SCIENCE CAREER ADVENTURES

CIA Agent: Understanding Digital Signals

NGSS Standard: 4-PS4-3

Adventure Description:

In this adventure, you will think like a CIA agent and compare two codes to see which is better to transmit top-secret information.

Activity

Step 1: Background Information on Codes (10-15 minutes)

- Show Video: Using Codes.
- As a class, discuss how codes are patterns that mean something. For example, if you have every had a secret language you invented to talk to a friend, that is a code! People use codes to keep messages private.
- Next, show Handout: Example of Message Using Morse Code. Explain to students that this handout has a message on it. Ask students if they know what the message says. Explain to students that they didn't understand the message because it was written in Morse Code and they probably don't have the key that says what each symbol means. Explain that the message says, "Meet by the monkey bars at recess so we can play a game." Morse Code uses patterns of dots and dashes to represent the alphabet and numbers.
- Explain to students that the CIA stands for the Central Intelligence Agency. The CIA is an organization that is in charge of providing information to the president and other government officials. The information is usually about topics related to the safety of the United States.
- Ask students why they think the CIA would use codes to transmit information. Explain that the CIA gives very secretive information to the President. To make sure no one else sees it, the CIA uses codes!
- Extra Time? Go to https://morsecode.scphillips.com/translator.html and type a message for your class. Press "translate." Then, press "play" and play the message for the class. Ask the class if they understood the message. Explain to students that they didn't understand the message because it was written in Morse Code.

Step 2: Activity Set Up (5 minutes)

- Explain to students that they will pretend they are a CIA agent who is giving important information to the President. They will use two different codes and test which one is better to give top-secret information.
- Show Handout: Steps to Create Codes. As a class, read through the steps.
- Next, provide students with Handout: Morse Code Key.
- Divide students into pairs.

Step 3: Practicing and Learning Codes (15 minutes)

- Have students complete the steps on the handout.
  - iPhone = .. .—. .... --- -. .
  - Dessert = -.. . ...-. -
- As students are working, ask the following:
  - When is it a good idea to use Morse Code instead of a secret code? (when you want anyone who hears the message to figure it our, like if you are in trouble and want to send an SOS signal).
  - When is it a good idea to use a secret code? (when you only want people that you gave the key to to understand your message).
- If students finish early, have them swap codes with another group.

Step 4: Class Discussion (5 minutes)

- Have groups volunteer to explain which code they preferred using to transmit their top-secret information.
- Discuss pros and cons to using codes like Morse Code, that many people will know, vs. using a secret code that no one else will understand.
  - Example pros for Morse Code: even if people don't know it, they can look it up online
  - Example cons for Morse code: people can read your message even if you don't want them to
  - Example pros for secret code: you get to decide who you will give the key to so they can read your message. If somebody else figures out your code, you can change it very easily.
  - Example cons for secret code: if the person you are sending the message to loses the key, the message won't make any sense
- Ask students what changes they would make in the future to their secret code after learning about other students' codes.

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Materials List

Provided online:

- Video: Understanding Digital Signals
- Handout: Example of Message Using Morse Code
- Handout: Steps to Create Codes
- Handout: Morse Code Key

Not provided (each pair of students needs):

- N/A