them thinking and talking right away. Engage them in conversation and explore what they currently know about drones

  - Tell the students that you want to start by hearing from them. “What do we know about drones? What are drones?”

  - They may be reluctant to offer thoughts. Tell them that it can be anything. It could be things like, “They fly!” “You use a remote control.” “I’ve seen one in person.” “They deliver pizzas!” “They’re really cool!”

  - After each suggestion from a student, simply say, “Thank you!” Don’t affirm or disapprove of any suggestion so as not to increase students’ concerns about being wrong or about making a contribution to the conversation
Activity 2: “What are drones?” (10 minutes, large group activity)

- Overview: Now that they have shared what they know, get them excited by showing them a real drone, and use the handout to fill in the gaps and expand their understanding of what a drone is.
  - Ask the students if they’d like to see a drone in action. Unveil the drone on the tabletop at the front of the room and rev up the rotors. Ask them to do a 5-4-3-2-1 countdown and launch the drone. Execute a few of the preset maneuvers to get them excited, then land the drone back on the tabletop.
  - Pass out the “Drones” visual handout and walk through it with the students. Quickly cover:
    - Definition of a drone.
    - Uses of drones.
  - As you go over the handout, be sure to point out thoughts that the students already covered, which will help them feel heard and validated.
  - To get them further excited, have the teacher show a brief example video from YouTube on various types of drones in action. Sharing these types of videos with students is key to helping them form a concrete, real-world understanding of what these technologies are and can do.

On showing videos in class:

Video policies vary from school to school. Check with the teacher ahead of time to make sure showing videos and using a channel such as YouTube are allowed at their school. Have the teacher preview and approve the videos ahead of time. Then have the teacher queue up the video and play it on their equipment (rather than you showing it).

Also be mindful of ads and popups. Encourage the teacher to mute and block the video during any ads and turn off any popup ads as soon as they emerge or use a popup blocker.

YouTube example video:

- “The Drone Revolution is Here!”
  - Video talking points:
    - FAA—Anticipates 30,000 drones in next few years (video was published in 2015)
    - Many uses:
      - Pizza delivery, Amazon package delivery.
      - The goosebuster drone—Dissipating geese on Ottawa beaches.
      - Home improvement drones—Inspecting roofs for damage, improving safety.
      - Farm drones—Surveying, crop-dusting, irrigation, can by automated to fly in coordinated swarms.
Drones

What are drones?
Drones are devices loaded with sensors that fly or move with no human onboard. They can be controlled by a person with a remote or by computers. They help us expand our reach and view of the world around us.

What are drones used for?
Drones can operate in the air, on land, or in water. They can be tiny or huge and serve lots of different purposes:

- Explore hard to reach or dangerous areas such as disaster zones
- Capture video for movies and shows
- Deliver packages like food or medicine
- Carry out security surveillance
- Inspect buildings or powerlines
- Track wildfires
- Monitor farm animals

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Activity 3: “Designing a drone”—Team design challenge (19 minutes, small group activity)

• Overview: Have the students work to design an innovative drone to help solve a local, national or global problem.
  - Work with the teacher to put the students into groups of 4-5. Then, read the challenge out loud to them.
  - Remind the students that, as we saw before, drones help us solve many different types of problems. Tell the students that it’s now time to put their innovative thinking and drawing skills to the test. Tell them that their challenge is to work in small teams to quickly design a drone to help solve a problem
  - Tell them that the capabilities and anatomy of their drone will need to match the tasks it’s designed to carry out. Briefly use a car as an example. A race car that is meant to drive really fast will be designed differently from a vehicle meant to pull heavy trailers or a vehicle designed to tote a family of six around the country. Tell them to consider the purpose of their drone, and then create a design that serves that purpose well
  - Let them know that they will have only 15 minutes to design their drones and develop their presentations
  - Pass out the “Designing a Drone” handout (see below) as well as sheets of paper (or space on their whiteboard) and markers for them to create their presentations. Then have them get to work!

Activity 4: “Innovation presentations” (10 minutes, large group activity)

• Overview: Have the students share their ideas for using drones to help solve problems
  - Have the teams quickly deliver their presentations
  - After each presentation, quickly highlight particularly innovative thinking and problem solving
  - Tell them that their designs are creative and worthy of being made a reality
Wrap up and supplemental activity (2 minutes)

• Point out that innovative companies are working with clients to **combine drone technology with other emerging technologies** (the rest of the Essential Eight—Virtual Reality, Augmented Reality, AI, Blockchain, Robotics, The Internet of Things, 3D Printing) to **solve big problems around the world**. This is called **convergence** when you’re using more than one of these technologies together to solve a problem.

• Remind the students that **drones are already a part of their lives**. When they are watching shows or movies, encourage them to guess whether the camera was mounted on a drone for particular shots. Tell them to watch the skies for drones that maybe carrying out surveillance or delivering packages. Encourage them to **check out more videos** of drones and the amazing things they can do and to consider whether they have any **further ideas** for ways to use drones in their lives or to **solve more problems**. Remind them that the world of drones is only getting bigger, and it will **need clever designers and pilots like them**

• Also encourage them to **share at least two things** they learned or figured out today about drones with friends or family

• **Thank the students** for contributing and working with you to explore the exciting world of drones. Tell them that you’re impressed by their ideas, their creative problem solving, and their teamwork

• If you have extra time, you can **have students test fly the drone**. You can even set up an obstacle course for them to navigate or ask them to try to land the drone in a particular spot
Designing a drone

Team design challenge

Your team’s challenge:

1. Think about how you might use a drone in Healthcare, Fire and Rescue, or the Food industry (choose one)

2. Identify a problem within that industry that you think an innovative drone could help solve. This problem could be in your community or school, or it could be somewhere else in the world.

3. Work together to design a drone that can help solve that problem. Remember that drones can work in the air, on land, or in water.

4. Create a presentation to share your innovative drone idea. Be sure to include the following:
   - Tell us what problem your drone will help solve.
   - Create a drawing of your drone with labels to describe the different parts and capabilities. Try drawing multiple images to show your drone in action!
   - Tell us who your drone will benefit. Whose life will it make better?

5. You will have only 2 minutes to give your presentation, so be brief!
Thank you