ADVANCED: AIRPORT OPERATIONS

DESCRIPTION OF SESSION

In this session, participants will direct air traffic in a web-based simulator and design their own airport runway configuration.

CATEGORY

- Exploring, Aviation
- US DOE, Transportation
- US DOE, STEM

OBJECTIVES

By the end of this session, participants will be able to:

- Practice the work of air traffic controllers.
- Design an airport runway configuration.
- Define a victor airway.

SUPPLIES

- **Activity 1**—iOS or Android devices or computer with internet access
- **Activity 2**—sidewalk chalk or duct tape; windsock; compass; map of the area (hand-drawn is fine), walkie-talkie, and compass (one per participant)
- **Activity 3**—traffic cones; Low Altitude Enroute Chart

ADVISOR NOTE

As you engage your post in activities each week, please include comments, discussions, and feedback to the group relating to **Character, Leadership,** and **Ethics**. These are important attributes that make a difference in the success of youth in the workplace and in life.

ACTIVITIES

Activity 1

Air Traffic Controller Simulator

NASA has developed an air traffic controller game called Sector 33 that's available for iOS and Android devices. In this game, players see radar returns of airplanes and can control the planes within specific parameters. The game starts with two planes and gets more complicated as players progress. It can be downloaded from http://www.nasa.gov/centers/ames/Sector33/iOS/index.html. Support files and lesson plans are available at http://smartskies.nasa.gov/lineup/index.html.

Before participants play Sector 33, review D = RT and discuss different scenarios. If participants want both planes to reach their points within a target time, solve for T to get D/R = D/R. On the screen, distance is marked, rate is variable, and time is a goal (i.e., the player has to get the two planes to the goal within a specific, maximum amount of time). Sometimes there is weather (lightning) preventing participants from sending a plane on a certain path. This is not a guessing game; it's a thinking game and an excellent way for Explorers to understand what an air traffic controller does.

If participants don't have access to iOS or Android devices but do have access to a computer with internet access, have them go to ATC-SIM (http://www.atc-sim.com/) and try their hand at being an

air traffic controller. ATC-SIM gives excellent insight into what air traffic controllers do to route arriving and departing aircraft both safely and accurately.

Activity 2
Make Your Own Airport
A nondigital activity that gives participants a flavor of airport operations and communication is to simulate an airport with airplanes navigating toward it. Set up an "airport" by using sidewalk chalk or duct tape to mark runways. Decide what direction the prevailing winds come from and align the "runway" accordingly. Set out a wind sock and label the runways using a compass. (If there is enough time, have the participants help you set it up to reinforce information about prevailing winds, runway numbering, and reading a compass.)

Give each participant a map of the area (hand-drawn is fine), a walkie-talkie, a compass, a call sign, and a starting point somewhere out of sight of the "airport." With the Advisor acting as the air traffic controller, have two or three "airplanes" at a time navigate to the "airport" using compass directions. Allow the "planes" to hover at any intersection, waiting for the next instruction, rather than flying in whatever direction they choose. This will slow things down. Once the "airplanes" find the airport, decide which runway is active based on wind direction. Have them fly the pattern and "land" their plane on the appropriate runway.

This activity can be done on sidewalks, through buildings, and up or down stairs (increasing or decreasing altitude), etc. You might also be able to use smartphones instead of compasses (download a compass app), and might be able to have some sort of public walkie-talkie system using phones instead of actual walkie-talkies.

After all the "planes" have landed, initiate a discussion using the following questions:
- *What was difficult about this activity?*
- *If the controller told you to "make a right turn to 270," what would that mean for you right now?* (Everyone should end up facing the same direction, regardless of where they were standing. Some would turn more than others, depending on their starting direction.)
- *What was unrealistic about this activity?* (Planes don't hover, so you have to give the controller some lead time when making requests. Also, the pace was slower than in real life.)
- *What do you think would happen if there was no space available for building a runway that faces the right direction for the prevailing winds? Do you think there are airports like that in the world?* (Yes, there are. It means that often pilots are faced with a crosswind on takeoff or landing. Depending on how strong the winds are, some planes might not be able to land or take off on certain days.)

Activity 3
Victor Airways
Victor airways are low-altitude airways that run from one VOR station to the next. Using these airways helps air traffic controllers coordinate airplane traffic.

In a large hangar, schoolyard, or gymnasium, place traffic cones to represent VOR stations. Create and hand out a generic paper map of the VORs. The Advisor acts as the air traffic controller and helps the aircraft navigate to a specific place.

A helpful display is a Low Altitude Enroute Chart to show participants what victor airways look like for pilots. These are available online at https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/ifr/. While looking at the chart and pointing from one airport to another, ask: *How would you get from here to here, using the airways?* They don't need to name the airways if it's too hard to see on the screen. Simply tracing a route will help participants understand that pilots often don't fly directly in a straight line to a destination. This is particularly true for IFR operations.

ADVISOR NOTE

Some sample questions are below. They are designed to help the participants apply what they have learned to their own interests. You are welcome to use these questions or develop your own questions that relate to your post or specific focus area.

REFLECTION

- *What is one new thing you learned during today's discussion?*
- *Based on what you saw and heard today, describe what you would do in this situation: You have an aircraft on the runway that just landed. The pilot did not listen to your directions and missed his turnoff. You have another aircraft on final passing over the numbers and a third aircraft entering the pattern crosswind. The traffic is a little too close for comfort. Create a plan to execute quickly so that all involved have a safe flight.*
- *What kinds of skills or characteristics do you believe an air traffic controller needs to possess in order to be successful?*
- *What can you do now, during your time as a student, to prepare yourself for this or a similar career in the aviation field?*

ADVISOR AND OFFICER REVIEW

After the meeting, address the following:

- Identify what was successful about the meeting.
- Identify what needed improvement.
- Schedule an officer and Advisor planning meeting to prepare for the next post meeting or activity.

Content for this session provided by Youth Aviation Adventure (http://www.youthaviationadventure.org/yaa/).