

# CSI: Chesapeake Bay

## Polygraph + Forensics = solve the crime

*A rare great Chesapeake flamingo has been found dead in a parking lot in a Maryland State park. Next to the bird sits a small plastic bottle, on its side, with a tiny bit of liquid still in it, and one rubber boot, half full of water. A set of skid marks lead out to the the road.*

*A witness found nearby claims to have seen the whole thing, but it turns out that the witness has been in prison before, for dealing in rare birds – and becomes the prime suspect. You must question the witness, and use the evidence to determine how the crime happened, to get a conviction.*

*You are now a crime scene investigator...*

### Polygraph

- Equipment:
  - EKG sensor
  - Blood pressure sensor
  - Respiration monitor
- Experiment:
  - measure signals from sensors while questioning witness
  - compare results from control questions (answer known) to actual questions (answer unknown)
  - correlate signals from all sensors, determine fluctuations, confidence levels
- Discussion questions:
  - How does an EKG work? A blood pressure monitor? A respiration monitor?
  - How would a person cheat on the test, based on the results of the first question?
  - What further tests would help determine if a person is lying?

### Forensics

- Equipment:
  - Force sensor
  - Salinity probe
  - Spectrometer

- Temperature probe
- Experiments:
  - Evidence at scene is skid marks of length  $X$ . Based on equations (provided) of friction energy = kinetic energy, how fast was the vehicle traveling? Students will measure sliding friction force of vehicle, and multiply force  $\times$  distance to get energy.
  - Evidence at scene includes boot full of salty water. Students will measure salinity of this water, compare to map of Chesapeake (or other appropriate body of water) and determine possible source locations of evidence.
  - Evidence includes the body of the flamingo, found at specific temperature. Students will measure temperature decay of simulated animal to determine time of death.
  - Evidence includes sample of liquid contaminant (poison?). Students will measure absorption spectrum of sample and compare to known absorption profiles (provided) to determine composition of contaminant.
- Discussion questions:
  - How could any of this evidence have been tampered with?
  - What if the animal were heated before it was dumped? Cooled?
  - What if the water was mixed with some other liquid?
  - What if the vehicle was heavier than we thought?