[TEACHER COPY]

LADY LIBERTY LAB

Scenario:

Grab your hats and gloves because in case you haven't noticed, there has been a major shift in climate over a majority of the United States. In fact, the entire state of New York is now covered by a giant ice sheet, part of which climate scientists are now referring to as the Liberty glacier. CReSIS scientists believe the Statue of Liberty is buried under the Liberty glacier and are asking you to use your remote sensing skills to build a radar and then map the topography of the bedrock underneath the glacier to detect the position of the Statue of Liberty.

Problem: Is the Statue of Liberty located underneath Liberty glacier?

Procedure:

BUILDING THE RADAR

[During this section the students are acting like electrical engineers. Nametags for positions can be passed out during selection.]

1. Select 10 – 15 students to form the bedrock. Students will form a single line across the front of the classroom.
   [Explain what is meant by "bedrock" by either drawing diagram on the board or using this illustration.]
2. Select one student to be the Transmitter and another to be the Receiver.
3. The remaining students will be part of the data recording system.
   [Have students write the names of the students representing the bedrock down on the data table.]

DATA COLLECTION FLIGHT

4. Using a predetermined flight path of left to right, the airplane will fly over the Liberty glacier collecting data at regular intervals.
5. An electromagnetic wave will be sent out from the Transmitter. (Throw the tennis ball towards the first student in the bedrock line and say "Signal Out.")
6. The electromagnetic wave will hit the bedrock and send back a signal to the Receiver. (Throw the tennis ball to the Receiver and the Receiver say "Signal Received." Then pass the ball back to the Transmitter.)
   [Students may hold the ball anywhere from 1 to 20 seconds.]
7. The data recording system records the amount of time it took the signal to hit the bedrock and return to the Receiver.
   [You will need to pace the Transmitter and Receiver so the data recorders can keep up. It might be a good time to talk about Ambiguity Scenarios. Example: Where the pulse intervals are set too close together and your radar didn't have time to receive the first signal before you send out the next one.]
8. The airplane keeps flying and the radar keeps sending out signals until the airplane reaches the end of the flight pattern.

DATA PROCESSING

9. Using the computer (your brain and the graph paper given to you), process the data collected during the flight.
   [Explain where the top of the ice would be in the graph.]
10. Now use your own really cool remote sensors (your eyes!) to see the topography of the bedrock.
    [Here is where the students get to act like geologists and glaciologists: have them interpret what they see. In some classes you might see a spike in the graph, which may be the Statue of Liberty. In others you may have a smooth line indicating that the glacier flattened the Statue of Liberty. Have students explain their interpretation of the data.]