STEM CAREER ADVENTURES

Aeronautical Engineer: Drones for Organ Transport

Adventure Description:

In this adventure, students will think like an aeronautical engineer and design drones to transport organs ready for donation.

Activity

Step One: Background Information on Aeronautical Engineers, Drones, and Organ Transport (5 minutes)

- Ask students if they know what an organ donor is, and if they know someone who is an organ donor.
- Explain to students that organ donors are people who sign up to donate organs if they pass away. These people decide to be an organ donor when they get their driver's license. Explain to students that people sign up to be organ donors to help people.
- Explain to students that organ donation has a few steps. Show Handout: Donating an Organ. Discuss how organs are tested for blood type before they are sent to the location of a recipient. If the blood types match, the organ is transported, typically by car or helicopter, to the location of the recipient. Then, the organ is surgically transplanted into the recipient, often saving their life.
- Tell students that organ donation is a timed process, because organs can only live for so long outside of the human body. For example, lungs can only live for 4-6 hours outside of the body. The organs need blood flow to survive, so it is important to get the organ to a recipient as quickly as possible.
- Because of the urgency of this situation, doctors and surgeons are always looking for new ways to transport donor organs quickly. As a result, they have discussed new methods for transporting organs with aeronautical engineers. Aeronautical engineers are responsible for designing aircraft technology to solve problems.
- One speedy method that aeronautical engineers have considered are drones. Drones are aircraft that don't require a pilot. They don't require a pilot because they have a computer that helps them fly. Show Handout: Drones. If aeronautical engineers used a drone to transport organs, they could plug GPS coordinates into the computer and the drone could fly itself to the new location. Aeronautical engineers want to attach a cooler to the drone that will keep the organ cold and safe during transport to the recipient's location.
- Explain to students that they will think like an aeronautical engineer and design a drone to transport donor organs to new recipients quickly.

Step Two: Building a Drone (7-10 minutes)

- Explain to students that they will now build a drone that can be used to transport organs to a new location.
- Divide students into pairs or small groups.
- Provide students with Handout: Organ Transport Drone. Walk through the steps and requirements on the handout.

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- Provide students with the following materials:
  - Building materials (cardboard, plastic containers, nuts and bolts)
  - Tape and scissors
  - Small length of rope or twine (to attach cooler to drone)
- Have students complete Step 1 on their handout.
- Teacher Note: This step should only take 7-10 minutes. Students should work quickly to build the drone so that they can focus on designing their coolers to keep the water balloon organ safe during testing.

Step Three: Designing a Cooler (15 minutes)

- Explain to students that they will now build a cooler that will protect donor organs during transport.
- Provide students with the following materials:
  - Art supplies and building materials (cardboard, plastic containers)
  - Padding materials like styrofoam, foam peanuts, newspaper
- Have students complete Step 2 on the handout and build their cooler.

Step Four: Testing Cooler (15-20 minutes)

- Explain to students that they will now test their drone and cooler to make sure that the cooler keeps the organs safe.
- Read through Step 3 on the handout together as a class. Explain to students that they will perform tests to see if their water balloon stays safe inside the cooler they have designed!
- Teacher note: The rain test is best performed outside. If you do not have access to an outdoor location, have students skip stage 3 of testing.
- After testing, have students share their cooler design with the rest of the class. Ask students to explain the features of the cooler that they think helped keep the water balloon safe. For groups whose water balloon popped, ask them what they would do differently if they designed their coolers again.

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Materials List

Provided online:

- Handout: Donating an Organ
- Handout: Drones
- Handout: Organ Transport Drone

Not provided (Each group needs):

- Masking tape
- Ruler or meter stick
- Step stool
- Timer
- Art supplies and building materials
- Materials for padding (foam peanuts, styrofoam, newspaper)
- Small length of rope or twine
- Water Balloon

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