

Super Sleuths

1. **DESCRIPTION**: Given a mystery scenario, evidence, and a list of possible suspects, teams will be expected to perform a series of tests to draw specific conclusions about the scenario and suspects. The test results along with other evidence will be used to solve the mystery of the scenario.
2. **ESSENTIAL STANDARDS ALIGNMENT**: 3.P.2, 4.P.2, Science as Inquiry
3. **TEAM OF UP TO**: 2
4. **MAXIMUM TIME**: 60 min.
5. **TEAMS**: Teams may bring only specified items and goggles. No other items are allowed. The event supervisors will check the kits, and confiscate non-allowed items. **Students not bringing these items will be at a disadvantage.**
 - a. Spot plates, cups, or any containers in which teams can perform the tests
 - b. Droppers, popsicle sticks, spatulas, plastic spoons, tongs, and/or forceps for handling materials
 - c. pH test strips or paper
 - d. A ruler
 - e. A wash bottle or dropper bottle of distilled water (don't use tap water for this)
 - f. Hand lenses
 - g. Paper towels
 - h. A disposable cup for solid waste
 - i. Writing instruments
 - j. Safety gear – see rule #7.
 - k. Teams may bring one 8.5” x 11” two-sided page of notes containing information in any form from any source.
6. **EVENT LEADERS**: Event leaders will provide evidence at a central location or pre-organized bags or packets of evidence for each team along with the following:
 - a. Iodine reagent (KI solution) Note: ***Be sure to check with parents about Iodine allergies before assigning students to this event.***
 - b. Vinegar
 - c. Isopropyl (rubbing) alcohol
 - d. A waste containerThe event leader may provide additional equipment such as microscopes or special demos as the test calls for; instructions on additional equipment will be given if deemed necessary. Flame tests are not permitted.
7. **SAFETY REQUIREMENTS**:

Students must wear the following or they cannot participate:

 - a. Closed-toed shoes
 - b. Safety goggles (indirect vent goggles)
 - c. Long hair must be tied back
 - d. Optional: aprons, gloves, and lab coatsStudents who unsafely remove their safety goggles or are observed handling any of the material or equipment in a hazardous/unsafe manner (e.g., tasting or touching chemicals or flushing solids down a drain) will be disqualified from the event.
8. **IMPOUND**: No

9. **THE COMPETITION:** Teams will be given a scenario that introduces a crime, suspects, and sources of evidence. Teams will perform tests on the evidence to identify the perpetrator of the crime, and write up their analysis of the crime.

a. **Crime Scene Chemical Evidence:**

- i. Powders: Teams will be asked to identify no more than 4 of the following powders. There will be no mixtures of powders.

cornstarch	flour
baking powder	non-iodized table salt
baking soda	powdered milk
citric acid	powdered sugar
crystal sugar	Vitamin C (ascorbic acid)

- ii. General Knowledge: Teams will be expected to answer questions about the tests they perform and proper lab procedure. Example questions:
1. If the pH of a substance is 3.5, is it acidic or basic?
 2. What does it mean if a powder turns black in the presence of iodine?
 3. What is the proper method to smell a chemical?

b. **Crime Scene Physical Evidence:**

- i. Paper Chromatography: Students will set up and analyze evidence from paper chromatography (ink pens, juices, markers, etc). Students should understand the basic principle of paper chromatography and be able to make predictions about the crime scene based on chromatographs. The paper chromatographs will be collected with the score sheet. No calculations are expected to be performed. Water chromatography only.
- ii. Fingerprints: Teams will be asked to compare fingerprints found at the scene of the crime to those taken from the suspects. Students will be expected to know these specific fingerprint patterns: loop, whorl, arch. They should also know the difference between latent and patent prints.

c. **Analysis of the Crime:**

Students will answer questions about which pieces of evidence implicate which suspect and why the suspect was chosen as the culprit, and also why the other suspects were not chosen. They will also answer any other crime scene analysis questions posed by the event supervisor.

10. **SCORING:** The team with the highest score wins. Time will not be used for scoring. The score will be composed of the following elements (percentages given are approximate):

- a. Analysis of chemical evidence 50%, analysis of physical evidence 30%, and analysis of the crime 20%.
- b. Tiebreaker: The highest score on the chemical evidence analysis will break ties.
- c. A 10% penalty may be given if the area is not cleaned up as designated.

11. **EVENT RESOURCES:**

See the Event Resources tab on our website at www.sciencenc.com for instructions, videos and more.